National Shellfish Sanitation Program (NSSP)

Guide for the Control of Molluscan Shellfish 2017 Revision

From the U.S. Food and Drug Administration website
http://www.fda.gov/Food/GuidanceRegulation/FederalStateFoodPrograms/ucm2006754.htm

National Shellfish Sanitation Program (NSSP) Guide for the Control of Molluscan Shellfish: 2017 Revision

This document is intended to provide guidance and shall supersede the 2015 NSSP Model Ordinance. It represents the Agency's current thinking on the safe and sanitary control of the growing, processing, and shipping of molluscan shellfish for human consumption. It does not create any rights for or on any persons and does not operate to bind FDA or the public under Federal law. However, through their participation in the National Shellfish Sanitation Program and membership in the Interstate Shellfish Sanitation Conference, States have agreed to enforce the Model Ordinance as the requirements which are minimally necessary for the sanitary control of molluscan shellfish.

U. S. Department of Health and Human Services
Public Health Service
Food and Drug Administration

Interstate Shellfish Sanitation Conference

2017 Revision

From the U.S. Food and Drug Administration website

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Table of Contents

Section I. Purpose & Definitions 1

Purpose 2

Definitions 3

Purpose 3

Definitions 3

Section II. Model Ordinance 11

Chapter I. Shellfish Sanitation Program Requirements for the Authority 12

@.01 Administration 12

@.02 Dealer Certification 13

@.03 Evaluation of Shellfish Sanitation Program Elements 16

Chapter II. Risk Assessment and Risk Management 24

Requirements for the Authority 24

@.01 Outbreaks of Shellfish-Related Illness 24

@.02 Shellfish Related Illnesses Associated with *Vibrio parahaemolyticus (V.p.)* 26

@. 03 Annual Assessment of *Vibrio vulnificus* and *Vibrio parahaemolyticus* Illnesses and Shellfish Production 27

@.04 Presence of Human Pathogens in Shellfish Meats 28

@.05 Presence of Toxic Substances in Shellfish Meats 30

@.06 *Vibrio vulnificus* Control Plan 30

@.07 *Vibrio parahaemolyticus* Control Plan 32

Chapter III. Laboratory 35

Requirements for the Authority 35

@.01 Quality Assurance 35

@.02 Methods 36

Chapter IV. Shellstock Growing Areas 38

Requirements for the Authority 38

@.01 Sanitary Survey 38

@.02 Microbiological Standards 40

@.03 Growing Area Classification 43

@.04 Marine Biotoxin Control 50

@.05 Marinas 53

Chapter V. Shellstock Relaying 55

Requirements for the Authority 55
@.01 General 55
@.02 Contaminant Reduction 55
@.03 Licenses to Relay Shellstock or to Harvest Shellstock for Delivery to a Low Acid Canned Food Processing Facility 56
@.04 Management of Relaying Shellstock or the Harvesting for Delivery to a Low Acid Canned Food Processing Facility Activities 57
Requirement for Harvesters 57
.01 Harvester License Required 57
Chapter VI. Shellfish Aquaculture 58
Requirements for the Authority 58
@ .01 General 58
@ .02 Seed Shellstock 58
@.03 Aquaculture in Federal Waters 58
Requirements for the Harvester/Dealer 59
.01 Exceptions 59
.02 General 59
.03 Seed Production in Water Classified as Prohibited or Unclassified 59
.05 Land Based Aquaculture 60
.06 Polyculture Systems 61
.07 Requirements for the Harvester in Aquaculture in Federal Waters 61
Chapter VII. Wet Storage in Approved and Conditionally Approved Growing Areas 63
Requirements for the Authority 63
@ .01 General 63
Requirements for the Dealer 63
.01 Source of Shellstock 63
.02 General 63
.03 Wet Storage Sites in Natural Bodies of Water (Offshore) 64
.04 Wet Storage in Artificial Bodies of Water (Land-Based) 64
Chapter VIII. Control of Shellfish Harvesting 68
Requirements for the Authority 68
@.01 Control of Shellstock Growing Areas 68

@.02 Shellstock Time to Temperature Controls 74
Requirements for Harvesters 75
.01 General 75
.02 Shellstock Harvesting and Handling 75
Chapter IX. Transportation 78
.01 Conveyances Used to Transport Shellstock to the Original Dealer 78
.02 Conveyances Used to Transport Shellstock from Dealer to Dealer 78
.03 Cargo Protection From Cross Contamination 78
.04 Shipping Temperatures 79
.05 Transportation Records 79
Chapter X. General Requirements for Dealers 80
.01 General HACCP Requirements 80
.02 General Sanitation Requirements 84
.03 Other Model Ordinance Requirements 84
.04 Certification Requirements 85
.05 Shellstock Identification 86
.06 Shucked Shellfish Labeling 88
.07 In-Shell Product or Post-Harvest Processed In-Shell Labeling 89
.08 Shipping Documents and Records 90
Chapter XI. Shucking and Packing 92
Requirements for the Authority 92
@.01 Heat Shock 92
Requirements for Dealers 92
.01 Critical Control Points 92
.02 Sanitation 94
.03 Other Model Ordinance Requirements 99
Chapter XII. Repacking of Shucked Shellfish 103
.01 Critical Control Points 103
.02 Sanitation 103
.03 Other Model Ordinance Requirements 108
Chapter XIII. Shellstock Shipping 111
.01 Critical Control Points 111

.02 Sanitation 112
.03 Other Model Ordinance Requirements 117
Chapter XIV. Reshipping 119
.01 Critical Control Points 120
.02 Sanitation 121
.03 Other Model Ordinance Requirements 124
Chapter XV. Depuration 128
Requirements for the Authority 128
Requirements for the Dealer 128
.01 Critical Control Points 128
.02 Sanitation 129
.03 Other Model Ordinance Requirements 135
Chapter XVI. Processes and Procedures for Pathogen Reduction 143
.01 Processes and Procedures Involving Labeling Claims 143
.02 Processes and Procedures Not Involving Labeling Claims 144
Chapter XVII Shellfish Gardening 145
@ .01 Shellfish Gardening 145
.01 Requirements for the Shellfish Gardener 145
Section III. Public Health Reasons and Explanations 146
Introduction 147
Chapter I. Shellfish Sanitation Program 150
Requirements for the Authority 150
@.01 Administration 150
@.02 Dealer Certification 151
Chapter II. Risk Assessment and Risk Management 153
Requirements for the Authority 153
@.01 Outbreaks of Shellfish-Related Illness 153
@.02 Shellfish Related Illnesses Associated with *Vibrio parahaemolyticus (V.p.)* 153
@.03 Annual Assessment of *Vibrio vulnificus* and *Vibrio parahaemolyticus* Illnesses and Shellfish Production 153
@.04 Presence of Human Pathogens in Shellfish Meats 153
@.05 Presence of Toxic Substances in Shellfish Meats 154
@.06 Vibrio vulnificus Control Plan 154

@.07 Vibrio parahaemolyticus Control Plan 154
Chapter III. Laboratory 155
Requirements for the Authority 155
@.01 Quality Assurance 155
@.02 Methods 155
Chapter IV. Shellstock Growing Areas 156
Requirements for the Authority 156
@.01 Sanitary Survey 156
@.02 Bacteriological Standards 159
@.03 Growing Area Classification 161
@.04 Marine Biotoxin Control 168
@.05 Marinas 171
Chapter V. Shellstock Relaying 173
Requirements for the Authority 173
@.01 General 173
@.02 Contaminant Reduction 173
@.03 Licenses to Relay Shellstock 173
@.04 Management of Relaying Activities 173
Requirements for Harvesters 174
.01 Harvester License Required 174
Chapter VI. Shellfish Aquaculture 175
Chapter VII. Wet Storage in Approved and Conditionally Approved Growing Areas 177
Chapter VIII. Control of Shellfish Harvesting 178
Requirements for the Authority 178
Requirements for Harvesters 179
Chapter IX. Transportation 181
Requirements for the Authority 181
Chapter X. General Requirements for Dealers 183
.01 General HACCP Requirements 183
.02 General Sanitation Requirements 184
.03 Other Model Ordinance Requirements 184
.04 Certification Requirements 184

.05 -.07 Shellstock Identification, Shucked Shellfish Labeling, Shipping Documents and Records 186
.08 Wet Storage in Artificial Bodies of Water 186
Chapters XI., XII., XIII., and XIV. - Shellfish Processing and Handling 188
Requirements for Dealers 188
.01 Critical Control Points 188
.02 Sanitation Requirements 189
.03 Other Model Ordinance Requirements 190
Chapter XV. Depuration 194
Requirements for the Authority 194
@.01 Administration 194
Requirements for the Depuration Processor 195
.01 Critical Control Points 195
.02 Sanitation 196
.03 Other Model Ordinance Requirements 198
Chapter XVI. Background & Performance of Post-Harvest Processing (PHP) Validation/ Verification Protocols 203
Background 203
Validation 203
Verification 205
Section IV. Guidance Documents 207
Chapter I. General 208
.01 Evaluation Standards 208
.02 Procedures for Initiating a New State Program Under the National Shellfish Sanitation Program 208
Chapter II. Growing Areas 210
.01 Total Coliform Standards 210
.02 Guidance for Developing Marine Biotoxin Plans 213
.03. Determining the Size of Closed Area as a Result of Illnesses 219
.04. Determining the Harvesting Periods Associated with Implicated Product for Identifying Shellfish to be Included in the Recall 220
.05 Determining the Scope of Implicated Product for Conducting a Recall 220
.06 Protocol for the Landing of Shellfish from Federal Waters 220
.07 Sanitary Survey and the Classification of Growing Waters 225
.08 Action Levels, Tolerances and Guidance Levels for Poisonous or Deleterious Substances in Seafood 237

.09 Management Plans for Growing Areas in the Conditional Classification 239

.10 Shellstock Relay 246

.11 Systematic Random Sampling Monitoring Strategy 251

.12 Growing Area Patrol and Enforcement 257

.13 Control of Shellfish Harvesting 261

.14 Approved NSSP Laboratory Tests 263

.15 Evaluation of Laboratories by State Shellfish Laboratory Evaluation Officers Including Laboratory Evaluation Checklists 270

.16 Protocol for Reviewing Classification of Areas Implicated by Pathogens in Shellfish Meat Samples 276

.17 Calculating the Ninetieth (90^{th}) Percentile for End-Product Depurated Shellfish 277

.18 Decision Tree - Shellfish from Non-MOU Countries 280

.19 Classification of Shellfish Growing Waters Adjacent to Waste Water Treatment Plants 281

.20 Quantitative Analytical Method Verification 319

Chapter III. Harvesting, Handling, Processing, and Distribution 322

.01 Shellfish Industry Equipment Construction Guide 322

.02 Shellfish Plant Inspection Standardization Procedures NSSP Standardized Shellfish Processing Plant Inspection Form 353

.03 Dealer Certification and the Interstate Certified Shellfish Shippers List (ICSSL) 363

.04 Shellstock Tagging 364

.05 Protocol for Addressing Positive Coliform Sample in an Artificial Wet Storage Water Body 371

.06 Guidance for Reinstating a Previously Infected Employee 372

.07 Time and Temperature Controls 374

.08 Icing, Cold Water Dips and Ice Slurries for Cooling Shellstock 387

.09 Irradiation Pre-labeling Guidance 388

Chapter IV. Naturally Occurring Pathogens 391

.01 Vibrio parahaemolyticus (V.p.) Control Plan Guidance 391

.02 Post- Harvest Processing (PHP) Validation/Verification Guidance for *Vibrio vulnificus (V.v.)* and *Vibrio parahaemolyticus (V.p.)* 394

.03 Guidance for Demonstrating the Effectiveness of Time to Temperature Reduction Criteria for *Vibrio vulnificus* and *Vibrio parahaemolyticus* 396

.04 Method for Validation and Verification of a Two (2) or Three (3) Log Reduction of *Vibrio parahaemolyticus* (*V.p.)* in Oysters 397

.05 Template for Submission of Post-Harvest Process Validation Studies 400

.06 Vibrio cholera 403
.07 Production Reporting Guidance 403
Chapter V. Illness Outbreaks and Recall Guidance 404
.01 Guidance for Investigating an Illness Outbreak and Conducting Recall 404
.02 Guidance for a Time-Temperature Evaluation of a Shellfish Implicated Outbreak 411
Section V. Suggested Forms 415
Shellfish Harvest Record 416
Shellfish Harvest/Purchase Record 417
Shellfish Harvest/Purchase Record 418
Shellfish Sales Record 419
Sales Disposition Record 420
Export Health Certificate 421
Section VI. NSSP Policy Setting Documents 423
Department of Health and Human Services - Food and Drug Administration Policy Statement 424
Interstate Shellfish Sanitation Conference Policy Statement 425
Interstate Shellfish Sanitation Conference Resolution 97 - 01 426
Interstate Shellfish Sanitation Conference Resolution 09-001 427
Interstate Shellfish Sanitation Conference Resolution 11-003 429
Section VII. Shellfish Federal Regulations 430
Section VIII. FDA Manual of Interpretations 439
Manual of Interpretations Codification System 440
Interpretation Number: 15-I-@.02-100 442
Interpretation Number: 15-I-@.02-101 444
Interpretation Number: 15-III-@.02-100 446
Interpretation Number: 15-IV-@.02-100 450
Interpretation Number: 15-IV-@.02-101 452
Interpretation Number: 15-IV-@.02-102 456
Interpretation Number: 15-VIII-.03-100 459
Interpretation Number: 15-XI-.01-100 460
Interpretation Number: 15-XI-.02-100 462
Interpretation Number: 15-XI-.02-101 465
Interpretation Number: 15-XV-.03-100 467
Section IX. History of the National Shellfish Sanitation Program 469
Introduction 470

Declaration of Principles 470
National Shellfish Sanitation Program 472
Interstate Shellfish Sanitation Program 475
References 476
List of Previous Editions of Manual of Operations for National Shellfish Sanitation Program – Now Superseded477

Section I. Purpose & Definitions

Purpose

The National Shellfish Sanitation Program (NSSP) is the Federal/State cooperative program recognized by the U. S. Food and Drug Administration (FDA) and the Interstate Shellfish Sanitation Conference (ISSC) for the sanitary control of shellfish produced and sold for human consumption. The purpose of the NSSP is to promote and improve the sanitation of shellfish (oysters, clams, mussels and whole or roe-on scallops) moving in interstate commerce through Federal/State cooperation and uniformity of State shellfish programs.

Participants in the NSSP include agencies from shellfish producing and non-producing States, FDA, EPA, NOAA, and the shellfish industry. Under international agreements with FDA, foreign governments also participate in the NSSP. Other components of the NSSP include program guidelines, State growing area classification and dealer certification programs, and FDA evaluation of State program elements.

In 1984, the FDA entered into a Memorandum of Understanding (MOU) with the Interstate Shellfish Sanitation Conference recognizing the ISSC as the primary voluntary national organization of State shellfish regulatory officials that provide guidance and counsel on matters for the sanitary control of shellfish. The purpose of the ISSC is to provide a formal structure for State regulatory authorities to participate in establishing updated regulatory guidelines and procedures for uniform State application of the Program. The ISSC has adopted formal procedures for State representatives to review shellfish sanitation issues and develop regulatory guidelines. Following FDA concurrence, these guidelines are published in revisions of the NSSP Model Ordinance.

The NSSP Guide for the Control of Molluscan Shellfish consists of a Model Ordinance, supporting guidance documents, recommended forms, and other related materials associated with the Program. The Model Ordinance includes guidelines to ensure that the shellfish produced in States in compliance with the guidelines are safe and sanitary. The Model Ordinance provides readily adoptable standards and administrative practices necessary for the sanitary control of molluscan shellfish.

Definitions

Purpose

This Ordinance establishes the minimum requirements necessary to regulate the interstate commerce of molluscan shellfish and to establish a program to protect the public health of consumers by assuring the sale or distribution of shellfish from safe sources and assuring shellfish have not been adulterated during cultivating, harvesting, processing, shipping, or handling.

Definitions

A. General. The definitions provided below are consistent in intent with the NSSP.

B. Definition of Terms.

(1) **Adequately Iced** means that the amount and application of the ice is sufficient to ensure that immediate cooling begins and continues for all shellfish. If ice slurry is used and the shellfish are submerged the presence of ice in the slurry indicates adequate icing.

(2) **Adverse Pollution Condition** means a state or situation caused by meteorological, hydrological or seasonal events or point source discharges that has historically resulted in elevated fecal coliform levels in a particular growing area. [In States using total coliform standard, insert "total coliform" for "fecal coliform".]

(3) **Air Gap** means the unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing fixture or other device and the flood level rim of that receptacle.

(4) **AOAC** means the Association of Official Analytical Chemists.

(5) **APHA** means the American Public Health Association.

(6) **Approved** means a classification used to identify a growing area where harvest for direct marketing is allowed.

(7) **Approved Limited Use Methods** are permanent methods accepted for use in the NSSP and listed in the NSSP Guide for the Control of Molluscan Shellfish, Guidance Documents Chapter II. Growing Areas .14 Approved NSSP Laboratory Tests. These methods include new methods, alternative methods or screening methods within the NSSP that meet an immediate need of the NSSP, improve turnaround time, cost effectiveness, and/or increase analytical capacity. These methods have been evaluated and the performance characteristics for specific applications in the NSSP have been determined through the Single Laboratory Validation Method Protocol (SLV) to be fit for purpose within the NSSP. These methods are referred to as being of limited use within the NSSP either because of their status as newly adopted methods with little corroborating data beyond the SLV or because the application for which the method can be or is used within the NSSP is limited in scope with little laboratory participation within the NSSP and little to no subsequent corroborating data or because of the nature of the test method itself and/or restrictions that have been placed on its use that limit its usefulness within the NSSP.

(8) **Approved NSSP Methods** are the primary/core methods used in the NSSP and cited in the NSSP Guide for the Control of Molluscan Shellfish, Guidance Documents Chapter II. Growing Areas .14 Approved NSSP Laboratory Tests. These methods have been described

in scientific or other peer-reviewed professional publications; have been used historically or are used throughout the NSSP and elsewhere to effectively detect or quantify and have been extensively evaluated and the performance characteristics for specific applications in the NSSP determined as fit for purpose through long use in the NSSP and/or Single Laboratory Validation (SLV) testing and/or collaborative study.

(9) **Aquaculture** means cultivating shellfish in controlled conditions for human consumption. Cultivation includes propagation and growing of shellfish. These activities may occur in natural or man-made water bodies. These activities include seed collection, production, and cultivation in natural water bodies when shellfish are held off the bottom such as the use of racks, bags, or cages, and when shellfish are held in man-made water bodies such as the use of tanks, ponds, or raceways. These activities do not include depuration or wet storage.

(10) **Authority** means the State or local shellfish control authority or authorities or its designated agents, which are responsible for the enforcement of this Code.

(11) **Assure** means to make best efforts within the reasonable limits of manpower and resources to fulfill the objectives of this Ordinance.

(12) **Backflow** means the flow of water or other liquids, mixtures or substances into the distribution pipes of a potable water supply from any source or sources other than the intended source.

(13) **Back Siphonage** means the flowing back of used, contaminated or polluted water from a plumbing fixture, vessel or other source into potable water supply pipes because of negative pressure in the water supply pipes.

(14) **Blower** means a receptacle for washing shucked shellfish which uses forced air as a means of agitation.

(15) **Broker** means any person who is not a dealer but who arranges the packaging, shipping, sale, or distribution of molluscan shellfish without taking ownership or physical custody of the shellfish.

(16) **Certification or Certify** means the issuance of a numbered certificate to a person for a particular activity or group of activities that indicates:
(a) Permission from the Authority to conduct the activity; and
(b) Compliance with the requirements of this Code.

(17) **Certification Number** means the unique identification number issued by the Authority to each dealer for each location. Each certification number shall consist of a one (1) to five (5) digit Arabic number preceded by the two letter State abbreviation and followed by a two (2) letter abbreviation for the type of activity or activities the dealer is qualified to perform in accordance with this Ordinance using the following terms:
(a) Shellstock shipper (SS);
(b) Shucker-packer (SP);
(c) Repacker (RP);
(d) Reshipper (RS); and
(e) Depuration processor (DP).

(18) **Coliform Group** means all of the aerobic and facultative anaerobic, gram negative, non-spore forming, rod shaped bacilli which ferment lactose broth with gas formation within 48 hours at 95 °Fahrenheit (35 ± 0.5 °Centigrade).

(19) **Commingle or Commingling** means the act of combining different lots of shellfish.

(20) **Compliance Schedule** means a written schedule that provides a correction time period to eliminate Key and Other deficiencies.

(21) **Conditionally Approved** means a classification used to identify a growing area which meets the criteria for the approved classification except under certain conditions described in a

management plan.

(22) **Conditionally Restricted** means a classification used to identify a growing area that meets the criteria for the restricted classification except under certain conditions described in a management plan.

(23) **Container** means any bag, sack, tote, conveyance or other receptacle used for containing shellfish for holding or transporting.

(24) **Corrosion Resistant Materials** means materials that maintain their original surface characteristics under normal exposure to the foods being contacted, normal use of cleaning compounds and bactericidal solutions, and other conditions of use.

(25) **Conveyance** means any type of container used to transport shellfish. The controls of the NSSP are intended to address the container in which the shellfish are being held during transport from landing to final consumer. For the purposes of meeting the NSSP time temperature requirements for conveyances, the containers in which the shellfish are being held must meet the required temperatures. Should shellfish be shipped in a small container within a cargo space, the temperature requirement would apply only to the temperature within the container.

(26) **Critical Control Point (CCP)** means a point, step or procedure in a food process at which control can be applied, and a food safety hazard can as a result be prevented, eliminated or reduced to acceptable levels.

(27) **Critical Deficiency** means a condition or practice which:
(a) Results in the production of a product that is unwholesome; or
(b) Presents a threat to the health or safety of the consumer.

(28) **Critical Limit** means the maximum or minimum value to which a physical, biological, or chemical parameter must be controlled at a critical control point to prevent, eliminate or reduce to an acceptable level the occurrence of the identified food safety hazard.

(29) **Critical Nonconformity** means a deviation of a laboratory requirement which has the highest likelihood of adversely affecting the quality of the analytical results if out of conformance.

(30) **Cross Connection** means an unprotected actual or potential connection between a potable water system and any source or system containing unapproved water or a substance that is not or cannot be approved as safe and potable. Examples are bypass arrangements, jumper connection, removable sections, swivel or change over devices, or other devices through which backflow could occur.

(31) **Cull** means to remove dead or unsafe shellstock from a lot of shellstock.

(32) **Dealer** means a person to whom certification is issued for the activities of shellstock shipper, shucker-packer, repacker, reshipper, or depuration processor.

(33) **Depletion** means the removal, under the direct control of the Authority, of shellstock from a growing area classified as prohibited.

(34) **Depuration** or **Depurate** means the process of reducing the pathogenic organisms that may be present in shellstock by using a controlled aquatic environment as the treatment process.

(35) **Depuration Processor (DP)** means a person who harvests or receives shellstock from growing areas in the approved or conditionally approved, restricted, or conditionally restricted classification and submits such shellstock to an approved depuration process.

(36) **Direct Marketing** means the sale for human consumption of shellfish which:
(a) Does not require depuration or relaying prior to sale; or
(b) Has been subjected to depuration or relaying activities.

(37) **Dry Storage** means the storage of shellstock out of water.

(38) **Easily Cleanable** means a surface which is:
(a) Readily accessible; and
(b) Is made of such materials, has a finish, and is so fabricated that residues may be effectively removed by normal cleaning methods.

(39) **Emergency Use Methods** are methods used to meet an immediate or ongoing critical need for

a method of analysis and no NSSP approved method exists. Emergency Use Methods may be given interim approval by the ISSC Executive Board provided the criteria in Procedure XV. of the ISSC Constitution, Bylaws, and Procedures are provided.

(40) **EPA** means the United States Environmental Protection Agency.

(41) **Facility** means a structure. For other connotations, use person or activity.

(42) **Fecal Coliform** means that portion of the coliform group which will produce gas from lactose in an EC or A-1 multiple tube procedure liquid medium within 24 (± 2) hours in a water bath maintained at 112 °Fahrenheit (44.5 ± 0.2 °Centigrade).

(43) **Federal Waters** means the waters that fall outside of State and local jurisdiction but within U.S. sovereignty (typically 3-200 nautical miles offshore). Federal waters include the territorial sea and exclusive economic zone.

(44) **FDA** means the United States Food and Drug Administration.

(45) **Float Aquaculture** means open water aquaculture where the shellfish product is suspended at the water surface using floats.

(46) **Food Contact Surface** means an equipment surface or utensil which normally comes into direct or indirect contact with shucked shellfish.

(47) **Food Safety Hazard** means any biological, chemical or physical property that may cause a food to be unsafe for human consumption.

(48) **Geometric Mean** means the antilog (base 10) of the arithmetic mean of the sample result logarithm (base 10).

(49) **Growing Area** means any site which supports or could support the propagation of shellstock by natural or artificial means.

(50) **HACCP** is an acronym that stands for Hazard Analysis Critical Control Point, a systematic, science-based approach used in food production as a means to assure food safety. The concept is built upon the seven principles identified by the National Advisory Committee on Microbiological Criteria for Foods (1992).

(51) **HACCP Plan** means a written document that delineates the formal procedures that a dealer follows to implement the HACCP requirements set forth in 21 Code of Federal Regulations (CFR) 123.6 as adopted by the Interstate Shellfish Sanitation Conference.

(52) **Harvest** means the act of removing shellstock from growing areas and its placement on or in a manmade conveyance or other means of transport.

(53) **Harvest Area** means an area that contains commercial quantities of shellstock and may include aquaculture sites and facilities.

(54) **Harvester** means a person who takes shellstock by any means from a growing area.

(55) **Heat Shock** means the process of subjecting shellstock to any form of heat treatment prior to shucking, including steam, hot water or dry heat, to facilitate removal of the meat from the shell without substantially altering the physical or organoleptic characteristics of the shellfish.

(56) **Importer** means any dealer who introduces molluscan shellfish into domestic commerce. An importer has ownership of the shellfish, but need not take physical custody of the shellfish.

(57) **Includes or Including** means includes or including by way of illustration and not by way of limitation.

(58) **In-Shell Product** means non-living, processed shellfish with one or both shells present.

(59) **In-Shell Product Packing** means the process of placing in-shell product into containers for introduction into commerce.

(60) **Inspection Item** means one of the standard criteria listed in the NSSP Plant Inspection Form under which single or multiple observations of specific critical, key or other deficiencies can be debited. [Note: term "item" appears several places in the Ordinance with a larger connotation than this definition. In the section addressing the use of the inspection form, however, the Ordinance uses the term "inspection item" hence that is provided here as

the defined term.]

(61) **Interstate Certified Shellfish Shippers List (ICSSL)** means an FDA publication of shellfish dealers, domestic and foreign, who have been certified by a State or foreign Authority as meeting the public health control measures specified in this Ordinance.

(62) **Interstate Shellfish Sanitation Conference (ISSC)** means the organization which consists of agencies from shellfish producing and receiving States, FDA, the shellfish industry, NOAA, and the EPA. The ISSC provides the formal structure wherein State regulatory authorities, with FDA concurrence, can establish updated guidelines and procedures for sanitary control of the shellfish industry.

(63) **Key Deficiency** means a condition or practice which may result in adulterated, decomposed, misbranded or unwholesome product.

(64) **Key Nonconformity** means a deviation of a laboratory requirement that has a significant potential to adversely affect the quality of the analytical results if out of conformance.

(65) **Label** means any written, printed or graphic matter affixed to or appearing upon any package containing shellfish.

(66) **Landing** means the point at which shellstock is put on land or a dock.

(67) **License** means the document issued by the Authority to a person to harvest or transport shellstock for commercial sale. [In those States issuing permits as opposed to licenses, the term license would be replaced with the term "permit" which would be defined the same as "license".]

(68) **Lot of In-Shell Product** means a single type of container of in-shell product of no more than one day's harvest from a single defined growing area.

(69) **Lot of Shellstock** means a single type of bulk shellstock or containers of shellstock of no more than one day's harvest from a single defined growing area gathered by one (1) or more harvesters. A lot may also be used to segregate the harvest times and intended uses of shellstock for the purposes of complying with time to temperature requirements.

(70) **Lot of Shellstock for Depuration** means shellstock harvested from a particular area during a single day's harvest and delivered to one depuration plant.

(71) **Lot of Shucked Shellfish** means a collection of containers of no more than one day's shucked shellfish product produced under conditions as nearly uniform as possible and designated by a common container code or marking.

(72) **Male-specific Coliphage (MSC)** are a group of bacterial viruses that infect and lyse *E. coli Famp* and produce plaques within 18 ± 2 hours at 35-37 ± 0.5 °Centigrade.

(73) **Marina** means any water area with a structure (docks, basin, floating docks, etc.) which is:

(a) Used for docking or otherwise mooring vessels; and

(b)Constructed to provide temporary or permanent docking space for more than ten (10) boats.

(74) **Marine Biotoxin** means any poisonous compound produced by marine microorganisms and accumulated by shellstock. Examples include toxins produced by *Alexandrium spp.* [*Protogonyaulax* species] and *Karenia brevis*.

(75) **May** means discretionary and is not mandatory or required.

(76) **Milliliter (ml)** means a unit of measurement equal to the 0.001 portion of a liter.

(77) **Monoculture** means the culture of a single bivalve species.

(78) **Most Probable Number (MPN)** means a statistical estimate of the number of bacteria per unit volume and is determined from the number of positive results in a series of fermentation tubes.

(79) **National Shellfish Sanitation Program (NSSP)** means the cooperative State-FDA-Industry program for the sanitary control of shellfish that is adequate to ensure that the shellfish produced in accordance with these guidelines will be safe and sanitary.

(80) **Open Water Aquaculture** means the cultivation of bivalve shellfish in natural shellfish growing areas.

(81) **Other Deficiency** means a condition or practice that is not defined as critical or key and is

not in accordance with the requirements of this Model Ordinance.

(82) **Other Nonconformity** means a deviation of a laboratory requirement which does not normally compromise the quality of the analytical results, but generally serves to enhance the overall operation of the laboratory.

(83) **Person** means any individual, receiver, trustee, guardian, personal representative, fiduciary, or representative of any kind, and any partnership, association, corporation or other entity. Person includes the Federal government, the State, and any other public or private entity.

(84) **Point Source** means any discernible, confined and discrete conveyance including any pipe, ditch, channel, tunnel or conduit that carries pollution.

(85) **Poisonous or Deleterious Substance** means a toxic substance occurring naturally or added to the environment for which a regulatory tolerance limit or action level has been established in shellfish to protect public health.

(86) **Polyculture** means the cultivation of:
(a) Two (2) or more species of shellfish; or
(b) Shellfish with other species in a common environment.

(87) **Post-Harvest Processing** means any process which has been validated using NSSP validation procedures which reduces the levels of pathogenic hazards to below the appropriate FDA action level or in the absence of such a level, below the appropriate level as determined by the ISSC.

(88) **Post-Harvest Processor** means a designation given to a shellfish dealer that has incorporated a post-harvest process.

(89) **Potable Water** means a water supply, which meets the requirements of the Safe Drinking Water Act, as, administered by the EPA, and any applicable state or local requirements.

(90) **Principal Display Panel** means that part of a label that is most likely to be displayed, presented, shown or examined under customary conditions of retail sale.

(91) **Processing** means any activity associated with the handling, shucking, freezing, packing, labeling or storing of shellfish in preparation for distribution. This would include the activities of a shellstock shipper, shucker packer, repacker, reshipper, or depuration processor.

(92) **Process Batch** means a quantity of shellstock used to fill each separate tank or a series of tanks supplied by a single process water system for a specified depuration cycle in a depuration activity.

(93) **Process Water** means the water used in the scheduled depuration process.

(94) **Prohibited** means a classification used to identify a growing area where the harvest of shellstock for any purpose, except depletion, gathering of seed or nursery culture for aquaculture, is not permitted.

(95) **Raw** means shellfish that have not been thermally processed:
(a) to an internal temperature of 145 °Fahrenheit or greater for 15 seconds (or equivalent); or
(b) altering the organoleptic characteristics.

(96) **Receipt of Shellfish** means the Critical Control Point where a shellfish dealer takes possession of shellfish at a location where it will be processed and/or will be shipped to another dealer or retail establishment. At this (location) point the dealer will monitor at receiving Critical Control Points to ensure compliance with Critical Limits. This is also the (location) point at which the dealer will monitor storage and shipping Critical Control Points.

(97) **Relay** means to transfer shellstock from a growing area classified as restricted or conditionally restricted to a growing area classified as approved or conditionally approved for the purpose of reducing pathogens as measured by the coliform indicator group or poisonous or deleterious substances that may be present in the shellstock by using the ambient environment as the treatment process.

(98) **Remote status** means a designation applied to a shellfish growing area that has no human habitation and is not impacted by any actual or potential pollution sources.

(99) **Repacker (RP)** means any person, other than the original certified shucker-packer, who repackages shucked shellfish into other containers.

(100) **Repacking In-Shell Product** means the practice of removing in-shell product from containers and placing it into other containers.

(101) **Repacking Shellstock** means the practice of removing shellstock from containers and placing it into other containers.

(102) **Replicate** is defined as two (2), or more, laboratory analyses conducted from the same sample at the same dilution using the same method.

(103) **Reshipper (RS)** means a person who purchases shellfish from dealers and sells the product without repacking or relabeling to other dealers, wholesalers, or retailers.

(104) **Restricted** means a classification used to identify a growing area where harvesting shall be by special license and the shellstock, following harvest, is subjected to a suitable and effective treatment process through relaying or depuration.

(105) **Restricted Use Shellstock** means shellstock that is harvested from growing areas classified as approved or conditionally approved in the open status and under conditions that do not allow the sale of the shellstock for direct marketing for raw consumption. Restricted use shellstock is identified with a tag indicating that the shellstock is intended for further processing prior to distribution to retail or food service.

(106) **Safe Materials** means articles manufactured from or composed of materials that may not reasonably be expected to, directly or indirectly, become a component of or otherwise adversely affect the characteristics of any food.

(107) **Sanitation Control Record** means records that document the monitoring of sanitation practices and conditions during processing.

(108) **Sanitary Survey** means the written evaluation report of all environmental factors, including actual and potential pollution sources, which have a bearing on the water quality in a shellfish growing area.

(109) **Sanitize** means to adequately treat food contact surfaces by a process that is effective in:
(a) Destroying vegetative cells of microorganisms of public health significance;
(b) Substantially reducing the numbers of other undesirable microorganisms; and
(c) Not adversely affecting the product or its safety for the consumer.

(110) **Seed** means shellstock which is less than market size.

(111) **Shall** means mandatory and required.

(112) **Shellfish** means all species of:
(a) Oysters, clams or mussels, whether:
(i) Shucked or in the shell;
(ii) Raw, including post-harvest processed;
(iii) Frozen or unfrozen;
(iv) Whole or in part; and
(b) Scallops in any form, except when the final product form is the adductor muscle only.

(113) **Shellfish Gardening** is non-commercial shellfish culture for the purposes of enhancing water quality, or enhancing natural stocks and not for sale for consumption.

(114) **Shellstock** means live molluscan shellfish in the shell.

(115) **Shellstock Packing** means the process of placing shellstock into containers for introduction into commerce.

(116) **Shellstock Shipper (SS)** means a dealer who grows, harvests, buys, or repacks and sells shellstock. They are not authorized to shuck shellfish nor to repack shucked shellfish. A shellstock shipper may also buy, repack, and sell in-shell product as well as ship shucked shellfish.

(117) **Should** means recommended but is not required.

(118) **Shucker-Packer (SP)** means a person who shucks and packs shellfish. A shucker-packer may

act as a shellstock shipper or reshipper or may repack shellfish originating from other certified dealers.

(119) **Standardization** means a process in which applicable staffs from the FDA and the Authority conduct evaluations using standard criteria in a uniform manner.

(120) **State Shellfish Standardization Inspector** means a person that has successfully completed the FDA standardization training course (or one deemed acceptable by the FDA and the field evaluation phase of shellfish plant inspection with either an FDA standardization officer or a State standardization officer).

(121) **State Shellfish Standardization Officer** means a person that has successfully completed the FDA standardization training course and the field evaluation phase of shellfish plant inspection with an FDA standardization officer.

(122) **Swing Deficiency** means a deficiency noted on the NSSP Standardized Shellfish Processing Plant Inspection Form which, depending upon the severity and circumstances, can be either a "Critical" or a "Key" deficiency.

(123) **Transaction Record** means the form or forms used to document each purchase or sale of shellfish at the wholesale level and includes shellfish harvest and sales records, ledgers, purchase records, invoices and bills of lading.

(124) **Trip Records** means a form of written documentation that includes the date and time of each lot of shellfish harvested.

(125) **Wastewater Collection System** means a collection system which may comprise of sanitary sewer pipes, or a combination of sanitary sewer pipes and storm water pipes, and pump stations to ensure that disposed wastewater is delivered to the wastewater treatment plant to be treated.

(126) **Wastewater Treatment Plant (WWTP)** means a facility that treats or removes contaminants from sanitary and industrial sewage through a combination of processes to a point where it can be discharged to the environment or reclaimed for other purposes.

(127) **Wastewater Treatment Plant Design Flow** means the flow that the WWTP is designed to discharge over a specified time period (such as hourly, daily, monthly, or annually) and typically expressed as a daily or hourly average with the expectation of meeting permit requirements.

(128) **Wet Storage** means the storage, by a dealer, of shellstock from growing areas in the approved classification or in the open status of the conditionally approved classification in containers or floats in natural bodies of water or in tanks containing natural or synthetic seawater at any permitted land-based activity or facility.

Section II. Model Ordinance

Chapter I. Shellfish Sanitation Program Requirements for the Authority

Additional Guidance: Section IV. Guidance Documents - Chapter I. Section .02

[Note: The Authority must meet the requirements of this section even if the Authority does not formally adopt this section in regulation.]

@.01 Administration

A. Scope. The Authority shall establish a statewide shellfish safety and sanitation program to regulate:
   (1) The classification of shellfish growing areas;
   (2) The harvesting of shellfish;
   (3) Shellfish processing procedures and facilities;
   (4) Product labeling;
   (5) Storage, handling and packing;
   (6) Shellfish shipment in interstate commerce;
   (7) Shellfish dealers; and
   (8) Bivalve aquaculture.

B. State Laws and Regulations. The Authority shall have laws and regulations which provide an adequate legal basis for the safety and sanitary control of all program elements including but not limited to the elements outlined in @.01 A.

C. Records. The Authority shall maintain records to demonstrate the effective administration of a statewide shellfish safety and sanitation program. These records shall be maintained in a central file and made available physically and/or electronically to any interested person upon request, consistent with appropriate State and Federal law.

D. Shared Responsibilities. If more than one agency is involved in the administration of the statewide shellfish safety and sanitation program, memoranda of agreement shall be developed between the agencies to define each agency's responsibilities.

E. Administrative Procedures. The Authority shall have administrative procedures sufficient to:
   (1) Regulate shellfish harvesting, sale, and shipment;
   (2) Ensure that all shellfish shipped in interstate commerce originate from a dealer located within the State from which the shellstock are harvested or landed, unless the Authority has a memorandum of understanding with the Authority in another State to allow dealers from its State to purchase the shellstock;
   (3) Detain, condemn, seize, and embargo shellfish; and
   (4) Assure compliance with Shellfish Plant Inspection Standardization.

F. Epidemiologically Implicated Outbreaks of Shellfish-Related Illness.
   The Authority shall:
   (1) Have a written protocol with the appropriate State agencies responsible for collecting epidemiological information related to reported foodborne illnesses. The protocol shall outline the procedure to ensure that all shellfish related illnesses are reported to the shellfish Authority(s); and
   (2) Have procedures for investigating incidents of shellfish borne disease.

G. Commingling.

(1) Except for any shellfish included in the Authority's commingling plan, the Authority shall not permit the commingling of shellfish.

(2) If the Authority permits shellfish product commingling, the Authority shall develop a commingling management plan. The plan shall:

(a) Minimize the commingling dates of harvest and growing areas;

(b) Define a primary dealer;

(c) Limit the practice of commingling to primary dealers;

(d) Limit commingling to shellfish harvested from specific growing areas within the State as identified by the Authority and purchased directly from harvesters; and

(e) Define how the commingled shellfish will be identified.

Additional Guidance: Section IV Guidance Documents Chapter III. Section.02

@.02 Dealer Certification

A. General

(1) A person requesting certification shall be subject to a comprehensive, onsite inspection and meet the criteria in Section B. or Section C., as appropriate. The plant inspection shall be conducted by the State shellfish standardization inspector, using the appropriate inspection form, within the 120-day period immediately prior to the issuance or renewal of the certification.

(2) Certification shall be given only to persons who meet the established requirements established for certification.

(3) All certifications shall expire annually. The month selected for certification expiration shall be at the discretion of the Authority.

(4) The Authority shall issue only one certification number to a dealer for a location. A person or dealer may obtain more than one certification if each business is:

(a) Maintained as a separate entity; and

(b) Is not found at the same location.

(5) The Authority may permit separate certified dealers to share a facility.

(6) The certification number issued to each dealer by the Authority shall be unique.

(7) Adequate records documenting each dealer's compliance with certification requirements shall be maintained for at least three (3) years. These records shall include:

(a) Inspection reports of dealers;

(b) Notification letters and enforcement actions;

(c) Shellfish sample results and follow-up actions taken;

(d) Records of complaints or inquiries and follow-up actions taken; and

(e) Administrative hearing transcripts and records.

B. Initial Certification.

(1) Initial certification shall be given only to persons who meet the following requirements:

(a) HACCP requirements:

(i) A HACCP plan accepted by the Authority;

(ii) No critical deficiencies;

(iii) Not more than two (2) key deficiencies; and

(iv) Not more than two (2) other deficiencies.

(b) Sanitation and additional Model Ordinance Requirements

(i) No critical deficiencies;

(ii) Not more than two (2) key deficiencies; and
(iii) Not more than three (3) other deficiencies.

(2) The initial certification shall include a compliance schedule to correct any deficiencies not corrected by the dealer during the inspection.

C. Renewal of Certification.

(1) A dealer shall make application for certification renewal annually at the time specified by the Authority. The Authority shall not renew the certification for any dealer until the dealer:

(a) Meets the requirements of Section B. 1. (a) and Section B. 1. (b). The number of deficiencies allowed under Section B. 1. (a) and Section B. 1. (b) shall include carry over deficiencies from an existing compliance schedule approved by the Authority and new deficiencies identified during the certification renewal inspection; and
(b) Agrees to a compliance schedule to address any new deficiencies not corrected by the dealer during the inspection.

D. Revocation or Suspension of Certification.

(1) The Authority shall not allow any dealer whose certification has been suspended or revoked under Section H. to deal in shellfish.

(2) The Authority shall not issue certification to a dealer whose certification has been suspended or revoked to deal in shellfish until the dealer meets the requirements for initial certification.

E. Interstate Certified Shellfish Shippers List (ICSSL).

(1) When the Authority certifies a person to become a dealer, the Authority shall notify the FDA for the purpose of having the dealer listed in the ICSSL. The Authority shall include any permit designation to be included in the ICSSL. The notice shall be in the format of FDA Form 3038.

Designations:

Certification	**Permit**
SP – Shucker Packer	PHP – Post-Harvest Processing
RP – Repacker	AQ – Aquaculture
SS – Shellstock Shipper	WS – Wet Storage
RS – Reshipper	
DP – Depuration	

(2) The Authority shall notify the FDA for the purpose of having the dealer removed from the ICSSL whenever a dealer's certificate or permit is:

(a) Suspended; or
(b) Revoked.

F. Inspections.

(1) After any person is certified, the Authority shall make unannounced inspections of the dealer's facilities:

(a) During periods of activity; and
(b) At the following minimum frequencies:
(i) Within thirty (30) days of beginning activities if the dealer was certified on the basis of a pre-operational inspection;
(ii) At least monthly for dealer facilities certified as depuration processors;
(iii) At least quarterly for dealer's activities certified as shucker-packer or repacker; and
(iv) At least semiannually for other dealer activities.

(2) The Authority shall provide a copy of the completed inspection form to the person in-charge at the dealer's operation at the time of inspection. The inspection form shall contain a listing of deficiencies by area in the operation and inspection item with corresponding citations to this Model

Ordinance.

G. Performance Based Inspection Program (PIP).

(1) A PIP may be instituted by the Authority for any dealer who meets the requirements of this section.

(2) The minimum frequency of inspection under a PIP shall be no less than one (1) inspection per certification period. The recertification inspection may qualify as the required minimum inspection frequency.

(3) To be eligible for a PIP, the dealer shall have demonstrated a history of satisfactory compliance for the previous three-year period. The three-year demonstration shall include:

(a) Full compliance with the minimum inspection frequency shown under Section F.;

(b) Recertification of the dealer by the Authority;

(c) Verification that no critical deficiencies, no more than one (1) key deficiency and no more than two (2) other deficiencies have occurred in any one inspection;

(d) Correction of all identified deficiencies in accordance with the compliance schedule approved by the Authority; and

(e) No repetition of the identified deficiencies.

H. Enforcement.

(1) General.

(a) The Authority shall use any combination of administrative hearings, fines, certification cancellations, temporary suspension of operating licenses, embargoes, product condemnations or product seizures to accomplish the implementation of this Ordinance.

(b) When a dealer has failed to meet the compliance schedule, the Authority shall:

(i) Consider whether it is appropriate to revise the compliance schedule, suspend or revoke the dealer's certification, or seek other administrative remedies; and

(ii) Document why an option was selected.

(2) Actions Triggered by Inspections.

(a) When any inspection detects a critical deficiency:

(i) The deficiency shall be corrected during that inspection; or

(ii) The dealer must cease production affected by the deficiency.

(b) When the dealer fails to comply with (a) above, the Authority shall immediately begin actions to suspend or revoke the dealer's certification.

(c) Product affected by a critical deficiency shall be controlled to prevent contaminated or adulterated product from reaching consumers. When necessary the Authority shall:

(i) Detain or seize any undistributed lots of shellfish that may have been adulterated;

(ii) Initiate a recall of any distributed shellfish; and

(iii) Immediately notify the enforcement officials for FDA and any other Authorities where the product was distributed.

(d) When any inspection detects any key or other deficiencies not already covered in a compliance schedule, the Authority, working with the dealer, shall develop a compliance schedule to correct the new key or other deficiencies.

(e) When any inspection detects four (4) or more new key deficiencies, the Authority shall consider the following options and document the reasons for the selection of a particular option:

(i) Revise the existing compliance schedule;

(ii) Suspend or revoke the dealer's certification; or

(iii) Seek other administrative remedies.

@.03 Evaluation of Shellfish Sanitation Program Elements

A. The goal of shellfish program evaluation shall be to monitor program implementation and work with States to determine where problems may exist and how to address them.

1. Shellfish program evaluation methodologies shall:
   a. Monitor State program implementation;
   b. Assess State program effectiveness; and
   c. Evaluate the validity of the elements of the NSSP Guide for the Control of Molluscan Shellfish.
2. The minimum components of shellfish program evaluation shall include:
   a. A description of the program activity;
   b. A comparison of FDA observations with State observations; and
   c. A measurement of conformity of shellfish program activities with elements of the NSSP Guide for the Control of Molluscan Shellfish.
3. The focus of data collection shall be on measuring conformity of shellfish program activities with elements of the NSSP Guide for the Control of Molluscan Shellfish.
4. The types of data collected shall include the following:
   a. Program records;
   b. Direct observation made by the evaluator; and
   c. Data and information from the Authority or other pertinent sources.

B. Criteria for evaluation of shellfish sanitation program elements shall be as follows:

1. Laboratory
   a. Requirements for evaluation of shellfish laboratories shall include at a minimum:
      i. Records audit of laboratory operations both Quality Systems and Technical methods;
      ii. Direct observation of current laboratory operating conditions; and
      iii. Information collection from the Authority and other pertinent sources concerning laboratory operations.
   b. Laboratory status is determined by the number and types of nonconformities found in the evaluation using NSSP standardized criteria contained in the FDA Shellfish Laboratory Evaluation Checklists found in Section IV Guidance Documents Chapter II. Growing Areas .15 Evaluation of Laboratories by State Shellfish Laboratory Evaluation Officers Including Laboratory Evaluation Checklists.
      i. Quality System Evaluation.
         (a) This checklist includes a conforming and nonconforming status only. All nonconformities must be reconciled prior to scheduling an onsite evaluation of technical methods in NSSP laboratories. As this part of the evaluation specifically refers to the Quality manual and SOPs and other documentation considered the basis for data defensibility, this documentation must be in order prior to further Laboratory Evaluation Officer (LEO) scheduling. The Quality Systems evaluation is performed as a desk audit and is in accordance with the checklist found in Section IV Chapter II.
      ii. Technical Evaluation: Conforms. In order to achieve or maintain conforming status under the NSSP, a laboratory must meet the following laboratory evaluation criteria:
         (a) No critical nonconformities in the microbiological or marine biotoxin component under evaluation have been identified using the appropriate NSSP Shellfish Laboratory Evaluation Checklist; and
         (b) Not more than thirteen (13) key nonconformities in the microbiological

component or six (6) in the marine biotoxin components have been identified using the appropriate NSSP Shellfish Laboratory Evaluation Checklist; and

(c) Not more than eighteen (18) critical, key, and other nonconformities in total in the microbiological component, twelve (12) critical, key and other nonconformities in total for the paralytic shellfish poisoning (PSP) and amnesic shellfish poisoning (ASP) components, or ten (10) critical, key and other nonconformities in total for the neurotoxic shellfish poisoning (NSP) component have been identified using the appropriate NSSP Shellfish Laboratory Evaluation Checklist. This number must not exceed the numerical limits established for either the critical or key criteria; and

(d) No repeat key nonconformities have been identified in the microbiological or marine biotoxin component under evaluation in consecutive evaluations using the appropriate NSSP Shellfish Laboratory Evaluation Checklist.

iii. Technical Evaluation: Provisionally Conforms. In order to be deemed provisionally conforming under the NSSP, a laboratory must meet the following laboratory evaluation criteria:

(a) Not more than three (3) critical nonconformities in the microbiological component, four (4) in the PSP and ASP components, or three (3) in the NSP component have been identified using the appropriate NSSP Shellfish Laboratory Evaluation Checklist; and

(b) Not more than thirteen (13) key nonconformities in the microbiological component or six (6) in the marine biotoxin component have been identified using the appropriate NSSP Shellfish Laboratory Evaluation Checklist; and

(c) Not more than eighteen (18) critical, key and other nonconformities in total in the microbiological component, or twelve (12) critical, key and other nonconformities in total in the PSP and ASP components or ten (10) critical, key and other nonconformities in total in the NSP component have been identified using the appropriate NSSP Shellfish Laboratory Evaluation Checklist. This number must not exceed the numerical limits established for either the critical or key criteria; and

(d) Not more than one (1) repeat key nonconformity has been identified in the microbiological or marine biotoxin component under evaluation in consecutive evaluations using the appropriate NSSP Shellfish Laboratory Checklist.

iv. Technical Evaluation: Nonconformance. When a laboratory exceeds the following criteria, it will be determined to be in nonconformance:

(a) More than three (3) critical nonconformities in the microbiological component or four (4) in the PSP and ASP components, or three (3) in the NSP component have been identified using the appropriate NSSP Shellfish Laboratory Checklist; or

(b) More than thirteen (13) key nonconformities in the microbiological component or six (6) in the marine biotoxin component have been identified using the appropriate NSSP Shellfish Laboratory Evaluation Checklist;

(c) More than eighteen (18) critical, key, and other nonconformities in total in the microbiological component, or more than twelve (12) critical, key and other nonconformities in total in the PSP and ASP components, or more than ten (10) critical, key, and other nonconformities in total in the NSP component have been identified using the appropriate NSSP Shellfish Laboratory Evaluation Checklist; or

(d) One (1) or more repeat critical or two (2) or more repeat key nonconformities

have been identified in consecutive evaluations in either the microbiological or marine biotoxin components using the appropriate NSSP Shellfish Laboratory Evaluation Checklist.

c. Corrective Actions for Conforming Status. A laboratory found to be in conforming status for technical checklists, other than the Quality Systems checklist, has up to ninety (90) days to successfully correct all nonconformities noted in each component evaluated or has an approved action plan in place to deal with the nonconformities noted. After this period, the laboratory's status will be downgraded to nonconforming if any key nonconformities remain to be successfully corrected. As a result, data being generated by the laboratory will no longer be acceptable for use in support of the NSSP for the laboratory component in question.

d. Corrective Actions for Provisionally Conforming Status. A laboratory found to be in provisionally conforming status for technical methods checklists has up to sixty (60) days to successfully correct all nonconformities found in each provisionally conforming component evaluated or has an approved action plan in place to deal with the nonconformities noted. After this period, the laboratory will be assigned the following status for the laboratory component(s) in question:

   i. Conforms if all the critical and key nonconformities have been successfully corrected in each provisionally conforming component evaluated; or

   ii. Nonconforming if any critical or key nonconformities remain to be successfully corrected in each provisionally conforming component evaluated or if the lab is not able to be evaluated because of a nonconforming Quality System. As a result, data being generated by the laboratory will no longer be acceptable for use in support of the NSSP for the laboratory component in question.

e. Nonconformance.

   i. Upon a determination of nonconforming status in any of the technical method components, the laboratory has up to thirty (30) days to demonstrate successful correction of all nonconformities found. After this period, if all critical and key nonconformities have been successfully corrected, the status of the laboratory will be upgraded to conforming for the laboratory component(s) in question. However, if any critical or key nonconformities remain to be successfully corrected, the status of the laboratory for the laboratory component(s) in question will continue to be nonconforming; and as a result, data being generated by the laboratory for this/these laboratory components will continue to be unacceptable for use in support of the NSSP.

   ii. Upon a determination of nonconformance for the Quality Systems component, the laboratory will have to successfully implement a quality system prior to the onsite technical evaluation. Once all nonconformities are reconciled successfully, a technical evaluation for NSSP methods using the appropriate method specific NSSP Shellfish Laboratory Evaluation Checklist will be scheduled with the laboratory.

   iii. When a laboratory is found to be nonconforming in either the technical or quality component or in both components for failure to successfully implement the required corrective action, or for having repeated critical or key nonconformities in consecutive evaluations, the Authority will ensure that an action plan is developed to correct the situation in an acceptable and expeditious manner or discontinue use of the laboratory to support the NSSP.

   iv. For each laboratory component evaluated, the laboratory will be reevaluated either on-site or through a thorough desk audit as determined by the FDA Shellfish LEO and the FDA certified State Shellfish LEO if one is utilized by the State. Only a finding of fully conforming in laboratories whose data has ceased to be acceptable

to the NSSP will restore its acceptability for use in the NSSP for the laboratory components in question.

2. Growing Areas

Requirements for evaluation of the shellfish growing area program element shall include at a minimum:

a. Records audit of sanitary survey;
b. Bacteriological standards;
c. Growing area classification;
d. Marine biotoxin control; and
e. Marinas.

3. Patrol

a. Requirements for evaluation of shellfish growing area patrol elements shall include at a minimum:
   i. Records audit of past patrol activities;
   ii. Direct observation of current patrol activities; and
   iii. Information collection from the Authority and other pertinent sources.

b. Legal Penalties – Chapter VIII. @.01 A. (2) (c) Are there penalties in place to address illegal harvest?

   Compliance Criteria: The patrol element will be deemed in compliance if laws and regulations exist that provide penalties for controlling harvest from harvest restricted areas. **[Critical]**

c. Notification of Harvest Restricted Areas – Chapter VIII. @.01 A. (2) (d)
   Is the industry notified of the boundaries of Harvest Restricted Areas? – Chapter VIII. @.01 A. (3) (b)

   Compliance Criteria: The patrol element will be deemed in compliance with this requirement when the appropriate Authority demonstrates that the industry has been notified of the boundaries. **[Critical]**

d. Comprehensive Listing of Harvest Restricted Areas –
   Does the Patrol Agency have a comprehensive listing of Harvest Restricted areas?

   Compliance Criteria: The patrol element will be deemed in compliance with this requirement when it is determined that the Authority has a comprehensive listing of all Harvest Restricted areas. **[Critical]**

e. Patrol Policy Document – Chapter VIII. @.01 B. (7).
   i. Does the Patrol Agency have a patrol policy document?

      Compliance Criteria: The patrol element will be deemed in compliance with this requirement when the Authority provides a patrol policy document. **[Key]**

   ii. Is the patrol policy document complete?

      Compliance Criteria: The patrol element will be deemed in compliance with this requirement when it is determined that the patrol policy document includes all items in Chapter VIII. @.01 B. (7) listed below. **[Key]**

      (a) Citation of the law providing the legal basis for enforcement authority
      (b) Citation of the laws and regulations, including penalties, which are directly related to effective control of illegal harvest activities;
      (c) The organizational structure of the unit responsible for patrol activities, including:
         (1) Patrol unit(s) name, address, and phone number;
         (2) The roster and chain of command;
         (3) Area assignments that support the frequencies of patrol delineated in B. (2); and
         (4) A listing of specific vessels, vehicles, and equipment that support the

frequencies of patrol delineated in @.01 B. (2);

(d) Summaries of training in shellfish patrol techniques;
(e) The methods used to inform officers of growing area classifications and status, and of any special activities licensed in the area;
(f) A listing of growing areas where patrol is required;
(g) An identification of any patrol problems;
(h) The type and frequency of reporting by patrol personnel;
(i) Copy of agreements with other agencies responsible for shellfish control activities; and
(j) Citations/summons for the past year. If available, this information may include:
    (1) The number of convictions or dismissals;
    (2) Fines in dollar amount;
    (3) Equipment or property confiscations and forfeitures;
    (4) License suspensions or revocations; and
    (5) Jail sentences; and
    (6) Written warnings.

iii. Is the patrol policy document updated annually?
Compliance Criteria: The patrol element will be deemed in compliance with this requirement when the Authority can demonstrate that the patrol policy document is updated every calendar year. **[Key]**

f. Officer Training – Chapter VIII. @.01 B. (6)
Has the Patrol Agency met the NSSP patrol training requirements?
Compliance Criteria: The patrol element will be deemed in compliance with this requirement when the Patrol Agency can demonstrate that all officers have met or are scheduled for the training requirements of Chapter VIII. @.01 B. (6) before assuming their patrol duties **[Key].**

g. Patrol Frequency – Chapter VIII. @.01 B. (2).
i. Has the agency determined risk categories for all harvest restricted areas? – Chapter VIII. @.01 B. (4)?
Compliance Criteria: The patrol element will be deemed in compliance with this requirement when the Authority assigns risk categories for each harvest restricted area and provides a listing of those categories. **[Critical]**

ii. Does a risk management plan exist if required? – Chapter VIII. @.01. B. (3) (c) and (d)
Compliance Criteria: The patrol element will be deemed in compliance with this requirement when the Patrol Authority has conducted a Risk Management Plan for all areas that are not patrolled at the frequency required in Chapter VIII. @.01 B. (2). **[Critical]**

iii. Has the patrol frequency requirement been met in all areas? – Chapter VIII. @.01 B. (3) (b), (c), and (d)
Compliance Criteria: The patrol element will be deemed in compliance as follows:
(a) When the Authority achieved 95-100 percent of required patrols in all harvest restricted areas the program is considered to be in conformance with NSSP patrol frequency requirements.
(b) When the Authority achieved 80 – 94 percent of required patrols in all harvest restricted areas the program is considered to be in nonconformance with NSSP patrol frequency requirements. **[Key]**
(c) When the Authority achieved <80 percent of required patrols in all harvest restricted areas the program is considered to be in major non- conformance with

NSSP patrol frequency requirements. **[Critical]**

h. Memorandum of Understanding/Agreements - Chapter VIII. @.01 B. (5). If enforcement of shellfish regulations is shared with another agency(s), is there a formalized MOU/MOA with the other agency(s)?

Compliance Criteria: The patrol element will be deemed in compliance when the authority has developed a Memorandum of Understanding/Agreement with all Authorities which have delegated patrol responsibilities. **[Key]**

i. The following procedures will be implemented when an FDA evaluation identifies deficiencies with the above patrol evaluation criteria.

i. The overall Patrol Program element will be assigned one (1) of the following designations:

(a) **Conformance:** The program is in compliance with all of the criteria listed above.

(b) **Conformance with Deficiencies**: The program only has minor deficiencies associated with a key compliance item.

(c) **Nonconformance:** The program has:

i. at least one (1) critical deficiency;

ii. two (2) or more key deficiencies; or

iii. a repeat **[Key]** deficiency from the previous evaluation.

(d) **Major Nonconformance:** The program has multiple deficiencies, key or critical, that suggests the program has become ineffective to control harvest in harvest restricted waters.

ii. During the closeout meeting for patrol evaluation, the Shellfish Specialists shall identify any patrol deficiency to the State patrol agency;

iii. Within thirty (30) days of the closeout meeting, the Shellfish Specialist shall provide a written Program Element Evaluation Report (PEER), including supporting documentation, to the State patrol agency;

iv. Within thirty (30) days of receiving the PEER, the State patrol agency shall provide a written response that indicates:

(a) The item(s) was corrected;

(b) A correction plan has been developed with a completion date; or,

(c) The reasons why the State disagrees with FDA's finding(s).

v. Within fifteen (15) days of receipt FDA shall review the State response, and respond to the State;

vi. Any CRITICAL item deficiency shall be corrected within thirty (30) days of acceptance by FDA of the correction plan;

vii. Any KEY item deficiency shall be corrected within one (1) year of acceptance by FDA of the correction plan.

viii. FDA shellfish specialists shall be responsible for monitoring the progress of State action plans.

ix. Patrol Program recommendations addressing improvements not associated with the criteria included in Section I or recommendations addressing improvements beyond the requirements of the Model Ordinance should be submitted to the Authority in correspondence.

4. Plants

Requirements for evaluation of the shellfish plant inspection program elements shall include at a minimum:

a. Records audit of past shellfish processing facility inspections;

b. Direct observation of current shellfish processing facility conditions;

c. Information collection from the Authority and other pertinent sources concerning

shellfish processing facility inspection program.

d. Shellfish sanitation program element criteria shall be used to evaluate consecutive full evaluations (not including follow up). If a violation of the same criteria is repeated, the program element is considered out of compliance. This program element compliance will be based on the following criteria:
   i. All dealers are required to be certified in accordance with the Guide for the Control of Molluscan Shellfish.
   ii. 95% of the certified dealers evaluated must have been inspected by the State at the frequency required by the current Guide for the Control of Molluscan Shellfish.
   iii. Where compliance schedules are required no more than 10% of the certified dealers evaluated will be without such schedules.
   iv. States must demonstrate that they have performed proper follow up for compliance schedules for 90% of dealers evaluated, and if the compliance schedules were not met, that proper administrative action was taken by the State.
   v. All critical deficiencies have been addressed by the State inspector in accordance with the Guide for the Control of Molluscan Shellfish.

e. Plant Evaluation Criteria
   i. Legal Authority – Chapter I @ .01 B.
   The plant sanitation element will be deemed in compliance if administrative laws and regulations exist that provide the administrative authority to implement the Dealer Certification requirements listed in Chapter I @ .01 and @ 02. **[Critical]**
   ii. Initial Certification – Chapter I @ .02 B.
   The Plant Sanitation Element will be deemed in compliance with this requirement when all plants are certified in accordance with criteria listed below:
      (a) HACCP requirements:
         (i) A HACCP plan accepted by the Authority
         (ii) No critical deficiencies;
         (iii) Not more than two (2) key deficiencies;
         (iv) Not more than two (2) other deficiencies.
      (b) Sanitation and additional Model Ordinance Requirements:
         (i) No critical deficiencies;
         (ii) Not more than two (2) key deficiencies;
         (iii) Not more than three (3) other deficiencies.
   iii. Inspection frequency – Chapter I @ .02 F. and G.
   The Plant Sanitation Element will be deemed in compliance with this requirement when one (1) or less plants inspected doesn't meet the required inspection frequency.
   iv. Compliance schedules.
   The Plant Sanitation Element will be deemed in compliance with this requirement when no more than 10% of the certified dealers evaluated are found to be without schedules.
   v. Follow-Up.
   The Plant Sanitation Element will be deemed in compliance with this requirement when the State demonstrates that they have performed proper follow-up for compliance schedules for 90% of dealers evaluated and if the compliance schedules were not met that administrative action was taken.
   vi. Deficiency Follow-up.
   The Plant Sanitation Element will be deemed in compliance with this requirement when the State demonstrates that all critical deficiencies have been addressed.
   vii. In-Field Plant Criteria.
   Certified plants will be evaluated to determine compliance with the criteria listed

below:

(a) Shucker/packers and repackers HACCP requirements:
  (i) A HACCP plan accepted by the Authority;
  (ii) No critical deficiencies; and
  (iii) Not more than four (4) key deficiencies.

(b) Shucker/packers and repackers sanitation and additional Model Ordinance requirements:
  (i) No critical deficiencies; and
  (ii) Not more than four (4) key deficiencies.

(c) Shellstock shippers and reshippers HACCP requirements:
  (i) A HACCP plan accepted by the authority;
  (ii) No critical deficiencies; and
  (iii) Not more than three (3) key deficiencies.

(d) Shellstock shippers and reshippers sanitation and additional Model Ordinance requirements
  (i) No critical deficiencies; and
  (ii) Not more than three (3) key deficiencies.

f. The overall Plant Sanitation Program element will be assigned one (1) of the following conformance designations based on compliance with the criteria listed in Chapter I. @.03 B. 4.:

i. Conformance: The program is in compliance with all of the criteria listed above and all plants evaluated are in compliance with Chapter I. @.03 B. 4. e. vii.

ii. Conformance with Deficiencies:
The program is in compliance with Chapter I. @ .03 B. 4. e. i - vi. and has 25% or less of plants with deficiencies associated with Chapter I. @ .03 B. 4. e. vii.

iii. Nonconformance:
The program is in compliance with Chapter I. @ .03 B. 4. e. i., but, does not meet the criteria in Chapter I. @.03 B. 4. e. ii. or iii. or iv. or v. or vi. or has greater than 25% (but less than 51%) of plants with deficiencies associated with Chapter I. @.03 B. 4. e. vii.

iv. Major Nonconformance:

C. The program has multiple deficiencies. It is non-compliant with Chapter I. @.03 B. 4. e. i., or two (2) or more of Chapter I. @.03 B. 4. e. ii., or iii., or iv., or v., or vi., or 51% or greater of plants with deficiencies associated with Chapter I. @.03 B. 4. e. vii. FDA will follow the current compliance program for communication with the State agencies.

D. All deficiencies observed by FDA while conducting the in-plant inspection portion of the evaluation will be documented and included in the compliance determination outlined in Chapter I. @.03B.4.e.ii.

Chapter II. Risk Assessment and Risk Management

Requirements for the Authority

[Note: The Authority must meet the requirements of this section even if the Authority does not formally adopt this section in regulation.]

Additional Guidance: Section IV. Guidance Documents - Chapter V. Illness Outbreaks and Recall Guidance

@.01 Outbreaks of Shellfish-Related Illness

A. When shellfish are implicated in an illness outbreak involving two (2) or more persons not from the same household (or one (1) or more persons in the case of shellfish toxicity poisoning associated with marine biotoxins), the Authority shall determine whether an epidemiological association exists between the illness and the shellfish consumption by reviewing:
   (1) Each consumer's food history;
   (2) Shellfish handling practices by the consumer and/or retailer;
   (3) Whether the disease has the potential or is known to be transmitted by shellfish; and
   (4) Whether the symptoms and incubation period of the illnesses are consistent with the suspected etiologic agent.

NOTE: For additional guidance refer to the International Association of Milk, Food, and Environmental Sanitarians' *Procedures to Investigate Food Borne Illness*.

B. When the Authority has determined an epidemiological association between an illness outbreak and shellfish consumption, the Authority shall:
   (1) Notify the FDA Shellfish Specialist that a shellfish related outbreak has occurred.
   (2) Conduct an investigation of the illness outbreak within twenty-four (24) hours to determine whether the illness is growing area related or is the result of post-harvest contamination or mishandling.
   (3) Determine whether to initiate a voluntary recall by firms. If a firm(s) is requested by the Authority to recall, the firm will use procedures consistent with the Recall Enforcement Policy, Title 21Code of Federal Regulations (CFR) Part 7. The recall shall include all implicated products.

C. When the investigation outlined in Model Ordinance Chapter II. @.04 B. does not indicate a post-harvest contamination problem, or illegal harvesting from a closed area, the Authority shall:
   (1) Immediately place the implicated portion(s) of the harvest area(s) in the closed status;
   (2) Notify the ISSC and the FDA Shellfish Specialist that a potential health risk is associated with shellfish harvested from the implicated growing area;
   (3) Promptly initiate recall procedures consistent with the Recall Enforcement Policy, Title 21 CFR Part 7. The recall shall include all implicated products.
   (4) Transmit to the ISSC and FDA information identifying the dealers shipping the implicated shellfish.
   (5) The ISSC will notify States and FDA Shellfish Specialists of growing area closures and recalls. In the case of recalls, ISSC will notify States with information identifying dealers shipping the implicated shellfish. Closure and recall notices (not to include

dealers) will be posted on the ISSC website. ISSC will maintain an inventory of closure and recall information.

D. When the investigation outlined in Model Ordinance Chapter II. @.04 B. demonstrates that the illnesses are related to post- harvesting contamination or mishandling, growing area closure is not required. However, the Authority shall:
   (1) Notify the ISSC and the FDA Shellfish Specialist of the problem; and
   (2) Initiate a voluntary recall by firms. If a firm or firms is requested by the Authority to recall, the firm will use procedures consistent with the Recall Enforcement Policy, Title 21 CFR Part 7. The recall shall include all implicated products.
   (3) Transmit to the ISSC and FDA information identifying the dealers shipping the implicated shellfish.
   (4) The ISSC will notify States and FDA Shellfish Specialists of growing area closures and recalls. In the case of recalls, ISSC will notify States with information identifying dealers shipping the implicated shellfish. Closure and recall notices (not to include dealers) will be posted on the ISSC website. ISSC will maintain an inventory of closure and recall information.

E. When the investigation outlined in Model Ordinance Chapter II. @.04 B. cannot be completed within 24 hours, the Authority shall:
   (1) Follow the closure procedure outlined in Chapter II @.01 C.; and if the investigation does not indicate a growing area problem, the area may be immediately reopened and product recall terminated.

F. Upon closing an implicated area for problems other than naturally occurring pathogens and/or biotoxins, the Authority shall review the growing area classification and determine if a growing area classification problem exists. The review shall include at a minimum:
   (1) A review of the growing area classification file records;
   (2) A field review of existing pollution sources;
   (3) A review of actual and potential intermittent pollution sources, such as vessel waste discharge and wastewater discharge from treatment plant collection systems; and
   (4) Examination of water quality subsequent to the illness outbreak.

G. Upon closing an implicated portion(s) of the harvest area(s) for naturally occurring pathogens and/or biotoxins, the Authority:
   (1) Shall follow an existing marine biotoxin contingency plan, if appropriate.
   (2) Shall collect and analyze samples relevant to the investigation, if appropriate.
   (3) Shall keep the area closed until it has been determined that levels of naturally occurring pathogens and/or biotoxins are not a public health concern.
   (4) May limit the closure to specific shellfish species when FDA concurs that the threat of illness is species specific.

H. When the growing area is determined the problem, the Authority shall:
   (1) Place the growing area in the closed status until:
      (a) The Authority verifies that the area is properly classified, using current data, in compliance with the NSSP Model Ordinance; or
      (b) Shellfish from the growing area are confirmed as the cause of illness but it has been determined that the event which caused the contamination no longer exists;
   (2) Keep the area closed for a minimum of 21 days if the illness is consistent with viral etiology; and
   (3) Develop a written report summarizing the findings of the investigation and actions taken.

I. Whenever an Authority or dealer initiates a recall of shellfish products because of public health concerns, the Authority will monitor the progress and success of the recall. The Authority will immediately notify the FDA, ISSC and the Authorities in other States involved in the recall. The

Authority shall submit periodic recall status reports to the FDA Shellfish Specialist consistent with the Recall Enforcement Policy Title 21 CFR Part 7, Subpart C, Section 7.53 (b) (1- 6) until such time that the Authority deems the recall to be completed. Each Authority involved in a recall will implement actions to ensure removal of recalled product from the market, issue public warnings if necessary to protect public health and provide periodic reports to the Authority in the State of product origin regarding recall efforts within their State until such time that the Authority in the State of product origin deems the recall to be completed. FDA will decide whether to audit or issue public warnings after consultation with the Authority/Authorities and after taking into account the scope of the product distribution and other related factors. If the FDA determines that the Authority in any State involved in the recall fails to implement effective actions to protect public health, the FDA may classify, publish and audit the recall, including issuance of public warnings when appropriate.

J. Molluscan shellfish product that is recalled as a result of an illness outbreak associated with *V.v.* or *V.p.* may be reconditioned. Validated reconditioning processes include subjecting product to validated post-harvest processing (PHP) or placing product into approved, conditionally approved, conditionally restricted, or restricted growing areas for an appropriate period of time, not less than fourteen (14) days, with appropriate controls and documentation to be determined by the Authority.

Additional Guidance: Section IV. Guidance Documents Chapter IV. Section .01

@.02 Shellfish Related Illnesses Associated with *Vibrio parahaemolyticus (V.p.)*

A. When the investigation outlined in Section @.01 A. indicates the illness(es) are associated with the naturally occurring pathogen *Vibrio parahaemolyticus (V.p.)*, the Authority shall determine the number of laboratory confirmed cases epidemiologically associated with the implicated area and actions taken by the Authority will be based on the number of cases and the span of time as follows.

(1) When sporadic cases do not exceed a risk of one (1) illness per 100,000 servings or involves at least two (2) but not more than four (4) cases occurring within a thirty (30) day period from an implicated area in which no two (2) cases occurred from a single harvest day, the Authority shall determine the extent of the implicated area. The Authority will make reasonable attempts to ensure compliance with the existing Vibrio Management Plan.

(2) When the risk exceeds one (1) illness per 100,000 servings within a thirty (30) day period or when cases exceed four (4) but not more than ten (10) over a thirty (30) day period from the implicated area or two (2) or more cases but less than four (4) cases occur from a single harvest day from the implicated area, the Authority shall:

(a) Determine the extent of the implicated area; and

(b) Immediately place the implicated portion(s) of the harvest area(s) in the closed status; and

(c) As soon as determined by the Authority, transmit to the FDA and receiving States information identifying the dealers shipping the implicated shellfish.

(3) When the number of cases exceeds ten (10) illnesses within a thirty (30) day period from the implicated area or four (4) or more cases occurred from a single harvest date from the implicated area, The Authority shall:

(a) Determine the extent of the implicated area; and

(b) Immediately place the implicated portion(s) of the harvest area(s) in the closed status; and

(c) Promptly initiate a voluntary industry recall consistent with the Recall Enforcement Policy, Title 21 CFR Part 7 unless the Authority determines that a recall is not required where the implicated product is no longer available on the market or when the Authority determines that a recall would not be effective in preventing additional illnesses. The recall shall include all implicated products.

(d) Issue a consumer advisory for all shellfish (or species implicated in the illness).

(4) When a growing area has been closed as a result of *V.p.* cases, the Authority shall keep the area closed for the following periods of time to determine if additional illnesses have occurred:

(a) The area will remain closed for a minimum of fourteen (14) days when the risk exceeds one (1) illness per 100,000 servings within a thirty (30) day period or cases exceed four (4) but not more than ten (10) cases over a thirty (30) day period from the implicated area or two (2) or more cases but less than four (4) cases occur from a single harvest date from the implicated area.

(b) The area will remain closed for a minimum of twenty-one (21) days when the number of cases exceeds ten (10) illnesses within thirty (30) days or four (4) cases occur from a single harvest date from the implicated area

(5) Prior to reopening an area closed as a result of the number of cases exceeding ten (10) illnesses within thirty (30) days or four (4) cases from a single harvest date from the implicated area, the Authority shall:

(a) Collect and analyze samples to ensure that tdh does not exceed 10/g and trh does not exceed 10/g; or other such values as determined appropriate by the Authority based on studies.

(b) Ensure that environmental conditions have returned to levels not associated with *V.p.* cases.

(6) Shellfish harvesting may occur in an area closed as a result of *V.p.* illnesses when the Authority implements one (1) or more of the following controls:

(a) PHP using a process that has been validated to achieve a two (2) log reduction in the levels of total *V.p.* for Gulf and Atlantic Coast oysters and/or hard clams and a three (3) log reduction for Pacific Coast oysters and/or hard clams;

(b) Restricting oyster and/or hard clam harvest to product that is labeled for shucking by a certified dealer, or other means to allow the hazard to be addressed by further processing;

(c) Other control measures that based on appropriate scientific studies are designed to ensure that the risk of *V.p.* illness is no longer reasonably likely to occur, as approved by the Authority.

@. 03 Annual Assessment of *Vibrio vulnificus* and *Vibrio parahaemolyticus* Illnesses and Shellfish Production

A. The Authority shall assess annually *Vibrio vulnificus (V.v.)* and *Vibrio parahaemolyticus (V.p.)* illnesses associated with the consumption of molluscan shellfish. The assessment will include a record of all *V.v.* and *V.p.* shellfish-associated illnesses reported within the State and from receiving States, the numbers of illnesses per event, and actions taken by the Authority in response to the illnesses.

B. The Authority shall collect by month and report annually to the ISSC the volume of shellfish harvested in the State. The report shall include the volume of shellfish harvested for each species. Where available the volume breakdown of the production data will be reported by utilization type (raw, shucked, PHP, etc.).

@.04 Presence of Human Pathogens in Shellfish Meats

Additional Guidance: Section IV. Guidance Documents Chapter II. Section.16

A. Finding. Upon determination that human pathogens are present in shellfish meats, the Authority shall investigate the harvesting, the distribution, and the processing of the shellfish.
B. Growing Area Investigation.
   (1) The Authority shall review the following factors:
      (a) The documentation to trace the shellfish to its source;
      (b) The classification assigned to the growing area and whether the sanitary survey data supporting that classification is current; and
      (c) The probability of illegal harvesting from areas classified as restricted or prohibited, or in the closed status.
   (2) The Authority shall take no further action when the Authority determines that:
      (a) The growing area is properly classified;
      (b) No illegal harvesting is taking place; and
      (c) There is no reason to believe that the growing area is the source of the pathogens.
   (3) When the Authority determines that the growing area is not properly classified, the Authority shall take immediate action to:
      (a) Change the existing classification to the correct classification; or
      (b) Close the growing area until the correct classification can be determined; and
      (c) Determine whether to initiate a voluntary recall by firms. If a firm or firms is requested by the Authority to recall, the firm will use procedures consistent with the Recall Enforcement Policy, Title 21 CFR Part 7. The recall shall include all implicated products.
   (4) When the Authority determines that the growing area may be the source of pathogens and the pathogens exceed tolerance levels, the Authority shall request a voluntary recall by firms. The firms will use procedures consistent with the Recall Enforcement Policy, Title 21 CFR Part 7. The recall shall include all implicated products.
   (5) When the Authority determines that illegal harvesting is taking place, the Authority shall determine whether to initiate a voluntary recall by firms. The firm will use procedures consistent with the Recall Enforcement Policy, Title 21 CFR Part 7. The recall shall include all implicated products.
C. Distribution and Processing Investigation.
   (1) The Authority shall evaluate the distribution and processing of the shellfish. This investigation may include collection of additional meat samples.
   (2) The Authority shall take no further action when the Authority determines that there is no reason to believe a problem exists in the distribution or processing of the shellfish.
   (3) When the Authority determines that a problem exists in the distribution or processing of the shellfish, the Authority shall take immediate steps to correct the problem and determine whether to initiate a voluntary recall by firms. If a firm(s) is requested by the Authority to recall, the firm will use procedures consistent with the Recall Enforcement Policy, Title 21 CFR Part 7. The recall shall include all implicated products.
D. Risk Management and Tolerance Levels.

Additional Guidance: Section IV. Guidance Documents Chapter II. Section .08

(1) Pathogen Present. When a growing area continues to demonstrate the presence of human pathogen isolates in shellfish meats in the absence of illness, the Authority shall perform a risk assessment to determine the correct classification for an area.

(2) Established Tolerance Levels.

(a) When the established tolerance level for a particular pathogen isolate is not exceeded, the Authority:

(i) Shall maintain a written summary of its finding and the data supporting its finding in its central file; and

(ii) May leave the growing area in its present classification.

(b) When the established tolerance level for a particular pathogen isolate is known and there are no known outbreaks of shellfish associated disease caused by that pathogen in a particular growing area, the Authority shall:

(i) Leave the area in the open status of its classification when the tolerance level is not exceeded; and

(ii) Place the area in the closed status of its classification when the tolerance level is exceeded.

(c) When the tolerance level is exceeded, the Authority may:

(i) Maintain the growing area in the closed status of its current classification;

(ii) Reclassify the growing area to the restricted or prohibited classification; or

(iii) Reclassify the growing area to the conditionally restricted classification and establish a management plan.

(d) Any management plan based on shellstock exceeding established tolerance levels shall:

(i) Meet all appropriate requirements for a management plan for the conditionally approved or conditionally restricted classification;

(ii) Specify the additional criteria associated with the particular pathogen isolate that the growing area must meet to be in the open status of its classification;

(iii) Document the scientific basis for the additional criteria;

(iv) Provide for periodic retesting of the shellfish meats; and

(v) Provide for the growing area to be placed in the closed status if the criteria are exceeded.

(3) Established Tolerance Levels Not Known.

(a) When an established tolerance level does not exist for the particular pathogen isolated, the Authority shall assess the public health significance of the levels of the pathogen found in the growing area shellfish meats. The Authority may consider FDA recommended action levels or levels of concern in this determination. When the Authority determines that:

(i) The levels are acceptable, the growing area shall remain in the open status of its classification; or

(ii) The levels are unacceptable; the growing area shall be placed in the closed status of its classification.

(b) If a growing area is placed in the closed status, the Authority may elect to

(i) Maintain that status indefinitely;

(ii) Reclassify the area to the restricted or prohibited classification; or

(iii) Reclassify the area to the conditionally restricted classification and establish a management plan. The management plan shall meet the requirements of Section D. (2) (d).

@.05 Presence of Toxic Substances in Shellfish Meats

Additional Guidance: Section IV. Guidance Documents Chapter II. Section .08

A. Upon determination that toxic substances, including heavy metals, chlorinated hydrocarbons, and natural toxins are present in levels of public health significance in shellfish meats, the Authority shall investigate the harvesting, distribution, and processing of shellfish and take necessary corrective action in accordance with the procedures described in Section @.04.
B. When a growing area continues to demonstrate the presence of toxic substances in the absence of illness, the Authority shall perform a risk assessment to determine the correct classification of the area. The risk assessment and subsequent risk management shall follow the procedures outlined in Section @.04 D., Risk Management and Tolerance Levels.

@.06 *Vibrio vulnificus* Control Plan

A. Risk Evaluation
Each shellfish producing State that is not currently implementing a *V.v.* Control Plan shall conduct a *V.v.* risk evaluation annually. The evaluation shall consider each of the following factors, including seasonal variations in the factors, in determining the risk of *V.v.* infection from the consumption of shellfish harvested from the State's growing waters.
(1) In conducting the risk evaluation, the Authority will at a minimum consider the following:
(a) The number of *V.v.* cases etiologically confirmed and epidemiologically linked to the consumption of commercially harvested shellfish from the State; and
(b) Levels of *V.v.* in the growing waters and in shellfish, to the extent that such data exists; and
(c) The quantity of harvest from the area and its uses i.e. shucking, half shell, PHP.
B. States which have previously met the illness threshold requiring a *V.v.* Control Plan will continue to maintain and implement a *V.v.* Control Plan.
C. All States not currently implementing a *V.v.* Control Plan shall develop and implement a *V.v.* Control Plan should the risk evaluation indicate two (2) or more etiologically confirmed, and epidemiologically linked *V.v.* septicemia illnesses from the consumption of commercially harvested raw or undercooked oysters that originated from the growing waters of that State within the previous ten (10) years
D. The Authority shall develop a *V.v.* Contingency Plan should the risk evaluation indicate any etiologically confirmed shellfish-borne *V.v.* illness from the growing waters of that State but the number of cases does not reach the threshold established in @.06 C.
E. Control Plan
(1) The *V.v.* Control Plan shall include the following:
(a) Identification of triggers which address factors that affect risks. The triggers will be used to indicate when control measures are needed. One (1) or more of the following triggers will be used:
(i) The water temperatures in the area;
(ii) The air temperatures in the area;
(iii) Salinity in the area;
(iv) Harvesting techniques in the area; and
(v) Other factors which affect risk which can be used as a basis for reducing risk.
(b) Implementation of one (1) or more of the following control measures to reduce the

risk of *V.v.* illness:

(i) Labeling oysters, "For shucking by a certified dealer", when the Average Monthly Maximum Water Temperature exceeds 70 °F.

(ii) Subjecting all oysters intended for the raw, half-shell market to Authority approved PHP when the Average Monthly Maximum Water Temperature exceeds 70 °F.

(iii) Reducing time of exposure to ambient air temperature prior to delivery to the initial certified dealer based on modeling or sampling, as determined by the Authority in consultation with FDA. For the purpose of time to temperature control, time begins once the first shellstock harvested is no longer submerged. When this control measure is selected, State *V.v.* plans will include controls when water temperature promotes *V.v.* levels and risk of illness increases. The controls will minimize risk to less than three (3) illnesses per 100,000 servings when Average Monthly Maximum Water Temperature exceeds 80 °F. Authority approved Best Management Practices (BMPs) will be applied to minimize *V.v.* growth to the extent possible when Average Monthly Maximum Water temperature exceeds 70 °F but is less than or equal to 80 °F. BMPs will ensure that when the water temperature exceeds 70 °F but is less than or equal to 75 °F risk is minimized to less than 1.75 illnesses per 100,000 servings and when water temperature exceeds 75 °F but is less than or equal 80 °F the risk will not exceed 2.5 illnesses per 100,000 servings. These risks per serving will be determined using the FDA developed *V.v.* calculator. A State is in compliance with the NSSP when it effectively implements the controls established in its plan using the FDA calculator to determine the risk per serving for the established water temperatures.

(iv) The State Authority may implement alternative controls that will reduce the risk to a level comparable to the risk per serving identified above in @.05 E. (1) (b) (iii) when water temperatures exceed 70 °F.

(c) When pre-harvest culture practices have the potential to elevate Vibrio levels in market size product intended for immediate harvest, the Authority shall establish Vibrio control measures and include the measures in the State Vibrio Control Plan. Such control measures may be implemented on a State-wide, regional, geographic, or farm or growing area-specific basis. When shellfish are re-immersed as a control measure the Authority should consider inclusion of record keeping requirements such as means of shellfish segregation/identification procedures, date re-immersed in water and date of final harvest. The Authority may require growers to have a control plan approved by the Authority.

(2) Control Plan Evaluation

(a) The State Authority will conduct an evaluation of the plan. At a minimum the Authority will consider:

(i) The annual number of *Vibrio vulnificus* cases associated with the State's growing waters and the amount of shellstock sold for half shell consumption to determine risk per servings for each temperature period.

(ii) Environmental changes which could affect total *V.v.* in shellfish pre and post-harvest.

(iii) Industry compliance with existing controls.

(iv) The Authorities enforcement of industries' implementation of the controls.

(b) For the purposes of determining Authority compliance the FDA will conduct

an annual Vibrio evaluation of the Authority to determine the following:

(i) Authority compliance with *V.v.* Risk Evaluation as required in Chapter II. @.06 A.

(ii) For States requiring the development of *V.v.* Plans, compliance with Control Plan requirements of Chapter II. @.06 E. (1). The evaluation should determine:

(a) Appropriate identification of triggers to determine when control measures are needed.

(b) Did the Authority implement one (1) or more of the control measures required in Chapter II. @.06 E. (1) (b).

(c) For Authorities implementing Chapter II. @.06 E. (1) (b) (i) and (ii), were the controls implemented adequately.

(d) For Authorities implementing Chapter II. @.06 E. (1) (b) (iii) (time and temperature control), did the Authority establish controls consistent with water temperature and was the FDA developed *V.v.* calculator used correctly.

(iii) For Authorities required to develop *V.v.* Contingency Plans the evaluation should determine:

a. Did the risk evaluation indicate the need for a Contingency Plan.

b. For States requiring the development of a Contingency Plan, does the plan include the regulatory steps to be implemented should the number of illnesses reach the threshold for a *V.v.* Plan

(c) Should the findings of the State evaluation indicate that the Authority was in compliance with the items audited in (2) (b) and the observed risk per servings exceeded established risk per serving for one (1) or more water temperature, the Authority will be deemed in compliance with the NSSP Model Ordinance. The FDA will include this finding in a report to the ISSC.

(d) The results of the State and FDA risk per serving evaluations will be shared with the ISSC Vibrio Management Committee for use in conducting trend evaluations as stated in the ISSC Constitution, Bylaws, and Procedures.

F. Contingency Plan

(1) The Contingency Plan shall include a detailed plan outlining the regulatory steps that will be implemented should the number of illnesses reach the threshold established for development and implementation of a *V.v.* Control Plan.

(2) Contingency Plan Evaluation
In consultation with FDA the Authority will evaluate the adequacy of their Contingency Plan.

@.07 *Vibrio parahaemolyticus* Control Plan

Additional Guidance: Section IV. Guidance Documents Chapter IV. Section .01 *V.p.* Control Plan

The goal of the Control Plan is to reduce the probability of occurrence of *Vibrio parahaemolyticus* (*V.p.*) illness during periods that have been historically associated with annual illnesses. The Plan is to be implemented as part of a comprehensive program which includes all the time and temperature requirements contained in the Model Ordinance.

A. Independent Species Specific Risk Evaluation.
Every State from which oysters or hard clams (*Mercenaria mercenaria*) are harvested shall conduct a *V.p.* risk evaluation annually. The evaluation shall consider each of the following

factors, including seasonal variations in the factors, in determining whether the risk of *V.p.* infection from the consumption of oysters or hard clams harvested from an area (hydrological, geographical, or growing) is reasonably likely to occur: (For the purposes of this section, "reasonably likely to occur" shall mean that the risk constitutes an annual occurrence)

(1) The number of *V.p.* cases epidemiologically linked to the consumption of oysters or hard clams commercially harvested from the State;
(2) Levels of total and tdh+ *V.p.* in the area, to the extent that such data exists;
(3) The water temperatures in the area;
(4) The air temperatures in the area;
(5) Salinity in the area;
(6) Harvesting techniques in the area; and
(7) The quantity of harvest from the area and its uses i.e. shucking, half-shell, PHP.

B. Independent Species Specific Control Plan

(1) If a State's *V.p.* risk evaluation determines that the risk of *V.p.* illness from the consumption of oysters or hard clams harvested from a growing area is reasonably likely to occur, the State shall develop and implement a *V.p.* Control Plan.
(2) If a State has a shellfish growing area in which harvesting occurs at a time when average monthly daytime water temperatures exceed those listed below, the State shall develop and implement a *V.p.* Control Plan. The average water temperatures representative of harvesting conditions (for a period not to exceed thirty (30) days) that prompt the need for a Control Plan are:
(a) Waters bordering the Pacific Ocean: 60 °F.
(b) Waters bordering the Gulf of Mexico and Atlantic Ocean (NJ and south): 81 °F.
(c) Waters bordering the Atlantic Ocean (NY and north): 60 °F.
(d) However, development of a Plan is not necessary if the State conducts a risk evaluation, as described in Section A. that determines that it is not reasonably likely that *V.p.* illness will occur from the consumption of oysters or hard clams harvested from those areas.
(i) In conducting the evaluation, the State shall evaluate the factors listed in Section A. for the area during periods when the temperatures exceed those listed in this section;
(ii) In concluding that the risk is not reasonably likely to occur, the State shall consider how the factors listed in Section A. differ in the area being assessed from other areas in the State and adjoining States that have been the source of shellfish that have been epidemiologically linked to cases of *V.p.* illness; or
(3) If a State has a shellfish growing area that was the source of oysters or hard clams that were epidemiologically linked to an outbreak of *V.p.* within the prior five (5) years, the State shall develop and implement a *V.p.* Control Plan for the area.
(4) For States required to implement *V.p.* Control Plans, the Plan shall include the administrative procedures and resources necessary to accomplish the following:
(a) Establish one (1) or more triggers for when control measures are needed. These triggers shall be the temperatures in Section B. (2) where they apply, or other triggers as determined by the risk evaluation.
(b) Implement one (1) or more control measures to reduce the risk of *V.p.* illness at times when it is reasonably likely to occur. The control measures may include:
(i) PHP using a process that has been validated to achieve a two (2) log reduction in the levels of total *V.p.* for Gulf and Atlantic Coast oysters and hard clams and a three (3) log reduction for the Pacific Coast oysters;
(ii) Closing the area to oyster and/or hard clam harvest;
(iii) Restricting oyster and/or hard clam harvest to product that is labeled for

shucking by a certified dealer, or other means to allow the hazard to be addressed by further processing;

(iv) Limiting time from harvest to refrigeration to no more than five (5) hours, or other times based on modeling or sampling, as determined by the Authority in consultation with FDA;

(v) Limiting time from harvest to refrigeration such that the levels of total *V.p.* after the completion of initial cooling to 60 °F (internal temperature of the oysters or hard clams) do not exceed the average levels from the harvest water at time of harvest by more than 0.75 logarithms, based on sampling or modeling, as approved by the Authority;

(vi) Other control measures that based on appropriate scientific studies are designed to ensure that the risk of *V.p.* illness is no longer reasonably likely to occur, as approved by the Authority.

(c) Require the original dealer to cool oysters and/or hard clams to an internal temperature of 50 °F (10 °C) or below within ten (10) hours or less as determined by the Authority after placement into refrigeration during periods when the risk of *V.p.* illness is reasonably likely to occur. The dealer's HACCP Plan shall include controls necessary to ensure, document and verify that the internal temperature of oysters and/or hard clams has reached 50 °F (10 °C) or below within ten (10) hours or less as determined by the Authority of being placed into refrigeration. When deemed appropriate by the Authority an exception may be permitted for hard clams to allow for tempering. Oysters and/or hard clams without proper HACCP records demonstrating compliance with this cooling requirement shall be diverted to PHP or labeled *"for shucking only"*, or other means to allow the hazard to be addressed by further processing.

(d) Evaluate the effectiveness of the Plan.

(e) Modify the Control Plan when the evaluation shows the Plan is ineffective, or when new information is available or new technology makes this prudent as determined by the Authority.

(f) Optional cost benefit analysis of the *V.p.* Control Plan.

(5) When pre-harvest culture practices have the potential to elevate *V.p.* levels in market size product intended for immediate harvest, the Authority shall establish *V.p.* control measures and include the measures in the State Vibrio Control Plan. Such control measures may be implemented on a State-wide, regional, geographic, or farm or growing area-specific basis. When shellfish are re-immersed as a control measure the Authority should consider inclusion of record keeping requirements such as means of shellfish segregation/identification procedures, date re-immersed in water and date of final harvest. The Authority may require growers to have a control plan approved by the Authority.

C. The Time When Harvest Begins

For the purpose of time to temperature control, time begins once the first shellstock harvested is no longer submerged.

Chapter III. Laboratory

Requirements for the Authority

Additional Guidance: Section IV Guidance Documents Chapter II. Section 15.

[Note: The Authority must meet the requirements of this section even if the Authority does not formally adopt this section in regulation.]

@.01 Quality Assurance

A. NSSP Conformance Required for all laboratories supporting the NSSP. All laboratory analyses shall be performed by a laboratory found to conform or provisionally conform by the FDA Shellfish LEO or FDA certified State Shellfish LEO in accordance with the requirements established under the NSSP.

B. State Program Responsibilities. The Authority shall ensure that all samples are collected, maintained, transported, and analyzed in a manner that assures the validity of the analytical results. Accordingly, the Authority shall:

(1) Require laboratories to develop a written quality assurance plan that:

(a) Describes the organization and management structure of the laboratory;

(b) Describes the laboratory staff training program ensuring that all laboratory personnel are qualified, properly trained, and supervised;

(c) Describes all procedures and methods used to analyze samples;

(d) Describes quality control measures, their frequency and tolerance limits, for determining equipment performance;

(e) Requires maintenance of records of analytical performance, quality control results, and equipment maintenance and calibration;

(f) Includes an internal assessment and participation in a recognized annual proficiency test program (FDA, Northeast Laboratory Examination Officers and Managers (NELEOM), etc.); and

(g) Requires corrective action for any deficiencies found in the laboratory quality assurance program.

(2) Require laboratories to implement their quality assurance plan.

(3) Ensure that the laboratory has appropriate facilities and resources to effectively manage the workload.

(4) Require laboratories to participate in the laboratory evaluation process.

(5) Inform FDA Shellfish LEOs and/or the State Shellfish LEO as appropriate of major changes in laboratory personnel, laboratory workload or laboratory facilities.

(6) Require corrective action for any deficiencies/nonconformities found in the quality assurance program, laboratory operations, and laboratory performance.

C. FDA Responsibilities. The FDA will ensure that all laboratories generating data in support of the NSSP will be evaluated at a minimum frequency of once every three (3) years.

(1) Evaluations will be conducted by either an FDA Shellfish LEO or an FDA certified State Shellfish LEO as appropriate. Normally the initial evaluation of a laboratory will be conducted by FDA.

(2) Evaluations are generally onsite but can under certain circumstances be by desk audit (evaluation follow-up, action plan monitoring, nonconformity corrections, major changes in personnel, workload or facilities, etc.).

D. Wet Storage and Post-Harvest Processors. For any laboratory providing analytical testing services for depuration, wet storage or PHP, initial and subsequent triennial evaluations will be required and conducted in accordance with @.01 and @.03 of this Chapter by an FDA Shellfish LEO or an FDA certified State Shellfish LEO as appropriate. It is understood that academic laboratories involved in PHP Validation or Verification have special circumstances such as extended periods of inactivity resulting from university schedules or funding constraints; however, written documentation of Quality Control practices will be required for time periods in which they are preparing for or actively participating in a PHP Validation or Verification. Times in which the lab is inactive can be explained with a not applicable notation.

Additional Guidance: Section IV. Guidance Documents Chapter II. Section .14

@.02 Methods

A. Microbiological. Methods for the analyses of shellfish and shellfish growing or harvest waters shall be:

(1) The Approved NSSP Methods validated for use in the NSSP under Procedure XV. of the Constitution, Bylaws and Procedures of the ISSC and/or cited in the Guidance Documents Chapter II. Growing Areas .14 Approved NSSP Laboratory Tests.

(2) When there is an immediate or ongoing critical need for a method and no Approved NSSP Method exists, the following may be used:

(a) A validated AOAC, Bacteriological Analytical Manual (BAM), or EPA method;

(b) An Emergency Use Method pursuant to @ .02 D. (1) and (2) below.

B. Chemical and Physical. Methods for the analysis of shellfish and shellfish growing or harvest waters shall be:

(1) The Approved NSSP Methods validated for use in the NSSP under Procedure XV. of the Constitution, Bylaws, and Procedures of the ISSC and/or cited in the Guidance Documents Chapter II. Growing Areas .14 Approved NSSP Laboratory Tests.

(2) Results shall be expressed for chemical and physical measurements in standard units and not instrument readings.

(3) When there is an immediate or ongoing critical need for a Method and no Approved NSSP Method exists, the following may be used:

(a) A validated AOAC, BAM, or EPA method;

(b) An Emergency Use Method pursuant to @ .02 D. (1) and (2) below.

C. Biotoxin. Methods for the analyses of shellfish and shellfish harvest waters shall be:

(1) The Approved NSSP Methods validated for use in the NSSP under Procedure XV. of the Constitution, Bylaws, and Procedures of the ISSC and/or cited in the Guidance Documents Chapter II. Growing Areas .14 Approved NSSP Laboratory Tests.

(2) When there is an immediate or ongoing critical need for a method and no Approved NSSP Method exists, the following may be used:

(a) A validated AOAC, BAM, or EPA method;

(b) An Emergency Use Method pursuant to @ .02 D. (1) and (2) below.

D. Emergency Use Methods.

(1) When there is an immediate or critical need and no Approved NSSP Method exists, an unapproved or non-validated method may be used for a specific purpose provided that:

(a) The appropriate FDA Office is notified within a reasonable period of time regarding the method employed; and

(b) The ISSC Executive Board is notified within a reasonable period of time regarding the method employed.

(2) When it is necessary to continue the use of the emergency method employed under D. (1) beyond the initial critical need, then the following minimum criteria shall be provided to the ISSC Executive Board for interim approval:

(a) Name of Method;

(b) Date of Submission;

(c) Specific purpose or intent of the method for use in the NSSP;

(d) Step by step procedure including equipment, reagents and safety requirements necessary to run the method;

(e) Data generated in the development and/or trials of the method and/or comparing to approved methods if applicable;

(f) Any peer reviewed articles detailing the method;

(g) Name of developer(s) or submitter; and

(h) Developer/submitter contact information.

(3) Within two (2) years of Executive Board interim approval of the Emergency Use Method, the entire Single Lab Validation Protocol should be submitted. The Laboratory Committee will report to the Executive Board on the status of the Single Lab Validation Protocol data submission.

Chapter IV. Shellstock Growing Areas

Additional Guidance: Section IV. Guidance Documents Chapter II. Section .07

Additional Guidance: Section IV. Guidance Documents Chapter II. Section .09

Additional Guidance: Section IV. Guidance Documents Chapter II. Section .11

Requirements for the Authority

[Note: The Authority must meet the requirements of this section even if the Authority does not formally adopt this chapter in regulation.]

@.01 Sanitary Survey

A. General.

(1) The sanitary survey is the written evaluation report of all environmental factors, including actual and potential pollution sources, which have a bearing on water quality in a shellfish growing area. The sanitary survey shall include the data and results of:

(a) A shoreline survey;

(b) A survey of the microbiological quality of the water. In growing areas adjacent to waste water system discharge (WWSD)s the Authority may utilize male specific coliphage (MSC) results from analysis of shellfish meat samples and the analysis of the data will be included in the sanitary survey report;

(c) An evaluation of the effect of any meteorological, hydrodynamic, and geographic characteristics on the growing area; and

(d) A determination of the appropriate growing area classification.

(2) The sanitary survey shall be periodically updated through the triennial reevaluation and the annual review in accordance with Section C. to assure that data are current and that conditions are unchanged.

(3) The documentation supporting each sanitary survey shall be maintained by the Authority. For each growing area, the central file shall include all data, results, and analyses from:

(a) The sanitary survey;

(b) The triennial reevaluation; and

(c) The annual review.

(4) Wherever possible, the Authority shall provide the necessary information to Federal, State, or local agencies which have the responsibility to minimize or eliminate pollution sources identified in the sanitary survey.

(5) The Authority shall maintain a current comprehensive, itemized list of all growing areas, including maps showing the boundaries and classification of each shellstock growing area.

B. Sanitary Survey Required.

(1) A sanitary survey shall not be required to classify growing areas as prohibited. The findings of a sanitary survey, however, may result in a growing area being classified as

prohibited.

(2) A sanitary survey, including the triennial reevaluation, when available, of each growing area shall be required prior to:

(a) The harvest of shellstock for human consumption; and

(b) The classification of a growing area as approved, conditionally approved, restricted, or conditionally restricted.

C. Sanitary Survey Performance.

(1) A sanitary survey of each growing area shall be performed at least once every twelve (12) years and shall include the components in Section A. (1).

(2) When a written sanitary survey report is not completed, the area shall be placed in the closed status.

(3) The growing area classification and the supporting data from the sanitary survey shall be reviewed at least every three (3) years.

(a) This triennial reevaluation shall include:

(i) A water quality review in accordance with Section C. (5)(b)

(ii) Documentation of any new pollution sources and an evaluation of their effect on the growing area;

(iii) Reevaluation of all pollution sources, including the sources previously identified in the sanitary survey, as necessary to fully evaluate any changes in the sanitary conditions of the growing area. The reevaluation may or may not include a site visit;

(iv) A comprehensive report which analyzes the sanitary survey data and makes a determination that the existing growing area classification is correct or needs to be revised; and

(v) If the triennial reevaluation determines that conditions have changed based on the information and data collected during the triennial review and that the growing area classification is incorrect, immediate action shall be initiated to reclassify the area.

(b) When a written triennial reevaluation report is not completed, the Authority shall place the growing area in the closed status.

(4) The triennial reevaluation may include:

(a) Inspection of WWSD or collection of additional effluent samples to determine their impact on the growing area;

(b) Hydrodynamic studies;

(c) Additional field work to determine the actual impact of pollution sources; and

(d) Collection of additional water samples.

(5) On an annual basis, the sanitary survey shall be updated to reflect changes in the conditions in the growing area. The annual reevaluation shall include:

(a) A field observation of the pollution sources which may include:

(i) A drive-through survey;

(ii) Observations made during sample collection; and

(iii) Information from other sources.

(b) Review, at a minimum, of the past year's microbiological results by adding the year's sample results to the data base collected in accordance with the requirements for the microbiological standards and sample collection required in Section @.02;

(c) Review of available inspection reports and effluent samples collected from pollution sources;

(d) Review of available performance standards for various types of discharges that impact the growing area; and

(e) A brief report which documents the findings of the annual reevaluation.

(f) The Authority may use MSC meat sampling data and/or MSC waste water sampling

data in the annual reevaluation of (5) (b), (c), and (d) above to evaluate the viral contributions of the performance standards of WWSD impacts on shellfish growing areas. If MSC meat and/or water data are being used, the Authority shall conduct annual sample collection and analysis in determining performance standards.

(6) If the annual reevaluation determines that conditions have changed based on the information and data collected during the annual review and that the growing area classification is incorrect, immediate action shall be initiated to reclassify the area.

D. Shoreline Survey Requirements.

(1) In the shoreline survey for each growing area, the Authority shall:

(a) Identify and evaluate all actual and potential sources of pollution which may affect the growing area;

(b) Determine the distance from the pollution sources to the growing area and the impact of each source on the growing area;

(c) Assess the reliability and effectiveness of sewage or other waste treatment systems;

(d) Determine if poisonous or deleterious substances adversely affect the growing area; and

(e) Consider the presence of domestic, wild animal or resident and migrating bird populations for possible adverse effects on growing areas.

(2) The Authority shall assure that the shoreline survey meets the following minimum requirements:

(a) The boundaries, based on the area topography, of each shoreline survey area are determined by an in-field investigation which identifies only the properties with the potential to impact the shellfish waters;

(b) Each shoreline survey area is identified by a unique designation which results in identification of all data associated with each shoreline survey by the unique designation;

(c) Each shoreline survey area is investigated and pollution sources evaluated by qualified, trained personnel;

(d) Documentation for each pollution source identified by the Authority as affecting a growing area includes:

(i) The location of the site on a comprehensive map of the survey area; and

(ii) The determination that the pollution source has a direct or indirect impact on shellfish waters: and

(e) A written summary of the survey findings.

E. Sanitary surveys for Federal waters will be the responsibility of FDA. Sanitary surveys will be conducted in accordance with Chapter IV @.01, as applicable.

Additional Guidance: Section IV. Guidance Documents Chapter II. Section .01 Total Coliform Standards

@.02 Microbiological Standards

Note: The NSSP allows for a growing area to be classified using either a total or fecal coliform standard. The NSSP further allows the application of either standard to different water bodies within the State. The NSSP also allows for two (2) sample collection strategies for the application of the total or fecal coliform standard: adverse pollution condition and systematic random sampling. The 1992 Task Force II recommended that this portion of the Ordinance be codified in two (2) ways: a total coliform strategy and a fecal coliform strategy so that the State may choose sampling plans on a growing area basis. Within each strategy, provisions would appear for use of both systematic and adverse pollution condition sample collection. The Ordinance has been recodified in this manner. For maximum flexibility, an Authority may wish to adopt the use of both standards and both sampling

strategies for each standard. This codification represents the fecal coliform standards. Additionally, the Authority may choose to use MSC sample data in conjunction with total or fecal coliform data to evaluate areas impacted by WWSD.

A. General. Either the total coliform or fecal coliform standard shall be applied to a growing area. The Authority may utilize MSC data in conjunction with bacteriological data to evaluate WWSD impacts on shellfish growing areas.

B. Water Sample Stations. The Authority shall assure that the number and location of sampling stations is adequate to effectively evaluate all pollution sources.

C. Exceptions.

(1) Except for growing areas classified as prohibited, in growing areas where there are pollution sources having an impact on the water quality, a minimum of thirty (30) samples, collected under various environmental conditions, shall be required to classify any growing area not previously classified under Section @.03.

(2) Except for growing areas classified as prohibited or when the systematic random sampling standard is applied, in growing areas where there are no pollution sources having an impact on the water quality, a minimum of fifteen (15) samples shall be required to classify any growing area not previously classified under Section @.03.

D. Standard for the Approved Classification of Growing Areas in the Remote Status.

(1) Water Quality. The bacteriological quality of every station in the growing area shall meet the fecal coliform standard below.

(2) Fecal Coliform Standard for the Remote Status. The fecal coliform median or geometric mean most probable number (MPN) or membrane filter (MF) (membrane-Thermotolerant *Escherichia coli* [mTEC]) of the water sample results shall not exceed fourteen (14) per 100 ml, and not more than ten (10) percent of the samples shall exceed an MPN or MF (mTEC) of:

(a) 43 MPN per 100 ml for a five-tube decimal dilution test;
(b) 49 MPN per 100 ml for a three-tube decimal dilution test;
(c) 28 MPN per 100 ml for a twelve-tube single dilution test; or
(d) 31 colony-forming units (CFU) per 100 ml for a MF (mTEC) test.

(3) Required Sample Collection.

(a) A minimum of two (2) samples shall be collected annually.

(b) A minimum of the most recent fifteen (15) samples collected shall be used to calculate the median or geometric mean and percentage to determine compliance with the standard established for the approved classification of remote growing areas.

E. Standard for the Approved Classification of Growing Areas Affected By Point Sources.

(1) Water Quality. The bacteriological quality of every station in the growing area shall meet the fecal coliform standard in Section E. (2).

(2) Fecal Coliform Standard for Adverse Pollution Conditions. The fecal coliform median or geometric mean MPN or MF (mTEC) of the water sample results shall not exceed fourteen (14) per 100 ml, and not more than ten (10) percent of the samples shall exceed an MPN or MF (mTEC) of:

(a) 43 MPN per 100 ml for a five-tube decimal dilution test;
(b) 49 MPN per 100 ml for a three-tube decimal dilution test;
(c) 28 MPN per 100 ml for a twelve-tube single dilution test; or
(d) 31 CFU per 100 ml for a MF (mTEC) test.

(3) Required Sample Collection.

(a) A minimum of five (5) samples shall be collected annually under adverse pollution conditions from each sample station in the growing area.

(b) A minimum of the most recent fifteen (15) samples collected under adverse pollution conditions from each sample station shall be used to calculate the median or geometric

mean and percentage to determine compliance with this standard.

(c) Sample station locations shall be adjacent to actual or potential sources of pollution.

(4) For Authorities utilizing MSC data in conjunction with bacteriological data to evaluate WWSD impacts, the MSC level shall not exceed fifty (50) MSC per hundred (100) grams.

F. Standard for the Approved Classification of Growing Areas Affected by Nonpoint Sources.

(1) Exception. If the tidal stage increases the fecal coliform concentration, the authority shall use sample results collected during that tidal stage to classify the area.

(2) Pollution Sources. Growing areas shall be:

(a) Impacted only by randomly occurring, intermittent events; and

(b) Not impacted by discharges from sewage treatment facilities or combined sewer overflows.

(3) Water Quality. The bacteriological quality of every station in the growing area shall meet the fecal coliform standard in Section E. (2) or Section F. (4).

(4) Fecal Coliform Standard for Systematic Random Sampling. The fecal coliform median (or geometric mean MPN or MF (mTEC) of the water sample results shall not exceed fourteen (14) per 100 ml and the estimated 90th percentile shall not exceed an MPN or MF (mTEC) of:

(a) 43 MPN per 100 ml for a five-tube decimal dilution test;

(b) 49 MPN per 100 ml for a three-tube decimal dilution test; or

(c) 31 CFU per 100 ml for a MF (mTEC) test.

(5) Estimated 90th Percentile. The estimated 90th percentile shall be calculated by:

(a) Calculating the arithmetic mean and standard deviation of the sample result logarithms (base 10);

(b) Multiplying the standard deviation in (a) by 1.28;

(c) Adding the product from (b) to the arithmetic mean;

(d) Taking the antilog (base 10) of the results in (c) to get the estimated 90th percentile; and

(e) The MPN values that signify the upper or lower range of sensitivity of the MPN tests in the 90th percentile calculation shall be increased or decreased by one significant number.

(6) Required Sample Collection.

(a) Adverse Pollution Condition Standard. The Authority shall collect samples in the same intensity and frequency as described in Section E. (3) for application of the standard under Section E. (2).

(b) Systematic Random Sampling Standard. The requirement for systematic random sample collection shall be met when:

(i) Sample station locations are adequate to produce the data to effectively evaluate all nonpoint sources of pollution;

(ii) Sample collection is scheduled sufficiently far in advance to support random collection with respect to environmental conditions. Compliance requires that, prior to implementation, the schedule for random sampling shall be documented in the master file for the growing area, and if conditions at the time of scheduled sample collection are believed to be hazardous to the safety of the individuals assigned to collect samples, sample collection shall be rescheduled at a later date as soon as practical;

(iii) A minimum of six (6) random samples shall be collected annually from each sample station in the growing area;

(iv) A minimum of two (2) random samples shall be collected annually from each sample station in the growing area while in the inactive status. The sample collection frequency of six (6) random samples per station per year specified under @.02 F. (6) (b) (iii) must resume at least six (6) months before an area is reactivated; and

(v) A minimum of the thirty (30) most recent randomly collected samples from each sample station shall be used to calculate the median or geometric mean and 90th percentile to determine compliance with this standard.

(c) Transition from Adverse Pollution Condition Standard to Systematic Random Sampling Standard. If the Authority:

(i) Does not have thirty (30) recent randomly collected sample results from each station, then the previous fifteen (15) samples collected under adverse pollution conditions may be used with the most recent random samples to meet the minimum thirty (30) sample requirement for a transition period not to exceed three (3) years; and

(ii) Uses the transition period described in (i), as additional random samples are collected; the random samples shall replace chronologically the samples collected under adverse pollution conditions (e.g. sample 31 replaces sample 1).

G. Standard for the Restricted Classification of Growing Areas Affected by Point Sources and Used as a Shellstock Source for Shellstock Depuration.

(1) Water Quality. The bacteriological quality of every station in the growing area shall meet the fecal coliform standard in Section G. (2).

(2) Fecal Coliform Standard for Adverse Pollution Conditions. The fecal coliform median or geometric mean MPN or MF (mTEC) of the water sample results shall not exceed 88 per 100 ml and not more than ten (10) percent of the samples shall exceed an MPN or MF (mTEC) of:

(a) 260 MPN per 100 ml for a five-tube decimal dilution test;

(b) 300 MPN per 100 ml for a three-tube decimal dilution test;

(c) 173 MPN per 100 ml for a twelve-tube single dilution test; or

(d) 163 CFU per 100 ml for a MF (mTEC) test.

(3) Required Sample Collection. Samples shall be collected in accordance with Section E. (3).

H. Standard for the Restricted Classification of Growing Areas Affected by Nonpoint Sources and Used as a Shellstock Source for Shellstock Depuration.

(1) Exception. If the tidal stage increases the fecal coliform concentration, the Authority shall use samples collected under that tidal stage to classify the area.

(2) Pollution Sources. Growing areas shall meet the requirements in Section F. (2).

(3) Water Quality. The bacteriological quality of every sample station in the growing area shall meet the fecal coliform standard in Section G. (2) or Section H. (4).

(4) Fecal Coliform Standard for Systematic Random Sampling. The fecal coliform median or geometric mean MPN or MF (mTEC) of the water sample results shall not exceed 88 per 100 ml and the estimated 90th percentile shall not exceed a MPN or MF (mTEC) of:

(a) 260 MPN per 100 ml for a five-tube decimal dilution test;

(b) 300 MPN per 100 ml for a three-tube decimal dilution test; or

(c) 163 CFU per 100 ml for a MF (mTEC) test.

(5) Estimated 90th Percentile. The estimated 90th percentile shall be calculated by the same method described in Section F. (5).

(6) Required Sample Collection.

(a) Adverse Pollution Condition Standard. The Authority shall collect samples in the same intensity and frequency as described in Section E. (3) for application of the standard under Section G. (2).

(b) Systematic Random Sampling Standard. The Authority shall collect samples in the same intensity and frequency, and shall apply the sample results in the manner described in Section F. (6) for the application of the standard under Section H. (4).

@.03 Growing Area Classification

A. General. Each growing area shall be correctly classified as approved, conditionally approved, restricted, conditionally restricted, or prohibited, as provided by this Ordinance.

(1) Emergency Conditions. A growing area shall be placed in the closed status under Section @.03 A. (5) when pollution conditions exist which were not included in the database used to classify the area. If it is determined that an emergency condition or situation exists, then the growing area will be immediately (within twenty-four (24) hours) placed in the closed status.

(2) Classification of All Growing Areas. All growing areas which:

(a) Are not subjected to a sanitary survey every twelve (12) years shall be classified as prohibited;

(b) Have a sewage treatment plant outfall or other point source outfall of public health significance within or adjacent to the growing area shall have an area in the prohibited classification established adjacent to the outfall in accordance with Section E. Prohibited Classification; and

(c) Are subjected to a sanitary survey shall be correctly classified based on the twelve (12) year sanitary survey, and its most recent triennial or annual reevaluation when available, as only one (1) of the following:

(i) Approved;
(ii) Conditionally Approved;
(iii) Restricted;
(iv) Conditionally Restricted; or
(v) Prohibited.

(3) Boundaries. The boundaries of each classified growing area shall be delineated on charts which are:

(a) Of sufficient scale and detail so as to adequately describe the boundaries; and
(b) Maintained in the central file by the Authority.

(4) Revision of Classifications.

(a) Any upward revision of a growing area classification shall be supported by an adequate sanitary survey.

(b) The appropriate FDA office shall be notified of any revision in growing area classification.

(5) Status of Growing Areas. The status of a growing area is separate and distinct from its classification and may be open, closed or inactive for the harvesting of shellstock. Supporting information for all changes in the status of growing areas shall be documented by a written record in the central file.

(a) Open Status. Except for an area in the prohibited classification, any correctly classified growing area is normally open for the purposes of harvesting shellstock, subject to the limitations of its classification.

(b) Closed Status. Any classified growing area may be closed for a limited or temporary period because of:

(i) An emergency condition or situation;
(ii) The presence of biotoxins in concentrations of public health significance;
(iii) Conditions stipulated in the management plan of conditionally approved or conditionally restricted areas;
(iv) Failure of the Authority to complete a written sanitary survey or triennial review evaluation report; or
(v) The requirements for biotoxins or conditional area management plans as established in Section @.04 and Section @.03, respectively, are met.

(c) Reopened Status. A growing area temporarily placed in the closed status as provided in

(b) above, shall be returned to the open status only when:

(i) The emergency situation or condition has returned to normal and sufficient time has elapsed to allow the shellstock to reduce pathogens or poisonous or deleterious substances that may be present in the shellstock to acceptable levels. Studies establishing sufficient elapsed time shall document the interval necessary for reduction of contaminant levels in the shellstock to pre-closure levels. In addressing pathogen concerns, the study may establish criteria for reopening based on coliform levels in the water; or

(ii) For emergency closures of harvest areas caused by the occurrence of raw untreated sewage discharged from a large community sewage collection system or WWSD, the analytical sample results shall not exceed the levels established in Chapter IV @.02 E or pre-determined levels established by the Authority based on studies conducted on regional species under regional conditions from shellfish samples collected no sooner than seven (7) days after contamination has ceased and from representative locations in each growing area potentially impacted or until the event is over and twenty-one (21) days have passed; or

(iii) The requirements for biotoxins or conditional area management plans as established in Section @.04 and Section @.03, respectively, are met; and

(iv) Supporting information is documented by a written record in the central file.

(d) Inactive Status. The authority may place an approved or restricted growing area affected by non-point sources in the inactive status for up to five (5) years when shellstock harvest is suspended or no longer occurring. Shellstock harvesting shall be closed while an area is in the inactive status. The inactive status must continue for a minimum of one (1) year.

(i) While in inactive status, the required bacteriological sample collection under @.02 F. (6) (b) (iii) may be reduced to two (2) water samples per station per year collected under the systematic random sample collection strategy. Sanitary survey reports, triennial reevaluations, and annual updates must be completed as required under @.01 C.

(ii) The sample collection frequency of six (6) random samples per station per year specified under @.02 F. (6) (b) (iii) must resume at least six (6) months before an area is reactivated.

(iii) Before an area is reactivated, the results of the most recent thirty (30) samples must be reviewed and comply with the requirements under @.02 F.

(e) Remote Status. A growing area may be placed in the remote status if:

(i) A sanitary survey determines that the area has no human habitation, and is not impacted by any actual or potential pollution sources; and

(ii) The area is in the approved classification.

(f) Seasonally Remote/Approved Status. A growing area may be placed in a seasonally remote/approved status requiring two (2) water samples per year if the following criteria are met:

(i) The area is initially classified as approved;

(ii) The closure time period is defined; and

(iii) At least one (1) sample be taken upon reopening the area.

B. Approved Classification. Growing areas shall be classified as approved when the following criteria are met.

(1) Survey Required. A sanitary survey finds that the area is:

(a) Safe for the direct marketing of shellfish;

(b) Not subject to contamination from human or animal fecal matter at levels that, in the judgment of the Authority, presents an actual or potential public health hazard; and

(c) Not contaminated with:
(i) Pathogenic organisms;
(ii) Poisonous or deleterious substances;
(iii) Marine biotoxins; or
(iv) Bacteria concentrations exceeding the bacteriological standards for a growing area in this classification.

(2) Water Quality. The water quality in the growing area shall meet the bacteriological standards for an approved classification in Section @.02.

C. Conditional Classifications. Growing areas may be classified as conditional when the following criteria are met:

(1) Survey Required. The sanitary survey meets the following criteria:
(a) The area will be in the open status of the conditional classification for a reasonable period of time. The factors determining this period are known, are predictable, and are not so complex as to preclude a reasonable management approach;
(b) Each potential source of pollution that may adversely affect the growing area is evaluated;
(c) Microbiological water quality correlates with environmental conditions or other factors affecting the distribution of pollutants into the growing area; and
(d) For Authorities utilizing MSC meat sample data, this data correlates with environmental conditions or other factors affecting the distribution and persistence of viral contaminants into the growing area.

(2) Management Plan Required. For each growing area, a written management plan shall be developed and shall include:
(a) For management plans based on wastewater treatment plant function, performance standards that include:
(i) Peak effluent flow, average flow, and infiltration flow;
(ii) Microbiological quality of the effluent;
(iii) Physical and chemical quality of the effluent;
(iv) Conditions which cause plant failure;
(v) Plant or collection system bypasses;
(vi) Design, construction, and maintenance to minimize mechanical failure, or overloading;
(vii) Provisions for monitoring and inspecting the waste water treatment plant; and
(viii) Establishment of an area in the prohibited classification adjacent to a wastewater treatment plant outfall in accordance with Section E. Prohibited Classification;
(b) For management plans based on pollution sources other than waste water treatment plants:
(i) Performance standards that reliably predict when criteria for conditional classification are met; and
(ii) Discussion and data supporting the performance standards.
(c) For management plans based on WWSD function or pollution sources other than WWSD criteria that reliably predict when an area that was placed in the closed status because of failure to comply with its conditional management plan can be returned to the open status. The minimum criteria are:
(i) Performance standards of the plan are fully met;
(ii) Sufficient time has elapsed to allow the water quality in the growing area to return to acceptable levels;
(iii) Sufficient time has elapsed to allow the shellstock to reduce pathogens that might be present to acceptable levels. Studies establishing sufficient elapsed time shall document the interval necessary for reduction of coliform levels in the shellstock to

pre-closure levels. The study may establish criteria for reopening based on coliform levels in the water. The Authority may utilize MSC levels to establish that sufficient time has elapsed to allow the water quality to return to acceptable levels in growing areas adjacent to WWSD. Studies establishing sufficient elapsed time shall document the interval necessary for reduction of viral levels in the shellstock. Analytical sample results shall not exceed the MSC levels established in Chapter IV@.02 E. or pre-determined levels established by the Authority based on studies conducted on regional species under regional conditions. These studies may establish criteria for reopening based on viral levels in the shellfish meats or the area must be in the closed status until the event is over and twenty-one (21) days have passed; and

(iv) Shellstock feeding activity is sufficient to achieve microbial reduction.

(d) For management plans based on a risk assessment made in accordance with Chapter II. Risk Assessment and Risk Management, criteria that reliably determine when the growing area may be placed in the open status and shellfish may be harvested;

(e) For management systems based on marine biotoxins, the procedures and criteria that reliably determine when the growing area may be placed in the open status;

(f) Procedures for immediate notification to the Authority when performance standards or criteria are not met;

(g) Provisions for patrol to prevent illegal harvest; and

(h) Procedures to immediately place the growing area in the closed status in twenty-four (24) hours or less when the criteria established in the management plan are not met.

(3) Reevaluation of Conditional Classification.

(a) The classification shall be reevaluated at least once each year. The reevaluation shall include:

(i) Evaluation of compliance with the management plan;

(ii) Determination of adequacy of reporting of failure to meet performance standards;

(iii) Review of the cooperation of the persons involved;

(iv) Evaluation of water quality in the growing area with respect to the bacteriological standards for its classification;

(v) Field inspection of critical pollution sources, where necessary; and

(vi) Written findings, evaluations and recommendations.

(b) Water Sample Collection.

(i) When the conditional management plan is based on the absence of pollution from marinas for certain times of the year, monthly water samples are not required when the growing area is in the open status of its conditional classification provided that at least three (3) of the water samples collected to satisfy the bacteriological standard for the open status are collected when the growing area is in the open status.

(ii) When the conditional management plan is based on the operation and performance of a WWSD (s); combined sewer overflow(s); or other point sources of pollution, monthly water samples are required when the growing area is in the open status of its conditional classification.

(iii) If a monthly sample cannot be collected due to environmental constraints, the monthly sampling requirement will be satisfied if an additional water sampling run is conducted the following month.

(iv) When the conditional management plan is based on the effects of non-point sources of pollution, such as rainfall events, storm water runoff, and seasonal variations, a minimum of five (5) sets of water samples (when the Adverse Pollution Condition sampling regimen is used) or six (6) sets of water samples (when the Systematic Random Sampling regimen is used) are required. The samples shall be collected when the growing area is in the open status.

(v) When the conditional management plan is based on the effects of non-point sources of pollution, such as rainfall events or storm water runoff, and the area is in the open status for less than six (6) months a minimum of five (5) sets of water samples are required (Adverse Pollution Condition and Systematic Random Sampling). At least one (1) sample shall be collected each month the area is placed in the open status. This sample shall be collected while the area is open. If closed status samples are used to meet the minimum sample requirements only two (2) sets of samples may be utilized and they must have been taken within five (5) days of when the Authority anticipates that the area will be placed in the open status. For growing areas in the open status less than two (2) months, at least one (1) sample must be collected while the area is in the open status. Samples collected during the closed status to meet the minimum five (5) sets of water samples shall be applied to annual and triennial reevaluations of the area.

(vi) When the conditional management plan is based on the seasonal opening and closing of the area, and the area is in the open status for a predetermined period of less than six (6) months, a minimum of five (5) sets of water samples are required (Adverse Pollution Condition and Systematic Random Sampling). All samples shall be collected while the area is in the open status unless the Authority has historical water quality data to demonstrate that the area meets open status criteria while in the closed status. If closed status samples are used to meet the minimum sample requirements they must be collected within thirty (30) days prior to the area being placed in the open status.

(4) Understanding of and Agreement With the Purpose of the Conditional Classification and Conditions of Its Management Plan by All Parties Involved.

(a) The management plan shall be developed by the Authority in coordination with:

(i) The local shellfish industry;

(ii) The individuals responsible for the operation of any WWSDs involved; and

(iii) Any local or State agencies; and

(b) Failure of any one party to agree shall constitute sufficient justification to deny the application of the conditional classification to a growing area.

(5) Conditional Area Types. There are two (2) types of conditional areas:

(a) Conditionally approved; and

(b) Conditionally restricted.

(6) Conditionally Approved Classification. Any growing area in the conditionally approved classification shall:

(a) Meet the requirements for:

(i) An approved area classification when the conditionally approved classification is in the open status; and

(ii) A restricted or prohibited classification when the conditionally approved classification is in the closed status; and

(b) If the closed status meets the criteria for the restricted classification, designate in its management plan whether the shellstock may be harvested for relaying or depuration.

(7) Conditionally Restricted Classification. Any growing area in the conditionally restricted classification shall:

(a) Meet the requirements for:

(i) A restricted classification when the conditionally restricted classification is in the open status; and

(ii) A prohibited classification when the conditionally restricted classification is in the closed status; and

(b) Designate in its management plan whether the harvested shellstock are to be relayed or depurated.

D. Restricted Classification.

(1) General

(a) A growing area may be classified as restricted when:

(i) A sanitary survey indicates a limited degree of pollution; and

(ii) Levels of fecal pollution, human pathogens, or poisonous or deleterious substances are at such levels that shellstock can be made safe for human consumption by either relaying, depuration or low acid-canned food processing.

(b) The Authority shall have effective controls to assure that shellfish are harvested from restricted areas only:

(i) By special license; and

(ii) Under the supervision of the Authority.

(2) Water Quality. Water quality in the growing area shall meet the bacteriological standards in Section @.02 for a growing area in the restricted classification if the growing area is used for depuration.

(3) Shellstock Quality Criteria. The Authority shall establish shellstock quality criteria for use in placing an area in the restricted classification. Depending on the treatment process to be applied to the shellstock, the criteria shall be established in accordance with:

(a) Chapter V. Shellstock Relaying; or

(b) Chapter XV. Depuration.

E. Prohibited Classification.

(1) Exception. The prohibited classification is not required for harvest waters within or adjacent to marinas. The Authority, however, may use the prohibited classification for these waters.

(2) General. The Authority shall:

(a) Not permit the harvest of shellstock from any area classified as prohibited, except for the gathering of seed or nursery culture for aquaculture or the depletion of the areas classified as prohibited; and

(b) Ensure that shellstock removed from any growing area classified as prohibited is effectively excluded from human consumption unless it is seed to be cultured as outlined in the NSSP Model Ordinance Chapter VI. Shellfish Aquaculture @.02 Seed Shellstock.

(3) Sanitary Survey. A growing area shall be classified as prohibited if:

(a) No current sanitary survey exists;

(b) A sanitary survey determines:

(i) The growing area is adjacent to a sewage treatment plant outfall or other point source outfall with public health significance;

(ii) Pollution sources may unpredictably contaminate the growing area;

(iii) The growing area is contaminated with fecal waste so that the shellfish may be vectors for disease microorganisms;

(iv) The concentration of biotoxin is sufficient to cause a public health risk as identified in Section @ .04. or

(v) The area is contaminated with poisonous or deleterious substances causing the shellfish to be adulterated.

(4) Risk Assessment. A growing area shall be classified as prohibited if a risk assessment performed in accordance with Chapter II. Risk Assessment and Risk Management indicates the shellstock are not safe for human consumption.

(5) Wastewater Discharges.

(a) An area classified as prohibited shall be established adjacent to each sewage treatment plant outfall or any other point source outfall of public health significance.

(b) The determination of the size of the area to be classified as prohibited adjacent to each outfall shall include the following minimum criteria:

(i) The volume flow rate, location of discharge, performance of the wastewater treatment plant and the microbiological quality of the effluent. The Authority may utilize MSC waste water sample data in the determination of the performance of the sewage treatment plant;
(ii) The decay rate of the contaminants of public health significance in the wastewater discharged;
(iii) The wastewater's dispersion and dilution, and the time of waste transport to the area where shellstock may be harvested; and
(iv) The location of the shellfish resources, classification of adjacent waters and identifiable landmarks or boundaries.

F. FDA is responsible for the classification of growing areas in Federal waters. Federal waters are classified as Approved for shellfish harvesting unless such areas are known to be polluted (i.e., microbiological, chemical, or marine biotoxin hazards) and involve commercial shellfish resources.

Additional Guidance: Section IV. Guidance Documents Chapter II. Section .02

@.04 Marine Biotoxin Control

A. Contingency Plan.

(1) The Authority shall develop and adopt a marine biotoxin contingency plan for all marine and estuarine shellfish growing areas addressing the management of PSP, ASP, NSP, diarrhetic shellfish poisoning (DSP) and azaspiracid shellfish poisoning (AZP) in the event of the emergence of a toxin-producing phytoplankton that has not historically occurred or an illness outbreak caused by marine biotoxins.
(2) The plan shall define the administrative procedures and resources necessary to accomplish the following:
(a) Initiate an emergency shellfish sampling and assay program;
(b) Close growing areas and embargo shellfish;
(c) Prevent harvesting of contaminated species;
(d) Provide for product recall;
(e) Disseminate information on the occurrences of toxic algal blooms and/or toxicity in shellfish meats to adjacent States, shellfish industry, and local health agencies;
(f) Coordinate control actions taken by Authorities and Federal agencies; and
(g) Establish reopening criteria including the number of samples over what period of time.

NOTE: The plan may include other requirements, as deemed necessary by the Authority in the State of landing, to ensure adequate public health protection under the NSSP.

Additional Guidance: Section IV. Guidance Documents Chapter II. Section .06

B. Marine Biotoxin Management Plan.

In those areas that have been implicated in an illness outbreak or where toxin-producing phytoplankton are known to occur and the toxins are prone to accumulate in shellfish, and when appropriate at those times when marine biotoxins can be reasonably predicted to occur, representative samples of the water may be collected and shellfish shall be collected during harvest periods. The samples shall be collected from indicator stations at intervals determined by the Authority. Water samples may be assayed for the presence of toxin-producing

phytoplankton and shellfish meat samples shall be assayed for the presence of toxins.

NOTE: In situations in which the toxin of concern has an established cell count standard, such as *Karenia brevis*, water and shellfish samples would not be required. Management decisions could be made on either water or shellfish sampling results.

(1) The Authority shall develop and adopt a marine biotoxin management plan for all marine and estuarine shellfish growing areas if there is a history of biotoxin closures related to PSP, ASP, NSP, DSP, or AZP; if toxin-producing phytoplankton are known to occur in the growing area; or a reasonable likelihood that biotoxin closures could occur.
(2) The plan shall define the administrative procedures and resources necessary to accomplish the following:

(a) Maintain a routine shellfish sampling and assay program including;

i. Establishment of appropriate shellfish screening levels;
ii. Establishment of appropriate shellfish screening and testing methods;
iii. Establishment of appropriate laboratories/analysts to conduct shellfish screening and testing methods;
iv. Establishment of a sampling plan for both (i) and (ii) above; and
v. Other controls as necessary to ensure that shellstock are not harvested when levels of marine biotoxins meet or exceed the established criteria in Section C.

(b) Close growing areas and embargo shellfish;
(c) Prevent harvesting of contaminated species;
(d) Provide for product recall;
(e) Disseminate information on the occurrences of toxic algal blooms and/or toxicity in shellfish meats to adjacent States, shellfish industry, and local health agencies;
(f) Coordinate control actions taken by Authorities and Federal agencies; and
(g) Establish reopening criteria.

(3) The Authority may use precautionary closures based on screening or phytoplankton sample results as defined in their marine biotoxin management program. Precautionary closures may be lifted immediately:

(a) if confirmatory testing using an approved method shows the level of biotoxin present in shellfish meats is not equal to or above established criteria in Section C; or
(b) when screening or phytoplankton sample results indicate that the precautionary closure was not necessary.

(4) Except that the Authority shall classify as prohibited any growing areas where shellfish are so highly or frequently affected by marine biotoxins or so remote that adequate sampling cannot be achieved and thus the situation cannot be safely managed, the presence of marine biotoxins shall not affect the classification of the shellfish growing area under Section @.03. The Authority may use the conditionally approved classification for areas affected by marine biotoxins.
(5) The plan may include agreements or memoranda of understanding, between the Authority and individual shellfish harvesters or individual shellfish dealers, to allow harvesting in designated parts of a State growing area while other parts of the same growing area are placed in the closed status. Such controlled harvesting shall be conducted with strict assurances of safety. In State growing areas or designated portions of State growing waters that are closed, the Authority may allow for harvesting if an end product testing program is developed and samples of each lot are tested and found to be

below the action levels specified in Section C.

The program must include at a minimum:

(a) Establishment of appropriate pre-harvest screening levels;

(b) Establishment of appropriate screening and end product testing methods;

(c) Establishment of appropriate laboratories/analysts to conduct screening and end product testing methods;

(d) Establishment of representative sampling plan for both (a) and (b) above;

(e) Disposal of shellfish should end product test results meet or exceed established criteria specified in Section C; and

(f) Other controls as necessary to ensure that shellstock are not released prior to meeting all requirements of the program.

(6) Prior to allowing the landing of shellfish harvested from Federal waters where routine monitoring of toxin levels is not conducted, in addition to following State requirements in the Model Ordinance, the State Authority in the landing State, in cooperation with appropriate Federal agencies, shall develop agreements or memoranda of understanding between the Authority and individual shellfish harvesters or individual shellfish dealers. The agreements or memoranda of understanding shall provide strict safety assurances. At a minimum agreements or memoranda of understanding shall include provisions for:

(a) Harvest permit requirements;

(b) Training for individuals conducting onboard toxicity screening using NSSP methods;

(c) Vessel monitoring;

(d) Identification of shellfish for each harvesting trip to include:

(i) Vessel name and owner;

(ii) Captain's name;

(iii) Person conducting onboard screening tests;

(iv) Port of departure name and date;

(v) Port of landing name and date;

(vi) Latitude and longitude coordinates of designated harvest area;

(vii) Onboard screening test results;

(viii)Volume and species of shellfish harvested;

(ix) Intended processing facility name, address and certification number; and

(x) Captain's signature and date;

(e) Pre-harvested (onboard) sampling that includes a minimum of five (5) samples from the intended harvest area be tested for toxins that are likely to be present harvesting shall not be permitted if any of the pre-harvested samples contain toxin levels in excess of half of the established criteria listed in Chapter IV@.04(1) (e.g., 44 µg/l00 g when using a quantitative test or a positive at a limit of detection of 40 µg/100 g for the qualitative screening test for PSP toxins);

(f) Submittal of onboard screening homogenates and test results to the Authority in the State of landing;

(g) The collection of a minimum of seven (7) dockside samples by the Authority or designee and the testing of those samples for toxins using an NSSP method by an NSSP conforming laboratory; the Authority may require more samples based on the size of the vessel and the volume of shellfish harvested;

(h) Holding and providing separation until dockside samples verify that toxin levels are below the established criteria (e.g., 80 µg/100 g for PSP toxins);

(i) Disposal of shellfish when dockside test results meet or exceed the established criteria in Chapter IV@.04C.(1) (e.g., 80 µg /100 g for PSP toxins);

(j) Notification prior to unloading;
(k) Unloading schedule;
(l) Access for Dockside Sampling;
(m) Record Keeping; and
(n) Early Warning/Alert System.

NOTE: The plan may include other requirements, as deemed necessary by the Authority in the State of landing, to ensure adequate public health protection under the NSSP.

C. Closed Status of Growing Areas.
(1) A growing area, or portion(s) thereof as provided in Section A.(4), shall be placed in the closed status for the taking of shellstock when the Authority determines that the number of toxin-forming organisms in the growing waters and/or the level of biotoxin present in shellfish meats is sufficient to cause a health risk. The closed status shall be established based on the following criteria:
(a) PSP - 80 µg saxitoxin equivalents/100 grams
(b) NSP - 5,000 cells/L or 20 MU/100 grams (0.8 mg brevetoxin-2 equivalents/kg)
(c) AZP - 0.16 mg azaspiracid-1 (AZA-1) equivalents/kg (0.16 ppm)
(d) DSP – 0.16 mg okadaic acid (OA) equivalents/kg (0.16 ppm)
(e) ASP - 2 mg domoic acid/100 grams (20 ppm)
(2) For any marine biotoxin producing organism for which criteria have not been established under this Ordinance, either cell counts in the water column or biotoxin meat concentrations may be used by the Authority as the criteria for not allowing the harvest of shellstock.
(3) When sufficient data exist to establish that certain shellfish species can be safely exempted from the marine biotoxin management plan, the closed status for harvesting may be applied selectively to some shellfish species and not others.
(4) The closed status shall remain in effect until the Authority has data to show that the toxin content of the shellfish in the growing area is below the level established for closing the area.
(5) The determination to return a growing area to the open status shall consider whether toxin levels in the shellfish from adjacent areas are declining.
(6) The analysis upon which a decision to return a growing area to the open status is based shall be adequately documented.

D. Heat Processing. If heat processing is practiced, a control procedure shall be developed. This procedure shall define the following:
(1) Toxicity limits for processing;
(2) Controls for harvesting and transporting the shellstock to processor;
(3) Special marking for unprocessed shellstock;
(4) Scheduled processes; and
(5) End product controls on the processed shellfish.

E. Records. The Authority shall maintain a copy of all of the following records.
(1) All information, including monitoring data, relating to the levels of marine biotoxins in the shellfish growing areas;
(2) Copies of notices placing growing areas in the closed status;
(3) Evaluation reports; and
(4) Copies of notices returning growing areas to the open status.

@.05 Marinas

A. Marina Proper. The area within any marina which is in or adjacent to a shellstock growing area shall be classified as:
   (1) Conditionally approved;
   (2) Conditionally restricted; or
   (3) Prohibited.

B. Adjacent Waters. Waters adjacent to marina waters classified under Section A. may be impacted by pollution associated with the marina.
   (1) A dilution analysis shall be used to determine if there is any impact to adjacent waters.
   (2) The dilution analysis shall be based on the volume of water in the vicinity of the marina.
   (3) The dilution analysis shall incorporate the following:
      (a) A slip occupancy rate for the marina;
      (b) An actual or assumed rate of boats which will discharge untreated waste;
      (c) An occupancy per boat rate (i.e., number of persons per boat);
      (d) A fecal coliform discharge rate of 2 x 10 fecal coliform per ninth power per day; and
      (e) The assumption that the wastes are completely mixed in the volume of water in and around the marina.
   (4) If the dilution analysis predicts a theoretical fecal coliform loading greater than fourteen (14) fecal coliform MPN per 100 ml, the waters adjacent to the marina shall be classified as:
      (a) Conditionally approved;
      (b) Restricted;
      (c) Conditionally restricted; or
      (d) Prohibited.
   (5) If the dilution analyses predict a theoretical fecal coliform loading less than or equal to fourteen (14) fecal coliform MPN per 100 ml, the waters adjacent to the marina may be classified as:
      (a) Approved; or
      (b) Conditionally approved.
   (6) If the Authority chooses not to determine a specific occupancy per boat rate by investigation in specific areas or sites, the Authority shall assume a minimum occupancy rate of two (2) persons per boat.

Chapter V. Shellstock Relaying

Additional Guidance: Section IV. Guidance Documents Chapter II. Growing Areas .10 Shellstock Relay

Requirements for the Authority

[**Note:** The Authority must meet the requirements of this section even if the Authority does not formally adopt this section in regulation.]

@.01 General

The Authority shall assure that:

A. The shellstock used in relaying activities is harvested from growing areas classified as conditionally approved, restricted, or conditionally restricted;
B. The level of contamination in the shellstock can be reduced to levels safe for human consumption;
C. The contaminated shellstock are held in growing areas classified as approved or conditionally approved for a sufficient time under adequate environmental conditions so as to allow reduction of pathogens as measured by total coliform or fecal coliform, or poisonous or deleterious substances that may be present in shellstock. For shellstock harvested from areas impacted by WWSD, MSC may be used as a measure for viral reduction that may be present in shellstock; and
D. If shellstock are relayed in containers:
    (1) The containers are:
        (a) Designed and constructed so that they allow free flow of water to the shellstock; and
        (b) Located so as to assure the contaminant reduction required in Section C.; and
    (2) The shellstock are washed and culled prior to placement in the containers.

@.02 Contaminant Reduction

A. The Authority shall establish species-specific critical values for water temperature, salinity, and other environmental factors which may affect the natural treatment process in the growing area to which shellstock will be relayed. The growing area to be used for the treatment process shall be monitored with sufficient frequency to identify when limiting critical values may be approached.
B. The effectiveness of species-specific contaminant reduction shall be determined based on a study. The study report shall demonstrate that, after the completion of the relay activity:
    (1) The microbiological quality of each shellfish species is the same microbiological quality as that of the same species already present in the approved or conditionally approved area; or
    (2) Contaminant levels of poisonous or deleterious substances in shellstock do not exceed FDA tolerance levels; or
    (3) When the source growing area is impacted by WWSD, the viral quality of each shellfish

species meets the MSC levels established in Chapter IV@.02 E. or pre-determined levels established by the Authority based on studies conducted on regional species under regional conditions.

C. The Authority may waive the requirements for a contaminant reduction study if:
   (1) Only microbial contaminants need to be reduced; and
   (2) The shellstock are relayed from a conditionally approved, restricted, or conditionally restricted area meeting the bacteriological water quality for restricted areas used for shellstock depuration per Chapter IV. @.02 G. and Chapter IV. @.02 H.; and
   (3)The treatment period exceeds sixty (60) days.

D. The time period shall be at least fourteen (14) consecutive days when environmental conditions are suitable for shellfish feeding and cleansing unless shorter time periods are demonstrated to be adequate.

E. When container relaying is used and the Authority allows a treatment time of less than fourteen (14) days, the Authority shall require more intensive sampling including:
   (1) Product sampling before and after relay;
   (2) Monitoring of critical environmental parameters such as temperature and salinity; and
   (3) For Authorities using MSC, monitoring before and after relay for shellstock relayed from areas impacted by WWSD.

F. The Authority shall establish the time period during the year when relaying may be conducted.

@.03 Licenses to Relay Shellstock or to Harvest Shellstock for Delivery to a Low Acid Canned Food Processing Facility

A. The Authority shall require that each harvester that relays or harvests shellstock for delivery to a low acid canned food processing facility from growing areas in the conditionally approved (in the closed status), restricted or conditionally restricted classification possesses a valid harvester or relay license.

B. The license conditions shall not be transferable.

C. A license shall be valid only when issued for:
   (1) A specific relay or harvest activity; and
   (2) Not more than 365 days.

D. The license conditions shall include:
   (1) The source, destination, and species to be relayed or harvested for low acid canned food processing;
   (2) The relayed or harvested for low acid canned food processing shellstock deposition method;
   (3) The method used to maintain adequate separation between different lots of shellfish;
   (4) A requirement for the licensee to keep records which:
      (a) Specify the dates on which the shellstock is harvested, deposited for treatment and harvested again, or delivered to a low acid canned food processing facility;
      (b) Identify the buyer and quantity of shellstock harvested for relaying or delivery to a low acid canned food processing facility; and
      (c) Are submitted to the Authority at a specified frequency, if required by the Authority, or made available to the Authority upon request; and
   (5) A provision for additional information at the discretion of the Authority.

E. If the relay harvester or harvester for low acid canned food processing fails to comply with the conditions of the license, the Authority shall revoke the license.

@.04 Management of Relaying Shellstock or the Harvesting for Delivery to a Low Acid Canned Food Processing Facility Activities

A. The Authority shall be authorized and equipped to enforce the State's procedures for relay and low acid canned food processing. The Authority shall develop and maintain an effective program to control the harvest, transport, replanting, and security of the shellstock until the end of the complete relay activity to prevent shellstock from being illegally diverted to direct marketing.
B. In the event that the control of relaying or harvesting for low acid canning activities is shared among two (2) or more agencies, the Authority shall develop written operating procedures for joint use among the agencies. These procedures shall provide for the achievement of all requirements specified in this Chapter and shall be reviewed annually and updated as necessary.
C. If shellstock from growing areas classified as conditionally approved or restricted are to be relayed or harvested for low acid canned food processing across State boundaries, a memorandum of understanding outlining the procedures to be used shall be developed between the appropriate Authorities in each State.
D. If a growing area in the conditionally approved classification meets the criteria for the restricted classification when the growing area is in the closed status, the Authority may permit shellstock to be harvested for relaying or low acid canned food processing during the period the area is in its closed status, provided that these activities are addressed in the management plan for the growing area classified as conditionally approved, and all other conditions of this Chapter are met.
E. Locations designated to receive relayed shellstock within growing areas which are classified as approved or conditionally approved shall:
    (1) Be placed in the closed status until the period of treatment is complete and the Authority returns the area to the open status; and
    (2) Be marked so that these areas are easily identified by harvesters transporting the relayed shellstock and by the Authority. These areas shall:
        (a) Be marked prior to the placing of any shellstock;
        (b) Remain marked until the Authority reopens the area and gives written permission to harvest shellstock; and
        (c) Be adequately separated from the shellstock in adjacent waters to prevent cross-contamination and commingling.

Requirement for Harvesters

.01 Harvester License Required

A. Any person who wants to relay shellstock or to harvest shellstock from a growing area classified as conditionally approved, restricted, or conditionally restricted shall make application to the Authority for a valid license to relay or to harvest shellstock.
B. No person shall relay shellstock or shall harvest shellstock for low acid canned food processing without a valid harvester license from the Authority.

Chapter VI. Shellfish Aquaculture

Requirements for the Authority

[Note: The Authority must meet the requirements of this section even if the Authority does not formally adopt this section in regulation.]

@ .01 General

A. Aquaculture activities which may pose a significant public health concern and are regulated in this Chapter include, but are not limited to:
   (1) Seed production in waters classified as Prohibited or Unclassified;
   (2) Aquaculture structures that attract birds or mammals; and
   (3) Land based aquaculture.

B. The Authority shall:
   (1) Approve the written operational plan for operations as outlined in @.01A above;
   (2) Inspect operations outlined in @.01A above at least annually; and
   (3) At a minimum inspect operator records to verify that appropriate permits are up to date and operational plans required in @ .01 A (1). are being implemented.
   (4) Consistent with Chapter IV @ .01 D(1)(e) when aquaculture as defined in the Model Ordinance attracts birds or mammals, their presence should be considered for possible adverse effects on growing area water quality.

@ .02 Seed Shellstock

A. The Authority shall establish the maximum seed size for each species of shellfish that can be produced in prohibited waters. In determining the maximum seed size Authorities shall establish sizes that require a minimum of 120 days of growing to reach market size.
B. The Authority shall establish appropriate corrective actions for when seed exceeds the maximum seed size when it has been produced in waters classified as prohibited.
C. All sources of seed produced or collected in prohibited waters shall be sanctioned by the Authority.

@.03 Aquaculture in Federal Waters

A. Federal Agency Responsibilities. Once the appropriate permits for the construction of the aquaculture facility have been obtained,
   (1) NOAA is responsible for establishing a contract, in consultation with FDA, with the aquaculture facility describing requirements of the NSSP including:
      (a) the frequency with which NOAA will audit the aquaculture facility and vessels;
      (b) testing requirements of the aquaculture facility; and
      (c) the generation of product identification for traceability (i.e., tag numbers); and
   (2) FDA is responsible for reviewing the aquaculture facility operational plan prior to the start of operations, as well as the annual inspection of records, to ensure adherence to NSSP requirements. FDA is also responsible for the classification of the growing area(s) associated with the aquaculture facility.

Requirements for the Harvester/Dealer

.01 Exceptions

Hatcheries and nurseries rearing larvae and/or seed that are located in:

A. Approved or conditionally approved growing areas are exempt from these requirements; or
B. Restricted or Conditionally Restricted would be exempt from these requirements but subject to relay requirements in Chapter V for seed that exceeds the maximum seed size established by the Authority.

.02 General

A. Any person who performs aquaculture as defined in the Model Ordinance or operates an aquaculture facility to raise shellfish for human consumption shall obtain:
   (1)A permit from the Authority for the activity and functioning of his facility;
   (2)A harvester's license; and
   (3)Certification as a dealer, where necessary.
B. Shellfish aquaculture as defined in the Model Ordinance shall be practiced only in strict compliance with the provisions of the permit issued by the Authority for the aquaculture activity. Authorization shall be based on the operator's written operational plan.
C. Prior to beginning his activity, an operator shall obtain the permission of the Authority for use of his facility.
D. Any shellfish seed raised in aquaculture that exceeds the maximum seed size established by the Authority shall be subjected to relaying or depuration prior to direct marketing if the culture area or facility is located in or using water which is in:
   (1)The closed status of the conditionally approved classification;
   (2)The restricted classification; or
   (3)The open status of the conditionally restricted classification.
E. Only drugs sanctioned by the FDA shall be used for shellfish treatment.
F. Harvesting, processing, storage, and shipping requirements for shellfish raised in a land-based aquaculture facility or a seed rearing facility or system that exceeds the maximum seed size established by the Authority shall be the same as the requirements for shellfish specified in Chapters V., VII., VIII., IX., X., XI., XII., XIII. and XIV.
G. Complete and accurate records shall be maintained for at least two (2) years by the operator of the aquaculture facility and shall include the:
   (1)Source of shellfish, including seed if the seed is from growing areas which are not in the approved or conditionally approved classification; and
   (2)Water source, its treatment method, if necessary, and its quality in land based systems.

.03 Seed Production in Water Classified as Prohibited or Unclassified

Seed may come from any growing area, or from any growing area in any classification, provided that:

A. The source of the seed, if from waters classified as prohibited or unclassified, is sanctioned by the Authority; and
B. Operational Plan. Each aquaculture site that cultures seed in waters classified as prohibited or unclassified shall have a written operational plan. The plan shall be approved by the Authority prior

to its implementation and shall include:

(1) A description of the design and activities of the culture facility;
(2) The specific site and boundaries in which shellfish aquaculture activities will be conducted;
(3) The types and locations of any structures, including rafts, pens, cages, nets, or floats which will be placed in the waters;
(4) The species of shellfish to be cultured and harvested;
(5) Procedures to assure that no poisonous or deleterious substances are introduced from the seed production activities; and
(6) Corrective actions for addressing seed exceeding the maximum seed size as defined by the Authority.

.04 Aquaculture That Attracts Birds or Mammals

A. Operational Plan. Each aquaculture site that the Authority determines may attract sufficient birds and/or mammals that their waste presents a human health risk shall have a written operational plan. The plan shall be approved by the Authority prior to its implementation and shall include:

(1) A description of the design and activities of the culture facility;
(2) The specific site and boundaries in which shellfish aquaculture activities will be conducted;
(3) The types and locations of any structures, including rafts, pens, cages, nets, or floats which will be placed in the waters;
(4) The species of shellfish to be cultured and harvested;
(5) Procedures to assure that no poisonous or deleterious substances are introduced from the aquaculture activities; and
(6) Maintenance of the required records.

.05 Land Based Aquaculture

A. Operational Plan. Each facility shall have a written operational plan. The facility must obtain approval from the Authority prior to its implementation and shall include:

(1)A description of the design and activities of the culture facility;
(2)The specific site and boundaries in which shellfish culture activities will be conducted;
(3)The types and locations of any structures, including rafts, pens, cages, nets, tanks, ponds, or floats which will be placed in the waters;
(4)The species of shellfish to be cultured and harvested;
(5)Procedures to assure that no poisonous or deleterious substances are introduced into the activities;
(6)A program of sanitation, maintenance, and supervision to prevent contamination of the shellfish products;
(7)A description of the water source, including the details of any water treatment process or method;
(8)A program to maintain water quality, which includes collection of microbial water samples and their method of analysis and routine temperature and salinity monitoring (the bacterial indicator monitored shall be the same as used for monitoring growing areas);
(9)If applicable, collection of data concerning the quality of food production (algae or other) used in the artificial harvest system; and
(10) Maintenance of the required records.

B. Each land-based facility conducting aquaculture as defined by the Model Ordinance shall maintain the following records while the aquaculture activity continues:

(1) Construction and remodeling plans for any permitted aquaculture facility;
(2) Aquaculture operational plans; and
(3) Aquaculture permits.

C. Water Systems.
If the land-based aquaculture system is of continuous flow through design, water from a growing area classified as approved, or in the open status of the conditionally approved classification at all times shellfish are held, may be used without treatment.

D. Water Quality.
(1) Shellstock cultured in a closed or recirculating system that exceeds the maximum seed size and meets the requirements for water quality and testing in Chapter VII C. .04 (3) (a), (b), (c), and (d) may be used in direct marketing.
(2) Shellstock cultured in a closed or recirculating system that exceeds the maximum seed size and does not meet the requirements for water quality and testing in Chapter VII C. .04 (3) (a), (b), (c), and (d) shall be relayed or depurated consistent with Chapter IV prior to direct marketing.

.06 Polyculture Systems

A polyculture system shall:

A. Meet all requirements in Section .05 Land Based Systems;
B. Provide information concerning all sources and species of all organisms to be cultivated, cultured, and harvested; and
C. Include in its operational plan requirements to:
(1) Monitor for human pathogens, unacceptable levels of animal drugs, and other poisonous or deleterious substances that might be associated with polyculture activities; and
(2) Subject all harvested shellstock to relaying or depuration if human pathogens, unacceptable levels of animal drugs, and other poisonous or deleterious substances exist at levels of public health significance.

.07 Requirements for the Harvester in Aquaculture in Federal Waters

A. Prior to beginning any aquaculture activities, the person who performs aquaculture or operates an aquaculture facility to raise shellfish in Federal waters for human consumption shall obtain the appropriate permission(s) from Federal agencies as described in @.03.
B. Operational Plan. Each aquaculture facility shall have a written operational plan as described for Land Based Aquaculture in Section II Chapter VI .05(A). The operational plan shall also include:
(1) Description of harvest, tagging, handling, storage, transportation, and landing procedures;
(2) Description of a marine biotoxin management and contingency plan (Section II Chapter IV @.04) to include marine biotoxin sampling consistent with Section II Chapter IV @.04(B)(6) and ensure product segregation and control until biotoxin results confirm the shellfish do not contain biotoxins equal to or exceeding criteria established in Section IV Chapter II .08.;
(3) Description of a contingency in the event of an emergency situation or condition (e.g., sewage or oil spills); and
(4) Procedures for implementing product recalls.
C. Each aquaculture facility shall obtain a review from the FDA to ensure adherence to NSSP requirements prior to its implementation. If the aquaculture facility makes changes to the

operational plan, they shall obtain a new review from the FDA to ensure adherence to the NSSP requirements.

Chapter VII. Wet Storage in Approved and Conditionally Approved Growing Areas

Requirements for the Authority

[Note: The Authority must meet the requirements of this section even if the Authority does not formally adopt this section in regulation.]

@ .01 General

A. The Authority shall permit all wet storage activities to ensure that all wet storage activities are conducted by certified NSSP shellfish firms.
B. The Authority shall approve and maintain the following records while the wet storage activity continues:
    (1) Construction and remodeling plans for any permitted wet storage facility;
    (2) Wet storage operational plans;
    (3) Wet storage permits; and
    (4) Inspection documentation.
C. The Authority shall inspect wet storage activities at the following frequency:
    (1) Activities in offshore natural bodies of water at least annually;
    (2) Activities at land-based sites with flow-through systems at least every six (6) months; and
    (3) Activities at land-based sites with recirculating systems semi-annually.
D. The Authority shall immediately notify (within twenty-four (24) hours) all wet storage permit holders affected by a change in growing area classification or status.
E. Reshippers shall not engage in wet storage activities.

Requirements for the Dealer

.01 Source of Shellstock

A. Dealers shall wet store shellstock harvested only from areas classified as approved, or conditionally approved, in the open status.
B. Shellstock shall be harvested, identified and shipped to the wet storage activity in accordance with the requirements of Chapters VIII. and IX.

.02 General

A. Wet storage may be used to store, condition, remove sand or to add salt to shellstock. Wet storage shall be deemed a processing activity.
B. Wet storage of depurated product shall occur only within the facility in which it was depurated. The shellstock shall be packed and labeled according to the requirements in Chapter XV.

C. Wet storage shall be practiced only by a dealer in strict compliance with the provisions in the written approval for the wet storage activity given by the Authority.
D. While awaiting placement in a wet storage activity, shellstock shall be protected from physical, chemical or thermal conditions which may compromise shellstock survival, quality or activity during wet storage.
E. Conditions and water quality during wet storage shall be sufficient to minimize the potential for compromising the sanitary quality of the shellstock during storage.
F. Shellstock from a wet storage activity shall be harvested, handled, identified, processed and shipped according to the requirements of Chapters VIII., IX., and X.
G. The wet storage operator shall keep complete and accurate records to enable a lot of shellstock to be traced back to the original harvest location and wet storage location, and include the dates the shellstock were held in wet storage. The records shall be maintained for a minimum of one (1) year.
H. Unless the dealer is in the Authority's commingling plan under Chapter I. .01 G., different lots of shellfish shall not be commingled during wet storage. If more than one (1) lot of shellstock is being held in wet storage at the same time, the identity of each lot of shellstock shall be maintained.

.03 Wet Storage Sites in Natural Bodies of Water (Offshore)

A. Natural bodies of waters used for wet storage shall meet the requirements for classification as approved or conditionally approved while shellstock is being held in storage. Areas classified as conditionally approved may be used only when in the open status. When an area classified as conditionally approved is placed in a status other than its open status, any shellstock in wet storage in that area shall be:
    (1) Subjected to relaying or depuration prior to human consumption; or
    (2) Held in the wet storage site until the area is returned to the open status.
B. Site evaluations of natural bodies of water shall include:
    (1) The sanitary survey of the storage site, with special consideration of potential intermittent sources of pollution;
    (2) The location of storage sites and/or floats;
    (3) The examination of the construction of shellstock containers, if used, to ensure the free flow of water to all shellstock; and
    (4) A review of the operation's plan and operating procedures for an offshore activity as submitted by the dealer.
C. Different lots of shellstock shall not be commingled in wet storage. If more than one (1) lot of shellstock is held in wet storage at the same time, the identity of each lot of shellstock shall be maintained.

.04 Wet Storage in Artificial Bodies of Water (Land-Based)

A. General
    (1) If the dealer chooses to practice wet storage in artificial bodies of water, the dealer shall meet the requirements of Chapter VII. .01 and .02.
    (2) For the purpose of permitting, each wet storage site or activity shall be evaluated in accordance with @.01. B. The evaluation shall include a review of the plan and operating procedures for conducting land-based wet storage activity as submitted by the dealer.

(3) The wet storage facility evaluation shall include a review of:

(a) The purpose of the wet storage activity such as holding, conditioning or increasing the salt content of shellstock;

(b) Any species specific physiological factors that may affect design criteria; and

(c) The plan giving the design of the land-based wet storage facility, source and quantity of process water to be used for wet storage, and details of any process water treatment (disinfection) system.

B. Operation Specifications.

(1) General. Each land-based wet storage activity shall meet the following design, construction, and operating requirements.

(a) Effective barriers shall be provided to prevent entry of birds, animals, and vermin into the area.

(b) Storage tanks and related plumbing shall be fabricated of safe material and shall be easily cleanable. This requirement shall include:

(i) Tanks constructed so as to be easily accessible for cleaning and inspection, self-draining and fabricated from nontoxic, corrosion resistant materials; and

(ii) Plumbing designed and installed so that it can be cleaned and sanitized on a regular schedule, as specified in the operating procedures.

(c) Storage tank design, dimensions, and construction are such that adequate clearance between shellstock and the tank bottom shall be maintained.

(d) Shellstock containers, if used, shall be designed and constructed so that the containers allow the free flow of water to all shellstock within a container.

(2) Outdoor Tank Operation. When the wet storage activity is outdoors or in a structure other than a building, tank covers shall be used. Tank covers shall:

(a) Prevent entry of birds, animals or vermin; and

(b) Remain closed while the system is in operation except for periods of tank loading and unloading, or cleaning.

C. Wet Storage Source Water

(1) General.

(a) Except for wells, the quality of the surface source water prior to treatment shall meet, at a minimum, the bacteriological standards for the restricted classification. Water classified as Prohibited or Conditionally Restricted when in the Closed Status shall not be used as source water.

(b) Any well used as source water for wet storage shall meet the requirements of Chapter XI. .02 (with the exception of the salt content in salt water wells).

(c) Except when the source of the water is a growing area in the approved classification, a water supply sampling schedule shall be included in the dealer's operating procedures and water shall be tested according to the schedule.

(d) Results of water samples and other tests to determine the suitability of the source water supply shall be maintained for at least two (2) years.

(e) Disinfection or other water treatment such as the addition of salt cannot leave residues unless they are Generally Recognized as Safe (GRAS) and do not interfere with the shellstock survival, quality or activity during wet storage.

(f) Disinfected process water entering the wet storage tanks shall have no detectable levels of the coliform group as measured by a recognized multi-tube MPN test per 100 ml for potable water and acceptable for use with marine water and follow the protocol of the Decision Tree (Section IV. Guidance Documents Chapter III. .05)

(g) When the laboratory analysis of a single sample of disinfected process water entering the wet storage tanks shows any positive result for the coliform group daily sampling shall be

immediately instituted until the problem is identified and eliminated.

(h) When the problem that is causing disinfected process water to show positive results for the coliform group is eliminated, the effectiveness of the correction shall be verified on the first operating day following correction through the collection, over a twenty-four (24) hour period, of a set of three (3) samples of disinfected process water.

(i) For water that is disinfected by ultra-violet treatment, turbidity shall not exceed twenty (20) nephelometric turbidity units (NTUs) measured in accordance with *Standard Methods for the Examination of Water and Wastewater*, APHA.

(j) The disinfection unit(s) for the process water supply shall be cleaned and serviced as frequently as necessary to assure effective water treatment.

(2) Continuous Flow-through System.

(a) If the system is of continuous flow-through design, water from a growing area classified as:

(i) Approved may be used, without disinfection, in wet storage tanks provided that the near shore water source used for supplying the system meets the approved classification bacteriological criteria at all times that shellstock are being held in wet storage; or

(ii) Conditionally Approved in the Closed Status, Restricted or Conditionally Restricted in the Open Status may be used if the source water is continuously subjected to disinfection and it is sampled and analyzed daily following disinfection.

(b) When a source classified as Conditionally Approved in the Closed Status, Restricted or Conditionally Restricted in the Open Status is used, a study shall be required to demonstrate that the disinfection system can consistently produce water that tests negative for the coliform group under normal operating conditions. The study shall:

(i) Include five (5) sets of three (3) samples from each disinfection unit collected for five (5) consecutive days at the outlet from the disinfection unit or at the inlet to at least one (1) of the wet storage tanks served by the disinfection system;

(ii) Include one (1) sample daily for five (5) consecutive days from the source water prior to disinfection;

(iii) Use NSSP recognized methods to analyze the samples if determining coliform levels;

(iv) Require all samples of disinfected water to be negative for the coliform group; and

(v) Be repeated if any sample of disinfected process water during the study is positive for the coliform group.

(c) Once sanctioned for use, the water system shall be sampled daily to demonstrate that the disinfected water is negative for the coliform group.

(d) When other than approved water is located between the intake of a flow-through wet storage system and the land-based facility then the Authority may require periodic verification of the system's integrity to ensure that the other than approved water does not infiltrate into the intake pipe.

(3) Recirculating Water System.

(a) A study shall be required to demonstrate that disinfection for the recirculating system can consistently produce water that tests negative for the coliform group under normal operating conditions. The study shall meet the requirements in Section C. (2) (b) above.

(b) Once sanctioned for use, the recirculating process water system shall be sampled weekly to demonstrate that the disinfected water is negative for the coliform group

(c) When make-up water of more than ten (10) percent of the process water volume in the recirculating system is added from a growing area source classified as other than approved, a set of three (3) samples of disinfected water and one (1) sample of the source water prior to disinfection shall be collected over a twenty-four (24) hour period to reaffirm the ability

of the system to produce process water free from the coliform group or viable bacteria.
(d) When ultra-violet treatment is used as the water disinfectant, each time a bulb change is required either to replace a burned out bulb or for servicing, new ultraviolet bulbs shall be installed and old bulbs discarded, and the weekly disinfected process water sample shall be collected and analyzed.

D. Shellstock Handling.

(1) Shellstock shall be thoroughly washed with water from a source authorized by the Authority and culled prior to wet storage in tanks. Any deviation to this requirement is subject to permission from the Authority.

(2) Unless the dealer is in the Authority's commingling plan under Chapter I. @.01 G., different lots of shellstock shall not be commingled during wet storage in tanks. If more than one (1) lot of shellstock is being held in wet storage at the same time, the identity of each lot of shellstock shall be maintained.

(3) Bivalve mollusks shall not be mixed with other species in the same tank. Where multiple tank systems use a common water supply system for bivalve mollusks and other species, wet storage process water shall be effectively disinfected prior to entering tanks containing the bivalve mollusks.

Chapter VIII. Control of Shellfish Harvesting

Additional Guidance: Section IV. Guidance Documents Chapter II. Section .12

Additional Guidance: Section IV. Guidance Documents Chapter II. Section .13

Requirements for the Authority

[Note: The Authority must meet the requirements of this section even if the Authority does not formally adopt this section in regulation.]

@.01 Control of Shellstock Growing Areas

A. General.

(1) The Authority shall maintain an effective program to control shellstock growing areas and to assure that shellstock are harvested only:

(a) From areas in an open status; and

(b) With approval from areas classified as restricted, conditionally restricted, or prohibited, or in the closed status of the approved or conditionally approved classification.

(2) This program shall include:

(a) The patrol of growing areas;

(b) The licensing of harvesters;

(c) Enforceable legal penalties sufficient to encourage compliance; and

(d) Appropriate identification of harvest areas where shellstock harvest is not allowed.

(3) At the time of issuance or renewal of a harvester's license or a dealer's certification, or an annual mail out to all licensed shellfish harvesters, the Authority shall provide each harvester or dealer with:

(a) Information which explains the public health risk associated with illegal harvesting shellstock in areas classified as restricted, conditionally restricted, or prohibited or in the closed status; and

(b) When requested, a current, comprehensive, itemized listing of all harvest areas including their geographic boundaries and their classification.

B. Patrol of Growing Areas.

(1) The Authority shall assure that shellstock are harvested only as provided in this Chapter.

(2) The Authority shall patrol harvest areas classified as restricted, conditionally restricted, or prohibited, or conditionally approved and approved when in the closed status at sufficient intervals to deter illegal harvesting. This patrol activity shall include consideration of the need for night, weekend, and holiday patrols. At a minimum, these growing areas shall be patrolled at the following frequencies, except as provided in B. (3), in order to ensure effective control:

Risk Category	Minimum Frequency of Patrol
Low	Four (4) times per thirty (30) harvestable days
Medium	Eight (8) times per thirty (30) harvestable days
High	Sixteen (16) times per thirty (30) harvestable days

A patrol is accomplished when the majority of an area is monitored. No more than two (2) patrols can be counted in a 24-hour period, and each must be a separate deliberate effort. A harvestable day refers to a day during which tidal, weather and other conditions make it possible to harvest shellfish. When tidal, weather, or other conditions prohibit harvesting on a particular day, that day is not included in the thirty (30) day period.

(3) Exceptions.

(a) Patrol is not required under the following conditions:

(i) There is no shellfish productivity, as demonstrated by one (1) of the following methods:

a. pH, salinity, temperature, or turbidity are not favorable to the growth of shellfish; or

b. The water bottom does not support shellfish growth; or

c. The area has been depleted of shellfish by dredging, disease, or other means;

(ii) The area meets all of the following conditions:

a. The area is unclassified;

b. Historically there has not been interest in commercial harvesting; and

c. The Authority has current evidence that commercial harvesting does not occur. This can be accomplished by information gathered from periodic patrols or reliable non-patrol sources.

(b) Where natural sets resulting in commercially harvestable quantities of shellfish do not exist and advanced aquaculture methods (e.g., racks, bags, lantern nets, long lines and/or floats) are used in the area: The area shall be patrolled at the frequencies specified in Section B. (2) unless the Authority develops and implements a Risk Management Plan for the area for the prevention of illegal harvesting of shellfish. The Risk Management Plan shall include monitoring and control of surveillance activities that supplement the minimum required patrol frequency of one (1) time per thirty (30) harvestable days. The Risk Management Plan at least should include the following:

(i) Description of the area;

(ii) Classification of the area;

(iii) Description of adjacent growing areas;

(iv) Procedure used to prevent shellfish from prohibited or closed waters to be commingled with shellfish from an aquaculture area; and

(v) If, the patrol agency receives assistance from other State, Federal, or tribal agencies, a memorandum of agreement (MOA) must be developed describing responsibilities of each agency. A copy of such MOA must be kept in a central file.

(c) If the area is geographically remote, sparsely populated and has limited access (e.g., no or very poor roads) such that the potential for marketing the shellfish is severely restricted or not economically feasible:

(i) The area shall be patrolled at the frequencies specified in Section B. (2) unless the Authority develops and implements a Risk Management Plan for the area for the prevention of illegal harvesting of shellfish. The Risk Management Plan shall include monitoring and control of surveillance activities (e.g., airport, dock, border, or truck surveillance) that will be used in lieu of traditional patrol activities, and the area should be patrolled at least one (1) time per thirty (30) harvestable days. The Risk Management Plan shall describe the administrative procedures and resources necessary

to prevent illegal harvesting and/ or the illegal commingling of the product and include at least the following:

a. Description of the area;

b. Classification of the area;

c. Description of adjacent growing areas; and

d. If the patrol agency receives assistance from other State, Federal, or tribal agencies, a MOA must be developed describing responsibilities of each agency. A copy of such MOA must be kept in a central file.

(ii) If the Authority has current evidence that commercial illegal harvesting is occurring, the Management Risk Plan should be reevaluated.

(d) Where the entire State is closed to harvesting during traditional non-harvesting seasons:

(i) The area shall be patrolled at the frequencies specified in Section B. (2) unless the Authority develops and implements a Risk Management Plan for the area for the prevention of illegal harvesting of shellfish. The Risk Management Plan shall include monitoring and control of surveillance activities (e.g., airport, dock, border, or truck surveillance) that will be used in lieu of traditional patrol activities. The Risk Management Plan shall describe the administrative procedures and resources necessary to prevent illegal harvesting and/ or the illegal commingling of the product and include at least the following:

a. Description of the area;

b. Classification of the area;

c. Description of adjacent growing areas; and

d. If the patrol agency receives assistance from other State, Federal, or tribal agencies, a MOA must be developed describing responsibilities from each agency. A copy of such MOA must be kept in a central file.

(ii) The area shall be patrolled in low risk areas at least once (1) per thirty (30) harvestable days, for medium risk areas at least twice (2) per thirty (30) harvestable days, and for high-risk areas at least four (4) times per thirty (30) harvestable days.

(iii) If the Authority has current evidence that commercial illegal harvesting is occurring, the State agency shall resume patrol at the frequency specified in B. (2).

(4) The Risk Category for an area shall be determined as follows:

(a) Shellfish Productivity. Estimate the abundance of shellfish based on density studies, historical information, and environmental conditions described in B. (3) (a). Consider only commercially marketable species. The descriptions below refer to the range of productivity within the State. The area shall be rated based on the highest density in any portion of the growing area.

(i) Low Production - 1

(ii) Medium Productivity - 3

(iii) High Productivity - 5

(b) Ease of Harvest. Determine the method used to harvest the shellfish. If multiple harvest techniques are used in an area, select the one (1) with the highest score.

(i) Highly mechanized requiring expensive equipment, deep water, difficult harvest - 1

(ii) Restricted access aquaculture relative shallow water dredging - 2

(iii) Scuba diving, tonging, bullraking - 3

(iv) Hand collection from a boat - 4

(v) Hand collection, no special tools or boat - 5

(c) Difficulty of Patrol. Determine the difficulty of patrol. If the difficulty varies in an area, select the description with the highest score.

(i) Resource within sight of population and a normal patrol route. Patrol Officer can observe illegal harvesting from the patrol vehicle - 1

(ii) Resource is near a shore and easily visible - 2

(iii) Moderate difficulty, deliberate effort is required to provide coverage to the area - 3

(iv) Long travel time to growing area, large open expanse of harvest area - 4

(v) Growing area is a marsh, short sight distance, canals system, extensive shoals - 5

(d) Using the values determined in B. (4) (a), (b), and (c), calculate the total score for the area as follows:

Risk Factors	**Score (1-5)**	**Weight**	**Rating**	**Explain Rating (optional)**	**Adjustment Of Rating (if needed)**
Shellfish Productivity (a)		0.40			
Ease of Harvest (b)		0.40			
Difficulty of Patrol (c)		0.20			
			Subtotal		

The rating for each risk factor is calculated by multiplying the risk factor score by the weight for that factor. The subtotal is calculated by adding all three (3) of the risk factor ratings.

(e) The following criteria should be used to adjust the rating, if warranted:

(i) If a community-policing program is in place, the subtotal may be reduced by up to 0.25 points. If such a program leads to frequent citations, the subtotal may be reduced by up to 0.5 points. Community policing may include but is not limited to telephone hot lines, out-reach programs, financial incentives, local law enforcement activities not covered by B. (5), or private security arrangements.

(ii) If specialized equipment is available to the patrol agency, the subtotal may be reduced by up to 0.40 points. The actual reduction should be dependent upon the type of equipment that is available and its frequency of use. For example, frequent use of an aircraft can warrant a 0.4 point reduction, and frequent use of night vision or periodic use of aircraft can warrant a 0.2 point reduction.

(iii) If the patrol agency implements a strategy for comprehensive monitoring and control of surveillance activities, the subtotal may be reduced by up to 1 point. Activities include, but are not limited to, airport, dock, border, truck, wholesale and retail inspections. The actual reduction should be dependent on the frequency and extent of the activities

(iv) If a growing area is conditionally managed or is poorly marked, the subtotal may be increased by up to 0.2 point. Adding or subtracting the appropriate adjustment(s) calculates the total score.

(f) The following risk categories shall be applied to the total score:

Total Score	**Risk Category**
Less than 3	Low
3 or less than 4	Medium
4 or greater	High

(5) The Authority may delegate patrol activity to any State or local enforcement authority. If patrol activities are delegated, the Authority shall:

(a) Develop a MOA with the delegated agency to assure that patrol requirements are met; and

(b) Require the delegated agency to maintain and file records of its patrol activities consistent with those required in B. (7).

(6) Officers responsible for the patrol of shellfish growing areas shall obtain the following

training:

(a) Basic law enforcement training, before assuming their patrol duties;

(b) Training on shellfish control regulations within the jurisdiction of the patrol agency, before assuming independent patrol duties; and

(c) In-service training on the shellfish control regulations within the jurisdiction of the patrol agency, when the regulations change.

(7) The Authority shall prepare and revise, as necessary, a patrol policy document which records the Authority's patrol organization and its activities to deter illegal shellstock harvesting. This documentation shall include:

(a) Citation of the law providing the legal basis for enforcement authority;

(b) Citation of the laws and regulations, including penalties, which are directly related to effective control of illegal harvest activities;

(c) The organizational structure of the unit responsible for patrol activities, including;

(i) Patrol unit(s) name, address, and phone number;

(ii) The roster and chain of command;

(iii) Area assignments that support the frequencies of patrol delineated in B. (2); and

(iv) A listing of specific vessels, vehicles, and equipment that support the frequencies of patrol delineated in B. (2);

(d) Summaries of training in shellfish patrol techniques;

(e) The methods used to inform officers of growing area classifications and status, and of any special activities licensed in the area;

(f) A listing of growing areas where patrol is required;

(g) An identification of any patrol problems;

(h) The type and frequency of reporting by patrol personnel;

(i) Copy of agreements with other agencies responsible for shellfish control activities; and

(j) Citations/summons for the past year. If available, this information may include:

(i) The number of convictions or dismissals;

(ii) Fines in dollar amount;

(iii) Equipment or property confiscations and forfeitures;

(iv) License suspensions or revocations;

(v) Jail sentences; and

(vi) Written warnings.

(8) Upon request by FDA, the Authority shall provide any available documentation that is used to support the determination that the patrol program was effective in providing the required frequency of patrol. Ordinarily, this does not include providing reports not normally maintained by the Authority.

(9) To comply with the Standardized Evaluation Criteria, the Authority shall:

(a) Have a patrol policy document (Key item);

(b) Update patrol documents every year (Key item);

(c) Meet NSSP patrol training requirements (Key item);

(d) Patrol all areas that require patrol (Critical item);

(e) Meet NSSP requirements for frequency of patrol (Key item);

(f) Have a formalized MOA with other agency per Chapter VIII. @.01 B. (5) (Key item);

(g) Have a risk management plan per Chapter VIII. @.01 B. (3) (b), (c), and (d) (Critical item); and

(h) Have a complete risk management plan per Chapter VIII. @.01 B. (3) (b), (c), and (d) (Other item).

C. Licensing of Harvesting.

(1) The Authority shall assure that a license is required to commercially harvest shellstock,

including shellstock harvested from aquaculture.

(2) Each license shall:

(a) Not be valid for more than one (1) year;

(b) Require the harvester to sell only to dealers listed on the Interstate Certified Shellfish Shippers List; and

(c) Allow the harvester, at his discretion, to place shellstock in containers for transport of shellstock from a growing area to land or to a dealer.

(3) A license to harvest shall not allow a harvester to engage in shellstock packing or engage in independent wet storage activities as defined in this Ordinance unless the harvester is a certified shellfish dealer and has a Wet Storage Permit issued by the Authority.

(4) In the case of riparian or leased land, unless the riparian owner or lessee employs a licensed harvester, the Authority shall require a riparian owner or lessee to be licensed as a harvester prior to harvesting his shellstock. A licensed riparian owner or lessee may employ unlicensed harvesters to work his property or lease.

(5) When a person has a special license to harvest shellstock for depuration, the Authority may not require individuals working under the supervision of the licensed harvester to have their own license.

(6) The Authority shall inform each licensed harvester as to:

(a) The classification and current status assigned to each growing area; and

(b) The methods used to notify harvesters of changes in growing area status or classification.

(7) When the Authority authorizes shellstock relaying under Chapter V. or shellstock depuration under Chapter XV., the Authority shall issue special licenses to harvesters for the taking of shellfish from areas classified as restricted, conditionally restricted, or in the closed status of the approved or conditionally approved classification. The licenses shall specify the limitations and conditions for harvesting shellstock including requirements for the harvester to keep records which:

(a) For depuration:

(i) Specify the date and amount of shellstock harvested from each area; and

(ii) Record the name of the depuration facility to which the shellstock was consigned or sold; and

(b) For relaying, meet the requirements of Chapter V. @.03. D.

(8) The Authority shall maintain a record of all licenses and special licenses issued.

D. Identification of Certain Growing Areas.

(1) The Authority shall chart, describe, and mark the boundaries of growing areas classified as restricted, conditionally restricted, or prohibited, or in a closed status. The boundary descriptions shall:

(a) Be marked by fixed objects or landmarks; or

(b) Be described in a manner which allows easy recognition; and

(c) Allow successful prosecution of any illegal commercial harvesting activity.

(2) The Authority:

(a) Shall notify harvesters of the boundaries established under Section D. (1) by dissemination of information with licenses, publication, or direct notification including registered mail; and

(b) May use warning signs.

E. Prohibited Classification. The Authority shall exercise effective supervision over each depletion or seed gathering operation and maintain complete written documentation.

Additional Guidance: Section IV. Guidance Documents Chapter III. Section .07

@.02 Shellstock Time to Temperature Controls

A. Each shellfish producing State shall establish time to temperature requirements for the harvesting of all shellstock to ensure that harvesters shall comply with one (1) of the following:
(1) The State *V.v.* Control Plan as outlined in Chapter II. @.06; or
(2) The State *V.p.* Plan as outlined in Chapter II. @.07; or
(3) All other shellstock shall comply with the matrix below:

Action Level	Average Monthly Maximum Air Temperature	Maximum Hours from Exposure to Receipt at a
Level 1	<50 °F (10 °C)	36 hours
Level 2	50 - 60 °F (10 - 15 °C)	24 hours
Level 3	>60 - 80 °F (15 - 27 °C)	18 hours
Level 4	>80 °F (27 °C)	12 hours

B. For the purposes of this section, temperature control is defined as the management of the temperature of shellstock by means of ice, mechanical refrigeration or other approved means necessary to lower and maintain the temperature of the shellstock to comply with Chapters XI., XIII., or XIV.

C. The Authority shall establish the water or air temperature to be applied to the requirements above for each growing area by averaging the previous five (5) years maximum monthly water or air temperatures.

D. For the purpose of time to temperature control, time begins once the first shellstock harvested is no longer submerged.

E. The Authority shall ensure that harvesters document and provide trip records to the initial dealer demonstrating compliance with the time to temperature requirements. For States that establish and limit harvest times that assure compliance with the times outlined in the matrix of Chapter VIII. @.02 A. (3) recording the time harvest begins is not required.

F. Shellstock intended for Wet Storage, Depuration, PHP or "For Shucking Only by a Certified Dealer" must either be shucked, introduced into PHP, Wet Storage, or Depuration within the times outlined in the matrix in Chapter VIII. @.02 A. (3) or meet the applicable time to temperature controls of Chapter VIII. @.02 A. (3). Shellstock harvested under a State Vibrio Plan intended for Wet Storage or Depuration, must be placed in Wet Storage, Depuration or refrigeration to comply with time to temperature controls outlined in the State Authority *V.v.* or *V.p.* Control Plan

G. Ocean Quahogs (*Arctica islandia*) and surf clams (*Spisula solidissima*) are exempt from this temperature control plan when these products are intended for thermal processing.

H. Authorities shall consider the need for shading in developing *V.v.* and *V.p.* Control Plans. Shading shall be required when deemed appropriate by the Authority when implementing @.02 A. (1), (2), and (3).

I. Shellstock intended for a validated pathogen reduction process where refrigeration would reduce efficacy of the process (and appropriately labeled with name of the receiving dealer) is exempt from the requirements in Chapter VIII. @.02 A. (1) and (2).

Requirements for Harvesters

.01 General

A. Each harvester shall have a valid license, and a special license if necessary, in his possession while engaged in shellstock harvesting activities.
B. Each harvester shall obtain Authority approved training at an interval to be determined by the Authority not to exceed five (5) years. The training shall include required harvest, handling, and transportation practices as determined by the Authority. A harvester shall be allowed ninety (90) days following initial licensing to obtain the required education.
    (1) A harvester shall obtain proof of completion of the required training. Proof of training obtained by the harvester shall be presented to the Authority prior to certification, recertification, or licensing.
    (2) At a minimum, one (1) individual involved in the shellfish operations shall obtain the required training.
C. Persons who are working in a boat crew under the supervision of a licensed harvester need not have a valid harvester's license.
D. In the case of riparian or leased land, unless the riparian owner or lessee employs a licensed harvester, the riparian owner or lessee shall be licensed as a harvester prior to harvesting his shellstock. A licensed riparian owner or lessee may employ unlicensed harvesters to work his property or lease.
E. Each harvester shall report harvest quantities by species to the Authority. The reporting shall be at a frequency not to exceed monthly. Should the State choose to collect production data from certified dealers, harvesters may be exempt from this requirement to avoid double counting.

.02 Shellstock Harvesting and Handling

A. Harvesters. Any harvester who engages in shellfish packing as defined in this Ordinance shall:
    (1) Be a dealer; or
    (2) Pack shellstock for a dealer.
B. Non-Vessel Harvesting.
Harvesters shall assure shellstock are harvested, handled, and transported to prevent contamination, deterioration, and decomposition.
C. Vessels.
    (1) The operator shall assure that all vessels used to harvest and transport shellstock are properly constructed, operated, and maintained to prevent contamination, deterioration, and decomposition of the shellstock.
        (a) Decks and storage bins shall be constructed and located to prevent bilge water or polluted overboard water from coming into contact with the shellstock.
        (b) Bilge pump discharges shall be located so that the discharge shall not contaminate shellstock.
        (c) Containers used for storing shellstock shall be clean and fabricated from safe materials.
        (d) Boat decks and storage bins used in the harvest or transport of shellstock for direct marketing shall be:
            (i) Kept clean with potable water or water from a growing area in the approved classification or in the open status of the conditionally approved classification; and
            (ii) Provided with effective drainage.

(e) Vessels and all other equipment coming in contact with shellstock during handling or transport for relaying or depuration shall be thoroughly cleaned before the vessels or equipment are used to transport or handle shellfish for direct marketing.

(f) When necessary, effective coverings shall be provided on harvest boats to protect shellstock from exposure to:

(i) Hot sun;

(ii) Birds; and

(iii) Other adverse conditions.

(2) Cats, dogs, and other animals shall not be allowed on vessels.

D. Disposal of Human Sewage from Vessels.

(1) Human sewage shall not be discharged overboard from a vessel used in the harvesting of shellstock, or from vessels which buy shellstock while the vessels are in growing areas.

(2) As required by the Authority, in consultation with FDA, an approved marine sanitation device (MSD), portable toilet or other sewage disposal receptacle shall be provided on the vessel to contain human sewage.

(3) Portable toilets shall:

(a) Be used only for the purpose intended;

(b) Be secured while on board and located to prevent contamination of shellstock by spillage or leakage;

(c) Be emptied only into a sewage disposal system;

(d) Be cleaned before being returned to the boat; and

(e) Not be cleaned in equipment used for washing or processing food.

(4) Use of other receptacles for sewage disposal may be approved by the Authority if the receptacles are:

(a) Constructed of impervious, cleanable materials and have tight fitting lids;

(b) Indelibly labeled “Human Waste” in contrasting letters at least three (3) inches in height; and

(c) Meet the requirements in Section D. (3).

E. Shellstock Washing.

(1) Shellstock shall be washed reasonably free of bottom sediments as soon after harvesting as practicable.

(2) The harvester shall be primarily responsible for washing shellstock.

(3) If shellstock washing is not feasible at the time of harvest, the dealer shall assume this responsibility.

(4) Water used for shellstock washing shall be obtained from:

(a) A potable water source; or

(b) A growing area in the:

(i) Approved classification; or

(ii) In the open status of the conditionally approved classification.

(5) If the harvester or dealer elects to use tanks or a recirculating water system to wash shellstock, the shellstock washing activity shall be constructed, operated, and maintained in accordance with Chapter XI. .02 A. (3) and Chapter XIII. .02 A. (3).

F. Shellstock Identification.

(1) Each harvester shall affix a tag to each container of shellstock which shall be in place while the shellstock is being transported to a dealer.

(2) If the shellstock was harvested at more than one (1) location, each container shall be tagged at its growing area.

(3) When the harvester is also the dealer, the harvester has the option to tag the shellfish with a harvester's tag or a dealer's tag meeting the requirements outlined in Chapter X. Section .05.

(4) The harvester's tags shall:

(a) Be durable, waterproof and sanctioned by the Authority prior to use; and

(b) Be at least 13.8 square inches (89.03 cm^2) in size.

(5) The harvester's tag shall contain the following indelible, legible information in the order specified below:

(a) The harvesters' identification number as assigned by the Authority;

(b) The date of harvest;

(c) The most precise identification of the harvest location or aquaculture site as is practicable, including the initials of the State of harvest, and the Authority's designation of the growing area by indexing, administrative or geographic designation. If growing areas have not been indexed by the Authority, then an appropriate geographical or administrative designation must be used (e.g. Long Bay, Decadent County, lease number, bed, or lot number).

(d) The type and quantity of shellstock; and

(e) The following statement in bold capitalized type on each tag:

"THIS TAG IS REQUIRED TO BE ATTACHED UNTIL CONTAINER IS EMPTY OR IS RETAGGED AND THEREAFTER KEPT ON FILE FOR 90 DAYS."

(6) If the shellstock is removed from the original container, the tag on the new container shall meet the requirements in Section .02 F.

(7) Bulk tagging of a lot of shellstock during transport from harvest area to the dealer facilities.

(a) When shellstock are harvested from one (1) harvest area on a single day by a single harvester or aquaculture leaseholder, multiple containers may be utilized on a wrapped pallet, in a tote, in a net brailer, in a single boat, vehicle, conveyance or other container and the unit tagged with a single tag in accordance with the requirements of Section .02 F.

(b) In addition to the information required in Section .02 F. the unit tag shall also include:

(i) A statement that "All shellstock containers in this lot have the same harvest data and area of harvest"; and

(ii) Number of individual containers in the unit or an estimate of the total weight, volume or count.

(8) Bulk Sale of Shellstock. If shellstock are sold in bulk, the harvester or dealer shall provide a transaction record prior to shipment. This transaction record shall contain all the information required in Section .02 F. with the addition of the name of the consignee.

G. Shellstock Temperature Control

(1) All harvesters shall comply with the applicable time to temperature requirements of

(a) State *V.v.* and *V.p.* Control Plans outlined in Chapter II. @.06 and @.07; or

(b) Chapter VIII. @.02 Shellstock Time to Temperature Controls A. (3).

(2) All harvesters shall provide trip records to the initial dealer demonstrating compliance with the time to temperature requirements.

NOTE: State *V.v.* and *V.p.* Control Plans can be accessed on the ISSC web site using the following link: www.issc.org.

Chapter IX. Transportation

Additional Guidance: Section IV. Guidance Documents Chapter III. Section .07

.01 Conveyances Used to Transport Shellstock to the Original Dealer

A. Any conveyance used to transport shellstock to the original dealer shall be properly constructed, operated, and maintained to prevent contamination, deterioration, and decomposition.
B. Storage bins on conveyances used in the transport of shellstock shall be:
    (1) Kept clean with potable water or water from an approved area or conditionally approved area in the open status; and
    (2) Provided with effective drainage.
C. When transporting shellstock to the original dealer within the applicable time to temperature controls in Chapter VIII. @.02 A. (1), (2), and (3) the temperature inside the conveyance or truck shall not exceed the ambient air temperature when the ambient air temperature is above 50 °F (10 °C).
D. When mechanical refrigeration units are used, the units shall be:
    (1) Equipped with automatic controls; and
    (2) Maintained at an ambient air temperature necessary to comply with .01 C. above.
E. Any ice used to cool shellstock during transport shall meet the requirements of Chapter XI. .02 A. (2).
F. Cats, dogs, and other animals shall not be allowed in any part of the conveyance where shellstock is stored.

.02 Conveyances Used to Transport Shellstock from Dealer to Dealer

A. All containers used to transport shellstock shall be:
    (1) Constructed to allow for easy cleaning; and
    (2) Operated and maintained to prevent product contamination.
B. All containers shall be cleaned with:
    (1) Potable water; and
    (2) Detergents, sanitizers, and other supplies acceptable for food contact surfaces.

.03 Cargo Protection From Cross Contamination

A. General. All containers used for storing shellfish shall be clean and fabricated from safe materials.
B. Shellfish Cargo Only.
    (1) The entire cargo shall consist of shellfish products only.
    (2) Except for bulk shipments, shellstock shipments shall be shipped on pallets.
    (3) In-shell product shipments shall be shipped on pallets.
    (4) If the conveyance does not have a channeled floor, pallets shall be used for all shellfish.
C. Mixed Cargoes. Shellfish shall be shipped as part of a mixed cargo of seafood or other food product only when:

(1) Shellfish products are protected from contamination by the other cargo;
(2) All cargo is placed on pallets; and
(3) No other cargo is placed on or above the shellfish unless all cargo is packed in sealed, crush resistant, waterproof containers.

D. Ice. Any ice used to cool shellfish shall meet the requirements of Chapter XI. .02 A. (2).

.04 Shipping Temperatures

Shellfish dealers shall ship shellfish adequately iced; or in a conveyance pre-chilled at or below 45 °F (7.2 °C) ambient air temperature. Geoduck clams (*Panopea generosa*) are exempt from these requirements

.05 Transportation Records

All shipments of shellstock shall be accompanied with documentation indicating the time of shipment and that all shipping conveyances comply with the requirements of Chapter IX. .04. This documentation must include a notice of all shellstock harvested under the requirements of Chapter VIII. @.02 A. (3) that has not been cooled to an internal temperature of 50 °F (10 °C) and indicate the presence of a time/temperature recording device. Geoduck clams (*Panopea generosa*) are exempt from these requirements.

Chapter X. General Requirements for Dealers

.01 General HACCP Requirements

A. Hazard Analysis. Every dealer shall conduct a hazard analysis to determine the food safety hazards that are reasonably likely to occur for each kind of shellfish product processed by that dealer and to identify the preventive measures that the dealer can apply to control those hazards. Such food safety hazards can be introduced both within and outside the processing plant environment, including food safety hazards that can occur before, during, and after harvest. A food safety hazard that is reasonably likely to occur is one for which a prudent dealer would establish controls because experience, illness data, scientific reports, or other information provide a basis to conclude that there is a reasonable possibility that it will occur in the particular type of shellfish product being processed in the absence of those controls. In the hazard analysis, the dealer shall consider the critical control points listed in Chapters XI., XII., XIII., XIV., and XV.

B. HACCP Plan. Every dealer shall have and implement a written HACCP plan. A HACCP plan shall be specific to:

(1) Each location where shellfish products are processed by that dealer; and

(2) Each kind of shellfish product processed by the dealer. The plan may group kinds of shellfish products together, or group kinds of production methods together, if the food safety hazard, critical control points, critical limits, and procedures required to be identified and performed in Section .01 C. are identical for all shellfish products so grouped or for all production methods so grouped.

C. Contents of the HACCP Plan. The HACCP plan shall, at a minimum:

(1) List the food safety hazards that are reasonably likely to occur, as identified in accordance with Section .01 A. and that thus must be controlled for each shellfish product. Consideration should be given to whether any food safety hazards are reasonably likely to occur as a result of the following:

(a) Natural toxins;
(b) Microbiological contamination;
(c) Chemical contamination;
(d) Pesticides;
(e) Drug residues;
(f) Unapproved use of direct or indirect food or color additives; and
(g) Physical hazards;

(2) List the critical control points for each of the identified food safety hazards, including as appropriate:

(a) Critical control points designed to control food safety hazards introduced outside the processing plant environment, including food safety hazards that occur before, during and after harvest. At a minimum, the critical control points shall include those identified in Chapter XI. .01, Chapter XII. .01, Chapter XIII. .01, Chapter XIV. .01 and Chapter XV. .01, as applicable. As an alternative, the dealer may establish other critical control points which the dealer can demonstrate to the Authority provide equivalent public health protection. If the dealer can demonstrate to the Authority through a hazard analysis that the food safety hazard is not reasonably likely to occur, the critical control point is not required with the exception of receiving which shall always be considered as a critical control point.

(b) Critical control points designed to control food safety hazards that could be introduced in the processing plant environment. As an alternative, the dealer may establish other critical control points which the dealer can demonstrate to the Authority provide equivalent public health protection. If the dealer can demonstrate to the Authority through a hazard analysis

that the food safety hazard is not reasonably likely to occur, the critical control point is not required. At a minimum, the critical control points shall include those identified in Chapter XI. .01 A., Chapter XII. .01 A., Chapter XIII. .01 A., Chapter XIV. .01 A. and Chapter XV. .01 A., as applicable.

(c) Critical control points shall be designed to ensure that shellstock received with restricted use tags is processed consistent with the stated purpose. For Shellstock tagged for restricted use, critical control points shall be included in the Certified Dealer's HACCP plan to ensure that the shellstock is shipped to another Certified Dealer with the restricted use tag or processed consistent with the stated purpose.

(3) List the critical limits that must be met at each of the critical control points. At a minimum, the critical limits shall include those listed in Chapter XI. .01, Chapter XII. .01, Chapter XIII. .01, Chapter XIV. .01 and Chapter XV. .01, as applicable. As an alternative the dealer may establish other critical limits which the dealer has demonstrated provide equivalent public health protection with the exception of receiving which shall always be considered as a critical control point. In any case, the critical limits identified in Chapter XI. .01, Chapter XII. .01, Chapter XIII. .01, Chapter XIV. .01 and Chapter XV. .01 shall be met as components of good manufacturing practices.

(4) List the procedures, and frequency thereof, that will be used to monitor each of the critical control points to ensure compliance with the critical limits.

(5) Include any corrective action plans that have been developed in accordance with Section .01 F. (2), to be followed in response to deviations from critical limits at critical control points.

(6) Provide for a record keeping system that documents the monitoring of the critical control points. The records shall contain the actual values and observations obtained during monitoring.

(7) List the verification procedures, and frequency thereof, that the dealer will use in accordance with Section .01 G. (1).

D. Signing and Dating the HACCP Plan.

(1) The HACCP plan shall be signed and dated, either by the most responsible individual on site at the processing facility or by a higher-level official of the dealer. This signature shall signify that the HACCP plan has been accepted for implementation by the dealer.

(2) The HACCP plan shall be signed and dated:

(a) Upon initial acceptance;

(b) Upon any modification; and

(c) Upon verification of the plan in accordance with Section .01 G. (1) (a).

E. Sanitation. Sanitation controls may be included in the HACCP plan. However, to the extent that they are monitored in accordance with Section .02 they need not be included in the HACCP plan, and vice versa.

F. Corrective Actions.

(1) Whenever a deviation from a critical limit occurs, a dealer shall take corrective action either by:

(a) Following a corrective action plan that is appropriate for the particular deviation, or

(b) Following the procedures in Section .01 F. (3).

(2) Dealers may develop written corrective action plans, which become part of their HACCP plans in accordance with Section .01 C. (5), by which they predetermine the corrective actions that they will take whenever there is a deviation from a critical limit. A corrective action plan that is appropriate for a particular deviation is one that describes the steps to be taken and assigns responsibility for taking those steps, to ensure that:

(a) No product enters commerce that is either injurious to health or is otherwise adulterated as a result of the deviation; and

(b) The cause of the deviation is corrected.

(3) When a deviation from a critical limit occurs and the dealer does not have a corrective

action plan that is appropriate for that deviation, the dealer shall:

(a) Segregate and hold the affected product until:

(i) There is a review to determine the acceptability of the affected product for distribution. The review shall be performed by an individual or individuals who have adequate training or experience to perform such a review. Adequate training may or may not include training in accordance with Section .01 I.; and

(ii) Corrective action i s taken when necessary, to ensure that no product enters commerce that is either injurious to health or is otherwise adulterated as a result of the deviation.

(b) Perform or obtain timely reassessment by an individual or individuals who have been trained in accordance with Section .01 I., to determine whether the HACCP plan needs to be modified to reduce the risk of recurrence of the deviation, and modify the HACCP plan as necessary.

(4) All corrective actions taken in accordance with this section shall be fully documented in records that are subject to verification in accordance with Section .01 G. and the record keeping requirements of Section .01 H.

G. Verification.

(1) Every processor shall verify that the HACCP plan is adequate to control food safety hazards that are reasonably likely to occur, and that the plan is being effectively implemented. Verification shall include, at a minimum:

(a) A reassessment of the adequacy of the HACCP plan whenever any changes occur that could affect the hazard analysis or alter the HACCP plan in any way or at least annually. These changes may include: Raw materials or source of raw materials, product formulation, processing methods or systems, finished product distribution systems, or the intended use or consumers of the finished product. The reassessment shall be performed by an individual or individuals who have been trained in accordance with Section .01.I. The HACCP plan shall be modified immediately whenever a reassessment reveals that the plan is no longer adequate to fully meet the requirements of Section .01.C.

(b) Ongoing verification activities including:

(i) A review of any consumer complaints that have been received by the dealer to determine whether they relate to the performance of critical control points or reveal the existence of unidentified critical control points;

(ii) The calibration of process-monitoring instruments; and

(iii) At the option of the dealer, the performing of periodic end product or in-process testing.

(c) A review, including signing and dating, by an individual who has been trained in accordance with Section .01 I., of the records that document:

(i) The monitoring of critical control points. The purpose of this review shall be, at a minimum, to ensure that the records are complete and to verify that they document values that are within the critical limits. This review shall occur within one (1) week of the day that the records are made;

(ii) The taking of corrective actions. The purpose of this review shall be, at a minimum, to ensure that the records are complete and to verify that appropriate corrective actions were taken in accordance with Section .01 F. This review shall occur within one (1) week of the day that the records are made; and

(iii) The calibrating of any process monitoring instruments used at critical control points and the performing of any periodic end product or in process testing that is part of the dealer's verification activities. The purpose of these reviews shall be, at a minimum, to ensure that the records are complete, and that these activities occurred in accordance with the processor's written procedures. These reviews shall occur within a

reasonable time after the records are made.

(2) Dealers shall immediately follow the procedures in Section .01 F. whenever any verification procedure, including the review of a consumer complaint, reveals the need to take a corrective action.

(3) The calibration of process-monitoring instruments, and the performing of any periodic end- product and in-process testing, in accordance with Section .01 G. (1) (b) (ii) and (iii) shall be documented in records that are subject to the record keeping requirements of Section .01 H.

H. Records.

(1) All records required by Section .01 and Section .02 shall include:

(a) The name and location of the dealer;

(b) The date and time of the activity that the record reflects;

(c) The signature or initials of the person performing the operation; and

(d) Where appropriate, the identity of the product and the production code, if any.

Processing and other information shall be entered on records at the time that it is observed.

(2) All records required by Section .01 and Section .02 shall be retained at the processing facility for at least one (1) year after the date they were prepared in the case of refrigerated products and for at least two (2) years after the date they were prepared in the case of frozen products.

(3) Records that relate to the general adequacy of equipment or processes being used by a processor, including the results of scientific studies and evaluations, shall be retained at the processing facility for at least two (2) years after their applicability to the product being produced at the facility.

(4) If the processing facility is closed for a prolonged period between seasonal operations, or if record storage capacity is limited on a processing vessel or at a remote processing site, the records may be transferred to some other reasonably accessible location at the end of the seasonal operations but shall be immediately returned for official review upon request.

(5) All records required by Section .01 and Section .02 and HACCP plans required by Section .01 B. and Section .01 C. shall be available for official review and copying at reasonable times.

(6) Tags on containers of shellstock are not subject to the requirements of this section unless they are used to fulfill the requirements of Chapter X. .05.

(7) The maintenance of records on computers is acceptable, provided that appropriate controls are implemented to ensure the integrity of the electronic data and electronic signatures.

I. Training.

(1) At a minimum, the following functions shall be performed by an individual who has successfully completed training in the application of HACCP principles to shellfish processing at least equivalent to that received under standardized curriculum recognized as adequate by the Authority or who is otherwise qualified through job experience to perform these functions:

(a) Developing a HACCP plan, which could include adapting a model or generic-type HACCP plan that is appropriate for a specific processor, in order to meet the requirements of Section .01 C.;

(b) Reassessing and modifying the HACCP plan in accordance with the corrective action procedures specified in Section .01 F. (3) (b), and the HACCP plan in accordance with the verification activities specified in Section .01 G. (1) (a); and

(c) Performing the record review required by Section .01 G. (1) (c).

(2) Job experience will qualify an individual to perform these functions if it has provided knowledge at least equivalent to that provided through the standardized curriculum as determined by the Authority.

(3) The trained individual need not be an employee of the dealer.

Additional Guidance: Section IV Guidance Documents Chapter III. Section.01

.02 General Sanitation Requirements

A. Sanitation Monitoring. Each dealer shall monitor conditions and practices that are both appropriate to the plant and the food being processed with sufficient frequency to ensure, at a minimum, conformance with the requirements specified in Chapter XI. .02, Chapter XII. .02, Chapter XIII. .02, Chapter XIV. .02 and Chapter XV. .02. The requirements specified in these Sections relate to the following sanitation items:

(1) Safety of the water that comes into contact with food or food contact surfaces, or is used in the manufacture of ice, hereinafter referred to as: Safety of Water for Processing and Ice Production;

(2) Condition and cleanliness of food contact surfaces, including utensils, gloves, and outer garments, and from raw product to cooked product, hereinafter referred to as: Condition and Cleanliness of Food Contact Surfaces;

(3) Prevention of cross contamination from unsanitary objects to food, food packaging materials, and other food contact surfaces, including utensils, gloves, and outer garments, and from raw product to cooked product, hereinafter referred to as: Prevention of Cross Contamination;

(4) Maintenance of hand washing, hand sanitizing, and toilet facilities, hereinafter referred to as: Maintenance of Hand Washing, Hand Sanitizing and Toilet Facilities;

(5) Protection of food, food packaging material, and food contact surfaces from adulteration with lubricants, fuel, pesticides, cleaning compounds, sanitizing agents, condensate, and other chemical, physical, and biological contaminants, hereinafter referred to as: Protection from Adulterants;

(6) Proper labeling, storage, and use of toxic compounds, hereinafter referred to as: Proper Labeling, Storage, and Use of Toxic Compounds;

(7) Control of employee health conditions that could result in the microbiological contamination of food, food packaging materials, and food contact surfaces, hereinafter referred to as: Control of Employees with Adverse Health Conditions; and

(8) Exclusion of pests from the food plant hereinafter referred to as “Exclusion of Pests”.

While monitoring of those specified conditions and practices (listed in 1-8) that are not appropriate to the plant and the food being processed is not required, compliance with such conditions and practices remains mandatory.

B. Sanitation Monitoring Records. Each dealer shall maintain sanitation control records that, at a minimum, document the monitoring and corrections prescribed by Section .02 A. These records are subject to the requirements of Section .01 H.

C. Relationship to HACCP Plan. Sanitation controls may be included in the HACCP Plan, required by Section .01 B. However, to the extent that they are monitored in accordance with Section .02 A. they need not be included in the HACCP Plan, and vice versa.

Additional Guidance: Section IV. Guidance Documents Chapter V. Section .02

.03 Other Model Ordinance Requirements

A. Each dealer shall comply with the requirements specified in Chapter XI. .03, Chapter XII. .03, Chapter XIII. .03, Chapter XIV. .03, and Chapter XV. .03 that are appropriate to the plant and

the food being processed. However, monitoring and record keeping for these conditions and practices is not required, unless specifically stated.

B. Recalls.

(1) Dealers shall adopt written procedures for conducting recalls of adulterated misbranded shellfish products. These written procedures for conducting recalls shall be based on, and complementary to, the FDA Enforcement Policy on Recalls, CFR Title 21, Chapter 1, Subchapter A., Part 7-Enforcement Policy, (NSSP Guide for the Control of Molluscan Shellfish, Federal Regulations).

(2) Dealers shall follow their written recall procedures to include timely notification of the Authority of a situation requiring recall, timely notification of consignee who received the affected product, and effective removal or correction of the affected product.

C. Each dealer shall report harvest quantities by species to the Authority. The reporting shall be at a frequency not to exceed monthly. Should the State choose to collect production data from harvesters, certified dealers are exempt from this requirement to avoid double counting.

Additional Guidance: Section IV. Guidance Documents Chapter III. Section .04 Shellstock Tagging

.04 Certification Requirements

A. General.

(1) No person shall act as a dealer prior to obtaining certification.

(2) Any person who wants to be a dealer shall:

(a) Make application to the Authority for certification;

(b) Have and implement a HACCP Plan, and have a program of sanitation monitoring and record keeping in compliance with 21 CFR 123 as it appears in the *Federal Register* of December 18, 1995, except for the requirement for harvester identification on a dealer's tag.

(c) Ensure that all individuals who manufacture, process, pack, or hold food obtain training in accordance with 21 CFR 117.4. A dealer shall be allowed thirty (30) days following initial hiring of a new employee to provide the required education.

(i) Proof of training for all employees shall be presented to the Authority prior to certification, recertification, or licensing.

(ii) The dealer shall maintain the record of the completed training.

(3) Each dealer shall have a business address at which inspections of facilities, activities, or equipment can be conducted.

B. Types of Certification.

(1) Shucker-packer. Any person who shucks shellfish shall be certified as a shucker-packer.

(2) Repacker.

(a) Any person who repacks shucked shellfish shall be certified as a shucker-packer or repacker;

(b) Any person who repacks shellstock shall be certified as a shellstock shipper, shucker-packer, or repacker;

(c) A repacker shall not shuck shellfish.

(3) Shellstock Shipper. Any person who ships and receives shellstock in interstate commerce shall be certified as a shellstock shipper, repacker, or shucker-packer.

(4) Reshipper. Any person who purchases shellstock or shucked shellfish from dealers and sells the product without repacking or relabeling to other dealers, wholesalers or retailers shall be certified as a reshipper.

.05 Shellstock Identification

[Note: All Federally allocated shellfish (surf and quahog) caught in Federally regulated waters must follow the National Marine Fisheries Service tagging protocol. These Federal sequential tags will supersede the tagging requirements in Section 05.*]*

A. General.

(1) The dealer shall keep the harvester's tag affixed to each container of shellstock until the container is:

(a) Shipped with his/her dealer tag affixed to each container of shellstock; or

(b) Emptied to wash, grade, or pack the shellstock.

(2) When the dealer is also the harvester and he elects not to use a harvest tag, the dealer shall affix his dealer tag to each container of shellstock prior to shipment.

B. Tags.

(1) The dealers' tags shall:

(a) Be durable, waterproof and sanctioned by the Authority prior to use; and

(b) Be at least 13.8 square inches (89.03 cm^2) in size.

(2) The dealer's tag shall contain the following indelible, legible information in the order specified below:

(a) The dealer's name and address.

(b) The dealer's certification number as assigned by the Authority.

(c) The original shellstock shipper's certification number. If depurated the original shellstock shipper's certification number is not required.

(d) The harvest date; or if depurated, the date of depuration processing, or if wet stored, the original harvest date, and the final harvest date which is the date removed from wet storage.

(e) If wet stored or depurated, the wet storage or depuration cycle or lot number. The wet storage lot number shall begin with the letter "w".

(f) The most precise identification of the harvest location as is practicable including the initials of the State of harvest, and the Authority's designation of the growing area by indexing, administrative or geographic designation. If the Authority has not indexed growing areas, then an appropriated geographical or administrative designation must be used (e.g., Long Bay, Decadent County, lease number, bed, or lot number).

(g) The type and quantity of shellstock.

(h) The following statement in bold capitalized type on each tag:
"THIS TAG IS REQUIRED TO BE ATTACHED UNTIL CONTAINER IS EMPTY OR IS RETAGGED AND THEREAFTER KEPT ON FILE, IN CHRONOLOGICAL ORDER, FOR 90 DAYS." "RETAILERS: DATE WHEN LAST SHELLFISH FROM THIS CONTAINER SOLD OR SERVED (INSERT DATE)**_____."**

Note: Shellstock tagged for restricted should not include the retailer guidance language "RETAILERS: DATE WHEN LAST SHELLFISH FROM THIS CONTAINER SOLD OR SERVED **(INSERT DATE)_____**."

(i) All shellstock intended for raw consumption shall include a consumer advisory. The following statement, from Section 3-603.11 of the Current Food Code, or an equivalent statement, shall be included on all shellstock: "Consuming raw or undercooked meats, poultry, seafood, shellfish or eggs may increase your risk of foodborne illness, especially if

you have certain medical conditions."

(j) The statement "Keep Refrigerated" or an equivalent statement.

(3) When both the dealer and harvester tags appear on the container, the dealer's tag is not required to duplicate the information on the harvester's tag.

(4) If the shellstock is removed from the original container, the tag on the new container shall meet the requirements in Section .05 B. If the shellstock is received bearing a restricted use tag all specific use language shall be transferred to the new shipping tag until processed consistent with the stated purpose.

(5) Country of origin information (USDA 2004) may be included on the dealer tag.

(6) When shellstock intended for retail sale are packed in containers of five (5) pounds or less and shipped in a master container which includes a tag in compliance with Chapter X. .05 B. (1) the individual containers of five (5) pounds or less shall not require tags as specified in Chapter X. .05 B. (1) but may be labeled in some other manner with indelible, legible, information which at a minimum is adequate to trace the shellfish back to the lot of shellstock it is part of.

(7) If a shellfish producing State selects to implement Chapter II. @.06 E. (1) (b) (i), the statement "For shucking by a certified dealer" or an equivalent statement shall be included on the tag. When this statement is included, the shellstock shall ultimately be sold to or processed by a certified shucker-packer for the purpose of shucking only.

C. Bulk Tagging Lots of Shellstock for Sales between Dealers.

(1) When a single lot of shellstock is sold, multiple containers may be used on a wrapped pallet, in a tote, in a net bailer, or other container and the unit tagged with a single tag in accordance with Section .05 B. (1) through (4).

(a) This bulk tagging provision shall not apply to sales to reshippers;

(b) The shipment must be accompanied by a transaction record stating the name of the consignee who must be a certified dealer;

(c) In addition to the information required in Section .05 B. (1) through (4) the unit tag shall also include:

(i) A statement that "All shellstock containers in this lot have the same harvest date and area of harvest"; and

(ii) Number of individual containers in the unit.

D. Tagging of a Lot of Shellstock during Intermediate Processing.

(1) When the shellstock is removed from the original container, the dealer shall:

(a) Keep the harvester tag for ninety (90) days;

(b) Keep track of the growing area and date of harvest for shellstock; and

(c) Maintain the lot identity of all shellstock during any intermediate stage of processing.

(2) A dealer receiving bulk tagged lots of shellstock must have an intermediate processing plan approved by the Authority to ensure that each lot of shellstock is kept separate and identified in a way which prevents commingling or misidentification.

(3) In order for a dealer to tag a lot container (e.g., a pallet) of shellstock in lieu of meeting the requirement in Section .05 B. for a harvester or dealer tag on each individual container, the dealer shall have an intermediate processing plan approved by the Authority, which establishes the procedures, the dealer shall use to tag the lot during the washing, packing or staging of shellfish.

(4) Unless the dealer is included in the Authority's commingling plan under Chapter I. @.01 F., the dealer's intermediate processing plan for tagging a lot of shellstock during the intermediate stage of processing shall ensure that each lot of shellstock is separated and identified in a way which prevents commingling or misidentification. The identification shall be provided by:

(a) A harvester's or dealer's tag which meets the requirements of Section .05 B.; or

(b) A tag for each lot of shellstock that contains the following information:

(i) A statement that "All shellstock containers in this lot have the same harvest date and area of harvest";
(ii) Harvest date;
(iii) Growing area;
(iv) Original dealer certification number; and
(v) Number of individual containers in each lot of shellstock container (e.g., a pallet) after washing, packing or staging has been completed.

(5) When a dealer has an approved intermediate processing plan, the dealer shall tag each lot of shellstock in accordance with the intermediate processing plan while the lot of shellstock is being processed in the plant.

E. All restricted use shellstock shall include a tag containing all information required in Section .05 of Model Ordinance Chapter X. In addition, the tag will include specific language detailing the intended use of the shellstock until processed consistent with the stated purpose.

F. Transaction Record. If shellstock are sold in bulk, the dealer shall provide a transaction record prior to shipment. This transaction record shall contain all the information required in Section .07 B. with the addition of the name of the consignee.

.06 Shucked Shellfish Labeling

A. Shellfish Labeling.

(1) The dealer shall maintain lot integrity when shucked shellfish are stored using in-plant reusable containers.

(2) If the shucker-packer uses returnable containers to transport shucked shellfish between dealers for the purpose of further processing or packing, the returnable containers are exempt from the labeling requirements in this section of the regulation. When returnable containers are used, the shipment shall be accompanied by a transaction record containing:

(a) The original shucker-packer's name and certification number;
(b) The shucking date; and
(c) The quantity of shellfish per container and the total number of containers.

(3) If the dealer uses master shipping cartons, the master cartons are exempt from these labeling requirements when the individual containers within the carton are properly labeled.

(4) At a minimum the dealer shall label each individual package containing fresh or frozen shucked shellfish meat in a legible and indelible form in accordance with CFR 21, Part 101; Part 161, Subpart B (161.130, and 161.136) and the Federal Fair Packaging and Labeling Act.

(5) The dealer shall assure that the shucker-packer's or repacker's certification number is on the label of each package of fresh or frozen shellfish.

(6) The dealer shall label each individual package containing less than sixty-four (64) fluid ounces of fresh or fresh frozen shellfish with the following:

(a) The words "SELL BY" or "BEST IF USED BY" followed by a reasonable date when the product would be expected to reach the end of its shelf life;
(b) The date shall consist of the abbreviation for the month and number of the day of the month; and
(c) For fresh frozen shellfish, the year shall be added to the date.

(7) The dealer shall label each individual package containing sixty-four (64) fluid ounces or more of fresh or fresh frozen shellfish with the following:

(a) The words "DATE SHUCKED" followed by the date shucked located on both the lid and sidewall or bottom of the container;
(b) The date shall consist of either the abbreviation for the month and number of the day of

the month or in Julian format (YDDD), the last digit of the four digit year and the three digit number corresponding the day of the year; and

(c) For fresh frozen shellfish, the year shall be added to the date (for non-Julian format).

(8) If the dealer thaws and repacks frozen shellfish, the dealer shall label the shellfish container as previously frozen.

(9) If the dealer freezes fresh shucked shellfish, the dealer shall label all frozen shellfish as frozen in type of equal prominence immediately adjacent to the type of the shellfish and the year shall be added to the date (for non-Julian format).

(10) If the dealer uses lot codes to track shellfish containers, the lot codes shall be distinct and set apart from any date listed on the container.

(11) The dealer shall assure that each package of fresh or frozen shucked shellfish shall include a consumer advisory. The following statement, from Section 3-603.11 of the Current Food Code, or an equivalent statement, shall be included on all packages: “Consuming raw or undercooked meats, poultry, seafood, shellfish, or eggs may increase your risk of foodborne illness, especially if you have certain medical conditions.”

B. Shucked Shellfish. If the dealer elects to repack shellfish, the dealer shall pack and label all shellfish in accordance with Section .06 except that the original date of shucking shall be added to the new repacked container as specified in Section A. (7) or the original date of shucking shall be used in establishing the SELL BY DATE as specified in Section A. (6).

.07 In-Shell Product or Post-Harvest Processed In-Shell Labeling

A. The dealer shall tag or label all in-shell product with tags meeting the requirements of Chapter X. 05 B. (1).

B. In-Shell Product Tags or Labels.

(1) The dealer tag or label on in-shell product shall contain the following indelible, legible information in the order specified below:

(a) The dealer's name and address;

(b) The dealer's certification number as assigned by the Authority;

(c) The original shellstock shipper's certification number. If depurated the original shellstock shipper's certification number is not required;

(d) A “SELL BY DATE” which is a reasonable subsequent shelf-life or the words “BEST IF USED BY” followed by a date when the product would be expected to reach the end of its shelf-life. The date shall include, month, day and year;

(e) If depurated, the depuration cycle number or lot number;

(f) The most precise identification of the harvest location as is practicable including the initials of the State of harvest, and the Authority's designation of the growing area by indexing, administrative or geographic designation. If the Authority has not indexed growing areas, then an appropriate geographical or administrative designation must be used (e.g., Long Bay, Decadent County, lease number, bed, or lot number).

(g) The type and quantity of in-shell product; and

(h) The following statement in bold capitalized type on each tag or label: **"THIS TAG IS REQUIRED TO BE ATTACHED UNTIL CONTAINER IS EMPTY OR IS RETAGGED AND THEREAFTER KEPT ON FILE, IN CHRONOLOGICAL ORDER, FOR 90 DAYS." “RETAILERS: DATE WHEN LAST SHELLFISH FROM THIS CONTAINER SOLD OR SERVED (INSERT DATE)_____.” OR “THIS LABEL IS REQUIRED TO BE ATTACHED UNTIL CONTAINER IS EMPTY OR IS RELABELED AND THEREAFTER**

KEPT ON FILE, IN CHRONOLOGICAL ORDER, FOR 90 DAYS."
"RETAILERS: DATE WHEN LAST SHELLFISH FROM THIS CONTAINER SOLD OR SERVED (INSERT DATE)_____."

(i) All in-shell product intended for raw consumption shall include a consumer advisory. The following statement, from Section 3-603.11 of the Current Food Code, or an equivalent statement, shall be included on all shellstock: "Consuming raw or undercooked meats, poultry, seafood, shellfish or eggs may increase your risk of foodborne illness, especially if you have certain medical conditions."

(j) The statement "Keep Refrigerated" or an equivalent statement must be included on the tag or label.

(k) At a minimum the dealer shall tag or label each individual container in a legible and indelible form in accordance with CFR 21, Part 101; Part 161. Subpart B (161.130 and 161.136) and the Federal Fair Packaging and Labeling Act.

(i) If the in-shell product is removed from the original container, the tag or label on the new container shall meet the requirements in Section .07.B.

(ii) Country of origin information (USDA 2004) may be included on the shucker-packer or reshipper tag or label.

(iii) When in-shell product intended for retail sale are packed in containers of five (5) pounds or less and shipped in a master container which includes a tag in compliance with Chapter X. .05 B. (1), the individual containers of five (5) pounds or less shall not require tags as specified in Chapter X. .05. .B. (1) but may be labeled in some other manner with indelible, legible, information which at a minimum is adequate to trace the in-shell shellfish back to the lot of in-shell product it is part of. Consumer advisory information identified in Chapter X. .07 B. (1) (i) shall be included on each retail package.

NOTE: Implementation will be delayed until January 1, 2019 to allow shellfish dealers adequate time to use up existing tag inventories.
NOTE: The Consumer Advisory shall be required for both A. and B.

.08 Shipping Documents and Records

A. Shipping Documents.
   (1) Each shellfish shipment shall be accompanied by a shipping document.
   (2) The shipping document shall contain:
      (a) The name, address, and certification number of the shipping dealer;
      (b) The name and address of the major consignee; and
      (c) The kind and quantity of the shellfish product.
   (3) The receiving dealer shall:
      (a) Maintain in his files a copy of the completed shipping document; and
      (b) Make the shipping document available to the Authority upon request.
   (4) If the shipment is subdivided to different dealers, each receiving dealer shall maintain records sufficient to trace his portion back to the original shipment.
B. Transaction and Shipping Records.
   (1) Each dealer shall have a business address at which transaction records are maintained.
   (2) Each dealer shall maintain accurate and legible transaction records that are sufficient to:
      (a) Document that the shellfish are from a source authorized under this Ordinance;
      (b) Permit a container of shellfish to be traced back to the specific incoming lot of shucked

shellfish from which it was taken;

(c) Permit a lot (or commingled lots as per Chapter I. @.01 F.) of shucked shellfish or a lot of shellstock to be traced back to the growing area(s), date(s) of harvest, date and location of wet storage, if applicable, and if possible, the harvester or group of harvesters.

(d) Trace the wet storage history of the shellstock including, original harvest site, original harvest date, wet storage site(s) and dates.

(3) Purchase and sales shall be recorded:

(a) In a permanently bound ledger book; or

(b) Using other recording methods acceptable to and authorized by the Authority. Entries of purchases or sales of shellfish shall be made into a permanently bound ledger book, computer record, or other method acceptable to and authorized by the Authority within seventy-two (72) hours of any purchase or sales.

(4) The transaction records shall be retained:

(a) In the case of fresh shellfish, for a minimum of one (1) year; and

(b) In the case of frozen shellfish, for at least two (2) years or the shelf life of the product, whichever is longer.

(5) If computer records are maintained, the Authority shall approve the format and its use.

Chapter XI. Shucking and Packing

Requirements for the Authority

[Note: The Authority must meet the requirements of this section even if the Authority does not formally adopt this section in regulation.]

@.01 Heat Shock

A. The Authority shall approve the scheduled process for heat shock. The schedule may be developed by the Authority or qualified persons with adequate facilities for conducting the appropriate studies;
B. The Authority shall assure that the critical factors, which may affect the heat shock process, have been adequately studied and provided for in establishing the process. The critical factors shall include:
    (1) Type and size of shellfish;
    (2) Time and temperature of exposure;
    (3) Type of process;
    (4) Size of tank, tunnel or retort;
    (5) Water to shellfish ratios in tanks; and
    (6) Temperature and pressure monitoring devices;
C. The Authority shall assure that heat shock process does not:
    (1) Change the physical and organoleptic properties of the species;
    (2) Kill the shellfish prior to shucking; and
    (3) Increase microbial deterioration of the shucked shellfish.
D. The Authority shall retain records covering all aspects of the establishment of the heat shock process.

Additional Guidance: Section IV Guidance Documents Chapter II. Section .18

Requirements for Dealers

Additional Guidance: Section IV. Guidance Documents Chapter III. Section .07

.01 Critical Control Points

A. Receiving Critical Control Point - Critical Limits.

(1) The dealer shall shuck and pack only shellstock obtained from a licensed harvester who has:
    (a) Harvested the shellstock from an Approved or Conditionally Approved area in the open status as indicated by the tag; and **[C]**
    (b) Identified the shellstock with a tag on each container or transaction record on each bulk shipment; and **[C]**

(c) Harvested the shellstock in compliance with the time temperature requirements of Chapter VIII. @.02 A. (1), (2), or (3) as determined from records supplied by the harvester described in Chapter VIII. .02 G. (2) **[C].**

(2) The dealer shall shuck and pack only shellstock obtained and transported from a dealer who has:

(a) Identified the shellstock with a tag on each container as outlined in Chapter X. .05 or transaction record with each bulk shipment as outlined in Chapter VIII. .02 F. (8); and **[C]**

(b) Provided documentation as required in Chapter IX. .05; and **[C]**

(c) Adequately iced the shellstock; or **[C]**

(d) Shipped the shellstock in a conveyance maintained at or below 45 °F (7.2 °C) ambient air temperature; or **[C]**

(e) Cooled the shellstock to an internal temperature of 50 °F (10 °C) or less. **[C]**

(3) A dealer may receive shellstock from a dealer who has elected to ship shellstock in accordance with Chapter XIII. .01 D. (2) without the shellstock meeting the receiving requirements of Chapter XIII. .01 A. (2) (c), (d) or (e). The product must be accompanied with documentation as outlined in Chapter XIII. A. (2) (b) and must be accompanied with a time/temperature recording device indicating that continuing cooling has occurred. Shipments of four (4) hours or less will not be required to have a time/temperature device or comply with Chapter XIII. .01 A. (2) (c), (d) or (e). Shipments of four (4) hours or less must have documentation as required in Chapter XIII. .01 A. (2) (b). **[C]**

(4) The dealer shall shuck and pack only in-shell product obtained from a dealer who has:

(a) Shipped the in-shell product adequately iced; or in a conveyance at or below 45 °F (7.2 °C) ambient air temperature; or 45 °F (7.2 °C) internal temperature or less; and **[C]**

(b) Identified the in-shell product with a tag on each container. **[C]**

B. Shellstock Storage Critical Control Point - Critical Limits. The dealer shall ensure that:

(1) If wet storage in artificial bodies of water is practiced, water quality meets the requirements outlined in Chapter VII. .04; and **[C]**

(2) Once placed under temperature control and until shucked the shellstock shall;

(a) Be iced; or **[C]**

(b) Be placed and stored in a storage area or conveyance maintained at 45 °F (7.2 °C) or less; and **[C]**

(c) Not be permitted to remain without ice, mechanical refrigeration or other approved methods of storage, as required in Section .01 B. (1) or Section .01 B. (2) (a) or (b) for more than two (2) hours at points of processing or transfer such as loading docks. **[C]**

C. In-shell Product Storage Critical Control Point - Critical Limits. The dealer shall ensure that in-shell product shall be:

(1) Iced; or **[C]**

(2) Placed and stored in a storage area or conveyance maintained at 45 °F (7.2 °C) or less. **[C]**

D. Processing Critical Control Point - Critical Limits. The dealer shall ensure that:

(1) For shellstock which has not been refrigerated prior to processing:

(a) Shucked meats are chilled to an internal temperature of 45 °F (7.2 °C) or less within three (3) hours of shucking. **[C]**

(b) In-shell product is chilled to an internal temperature of 45 °F (7.2 °C) or less within three (3) hours of processing. **[C]**

(2) For shellstock refrigerated prior to processing:

(a) Shucked meats are chilled to an internal temperature of 45 °F (7.2 °C) or less within four (4) hours of removal from refrigeration.**[C]**

(b) In-shell product is chilled to an internal temperature of 45 °F (7.2 °C) or less within four

(4) hours of removal from refrigeration.**[C]**

(3) If heat shock is used, once heat shocked shellstock is shucked, the shucked shellfish meats shall be cooled to 45 °F (7.2 °C) or less within two (2) hours after the heat shock process. **[C]**

(4) When heat shock shellstock are cooled and held under refrigeration for later shucking, the heat shocked shellstock shall be cooled to an internal temperature of 45 °F (7.2 °C) within two (2) hours from time of heat shock. **[C]**

(5) For in-shell product the internal temperature of meats does not exceed 45 °F (7.2 °C) for more than two (2) hours during processing. **[C]**

E. Shucked Meat Storage Critical Control Point - Critical Limit. The dealer shall store shucked and packed shellfish in covered containers at an ambient temperature of 45 °F (7.2 °C) or less or covered with ice. **[C]**

.02 Sanitation

A. Safety of Water for Processing and Ice Production.

Additional Guidance: Section IV Guidance Documents - Chapter III. Section .01

(1) Water Supply.

(a) The dealer shall provide a potable water supply in accordance with applicable Federal, State and local regulations. **[C]**

(b) If the water supply is from a private source, the dealer shall make arrangements to have the water supply sampled by persons recognized by the Authority and tested at laboratories sanctioned or certified by the Authority: **[K]**

(i) Prior to use of the water supply; **[C]**

(ii) Every six (6) months while the water supply is in use; and **[K**]

(iii) After the water supply has been repaired and disinfected. **[$S^{C/K}$]**

(2) Ice Production. Any ice used in the processing, storage, or transport of shellfish shall:

(a) Be made on-site from potable water in a commercial ice machine; **[C] or**

(b) Come from a facility sanctioned by the Authority or the appropriate regulatory agency. [**C]**

(3) Shellstock Washing.

(a) Water from either a potable water supply or a growing area in the approved classification shall be used to wash shellstock. **[C]**

(b) If the dealer uses any system to wash shellstock which recirculates water, the dealer shall:

(i) Obtain approval for the construction or remodeling of the system from the Authority. **[K]**

(ii) Provide a water treatment and disinfection system to treat an adequate quantity of water to a quality acceptable for shellstock washing which, after disinfection, meets the coliform standards for drinking water, and does not leave any unacceptable residues in the shellstock; and **[C]**

(iii) Test bacteriological water quality daily; **[$S^{C/K}$]**

(c) The dealer may use ultra-violet (UV) disinfection in the recirculating wash water system, provided that the turbidity of the water to be disinfected shall not exceed twenty (20) nephelometric turbidity units (NTUs) measured using the method in the APHA *Standard Methods for the Examination of Water and Wastewater*. **[K]**

(4) Plumbing and Related Facilities.

(a) The dealer shall design, install, modify, repair, and maintain all plumbing and plumbing fixtures to:

(i) Prevent contamination of water supplies; **[$S^{C/K}$]**

(ii) Prevent any cross-connection between the pressurized potable water supply and water from unacceptable source. **[$S^{C/K}$]** The dealer shall install and maintain in good working order devices to protect against backflow and back siphonage. **[K]**

B. Condition and Cleanliness of Food Contact Surfaces.

(1) Equipment and utensil construction for food contact surfaces.

(a) The dealer shall use only equipment which conforms to *Shellfish Industry Equipment Construction Guidelines*. **[K]**

(b) The dealer shall use only equipment and utensils, including approved plastic ware and finished product containers which are:

(i) Constructed in a manner and with materials that can be cleaned and sanitized, maintained or replaced in a manner to prevent contamination of shellfish products; **[K]**

(ii) Free from any exposed screws, bolts, or rivet heads on food contact surfaces; and **[K]**

(iii) Fabricated from food grade materials. **[K]**

(c) The dealer shall assure that all joints on food contact surfaces

(i) Have smooth easily cleanable surfaces; and **[K]**

(ii) Are welded. **[K]**

(d) Shucking blocks shall be provided which are:

(i) Easily cleanable; **[K]**

(ii) Fabricated from safe material; **[K]**

(iii) Solid, one piece construction; and **[K]**

(iv) Easily removed from the shucking bench, unless the block is an integral part of the bench. **[K]**

(e) The dealer shall provide a temperature measuring device accurate to +/- 2 °F for use in monitoring product temperatures. **[K]**

(f) All equipment used in heat shock processing shall meet the requirements of Chapter XI. .02 B. (1) (a), (b), and (c). **[K]**

(g) All equipment used to handle ice shall be kept clean and stored in a sanitary manner, and shall meet the construction requirements in Chapter XI. .02 B. (1) (a), (b), and (c). **[K]**

(h) Shellstock washing storage tanks and related plumbing shall be fabricated from safe materials and tank construction shall be such that it:

(i) Is easily accessible for cleaning and inspection; **[K]**

(ii) Is self-draining; and **[K]**

(iii) Meets the requirements for food contact surfaces. **[K]**

(2) Cleaning and sanitizing of food contact surfaces.

(a) Food contact surfaces of equipment, utensils and containers shall be cleaned and sanitized to prevent contamination of shellfish and other food contact surfaces. The dealer shall:

(i) Provide adequate cleaning supplies and equipment, including three (3) compartment sinks, brushes, detergents, and sanitizers, hot water and pressure hoses shall be available within the plant; **[K]**

(ii) Sanitize equipment and utensils prior to the start-up of each day's activities and following any interruption during which food contact surfaces may have been

contaminated; and **[K]**

(iii) Wash and rinse equipment and utensils at the end of each day. **[K]**

(b) Shellfish shall be protected from contamination by washing and rinsing shucking containers and sanitizing before each filling. **[K]**

(c) Containers which may have become contaminated during storage shall be washed, rinsed, and sanitized prior to use or shall be discarded. **[K]**

(d) Shucked shellfish shall be packed in clean covered containers and stored in a manner which assures their protection from contamination:

(i) Fabricated from food grade materials; and **[K]**

(ii) Stored in a manner which assures their protection from contamination. **[K]**

(e) If used, the finger cots or gloves shall be:

(i) Made of impermeable materials except where the use of such material is inappropriate or incompatible with the work being done; **[O]**

(ii) Sanitized at least twice daily; **[K]**

(iii) Properly stored until used; and **[K]**

(iv) Maintained in a clean, intact, and sanitary condition. **[K]**

C. Prevention of Cross Contamination.

(1) Protection of Shellfish.

(a) Shellstock shall be stored in a manner to protect shellstock from contamination in dry storage and at points of transfer. **[$S^{C/K}$]**

(b) Shellfish shall be protected from contamination. **[$S^{C/K}$]**

(c) Shellstock shall not be placed in containers with standing water for the purposes of washing shellstock or loosening sediment. **[K]**

(d) Equipment and utensils shall be stored in a manner to prevent splash, dust, and contamination. **[$S^{K/0}$]**

(2) Separation of operations.

(a) Facilities for shucking and packing activities shall be separated by use of:

(i) Separate rooms; **[K]**

(ii) Partitions; or **[K]**

(iii) Sufficient spacing. **[K]**

(b) Manufacturing activities which could result in the contamination of the shellfish shall be separated by adequate barriers. **[K]**

(3) Employee practices.

(a) Where the same employee works in both shucking and packing activities, the employee shall wash his hands thoroughly after entering. **[K]**

(b) The dealer shall require all employees to wash their hands thoroughly with soap and water and sanitize their hands in an adequate hand washing facility:

(i) Before starting work; **[K]**

(ii) After each absence from the work station; **[K]**

(iii) After each work interruption; and **[K]**

(iv) Any time when their hands may have become soiled or contaminated. **[K]**

(c) Any employee handling shucked shellfish shall be required to:

(i) Wear effective hair restraints; **[O]**

(ii) Remove any hand jewelry that cannot be sanitized or secured; **[O]**

(iii) Wear finger cots or gloves if jewelry cannot be removed; and **[O]**

(iv) Wear clean outer garments, which are rinsed or changed as necessary to be kept clean. **[O]**

(v) In any area where shellfish are shucked or packed and in any area which is used for the cleaning or storage of utensils, the dealer shall not allow employees to:

a. Store clothing or other personal belongings; **[O]**
b. Eat or drink; **[K]**
c. Spit; and **[K]**
d. Use tobacco in any form. **[K]**

D. Maintenance of Hand Washing, Hand Sanitizing and Toilet Facilities.
(1) Hand washing facilities with warm water at a minimum temperature of 100 °F (37.8 °C), dispensed from a hot and cold mixing or combination faucet, shall be provided. **[$S^{K/0}$]**
(2) Hand washing facilities shall be provided which are:
(a) Convenient to work areas; **[O]**
(b) Separate from the three (3) compartment sinks used for cleaning equipment and utensils; **[K]**
(c) Directly plumbed to an approved sewage disposal system, and **[$S^{O/K}$]**
(d) Adequate in number and size for the number of employees, and located where supervisors can observe employee use; **[K]**
(3) The dealer shall provide at least one (1) hand sink in the packing room. **[O]**
(4) The dealer shall provide at each hand washing facility:
(a) Supply of hand cleansing soap or detergent; **[K]**
(b) Conveniently located supply of single service towels in a suitable dispenser or a hand drying device that provides heated air; **[O]**
(c) Easily cleanable waste receptacle; and **[O]**
(d) Hand washing signs in a language understood by the employees; **[O]**
(5) Sewage **[C]** and liquid disposable wastes shall be properly removed from the facility **[K]**
(6) The dealer shall provide:
(a) Toilet room doors that are tight fitting, self-closing, and do not open directly into a processing area; **[K]**
(b) An adequate number of conveniently located, toilets; and **[K]**
(c) Each toilet facility with an adequate supply of toilet paper **[K]** in a suitable holder. **[$S^{K/0}$]**

E. Protection from Adulterants.
(1) Shellfish shall be protected from contamination while being transferred from one point to another during handling and processing. **[K]**
(2) Any lighting fixtures, light bulbs, skylights, or other glass suspended over food storage or processing activities in areas where shellfish are exposed shall be of the safety type or protected to prevent food contamination in case of breakage. **[O]**
(3) Food contact surfaces shall be protected from contamination by adulterants by using cleaning compounds and sanitizing agents only in accordance with applicable Federal and State laws and regulations. **[K]**
(4) Protection of ice used in shellfish processing.
(a) Any ice which is not made on site in the shellfish processing facility shall be inspected upon receipt and rejected if the ice is not delivered in a way so as to be protected from contamination. **[$S^{C/K}$]**
(b) Ice shall be stored in a safe and sanitary manner to prevent contamination of the ice. **[$S^{C/K}$]**
(5) Adequate ventilation shall be provided to minimize condensation in areas where food is stored, processed or packed. **[$S^{C/K}$]**
(6) The dealer shall assure that any steam used in food processing or that comes in contact with food contact surfaces is free from any additives, or deleterious substances consistent with Federal and State laws and regulations. **[K]**
(7) Air pump intakes shall be located in a protected place. Air filters shall be installed on all blower air pump intakes. Oil bath type filters are not allowed. **[O]**

F. Proper Labeling, Storage and Use of Toxic Compounds.

Additional Guidance: Section IV Guidance Documents Chapter III. Section .06

(1) Storage of toxic compounds.
(a) The dealer shall assure that only toxic substances necessary for plant activities are present in the facility. **[K]**
(b) Each of the following categories of toxic substances shall be stored separately:
(i) Insecticides and rodenticides; **[K]**
(ii) Detergents, sanitizers, and related cleaning agents; and **[K]**
(iii) Caustic acids, polishes, and other chemicals. **[K]**
(c) The dealer shall not store toxic substances above shellfish or food contact surfaces. **[K]**

(2) Use and labeling of toxic compounds.
(a) When pesticides are used, the dealer shall apply pesticides in accordance with applicable Federal and State regulations to control insects and rodents in such a manner to prevent the contamination of any shellfish or packaging materials with residues. **[K]**
(b) Cleaning compounds and sanitizing agents shall be labeled and used only in accordance with applicable Federal and State laws and regulations. **[K]**
(c) Toxic substances shall be labeled and used in accordance with the manufacturer's label directions. **[K]**
(d) Provide a test kit or other device that accurately measures the parts per million concentration of the chemical sanitizing agent in use. **[K]**

G. Control of Employees with Adverse Health Conditions

(1) The dealer and the supervisor shall take all reasonable precautions to assure that any employee with a disease in the communicable stage which might be transmissible through food shall be excluded from working in any capacity in which the employee may come in contact with the shellfish or with food contact surfaces. The pathogens causing diseases which are transmissible from food workers through food are those determined by the U.S. Centers for Disease Control and Prevention, in compliance with the Americans with Disabilities Act, and published in the *Federal Register*. These include: **[K]**
(a) Norovirus
(b) Hepatitis A virus,
(c) *Shigella* spp.,
(d) Enterohemorrhagic or Shiga Toxin-producing *Escherichia coli*, or
(e) *Salmonella typhi*;

(2) All employees shall immediately report to the dealer and/or the supervisor information about their health and activities as they relate to diseases that are transmissible through food. All employees shall report the information in a manner that allows the dealer and/or supervisor to reduce the risk of shellfish-borne disease transmission, including providing necessary additional information, such as the date of onset of symptoms of an illness, or of a diagnosis without symptoms, or if the employee: **[K]**
(a) Has any of the following symptoms:
(i) Vomiting
(ii) Diarrhea,
(iii) Jaundice,
(iv) Sore throat with fever, or
(v) A lesion containing pus such as a boil or infected wound that is open or draining

on any part of the body, or

(b) Has an illness diagnosed by a health practitioner due to:

(i) Norovirus

(ii) Hepatitis A virus,

(iii) *Shigella* spp.,

(iv) Enterohemorrhagic or Shiga Toxin-producing *Escherichia coli*, or

(v) *Salmonella typhi*;

(c) Had a previous illness, diagnosed by a health practitioner, within the past three (3) months due to *Salmonella typhi*, without having received antibiotic therapy, as determined by a health practitioner;

(d) Has been exposed to, or is the suspected source of, a confirmed disease outbreak, because the employee consumed or prepared food implicated in the outbreak, or consumed food at an event prepared by a person who is infected or ill with:

(i) Norovirus within the past twenty-four (24) hours of the last exposure:

(ii) Enterohemorrhagic or Shiga toxin-producing *Escherichia coli* or *Shigella* spp. within the past three (3) days of the last exposure;

(iii) *Salmonella typhi* within the past fourteen (14) days of the last exposure; or

(iv) Hepatitis A virus within the past thirty (30) days of the last exposure.

(e) Has been exposed by attending or working in a setting where there is a confirmed disease outbreak, or living in the same household as, and has knowledge about, an individual that works or attends a setting where there is a confirmed disease outbreak or living in the same household as, and has knowledge about, an individual diagnosed with an illness caused by:

(i) Norovirus within the past twenty-four (24) hours of the last exposure;

(ii) Enterohemorrhagic or Shiga toxin-producing *Escherichia coli*, or *Shigella* spp. within the past three (3) days of the last exposure;

(iii) *Salmonella typhi* within the past fourteen (14) days of the last exposure; or

(iv) Hepatitis A virus within the past thirty (30) days of the last exposure.

(3) If an employee with an infected wound protects the lesion by keeping it covered with a proper bandage, a dry, durable, tight-fitting impermeable barrier, and a single-use glove for a hand lesion, the dealer and/or supervisor may allow the employee to work in the shellfish processing facility without additional restrictions. **[K]**

(4) The dealer shall notify the Authority and Health Department when *notified* by an employee *of a diagnosis or exhibits symptoms of hepatitis*, and shall ensure that the employee is excluded from working in any capacity in which the employee may come in contact with the shellfish or with food contact surfaces or that may transmit the illness to other employees. **[K]**

H. Exclusion of Pests. The dealer shall operate his facility to assure that pests are excluded from the facility and processing activities. Animals shall not be allowed in those portions of the facilities where shellfish are stored, handled, processed, or packaged or food handling equipment, utensils, and packaging materials are cleaned or stored. **[K]**

.03 Other Model Ordinance Requirements

A. Plants and Grounds.

(1) General. The physical facilities shall be maintained in good repair. **[O]**

(2) Flooding.

(a) Facilities in which shellfish are stored, shucked, packed, repacked or reshipped shall be located so that these facilities are not subject to flooding during ordinary high tides. **[C]**

(b) If facilities are flooded:

(i) Shellfish processing, shucking or repacking activities shall be discontinued until the flood waters have receded from the building; and the building is cleaned and sanitized. **[C]**

(ii) Any shellfish coming in contact with the flood waters while in storage shall be destroyed; or discarded in non-food use. **[C]**

(3) The dealer shall operate his facility to provide adequate protection from contamination and adulteration by assuring that dirt and other filth are excluded from his facility and activities. **[$S^{C/K}$]**

(4) The dealer shall employ necessary internal and external insect and vermin control measures to insure that insects and vermin are not present in the facility.

(a) Tight fitting, self-closing doors: **[K]**

(b) Screening of not less than fifteen (15) mesh per inch; **[K]** and

(c) Controlled air current. **[K]**.

(5) Plant Interior.

(a) Sanitary conditions shall be maintained throughout the facility. **[O]**

(b) All dry area floors shall be hard, smooth, easily cleanable; and **[O]**

(c) All wet area floors used in areas to store shellfish, process food, and clean equipment and utensils shall be constructed of easily cleanable, impervious, and corrosion resistant materials which:

(i) Are graded to provide adequate drainage; **[O]**

(ii) Have even surfaces, and are free from cracks that create sanitary problems and interfere with drainage; and **[O]**

(iii) Have sealed junctions between floors and walls to render them impervious to water. **[O]**

(d) Walls and Ceilings. Interior surfaces of rooms where shellfish are stored, handled, processed, or packaged shall be constructed of easily cleanable, corrosion resistant, impervious materials. **[O]**

(6) Grounds around the facility shall be maintained to be free from conditions which may result in shellfish contamination. These conditions may include:

(a) Rodent attraction and harborage; and **[O]**

(b) Inadequate drainage. **[O]**

B. Plumbing and Related Facilities.

(1) All plumbing and plumbing fixtures shall be properly designed, installed, modified, repaired, and maintained. The water system shall provide an adequate quantity of water under pressure, and includes cold and warm water at all sinks. **[K]**

(2) Adequate floor drainage, including backflow preventers such as air gaps, shall be provided where floors are:

(a) Used in shellfish storage; **[K]**

(b) Used for food holding units (e.g., refrigeration units) **[K]**;

(c) Cleaned by hosing, flooding, or similar methods**]**; and **[K**

(d) Subject to the discharge of water or other liquid waste including three (3) compartment sinks on the floor during normal activities. **[K]**

(3) A safe, effective means of sewage disposal for the facility shall be provided in accordance with applicable Federal and State laws and regulations. **[$S^{C/K}$]**

(4) Installation of drainage or waste pipes over food processing or food storage areas, or over areas in which containers and utensils are washed or stored shall not be permitted. **[K]**

C. Utilities.

(1) The dealer shall ensure that ventilation, heating, or cooling systems do not create conditions that may cause the shellfish products to become contaminated. **[$S^{C/K}$]**
(2) The dealer shall provide lighting throughout the facility that is sufficient to promote good manufacturing practices. **[$S^{C/K}$]**

D. Disposal of Other Wastes.
(1) Disposal of waste materials shall be conducted in accordance with appropriate Federal and State laws and regulations. **[O]**
(2) Shell and other non-edible materials shall be promptly and effectively removed from the shucking bench or table. **[O]**
(3) All areas and receptacles used for the storage or conveyance of waste shall be operated and maintained to prevent attraction, harborage, or breeding places for insects and vermin. **[O]**

E. Equipment Condition, Cleaning, Maintenance, and Construction of Non-Food Contact Surfaces.
(1) The dealer shall use only equipment, including approved plastic ware, which is constructed in a manner and with materials that can be cleaned, sanitized, maintained, or replaced. **[O]**
(2) The dealer shall use easily cleanable, corrosion-resistant impervious materials, free from cracks to construct:
(a) Shucking benches and contiguous walls; **[O]**
(b) Stands or stalls and stools for shucker; and **[O]**
(c) Any non-food contact surfaces in shellfish storage or handling areas. **[O]**
(3) Shucking benches shall drain completely and rapidly, and shall drain away from any shellfish on the benches. **[O]**
(4) Cleaning activities for equipment shall be conducted in a manner and at a frequency appropriate to prevent contamination of shellfish and food contact surfaces. **[K]**
(5) All conveyances and equipment which come into contact with stored shellstock shall be cleaned and maintained in a manner and frequency as necessary to prevent shellstock contamination. **[O]**

F. Shellfish Storage and Handling.
The dealer shall:
(1) Assure that shellstock is:
(a) Reasonably free of sediment **[O]**; and
(b) Culled; **[K]**
(2) Assure shucking buckets are completely empty at the packing room so that no overage is returned to the shucker. **[K]**
(3) Inspect incoming shipments and shall reject dead or inadequately protected shellstock. **[K]**
(4) Not allow the use of dip buckets for hand or knife rinsing. **[K]**
(5) Not have on the premises any usable containers or container covers bearing a certification number different from the one issued for those premises unless documentation exists to verify the legitimate source of the containers and the containers contain shellfish from that source. **[K]**
(6) Wash, blow, and rinse all shellfish meats in accordance with 21 CFR 161 Section 130. **[K]**
(7) Thoroughly drain, clean as necessary, and pack shucked shellfish meats promptly after delivery to the packing room. **[K]**
(8) Conduct packing activities so as to conform to applicable food additive regulations; **[K]**
(9) Assure that shellfish are maintained frozen during storage frozen. **[$S^{K/O}$]**
(10) Not commingle shellstock during shucking unless the dealer is included in the Authority's commingling plan. **[K]**
(11) Ensure that all shellstock obtained from a licensed harvester are
(a) Adequately iced within two (2) hours of receipt;

(b) Placed in a storage area maintained at 45 °F (7.2 °C) within two (2) hours of receipt; or

(c) Shucked within two (2) hours of receipt. **[$S^{C/K}$]**

(d) Product intended for relay, wet storage or depuration, or either geoduck clams (*Panopea generosa*), or *Mercenaria* spp. which are being cooled utilizing an Authority approved tempering plan are exempt from the requirements listed above in .03 F. (11).

G. Heat Shock. A dealer may elect to use heat shock to prepare shellstock for shucking.

(1) The dealer shall:

(a) Post the schedule for the heat shock process in a conspicuous location; **[K]**

(b) Make sure all responsible persons are familiar with requirements; and **[K]**

(c) Cool all hot dipped shellstock immediately after the heat shock process **[K], which** shall be accomplished by:

(i) Dipping in an ice bath; or **[K]**

(ii) Use of flowing potable water. **[K]**

(2) If a heat shock tank is used, and the water is maintained at or above 140 °F degrees the dealer shall completely drain and flush the tank at the end of each day's operation so that all the mud and debris which have accumulated in the dip tank are eliminated. If the temperatures are maintained below 140 °F degrees, the dealer shall completely drain and flush the tank at three (3) hour intervals. **[K]**

H. Supervision.

(1) A reliable, competent individual shall be designated to supervise general plant management and activities. **[K]**

(2) Cleaning procedures shall be developed and supervised to assure cleaning activities do not result in contamination of shellfish or food contact surfaces. **[K]**

(3) All supervisors shall be:

(a) Trained in proper food handling techniques and food protection principles; and **[K]**

(b) Knowledgeable of personal hygiene and sanitary practices. **[K]**

(4) The dealer shall require:

(a) Supervisors to monitor employee hygiene practices, including handwashing, eating, and smoking at work stations, and storing personal items or clothing. **[K]**

(b) Supervisors to assure that proper sanitary practices are implemented, including:

(i) Plant and equipment clean-up; **[K]**

(ii) Rapid product handling; and **[K]**

(iii) Shellfish protection from contamination. **[K]**

(c) Supervisors to not allow unauthorized persons in those portions of the facilities where shellfish are stored, handled, processed, or packaged or food handling equipment, utensils, and packaging materials are cleaned or stored. **[K]**

(d) All employees to be trained in proper food handling and personal hygiene practices. **[K]**

Chapter XII. Repacking of Shucked Shellfish

Additional Guidance: Section IV Guidance Documents Chapter II. Section .18

.01 Critical Control Points

A. Receiving Critical Control Point - Critical Limits. The dealer shall repack only shellfish which originated from a dealer who has:
   (1) Shipped the shellfish iced, or in a conveyance at or below 45 °F (7.2 °C) ambient air temperature; **[C]** and
   (2) Identified the shellfish with a label as outlined in Chapter X. .06. **[C]**

B. Processing Critical Control Point - Critical Limits. The dealer shall ensure that repacked shucked shellfish do not exceed an internal temperature of 45 °F (7.2 °C) for more than two (2) hours. **[C]**

C. Shucked Meat Storage Critical Control Point - Critical Limit.
The dealer shall store repacked shellfish in covered containers at an ambient temperature of 45 °F (7.2 °C) or less or covered with ice. **[C]**

.02 Sanitation

A. Safety of Water for Processing and Ice Production.
   (1) Water Supply.
      (a) The dealer shall provide a potable water supply in accordance with applicable Federal, State and local regulations. **[C]**
      (b) If the water supply is from a private source, the dealer shall make arrangements to have the water supply sampled by persons recognized by the Authority and tested at laboratories sanctioned or certified by the Authority: **[K]**
         (i) Prior to use of the water supply; **[C]**
         (ii) Every six (6) months while the water supply is in use; and **[K]**
         (iii) After the water supply has been repaired and disinfected. **[$S^{C/K}$]**
   (2) Ice Production. Any ice used in the processing, storage, or transport of shellfish shall:
      a. Be made on-site from potable water in a commercial ice machine; **[C]** or
      b. Come from a facility sanctioned by the Authority or the appropriate regulatory agency. [**C]**
   (3) Plumbing and Related Facilities.
      (a) The dealer shall design, install, modify, repair, and maintain all plumbing and plumbing fixtures to:
         (i) Prevent contamination of water supplies and [$S^{C/K}$]
         (ii) Prevent any cross-connection between the pressurized potable water supply and water from an unacceptable source. [$S^{C/K}$]The dealer shall install and maintain in good working order devices to protect against backflow and back siphonage. **[K]**

Additional Guidance: Section IV Guidance Documents Chapter III. Section .01

B. Condition and Cleanliness of Food Contact Surfaces.

(1) Equipment and utensil construction for food contact surfaces.

(a) The dealer shall use only equipment which conforms to *Shellfish Industry Equipment Construction Guides.* **[K]**

(b) The dealer shall use only equipment and utensils, including approved plastic ware and finished product containers which are:

(i) Constructed in a manner and with materials that can be cleaned, and sanitized, maintained or replaced in a manner to prevent contamination of shellfish products; **[K]**

(ii) Free from any exposed screws, bolts, or rivet heads on food contact surfaces; and **[K]**

(iii) Fabricated from food grade materials. **[K]**

(c) The dealer shall assure that all joints on food contact surfaces

(i) Have smooth easily cleanable surfaces and **[K]**

(ii) Are welded. **[K]**

(d) All equipment used to handle ice shall be kept clean and stored in a sanitary manner, and shall meet the construction requirements in Chapter XI. .02 B. (1) (a), (b), and (c). **[K]**

(e) The dealer shall provide a temperature measuring device accurate to +/- 2 °F for use in monitoring product temperatures.

(2) Cleaning and sanitizing of food contact surfaces.

(a) Food contact surfaces of equipment, utensils and containers shall be cleaned and sanitized to prevent contamination of shellfish and other food contact surfaces. The dealer shall:

(i) Provide adequate cleaning supplies and equipment, including three (3) compartment sinks, brushes, detergents, and sanitizers, hot water and pressure hoses shall be available within the plant; **[K]**

(ii) Sanitize equipment and utensils prior to the start-up of each day's activities and following any interruption during which food contact surfaces may have been contaminated; and **[K]**

(iii) Wash and rinse equipment and utensils at the end of each day. **[K]**

(b) Containers which may have become contaminated during storage shall be washed, rinsed, and sanitized prior to use or shall be discarded. **[K]**

(c) Shucked shellfish shall be packed in clean covered containers:

(i) Fabricated from food grade materials; and **[K]**

(ii) Stored in a manner which assures their protection from contamination. **[K]**

(d) If used, the finger cots or gloves shall be:

(i) Made of impermeable materials except where the use of such material is inappropriate or incompatible with the work being done; **[O]**

(ii) Sanitized at least twice daily; **[K]**

(iii) Cleaned more often, if necessary; **[K]**

(iv) Properly stored until used; and **[K]**

(v) Maintained in a clean, intact, and sanitary condition. **[K]**

C. Prevention of Cross Contamination.

(1) Protection of shellfish.

(a) Shucked shellfish shall be protected from contamination. **[$S^{C/K}$]**

(b) Equipment and utensils shall be stored in a manner to prevent splash, dust, and contamination. **[$S^{K/O}$]**

(2) Employee practices

(a) The dealer shall assure that all employees working in direct contact with shellfish

processing activities or food contact surfaces maintain a high level of personal hygiene and cleanliness. **[K]**

(b) The dealer shall require all employees to wash their hands thoroughly with soap and water and sanitize their hands in an adequate hand washing facility:

(i) Before starting work; **[K]**

(ii) After each absence from the work station; **[K]**

(iii) After each work interruption; and **[K]**

(iv) Any time when their hands may have become soiled or contaminated. **[K]**

(c) Any employee handling shucked shellfish shall be required to:

(i) Wear effective hair restraints; **[O]**

(ii) Remove any hand jewelry that cannot be sanitized or secured; **[O]**

(iii) Wear finger cots or gloves if jewelry cannot be removed; **[O]**

(iv) Wear clean outer garments, which are rinsed or changed as necessary to be kept clean. **[O]**

(v) In any area where shellfish are repacked and in any area which is used for the cleaning or storage of utensils, the dealer shall not allow employees to:

a. Store clothing or other personal belongings; **[O]**

b. Eat or drink; **[K]**

c. Spit; and **[K]**

d. Use tobacco in any form. **[K]**

D. Maintenance of Hand Washing, Hand Sanitizing and Toilet Facilities.

(1) Hand washing facilities with warm water at a minimum temperature of 100 °F (37.8 °C) dispensed from a hot and cold mixing or combination faucet shall be provided. **[$S^{K/O}$]**

(a) Hand washing facilities shall be provided which are:

(i) Convenient to work areas; **[O]**

(ii) Separate from the three (3) compartment sinks used for cleaning equipment and utensils; **[K]**

(iii) Directly plumbed to an approved sewage disposal system, and **[$S^{K/O}$]**

(iv) Adequate in number and size for the number of employees, and located where supervisors can observe employee use; **[K]**

(b) The dealer shall provide at least one (1) hand sink in the packing room. **[O]**

(c) The dealer shall provide at each hand washing facility:

(i) Supply of hand cleansing soap or detergent; **[K]**

(ii) Conveniently located supply of single service towels in a suitable dispenser or a hand drying device that provides heated air; **[O]**

(iii) Easily cleanable waste receptacle; and **[O]**

(iv) Hand washing signs in a language understood by the employees; **[O]**

(2) Sewage **[C]** and liquid disposable wastes **[K]** shall be properly removed from the facility.

(3) The dealer shall provide:

(a) Toilet room doors that are tight fitting, self-closing, and do not open directly into a processing area; **[K]**

(b) An adequate number of conveniently located, toilets; and **[K]**

(c) An adequate supply of toilet paper at each toilet facility **[K]** in a suitable holder. **[$S^{K/0}$]**

E. Protection from Adulterants.

(1) Shellfish shall be protected from contamination while being transferred from one point to another during handling and processing. **[K]**

(2) Any lighting fixtures, light bulbs, skylights, or other glass suspended over food storage or processing activities in area where shellfish are exposed shall be of the safety type or protected to prevent food contamination in case of breakage. **[O]**

(3) Food contact surfaces shall be protected from contamination by adulterants by using

cleaning compounds and sanitizing agents only in accordance with applicable Federal and State laws and regulations. **[K]**

(4) Protection of ice used in shellfish processing:

(a) Any ice which is not made on site in the shellfish processing facility shall be inspected upon receipt and rejected if the ice is not delivered in a way so as to be protected from contamination. **[$S^{C/K}$]**

(b) Ice shall be stored in a safe and sanitary manner to prevent contamination of the ice. **[$S^{C/K}$]**

(5) Adequate ventilation shall be provided to minimize condensation in areas where food is stored, processed or packed. **[$S^{C/K}$]**

(6) The dealer shall assure that any steam used in food processing or that comes in contact with food contact surfaces is free from any additives, or deleterious substances consistent with Federal and State laws and regulations. **[K]**

F. Proper Labeling, Storage and Use of Toxic Compounds.

(1) Storage of toxic compounds.

(a) The dealer shall assure that only toxic substances necessary for plant activities are present in the facility. **[K]**

(b) Each of the following categories of toxic substances shall be stored separately:

(i) Insecticides and rodenticides; **[K]**

(ii) Detergents, sanitizers, and related cleaning agents; and **[K]**

(iii) Caustic acids, polishes, and other chemicals. **[K]**

(c) The dealer shall not store toxic substances above shellfish or food contact surfaces. **[K]**

(2) Use and labeling of toxic compounds.

(a) When pesticides are used, the dealer shall apply pesticides in accordance with applicable Federal and State regulations to control insects and rodents in such a manner to prevent the contamination of any shellfish or packaging materials with residues. **[K]**

(b) Cleaning compounds and sanitizing agents shall be labeled and used only in accordance with applicable Federal and State laws and regulations. **[K]**

(c) Toxic substances shall be labeled and used in accordance with the manufacturer's label directions. **[K]**

(d) Provide a test kit or other device that accurately measures the parts per million concentration of the chemical sanitizing agent in use. **[K]**

Additional Guidance: Section IV Guidance Documents Chapter III. Section .06

G. Control of Employees with Adverse Health Conditions

(1) The dealer and the supervisor shall take all reasonable precautions to assure that any employee with a disease in the communicable stage which might be transmissible through food shall be excluded from working in any capacity in which the employee may come in contact with the shellfish or with food contact surfaces. The pathogens causing diseases which are transmissible from food workers through food are those determined by the U.S. Centers for Disease Control and Prevention, in compliance with the Americans with Disabilities Act, and published in the *Federal Register*. These include: **[K]**

(a) Norovirus

(b) Hepatitis A virus,

(c) *Shigella* spp.,

(d) Enterohemorrhagic or Shiga Toxin-producing *Escherichia coli*, or

(e) *Salmonella typhi*;

(2) All employees shall immediately report to the dealer and/or the supervisor information about their health and activities as they relate to diseases that are transmissible through food. All employees shall report the information in a manner that allows the dealer and/or supervisor to reduce the risk of shellfish-borne disease transmission, including providing necessary additional information, such as the date of onset of symptoms of an illness, or of a diagnosis without symptoms, or if the employee: **[K]**

(a) Has any of the following symptoms:

(i) Vomiting

(ii) Diarrhea,

(iii) Jaundice,

(iv) Sore throat with fever, or

(v) A lesion containing pus such as a boil or infected wound that is open or draining on any part of the body, or

(b) Has an illness diagnosed by a health practitioner due to:

(i) Norovirus

(ii) Hepatitis A virus,

(iii) *Shigella* spp.,

(iv) Enterohemorrhagic or Shiga Toxin-producing *Escherichia coli*, or

(v) *Salmonella typhi*;

(c) Had a previous illness, diagnosed by a health practitioner, within the past three (3) months due to *Salmonella typhi*, without having received antibiotic therapy, as determined by a health practitioner;

(d) Has been exposed to, or is the suspected source of, a confirmed disease outbreak, because the employee consumed or prepared food implicated in the outbreak, or consumed food at an event prepared by a person who is infected or ill with:

(i) Norovirus within the past twenty-four (24) hours of the last exposure:

(ii) Enterohemorrhagic or Shiga toxin-producing *Escherichia coli* or *Shigella* spp. within the past three (3) days of the last exposure;

(iii) *Salmonella typhi* within the past fourteen (14) days of the last exposure; or

(iv) Hepatitis A virus within the past thirty (30) days of the last exposure.

(e) Has been exposed by attending or working in a setting where there is a confirmed disease outbreak, or living in the same household as, and has knowledge about, an individual that works or attends a setting where there is a confirmed disease outbreak or living in the same household as, and has knowledge about, an individual diagnosed with an illness caused by:

(i) Norovirus within the past twenty-four (24) hours of the last exposure;

(ii) Enterohemorrhagic or Shiga toxin-producing *Escherichia coli*, or *Shigella* spp. within the past three (3) days of the last exposure;

(iii) *Salmonella typhi* within the past fourteen (14) days of the last exposure; or

(iv) Hepatitis A virus within the past thirty (30) days of the last exposure.

(3) If an employee with an infected wound protects the lesion by keeping it covered with a proper bandage, a dry, durable, tight-fitting impermeable barrier, and a single-use glove for a hand lesion, the dealer and/or supervisor may allow the employee to work in the shellfish processing facility without additional restrictions. **[K]**

(4) The dealer shall notify the Authority and Health Department when *notified* by an employee *of a diagnosis or exhibits symptoms of hepatitis*, and shall ensure that the employee is excluded from working in any capacity in which the employee may come in contact with the shellfish or with food contact surfaces or that may transmit the illness to other employees. **[K]**

H. Exclusion of Pests. The dealer shall operate his facility to assure that pests are excluded from the facility and processing activities. Animals shall not be allowed in those portions of the facilities where shellfish are stored, handled, processed, or packaged or food handling equipment, utensils, and packaging materials are cleaned or stored. **[K]**

.03 Other Model Ordinance Requirements

A. Plants and Grounds.

(1) General. The physical facilities shall be maintained in good repair. **[O]**

(2) Flooding.

(a) Facilities in which shellfish are stored, shucked, packed, repacked or reshipped shall be located so that these facilities are not subject to flooding during ordinary high tides. **[C]**

(b) If facilities are flooded:

(i) Shellfish processing, shucking or repacking activities shall be discontinued until the flood waters have receded from the building; and the building is cleaned and sanitized. **[C]**

(ii) Any shellfish coming in contact with the flood waters while in storage shall be destroyed; or discarded in non-food use. **[C]**

(3) The dealer shall operate the facility to provide adequate protection from contamination and adulteration by assuring that dirt and other filth are excluded from the facility and activities. **[$S^{C/K}$]**

(4) The dealer shall employ necessary internal and external insect and vermin control measures to insure that insects and vermin are not present in the facility.

(a) Tight fitting, self-closing doors: **[K]**

(b) Screening of not less than fifteen (15) mesh per inch; **[K]** and

(c) Controlled air current. **[K]**.

(5) Plant Interior.

(a) Sanitary conditions shall be maintained throughout the facility. **[O]**

(b) All dry area floors shall be hard, smooth, easily cleanable; **[O]**

(c) All wet area floors used in areas to store shellfish, process food, and clean equipment and utensils shall be constructed of easily cleanable, impervious, and corrosion resistant materials which:

(i) Are graded to provide adequate drainage; **[O]**

(ii) Have even surfaces, and are free from cracks that create sanitary problems and interfere with drainage; and **[O]**

(iii) Have sealed junctions between floors and walls to render them impervious to water, **[O]**

(d) Walls and Ceilings. Interior surfaces of rooms where shellfish are stored, handled, processed, or packaged shall be constructed of easily cleanable, corrosion resistant, impervious materials **[O]**.

(6) Grounds around the facility shall be maintained to be free from conditions which may result in shellfish contamination. These conditions may include:

(a) Rodent attraction and harborage; and **[O]**

(b) Inadequate drainage. **[O]**

B. Plumbing and Related Facilities.

(1) All plumbing and plumbing fixtures shall be properly designed, installed, modified, repaired, and maintained. The water system shall provide an adequate quantity of water under pressure, and includes cold and warm water at all sinks; **[K]**

(2) Adequate floor drainage, including backflow prevention such as air gaps, shall be provided where floors are:

(a) Used in shellfish storage; **[K]**

(b) Used for food holding units **[K]** (e.g., refrigeration units);

(c) Cleaned by hosing, flooding, or similar methods **[K]**; and

(d) Subject to the discharge of water or other liquid waste including three (3) compartment sinks on the floor during normal activities. **[K]**

(3) A safe, effective means of sewage disposal for the facility shall be provided in accordance with applicable Federal and State laws and regulations; **[$S^{C/K}$]**

(4) Installation of drainage or waste pipes over food processing or food storage areas, or over areas in which containers and utensils are washed or stored shall not be permitted. **[K]**

C. Utilities.

(1) The dealer shall ensure that ventilation, heating, or cooling systems do not create conditions that may cause the shellfish products to become contaminated. **[$S^{C/K}$]**

(2) The dealer shall provide lighting throughout the facility that is sufficient to promote good manufacturing practices. **[$S^{C/K}$]**

D. Disposal of Other Wastes.

(1) Disposal of waste materials shall be conducted in accordance with appropriate Federal and State laws and regulations. **[O]**

(2) All areas and receptacles used for the storage or conveyance of waste shall be operated and maintained to prevent attraction, harborage, or breeding places for insects and vermin. **[O]**

E. Equipment Condition, Cleaning, Maintenance, and Construction of Non-food Contact Surfaces

(1) The dealer shall use only equipment, including approved plastic ware, which is constructed in a manner and with materials that can be cleaned, sanitized, maintained, or replaced. **[O]**

(2) The dealer shall use easily cleanable, corrosion-resistant, impervious materials, free from cracks to construct any non-food contact surfaces in shellfish storage or handling areas. **[O]**

(3) Cleaning activities for equipment shall be conducted in a manner and at a frequency appropriate to prevent contamination of shellfish and non-food contact surfaces. **[K]**

(4) All conveyances and equipment which come into contact with stored shellstock shall be cleaned and maintained in a manner and frequency as necessary to prevent shellstock contamination. **[O]**

F. Shellfish Storage and Handling.

(1) The dealer shall:

(a) Not commingle shellfish from different lots; **[K]**

(b) Repack shucked shellfish meats only into containers labeled with the authorized certification number; **[K]**

(c) Not have on the premises any usable containers or container covers bearing a certification number different from the one issued for those premises unless documentation exists to verify the legitimate source of the containers and the containers contain shellfish from that source; **[K]**

(d) Wash, blow, and rinse all shellfish meats in accordance with 21 CFR 161 Section 130; **[K]**

(e) Thoroughly drain, clean as necessary, and repack shucked shellfish meats promptly; **[K]**

(f) Conduct repacking activities so as to conform to applicable food additive regulations; and [K]

(g) During storage frozen shellfish shall be maintained frozen. **[$S^{K/0}$]**

G. Heat Shock. N/A

H. Supervision.

(1) A reliable, competent individual shall be designated to supervise general plant management and activities. **[K]**
(2) Cleaning procedures shall be developed and supervised to assure cleaning activities do not result in contamination of shellfish or food contact surfaces. **[K]**
(3) All supervisors shall be:
  (a) Trained in proper food handling techniques and food protection principles; and **[K]**
  (b) Knowledgeable of personal hygiene and sanitary practices. **[K]**
(4) The dealer shall require:
  (a) Supervisors to monitor employee hygiene practices, including handwashing, eating, and smoking at work stations, and storing personal items or clothing; **[K]**
  (b) Supervisors to assure that proper sanitary practices are implemented, including:
    (i) Plant and equipment clean-up; **[K]**
    (ii) Rapid product handling; and **[K]**
    (iii) Shellfish protection from contamination. **[K]**
  (c) Supervisors to not allow unauthorized persons in those portions of the facilities where shellfish are stored, handled, processed, or packaged or food handling equipment, utensils, and packaging materials are cleaned or stored; and**[K]**
  (d) All employees to be trained in proper food handling and personal hygiene practices; **[K]**

Chapter XIII. Shellstock Shipping

Exceptions. Shellstock Shippers are not required to pack shellstock in a building that complies with Sections .02 and .03 of this chapter when the Authority has determined that a shellstock shipper's practices and conditions do not warrant requiring shellstock to be packed in a building.

Additional Guidance: Section IV. Guidance Documents Chapter III. Section .07

.01 Critical Control Points

A. Receiving Critical Control Point - Critical Limits.

(1) The dealer shall ship or repack only shellstock obtained from a licensed harvester who has:

(a) Harvested the shellstock from an Approved or Conditionally Approved area in the open status as identified by the tag; and **[C]**

(b) Identified the shellstock with a tag on each container or transaction record on each bulk shipment; and **[C]**

(c) Harvested the shellstock in compliance with the time temperature requirements of Chapter VIII. @.02 A. (1), (2), or (3) as determined from records supplied by the harvester described in Chapter VIII. .02 G. (2) **[C]**.

(2) The dealer shall ship or repack only shellstock obtained and transported from a dealer who has:

(a) Identified the shellstock with a tag on each container as outlined in Chapter X. .05; and **[C]**

(b) Provided documentation as required in Chapter IX. .05; and **[C]**

(c) Adequately iced the shellstock; or **[C]**

(d) Shipped the shellstock in a conveyance maintained at or below 45 °F (7.2 °C) ambient air temperature; or **[C]**

(e) Cooled the shellstock to an internal temperature of 50 °F (10 °C) or less. **[C]**

(3) A dealer may receive shellstock from a dealer who has elected to ship shellstock in accordance with Chapter XIII. .01 D. (2) without the shellstock meeting the receiving requirement of Chapter XIII. .01 A. (2) (e). The product must be accompanied with documentation as outlined in Chapter XIII. A. (2) (b) and must be accompanied with a time/temperature recording device indicating that continuing cooling has occurred. Shipments of four (4) hours or less will not be required to have a time/temperature device or comply with Chapter XIII. .01 A. (2) (c), (d) or (e). Shipments of four (4) hours or less must have documentation as required in Chapter XIII. .01 A. (2) (b). **[C]**

(4) The dealer shall ship or repack only in-shell product obtained from a dealer who has:

(a) Shipped the in-shell product

(i) Adequately iced; or

(ii) In a conveyance at or below 45 °F (7.2 °C) ambient air temperature; or

(iii) At an internal temperature of 45 °F (7.2 °C) or less; and **[C]**

(b) Identified the in-shell product with a tag on each container. **[C]**

B. Shellstock Storage Critical Control Point - Critical Limits. The dealer shall ensure that:

(1) If wet storage in artificial bodies of water is practiced, water quality meets the requirements outlined in Chapter VII. .04; and **[C]**

(2) Once placed under temperature control and until sale to the processor or final consumer,

shellstock shall:

(a) Be iced; or **[C]**

(b) Be placed in a storage area or conveyance maintained at 45 °F (7.2 °C) or less; and **[C]**

(c) Not be permitted to remain without ice, mechanical refrigeration or other approved methods of storage, as required in Section .01 B. (1) or Section .01 B. (2) (a) or (b) for more than two (2) hours at points of processing or transfer such as loading docks. **[C]**

(3) All oysters harvested under State Vibrio Control Plans other than those labeled for a restricted use shall meet the following temperature requirements:

(a) Cooled to an internal temperature of 55 °F (12.7 °C) within the time periods outlined in the State *V.v.* Control Plans. **[C]**

(b) Cooled to an internal temperature of 50 °F (10 °C) within the time periods outlined in the State *V.p.* Control Plans. Shellstock cooled to an internal temperature of 55 °F (12.7 °C) to comply with a *V.v.* Control Plan is considered in compliance with this requirement. **[C]**

(4) All other shellstock obtained from a licensed harvester shall be placed in a conveyance pre-chilled or a storage area maintained to 45 °F (7.2 °C) or less and cooled to an internal temperature of 50 °F (10 °C) prior to shipment. **[C]**

(5) Product intended for relay, wet storage or depuration, or either geoduck clams (*Panopea generosa*), or *Mercenaria* spp. which are being cooled utilizing an Authority approved tempering plan are exempt from the requirement listed above in .01 B. (4) above. **[C]**

C. In-shell Product Storage Critical Control Point - Critical Limits. The dealer shall ensure that in-shell product shall be: (1) Iced; or **[C]** (2) Placed and stored in a storage area or conveyance maintained at 45 °F (7.2 °C) or less. **[C]**

D. Shellstock Shipping Critical Control Point- The dealer shall ensure that

(1) Shellstock that is received bearing a restricted use tag shall only be shipped to a certified dealer and shall include specific language detailing the intended use of the shellstock. The transaction record shall indicate the quantity of restricted use shellstock containers.**[C]**

(2) All shellstock is cooled to meet the requirements outlined in .01 B. (3) and (4) above prior to shipment. The original dealer may elect to ship restricted use shellstock and shellstock which has been harvested in accordance with Chapter VIII. @.02 A. (3) prior to achieving the internal temperature of 50 °F (10 °C). Should the original dealer choose this option the shipment shall be accompanied with a time/temperature recording device indicating continuing cooling. Shipments of four (4) hours or less will not be required to have a time/temperature recording device. **[C]**

.02 Sanitation

A. Safety of Water for Processing and Ice Production.

(1) Water Supply.

(a) The dealer shall provide a potable water supply in accordance with applicable Federal, State and local regulations. **[C]**

(b) If the water supply is from a private source, the dealer shall make arrangements to have the water supply sampled by persons recognized by the Authority and tested at laboratories sanctioned or certified by the Authority: **[K]**

(i) Prior to use of the water supply; **[C]**

(ii) Every six (6) months while the water supply is in use; and **[K]**

(iii) After the water supply has been repaired and disinfected. **[$S^{C/K}$]**

(2) Ice Production. Any ice used in the processing, storage, or transport of shellfish shall:
(a) Be made on-site from potable water in a commercial ice machine; **[C]** or
(b) Come from a facility sanctioned by the Authority or the appropriate regulatory agency. [**C]**

(3) Shellstock Washing.
(a) Water from either a potable water supply or a growing area in the approved classification shall be used to wash shellstock. **[C]**
(b) If the dealer uses any system to wash shellstock which recirculates water, the dealer shall:
(i) Obtain approval for the construction or remodeling of the system from the Authority; **[K]**
(ii) Provide a water treatment and disinfection system to treat an adequate quantity of water to a quality acceptable for shellstock washing which, after disinfection, meets the coliform standards for drinking water, and does not leave any unacceptable residues in the shellstock; and **[C]**
(iii) Test bacteriological water quality daily. **[$S^{C/K}$]**
(c) The dealer may use ultra-violet (UV) disinfection in the recirculating wash water system, provided that the turbidity of the water to be disinfected shall not exceed twenty (20) nephelometric turbidity units (NTUs) measured using the method in the APHA *Standard Methods for the Examination of Water and Wastewater*. **[K]**

(4) Plumbing and Related Facilities. The dealer shall design, install, modify, repair, and maintain all plumbing and plumbing fixtures to:
(a) Prevent contamination of water supplies; [$S^{C/K}$]
(b) Prevent any cross-connection between the pressurized potable water supply and water from an unacceptable source [$S^{C/K}$] The dealer shall install and maintain in good working order devices to protect against backflow and back siphonage. **[K]**

Additional Guidance: Section IV Guidance Documents Chapter III. Section .01

B. Condition, and Cleanliness, of Food Contact Surfaces.
(1) Equipment and utensil construction for food contact surfaces.
(a) The dealer shall use only equipment which conforms to *Shellfish Industry Equipment Construction Guides*. **[K]**
(b) The dealer shall use only equipment and utensils, including approved plastic ware and finished product containers which are:
(i) Constructed in a manner and with materials that can be cleaned, and sanitized, maintained or replaced in a manner to prevent contamination of shellfish products; **[K]**
(ii) Free from any exposed screws, bolts, or rivet heads on food contact surfaces; and **[K]**
(iii) Fabricated from food grade materials. **[K]**
(c) The dealer shall assure that all joints on food contact surfaces
(i) Have smooth easily cleanable surfaces and **[K]**
(ii) Are welded. **[K]**
(d) All equipment used to handle ice shall be kept clean and stored in a sanitary manner, and shall meet the construction requirements in Chapter XI. .02 B. (1) (a), (b), and (c). **[K]**
(e) Shellstock washing storage tanks and related plumbing shall be fabricated from safe materials and tank construction shall be such that it:
(i) Is easily accessible for cleaning and inspection; **[K]**

(ii) Is self-draining; and **[K]**

(iii) Meets the requirements for food contact surfaces. **[K]**

(2) Cleaning and sanitizing of food contact surfaces.

(a) Food contact surfaces of equipment, utensils and containers shall be cleaned and sanitized to prevent contamination of shellfish and other food contact surfaces. The dealer shall:

(i) Provide adequate cleaning supplies and equipment, including three (3) compartment sinks, brushes, detergents, and sanitizers, hot water and pressure hoses shall be available within the plant; **[K]**

(ii) Sanitize equipment and utensils prior to the start-up of each day's activities and following any interruption during which food contact surfaces may have been contaminated; and **[K]**

(iii) Wash and rinse equipment and utensils at the end of each day. **[K]**

(b) Containers which may have become contaminated during storage shall be washed, rinsed, and sanitized prior to use or shall be discarded. **[K]**

(3) If used, the finger cots or gloves shall be:

(a) Made of impermeable materials except where the use of such material is inappropriate or incompatible with the work being done; **[O]**

(b) Cleaned more often, if necessary; **[K]**

(c) Properly stored until used; and **[K]**

(d) Maintained in a clean, intact, and sanitary condition. **[K]**

C. Prevention of Cross Contamination.

(1) Protection of shellfish.

(a) Shellstock shall be stored in a manner to protect shellstock from contamination in dry storage and at points of transfer. **[$S^{C/K}$]**

(b) Shellfish shall be protected from contamination. **[$S^{C/K}$]**

(c) Shellstock shall not be placed in containers with standing water for the purposes of washing shellstock or loosening sediment. **[K]**

(d) Equipment and utensils shall be stored in a manner to prevent splash, dust, and contamination. **[$S^{K/O}$]**

(2) Employee practices.

(a) The dealer shall require all employees to wash their hands thoroughly with soap and water and sanitize their hands in an adequate handwashing facility:

(i) Before starting work; **[K]**

(ii) After each absence from the work station; **[K]**

(iii) After each work interruption; and **[K]**

(iv) Any time when their hands may have become soiled or contaminated. **[K]**

(b) In any area where shellfish are stored and in any area which is used for the cleaning or storage of utensils, the dealer shall not allow employees to:

(i) Store clothing or other personal belongings; **[O]**

(ii) Eat or drink; **[K]**

(iii) Spit; and **[K]**

(iv) Use tobacco in any form. **[K]**

D. Maintenance of Hand Washing, Hand Sanitizing and Toilet Facilities.

(1) Handwashing facilities with warm water at a minimum temperature of 100 °F (37.8 °C), dispensed from a hot and cold mixing or combination faucet, shall be provided. **[$S^{K/O}$]**

(a) Handwashing facilities shall be provided which are:

(i) Convenient to work areas; **[O]**

(ii) Separate from the three (3) compartment sinks used for cleaning equipment and utensils; **[K]**

(iii) Directly plumbed to an approved sewage disposal system; and **[$S^{O/K}$]**

(iv) Adequate in number and size for the number of employees, and located where supervisors can observe employee use. **[K]**

(b) The dealer shall provide at each handwashing facility:

(i) Supply of hand cleansing soap or detergent; **[K]**

(ii) Conveniently located supply of single service towels in a suitable dispenser or a hand drying device that provides heated air; **[O]**

(iii) Easily cleanable waste receptacle; and **[O]**

(iv) Handwashing signs in a language understood by the employees. **[O]**

(2) Sewage **[C]** and liquid disposable wastes **[K]** shall be properly removed from the facility.

(3) The dealer shall provide:

(a) Toilet room doors that are tight fitting, self-closing, and do not open directly into a processing area; **[K]**

(b) An adequate number of conveniently located toilets; and **[K]**

(c) Each toilet facility with an adequate supply of toilet paper **[K]** in a suitable holder. **[$S^{K/O}$]**.

E. Protection from Adulterants.

(1) Shellfish shall be protected from contamination while being transferred from one point to another during handling and processing. **[K]**

(2) Any lighting fixtures, light bulbs, skylights, or other glass suspended over food storage or processing activities in areas where shellfish are exposed shall be of the safety type or protected to prevent food contamination in case of breakage. **[O]**

(3) Food contact surfaces shall be protected from contamination by adulterants by using cleaning compounds and sanitizing agents only in accordance with applicable Federal and State laws and regulations. **[K]**

(4) Shellstock shall be packed in clean containers. **[K]**

(5) Protection of ice used in shellfish processing.

(a) Any ice which is not made on site in the shellfish processing facility shall be inspected upon receipt and rejected if the ice is not delivered in a way so as to be protected from contamination. **[$S^{C/K}$]**

(b) Ice shall be stored in a safe and sanitary manner to prevent contamination of the ice. **[$S^{C/K}$]**

(6) Adequate ventilation shall be provided to minimize condensation in areas where food is stored, processed or packed. **[$S^{C/K}$]**

(7) The dealer shall assure that any steam used in food processing or that comes in contact with food contact surfaces is free from any additives, or deleterious substances consistent with Federal and State laws and regulations. **[K]**

F. Proper Labeling, Storage and Use of Toxic Compounds.

(1) Storage of toxic compounds.

(a) The dealer shall assure that only toxic substances necessary for plant activities are present in the facility. **[K]**

(b) Each of the following categories of toxic substances shall be stored separately:

(i) Insecticides and rodenticides; **[K]**

(ii) Detergents, sanitizers, and related cleaning agents; and **[K]**

(iii) Caustic acids, polishes, and other chemicals. **[K]**

(c) The dealer shall not store toxic substances above shellfish or food contact surfaces. **[K]**

(2) Use and labeling of toxic compounds.

(a) When pesticides are used, the dealer shall apply pesticides in accordance with

applicable Federal and State regulations to control insects and rodents in such a manner to prevent the contamination of any shellfish or packaging materials with residues. **[K]**
(b) Cleaning compounds and sanitizing agents shall be labeled and used only in accordance with applicable Federal and State laws and regulations. **[K]**
(c) Toxic substances shall be labeled and used in accordance with the manufacturer's label directions. **[K]**
(d) Provide a test kit or other device that accurately measures the parts per million concentration of the chemical sanitizing agent in use. **[K]**

Additional Guidance: Section IV Guidance Documents Chapter III. Section .06

G. Control of Employees with Adverse Health Conditions.

(1) The dealer and the supervisor shall take all reasonable precautions to assure that any employee with a disease in the communicable stage which might be transmissible through food shall be excluded from working in any capacity in which the employee may come in contact with the shellfish or with food contact surfaces. The pathogens causing diseases which are transmissible from food workers through food are those determined by the US Centers for Disease Control and Prevention, in compliance with the Americans with Disabilities Act, and published in the *Federal Register*. These include: **[K]**

(a) Norovirus
(b) Hepatitis A virus,
(c) *Shigella* spp.,
(d) Enterohemorrhagic or Shiga Toxin-producing *Escherichia coli*, or
(e) *Salmonella typhi*.

(2) All employees shall immediately report to the dealer and/or the supervisor information about their health and activities as they relate to diseases that are transmissible through food. All employees shall report the information in a manner that allows the dealer and/or supervisor to reduce the risk of shellfish-borne disease transmission, including providing necessary additional information, such as the date of onset of symptoms of an illness, or of a diagnosis without symptoms, or if the employee: **[K]**

(a) Has any of the following symptoms:
(i) Vomiting
(ii) Diarrhea,
(iii) Jaundice,
(iv) Sore throat with fever, or
(v) A lesion containing pus such as a boil or infected wound that is open or draining on any part of the body, or

(b) Has an illness diagnosed by a health practitioner due to:
(i) Norovirus
(ii) Hepatitis A virus,
(iii) *Shigella* spp.,
(iv) Enterohemorrhagic or Shiga Toxin-producing *Escherichia coli*, or
(v) *Salmonella typhi*;

(c) Had a previous illness, diagnosed by a health practitioner, within the past three (3) months due to *Salmonella typhi*, without having received antibiotic therapy, as determined by a health practitioner;

(d) Has been exposed to, or is the suspected source of, a confirmed disease outbreak, because the employee consumed or prepared food implicated in the outbreak, or consumed

food at an event prepared by a person who is infected or ill with:

(i) Norovirus within the past twenty-four (24) hours of the last exposure:

(ii) Enterohemorrhagic or Shiga toxin-producing *Escherichia coli* or *Shigella* spp. within the past three (3) days of the last exposure; or

(iii) *Salmonella typhi* within the past fourteen (14) days of the last exposure; or

(iv) Hepatitis A virus within the past thirty (30) days of the last exposure.

(e) Has been exposed by attending or working in a setting where there is a confirmed disease outbreak, or living in the same household as, and has knowledge about, an individual that works or attends a setting where there is a confirmed disease outbreak or living in the same household as, and has knowledge about, an individual diagnosed with an illness caused by:

(i) Norovirus within the past twenty-four (24) hours of the last exposure;

(ii) Enterohemorrhagic or Shiga toxin-producing *Escherichia coli*, or *Shigella* spp. within the past three (3) days of the last exposure; or

(iii) *Salmonella typhi* within the past fourteen (14) days of the last exposure; or

(iv) Hepatitis A virus within the past thirty (30) days of the last exposure.

(3) If an employee with an infected wound protects the lesion by keeping it covered with a proper bandage, a dry, durable, tight-fitting impermeable barrier, and a single-use glove for a hand lesion, the dealer and/or supervisor may allow the employee to work in the shellfish processing facility without additional restrictions. **[K]**

(4) The dealer shall notify the Authority and Health Department when *notified* by an employee *of a diagnosis or exhibits symptoms of hepatitis*, and shall ensure that the employee is excluded from working in any capacity in which the employee may come in contact with the shellfish or with food contact surfaces or that may transmit the illness to other employees. **[K]**

H. Exclusion of Pests. The dealer shall operate his facility to assure that pests are excluded from the facility and processing activities. Animals shall not be allowed in those portions of the facilities where shellfish are stored, handled, processed, or packaged or food handling equipment, utensils, and packaging materials are cleaned or stored. **[K]**

.03 Other Model Ordinance Requirements

A. Plants and Grounds.

(1) General. The physical facilities shall be maintained in good repair. **[O]**

(2) Flooding.

(a) Facilities in which shellfish are stored, packed, repacked or reshipped shall be located so that these facilities are not subject to flooding during ordinary high tides. **[C]**

(b) If facilities are flooded:

(i) Shellfish processing, repacking or shipping activities shall be discontinued until the flood waters have receded from the building; and the building is cleaned and sanitized. **[C]**

(ii) Any shellfish coming in contact with the flood waters while in storage shall be destroyed; or discarded in non-food use.**[C]**

(3) The dealer shall operate the facility to provide adequate protection from contamination and adulteration by assuring that dirt and other filth are excluded from the facility and activities. **[$S^{C/K}$]**

(4) The dealer shall employ necessary internal and external insect and vermin control measures to insure that insects and vermin are not present in the facility.

(a) Tight fitting, self-closing doors: **[K]**

(b) Screening of not less than fifteen (15) mesh per inch; **[K]** and

(c) Controlled air current. **[K]**.

(5) Plant Interior.

(a) Sanitary conditions shall be maintained throughout the facility. **[O]**

(b) All dry area floors shall be hard, smooth, easily cleanable; **[O]**

(c) All wet area floors used in areas to store shellfish, process food, and clean equipment and utensils shall be constructed of easily cleanable, impervious, and corrosion resistant materials which:

(i) Are graded to provide adequate drainage; **[O]**

(ii) Have even surfaces, and are free from cracks that create sanitary problems and interfere with drainage; and**[O]**

(iii) Have sealed junctions between floors and walls to render them impervious to water. **[O]**

(d) Walls and Ceilings. Interior surfaces of rooms where shellfish are stored, handled, processed, or packaged shall be constructed of easily cleanable, corrosion resistant, impervious materials **[O]**.

(6) Grounds around the facility shall be maintained to be free from conditions which may result in shellfish contamination. These conditions may include:

(a) Rodent attraction and harborage; and **[O]**

(b) Inadequate drainage. **[O]**

B. Plumbing and Related Facilities.

(1) All plumbing and plumbing fixtures shall be properly designed, installed, modified, repaired, and maintained. The water system shall provide an adequate quantity of water under pressure, and includes cold and warm water at all sinks. **[K]**

(2) Adequate floor drainage, including backflow preventers such as air gaps, shall be provided where floors are:

(a) Used in shellfish storage; **[K]**

(b) Used for food holding units (e.g., refrigeration units) **[K]**;

(c) Cleaned by hosing, flooding, or similar methods; and **[K]**

(d) Subject to the discharge of water or other liquid waste including three (3) compartment sinks on the floor during normal activities. **[K]**

(3) A safe, effective means of sewage disposal for the facility shall be provided in accordance with applicable Federal and State laws and regulations. **[$S^{C/K}$]**

(4) Installation of drainage or waste pipes over food processing or food storage areas, or over areas in which containers and utensils are washed or stored shall not be permitted. **[K]**

C. Utilities.

(1) The dealer shall ensure that ventilation, heating, or cooling systems do not create conditions that may cause the shellfish products to become contaminated. **[$S^{C/K}$]**

(2) The dealer shall provide lighting throughout the facility that is sufficient to promote good manufacturing practices. **[$S^{C/K}$]**

D. Disposal of Other Wastes.

(1) Disposal of waste materials shall be conducted in accordance with appropriate Federal and State laws and regulations. **[O]**

(2) All areas and receptacles used for the storage or conveyance of waste shall be operated and maintained to prevent attraction, harborage, or breeding places for insects and vermin. **[O]**

E. Equipment Condition, Cleaning, Maintenance, and Construction of Non-Food Contact Surfaces.

(1) The dealer shall use only equipment, including approved plastic ware, which is constructed in a manner and with materials that can be cleaned, sanitized, maintained, or replaced. **[O]**

(2) The dealer shall use easily cleanable, corrosion-resistant, impervious materials, free from cracks to construct any non-food contact surfaces in shellfish storage or handling areas. **[O]**

(3) Cleaning activities for equipment shall be conducted in a manner and at a frequency appropriate to prevent contamination of shellfish and food contact surfaces. **[K]**

(4) All conveyances and equipment which come into contact with stored shellstock shall be cleaned and maintained in a manner and frequency as necessary to prevent shellstock contamination. **[O]**

F. Shellfish Storage and Handling.

(1) The dealer shall assure that shellstock is:

(a) Alive; **[K]**

(b) Reasonably free of sediment **[O]**; and

(c) Culled. **[K]**

(2) The dealer shall inspect incoming shipments and shall reject dead or inadequately protected shellstock. **[K]**

(3) A dealer whose activity consists of trucks or docking facilities only shall:

(a) Have a permanent business address at which records are maintained and inspections can be performed; and **[K]**

(b) Not repack shellstock. **[K]**

(4) A dealer who stores or repacks shellstock shall have:

(a) His own facility for proper storage or repacking of shellstock; or **[K]**

(b) Arrangements with a facility approved by the Authority of the storage or repacking of shellstock. **[K]**

(5) During storage frozen shellfish shall be maintained frozen.**[$S^{K/O}$]**

(6) All shellstock obtained from a licensed harvester shall be:

(a) Adequately iced within two (2) hours of receipt; or

(b) Placed in a storage area maintained at 45 °F (7.2 °C) within two (2) hours of receipt;

(c) Product intended for relay, wet storage or depuration, or either geoduck clams (*Panopea generosa*), or *Mercenaria* spp. which are being cooled utilizing an Authority approved tempering plan are exempt from the requirements listed above in .03 F. (6).

G. Heat Shock. - N/A

H. Supervision.

(1) A reliable, competent individual shall be designated to supervise general plant management and activities. **[K]**

(2) Cleaning procedures shall be developed and supervised to assure cleaning activities do not result in contamination of shellfish or food contact surfaces. **[K]**

(3) All supervisors shall be:

(a) Trained in proper food handling techniques and food protection principles; and **[K]**

(b) Knowledgeable of personal hygiene and sanitary practices. **[K]**

(4) The dealer shall require:

(a) Supervisors to monitor employee hygiene practices, including handwashing, eating, and smoking at work stations, and storing personal items or clothing; **[K]**

(b) Supervisors to assure that proper sanitary practices are implemented, including:

(i) Plant and equipment clean-up; **[K]**

(ii) Rapid product handling; and **[K]**

(iii) Shellfish protection from contamination; **[K]**

(c) Supervisors to not allow unauthorized persons in those portions of the facilities where shellfish are stored, handled, processed or packaged or food handling equipment, utensils, and packaging materials are cleaned or stored; and **[K]**

(d) All employees to be trained in proper food handling and personal hygiene practices. **[K]**

Chapter XIV. Reshipping

Exceptions. *Reshippers are not required to comply with the building requirements in Sections .02 and .03 of this chapter when the Authority has determined that a reshipper's practices and conditions do not warrant requiring a building.*

Additional Guidance: Section IV. Guidance Documents Chapter III. Section .07

.01 Critical Control Points

A. Receiving Critical Control Point - Critical Limits.
   (1) The dealer shall reship only shellfish obtained and transported from a dealer who has:
      (a) Identified the shellstock with a tag as outlined in Chapter X. .05, identified the in-shell product with a tag as outlined in Chapter X. .07, and/or identified the shucked shellfish with a label as outlined in Chapter X. .06; and **[C]**
      (b) Provided documentation as required in Chapter IX. .05; and **[C]**
      (c) Adequately iced the shellstock; or **[C]**
      (d) Shipped the shellstock in a conveyance maintained at or below 45 °F (7.2 °C) ambient air temperature; or **[C]**
      (e) Cooled the shellstock to an internal temperature of 50 °F (10 °C) or less; **[C]** or
      (f) Shipped the shucked shellfish and/or in-shell product adequately iced or in a conveyance at or below 45 ºF (7.2 ºC) ambient air temperature. **[C]**
   (2) A dealer may receive shellstock from a dealer who has elected to ship shellstock in accordance with Chapter XIII. .01 D. (2) without the shellstock meeting the receiving requirements of Chapter XIII. .01 A. (2) (c), (d) or (e). The product must be accompanied with documentation as outlined in Chapter XIII. A. (2) (b) and must be accompanied with a time/temperature recording device indicating that continuing cooling has occurred. Shipments of four (4) hours or less will not be required to have a time/temperature device or comply with Chapter XIII. 01 A. (2) (c), (d) or (e). Shipments of four (4) hours or less must have documentation as required in Chapter XIII. .01 A. (2) (b). **[C]**
B. Shellstock Storage Critical Control Point - Critical Limits. The dealer shall ensure that once placed under temperature control and until sale to the processor or final consumer, shellstock shall:
   (1) Be iced; or **[C]**
   (2) Be placed in a storage area or conveyance maintained at 45 °F (7.2 °C) or less; and **[C]**
   (3) Not be permitted to remain without ice, mechanical refrigeration, or other approved means of storage for more than two (2) hours at points of processing or transfer such as loading docks. **[C]**
C. In-shell Product Storage Critical Control Point - Critical Limits. The dealer shall ensure that in-shell product shall be:
   (1) Iced; or **[C]**
   (2) Placed and stored in a storage area or conveyance maintained at 45 °F (7.2 °C) or less. **[C]**
D. Shucked Meat Storage Critical Control Point - Critical Limit. The dealer shall store shucked shellfish at an ambient temperature of 45 °F (7.2 °C) or less or covered with ice. **[C]**
E. Shellstock Shipping Critical Control Point. The dealer shall ensure that:
   (1) Shellstock that is received bearing a restricted use tag shall only be shipped to a certified dealer and shall include specific language detailing the intended use of the shellstock. The

transaction record shall indicate the quantity of restricted use shellstock containers. **[C]**

(2) All shellstock received from a dealer which elected to ship restricted use shellstock or shellstock which has been harvested in accordance with Chapter VIII. @.02 A. (3) prior to achieving the internal temperature of 50 °F (10 °C) must be cooled to an internal temperature of 50 °F (10 °C) prior to shipment. The dealer may elect to ship restricted use shellstock and shellstock which has been harvested in accordance with Chapter VIII. @.02 A.
(3) prior to achieving the internal temperature of 50 °F (10 °C). Should the dealer choose this option the shipment shall be accompanied with a time/temperature recording device indicating continuing cooling. Shipments of four (4) hours or less will not be required to have a time/temperature recording device. **[C]**

.02 Sanitation

A. Safety of Water for Processing and Ice Production.
(1) Water Supply.
(a) The dealer shall provide a potable water supply in accordance with applicable federal, state and local regulations. **[C]**
(b) If the water supply is from a private source, the dealer shall make arrangements to have the water supply sampled by persons recognized by the Authority and tested at laboratories sanctioned or certified by the Authority: **[K]**
(i) Prior to use of the water supply; **[C]**
(ii) Every six (6) months while the water supply is in use; and **[K]**
(iii) After the water supply has been repaired and disinfected. **[$S^{C/K}$]**
(2) Ice Production. Any ice used in the processing, storage, or transport of shellfish shall:
(a) Be made on-site from potable water in a commercial ice machine; **[C]** or
(b) Come from a facility sanctioned by the Authority or the appropriate regulatory agency. [**C**]
(3) Plumbing and Related Facilities. The dealer shall design, install, modify, repair, and maintain all plumbing and plumbing fixtures to:
(a) Prevent contamination of water supplies; **[$S^{C/K}$]**
(b) Prevent any cross-connection between the pressurized potable water supply and water from an unacceptable source. **[$S^{C/K}$]**The dealer shall install and maintain in good working order devices to protect against backflow and back siphonage. **[K]**

B. Condition and Cleanliness of Food Contact Surfaces.
Equipment and utensil construction for food contact surfaces. All equipment used to handle ice shall be kept clean and stored in a sanitary manner, and shall meet the construction requirements in Chapter XI. .02 B. (1), (a), (b), and (c). **[K]**

C. Prevention of Cross Contamination.
(1) Protection of shellfish
(a) Shellstock shall be stored in a manner to protect shellstock from contamination in dry storage and at points of transfer. **[$S^{C/K}$]**
(b) Shellfish shall be protected from contamination. **[$S^{C/K}$]**
(c) Equipment and utensils shall be stored in a manner to prevent splash, dust, and contamination. **[$S^{K/O}$]**
(2) Employee practices.
(a) The dealer shall require all employees to wash their hands thoroughly with soap and water and sanitize their hands in an adequate hand washing facility:
(i) Before starting work; **[K]**

(ii) After each absence from the work station; **[K]**
(iii) After each work interruption; and **[K]**
(iv) Any time when their hands may have become soiled or contaminated. **[K]**

(b) In any area where shellfish are stored and in any area which is used for the cleaning or storage of utensils, the dealer shall not allow employees to:
(i) Store clothing or other personal belongings; **[O]**
(ii) Eat or drink; **[K]**
(iii) Spit; and **[K]**
(iv) Use tobacco in any form. **[K]**

D. Maintenance of Hand Washing, Hand Sanitizing and Toilet Facilities.

(1) Hand washing facilities with warm water at a minimum temperature of 100 °F (37.8 °C), dispensed from a hot and cold mixing or combination faucet, shall be provided. **[$S^{K/O}$]**

(a) Hand washing facilities shall be provided which are:
(i) Convenient to work areas; **[O]**
(ii) Separate from the three (3) compartment sinks used for cleaning equipment and utensils; **[K]**
(iii) Directly plumbed to an approved sewage disposal system; and **[$S^{K/O}$]**
(iv) Adequate in number and size for the number of employees, and located where supervisors can observe employee use. **[K]**

(b) The dealer shall provide at each hand washing facility:
(i) Supply of hand cleansing soap or detergent; **[K]**
(ii) Conveniently located supply of single service towels in a suitable dispenser or a hand drying device that provides heated air; **[O]**
(iii) Easily cleanable waste receptacle; and **[O]**
(iv) Hand washing signs in a language understood by the employees. **[O]**

(2) Sewage **[C]** and liquid disposable wastes shall be properly removed from the facility. **[K]**

(3) The dealer shall provide:
(a) Toilet room doors that are tight fitting, self-closing, and do not open directly into a processing area; **[K]**
(b) An adequate number of conveniently located, toilets; and **[K]**
(c) Each toilet facility with an adequate supply of toilet paper **[K]** in a suitable holder. **[$S^{K/O}$]**

E. Protection from Adulterants.

(1) Shellfish shall be protected from contamination while being transferred from one point to another during handling and processing. **[K]**

(2) Any lighting fixtures, light bulbs, skylights, or other glass suspended over food storage or processing activities in areas where shellfish are exposed shall be of the safety type or protected to prevent food contamination in case of breakage. **[O]**

(3) Food contact surfaces shall be protected from contamination by adulterants by using cleaning compounds and sanitizing agents only in accordance with applicable Federal and State laws and regulations. **[K]**

(4) Protection of ice used in shellfish reshipping.
(a) Any ice which is not made on site in the shellfish processing facility shall be inspected upon receipt and rejected if the ice is not delivered in a way so as to be protected from contamination. **[$S^{C/K}$]**
(b) Ice shall be stored in a safe and sanitary manner to prevent contamination of the ice. **[$S^{C/K}$]**

(5) Adequate ventilation shall be provided to minimize condensation in areas where food is stored, processed or packed. **[$S^{C/K}$]**

F. Proper Labeling, Storage and Use of Toxic Compounds.

(1) Storage of toxic compounds.

(a) The dealer shall assure that only toxic substances necessary for plant activities are present in the facility. **[K]**

(b) Each of the following categories of toxic substances shall be stored separately:

(i) Insecticides and rodenticides; **[K]**

(ii) Detergents, sanitizers, and related cleaning agents; and **[K]**

(iii) Caustic acids, polishes, and other chemicals. **[K]**

(c) The dealer shall not store toxic substances above shellfish or food contact surfaces. **[K]**

(2) Use and labeling of toxic compounds.

(a) When pesticides are used, the dealer shall apply pesticides in accordance with applicable Federal and State regulations to control insects and rodents in such a manner to prevent the contamination of any shellfish or packaging materials with residues. **[K]**

(b) Cleaning compounds and sanitizing agents shall be labeled and used only in accordance with applicable Federal and State laws and regulations. **[K]**

(c) Toxic substances shall be labeled and used in accordance with the manufacturer's label directions. **[K]**

Additional Guidance: Section IV Guidance Documents Chapter III. Section .06

G. Control of Employees with Adverse Health Conditions.

(1) The dealer and the supervisor shall take all reasonable precautions to assure that any employee with a disease in the communicable stage which might be transmissible through food shall be excluded from working in any capacity in which the employee may come in contact with the shellfish or with food contact surfaces. The pathogens causing diseases which are transmissible from food workers through food are those determined by the U.S. Centers for Disease Control and Prevention, in compliance with the Americans with Disabilities Act, and published in the *Federal Register*. These include: **[K]**

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(b) Hepatitis A virus,

(c) *Shigella* spp.,

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(e) *Salmonella typhi.*

(2) All employees shall immediately report to the dealer and/or the supervisor information about their health and activities as they relate to diseases that are transmissible through food. All employees shall report the information in a manner that allows the dealer and/or supervisor to reduce the risk of shellfish-borne disease transmission, including providing necessary additional information, such as the date of onset of symptoms of an illness, or of a diagnosis without symptoms, or if the employee: **[K]**

(a) Has any of the following symptoms:

(i) Vomiting,

(ii) Diarrhea,

(iii) Jaundice,

(iv) Sore throat with fever, or

(v) A lesion containing pus such as a boil or infected wound that is open or draining on any part of the body, or

(b) Has an illness diagnosed by a health practitioner due to:
(i) Norovirus
(ii) Hepatitis A virus,
(iii) *Shigella* spp.,
(iv) Enterohemorrhagic or Shiga Toxin-producing *Escherichia coli*, or
(v) *Salmonella typhi*;
(c) Had a previous illness, diagnosed by a health practitioner, within the past three (3) months due to *Salmonella typhi*, without having received antibiotic therapy, as determined by a health practitioner;
(d) Has been exposed to, or is the suspected source of, a confirmed disease outbreak, because the employee consumed or prepared food implicated in the outbreak, or consumed food at an event prepared by a person who is infected or ill with:
(i) Norovirus within the past twenty-four (24) hours of the last exposure;
(ii) Enterohemorrhagic or Shiga toxin-producing *Escherichia coli* or *Shigella* spp. within the past three (3) days of the last exposure;
(iii) *Salmonella typhi* within the past fourteen (14) days of the last exposure;
(iv) Hepatitis A virus within the past thirty (30) days of the last exposure; or
(e) Has been exposed by attending or working in a setting where there is a confirmed disease outbreak, or living in the same household as, and has knowledge about, an individual that works or attends a setting where there is a confirmed disease outbreak or living in the same household as, and has knowledge about, an individual diagnosed with an illness caused by:
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(3) If an employee with an infected wound protects the lesion by keeping it covered with a proper bandage, a dry, durable, tight-fitting impermeable barrier, and a single-use glove for a hand lesion, the dealer and/or supervisor may allow the employee to work in the shellfish processing facility without additional restrictions. **[K]**
(4) The dealer shall notify the Authority and Health Department when *notified* by an employee *of a diagnosis or exhibits symptoms of hepatitis*, and shall ensure that the employee is excluded from working in any capacity in which the employee may come in contact with the shellfish or with food contact surfaces or that may transmit the illness to other employees. **[K]**

H. Exclusion of Pests. The dealer shall operate his facility to assure that pests are excluded from the facility and processing activities. Animals shall not be allowed in those portions of the facilities where shellfish are stored, handled, processed, or packaged or food handling equipment, utensils, and packaging materials are cleaned or stored. **[K]**

.03 Other Model Ordinance Requirements

A. Plants and Grounds.
(1) General. The physical facilities shall be maintained in good repair. **[O]**
(2) Flooding.
(a) Facilities in which shellfish are stored, shucked, packed, repacked or reshipped shall be located so that these facilities are not subject to flooding during ordinary high tides. **[C]**

(b) If facilities are flooded:

(i) Shellfish processing, shucking or repacking activities shall be discontinued until the flood waters have receded from the building; and the building is cleaned and sanitized. **[C]**

(ii) Any shellfish coming in contact with the flood waters while in storage shall be destroyed; or discarded in non-food use. **[C]**

(3) The dealer shall operate his facility to provide adequate protection from contamination and adulteration by assuring that dirt and other filth are excluded from his facility and activities. **[$S^{C/K}$]**

(4) The dealer shall employ necessary internal and external insect and vermin control measures to insure that insects and vermin are not present in the facility.

(a) Tight fitting, self-closing doors; **[K]**

(b) Screening of not less than fifteen (15) mesh per inch; **[K]** and

(c) Controlled air current. **[K]**

(5) Plant Interior.

(a) Sanitary conditions shall be maintained throughout the facility. **[O]**

(b) All dry area floors shall be hard, smooth, easily cleanable. **[O]**

(c) All wet area floors used in areas to store shellfish, process food, and clean equipment and utensils shall be constructed of easily cleanable, impervious, and corrosion resistant materials which:

(i) Are graded to provide adequate drainage; **[O]**

(ii) Have even surfaces, and are free from cracks that create sanitary problems and interfere with drainage; and **[O]**

(iii) Have sealed junctions between floors and walls to render them impervious to water. **[O]**

(d) Walls and Ceilings. Interior surfaces of rooms where shellfish are stored, handled, processed, or packaged shall be constructed of easily cleanable, corrosion resistant, impervious materials. **[O]**

(6) Grounds around the facility shall be maintained to be free from conditions which may result in shellfish contamination. These conditions may include:

(a) Rodent attraction and harborage; and **[O]**

(b) Inadequate drainage. **[O]**

B. Plumbing and Related Facilities.

(1) All plumbing and plumbing fixtures shall be properly designed, installed, modified, repaired, and maintained. The water system shall provide an adequate quantity of water under pressure, and includes cold and warm water at all sinks. **[K]**

(2) Adequate floor drainage, including backflow preventer such as air gaps, shall be provided where floors are:

(a) Used in shellfish storage; **[K]**

(b) Used for food holding units (e.g., refrigeration units); **[K]**

(c) Cleaned by hosing, flooding, or similar methods **[K]**; and

(d) Subject to the discharge of water or other liquid waste including three (3) compartment sinks on the floor during normal activities. **[K]**

(3) A safe, effective means of sewage disposal for the facility shall be provided in accordance with applicable Federal and State laws and regulations. **[$S^{C/K}$]**

(4) Installation of drainage or waste pipes over food processing or food storage areas, or over areas in which containers and utensils are washed or stored shall not be permitted. **[K]**

C. Utilities.

(1) The dealer shall ensure that ventilation, heating, or cooling systems do not create conditions that may cause the shellfish products to become contaminated. **[$S^{C/K}$]**

(2) The dealer shall provide lighting throughout the facility that is sufficient to promote good manufacturing practices. **[$S^{C/K}$]**

D. Disposal of Other Wastes.

(1) Disposal of waste materials shall be conducted in accordance with appropriate Federal and State laws and regulations. **[O]**

(2) All areas and receptacles used for the storage or conveyance of waste shall be operated and maintained to prevent attraction, harborage, or breeding places for insects and vermin. **[O]**

E. Equipment Condition, Cleaning, Maintenance, and Construction of Non-Food Contact Surfaces.

(1) The dealer shall use only equipment, including approved plastic ware, which is constructed in a manner and with materials that can be cleaned, sanitized, maintained, or replaced; and **[O]**

(2) The dealer shall use easily cleanable, corrosion-resistant, impervious materials, free from cracks to construct any non-food contact surfaces in shellfish storage or handling areas. **[O]**

(3) Cleaning activities for equipment shall be conducted in a manner and at a frequency appropriate to prevent contamination of shellfish and non-food contact surfaces. **[K]**

(4) All conveyances and equipment which come into contact with stored shellstock shall be cleaned and maintained in a manner and frequency as necessary to prevent shellstock contamination. **[O]**

F. Shellfish Storage and Handling.

(1) The dealer shall buy shellfish only from sources certified by the Authority or listed in the ICSSL. **[K]**

(2) The dealer shall not:

(a) Commingle, sort, or repack shellfish; or **[K]**

(b) Remove or alter any existing tag or label. **[K]**

(3) A dealer whose activity consists of trucks only shall:

(a) Have his own facility for the storage of shellfish; or **[K]**

(b) Have arrangements with a facility approved by the Authority for the storage of shellfish; and **[K]**

(c) Have a permanent business address at which records are maintained and inspections can be performed. **[K]**

(4) During storage frozen shellfish shall be maintained frozen. **[$S^{K/O}$]**

G. Heat Shock. - N/A

H. Supervision.

(1) A reliable, competent individual shall be designated to supervise general plant management and activities. **[K]**

(2) Cleaning procedures shall be developed and supervised to assure cleaning activities do not result in contamination of shellfish or food contact surfaces. **[K]**

(3) All supervisors shall be:

(a) Trained in proper food handling techniques and food protection principles; and **[K]**

(b) Knowledgeable of personal hygiene and sanitary practices. **[K]**

(4) The dealer shall require:

(a) Supervisors to monitor employee hygiene practices, including hand washing, eating, and smoking at work stations, and storing personal items or clothing. **[K]**

(b) Supervisors to assure that proper sanitary practices are implemented, including:

(i) Plant and equipment clean-up; **[K]**

(ii) Rapid product handling; and **[K]**

(iii) Shellfish protection from contamination; **[K]**

(c) Supervisors to not allow unauthorized persons in those portions of the facilities where shellfish are stored, handled, processed, or packaged or food handling equipment, utensils, and packaging materials are cleaned or stored. **[K]**

(d) All employees to be trained in proper food handling and personal hygiene practices. **[K]**

Chapter XV. Depuration

[Note: In those States where depuration is not practiced, this Chapter may be deleted from the Model Ordinance, as well as references to depuration throughout the Model Ordinance.]

Requirements for the Authority

[Note: The Authority must meet the requirements of this section even if the Authority does not formally adopt this Chapter in regulation.]

A. Prior to authorizing depuration, the Authority shall develop and maintain an effective program to:
   (1) Control shellstock harvesting by special license in accordance with Chapter VIII. @.01 C.;
   (2) Control shellstock transportation between the harvest area and the depuration facility to prevent shellstock from being illegally diverted to direct marketing; and
   (3) Approve the design and construction of the depuration facility or activity including subsequent changes.
B. If shellstock is transported interstate to be depurated, the Authorities in both States shall execute a memorandum of agreement to provide adequate control measures to prevent diversion prior to depuration.
C. The Authority shall review and approve the Depuration Plant Operating Manual prior to granting depuration certification.
D. The Authority shall review the depuration plant performance index and other records as part of the monthly inspections to verify that the process and CCP are effective and the process verification analysis is being performed properly.
E. The Authority shall maintain adequate records for each depuration facility. The inspection reports and reviews of the plant performance in accordance to Section D. (above) for each facility shall be kept for the period of five (5) years.
F. The Authority shall assure that each dealer has procedures to assure that no shellstock which has not been depurated is removed from the depuration facility without the direct supervision of the Authority.

Requirements for the Dealer

Additional Guidance: Section IV. Guidance Documents Chapter III. Section .07

.01 Critical Control Points

A. Receiving Critical Control Point - Critical Limits.
   (1) The dealer shall receive and depurate only shellstock which is obtained from a licensed harvester who has:
      (a) Harvested the shellstock from an Approved or Conditionally Approved area in the open status as indicated by the tag; **[C]** and
      (b) Identified the shellstock with a tag on each container or transaction record on each bulk

shipment; **[C]** and

(c) Harvested the shellstock in compliance with the time/temperature requirements of Chapter VIII. @.02 A. (1), (2) or (3) as determined from records supplied by the harvester described in Chapter VIII. .02 G. (2). **[C]**

(2) The dealer shall receive and depurate only shellstock obtained and transported from a dealer who has:

(a) Identified the shellstock with a tag on each container as outlined in Chapter X. .05 or transaction record with each bulk shipment as outlined in Chapter VIII. .02 F. (8); **[C]** and

(b) Provided documentation as required in Chapter IX. .05; and **[C]**

(c) Adequately iced the shellstock, or **[C]**

(d) Shipped the shellstock in a conveyance maintained at or below 45 °F (7.2 °C) ambient air temperature; or **[C]**

(e) Cooled the shellstock to an internal temperature of 50 °F (10 °C) or less. **[C]**

(3) Should a dealer receive shellstock from a dealer who is shipping shellstock harvested in accordance with Chapter VIII. @.02 A. (3) or restricted use shellstock that has not been cooled to an internal temperature of 50 °F (10 °C), the shellstock must be accompanied with a time/temperature recording device indicating that continuing cooling has occurred. This product can be received without meeting the receiving requirements of Chapter XIII. .01 A. (2) (c), (d) or (e). Shipments of four (4) hours or less will not be required to have a time/temperature device. **[C]**

(4) The dealer shall receive and depurate only shellstock obtained from a special licensed harvester who has:

(a) Harvested or supervised the harvest of shellstock from a Restricted or Conditionally Restricted area in the open status; **[C]** and

(b) Identified the shellstock by transaction records which include the harvest area, the special-licensed harvester's name, harvester license number(s), the harvest date, and the amount of shellstock shipped in each lot. **[C]**

B. Processing Critical Control Points - Critical Limits. The dealer shall assure that:

(1) All depuration lots are treated for a minimum of forty-four (44) hours; **[C]**

(2) The water treatment system is operating to design specifications; and **[C]**

(3) All critical limits established during verification of the specific depuration process are being met. **[C]**

C. Finished Shellstock Storage Critical Control Point - Critical Limits. The dealer shall assure that:

(1) If wet storage in artificial bodies of water is practiced, water quality meets the requirements outlined in Chapter VII. .04; **[C]** and

(2) Once placed under temperature control while in the possession of the dealer, shellstock shall be:

(a) Iced; **[C]** or

(b) Placed in a storage area or conveyance maintained at 45 °F (7.2 °C) or less; **[C]** and

(c) Not permitted to remain outside temperature control for more than two (2) hours at points of processing or transfer such as loading docks. **[C]**

.02 Sanitation

A. Safety of Water for Processing and Ice Production

(1) Water Supply.

(a) Dealers shall provide a potable water supply in accordance with applicable federal,

state and local regulations. **[C]**

(b) If the water supply is from a private source, the dealer shall make arrangements to have the water supply sampled by persons recognized by the Authority and tested at laboratories sanctioned or certified by the Authority: **[K]**

(i) Prior to use of the water supply; **[C]**

(ii) Every six (6) months while the water supply is in use; **[K]** and

(iii) After any water supply has been repaired and disinfected. **[$S^{C/K}$]**

(2) Ice production. Any ice used in the processing or storage of shellfish shall:

(a) Be made on-site from potable water in a commercial ice machine; or **[C]**

(b) Come from a facility sanctioned by the Authority or the appropriate regulatory agency. [**C**]

(3) Shellstock washing

(a) Water from either a potable water supply, a growing area in the approved classification, a saltwater well approved by the Authority, or the restricted area at the time and place of harvest, shall be used to wash shellstock. **[C]**

(b) If the dealer uses any system to wash shellstock which recirculates water, the dealer shall:

(i) Obtain approval for the construction or remodeling of the system from the Authority; **[K]**

(ii) Provide a water treatment and disinfection system to treat an adequate quantity of water to a quality acceptable for shellstock washing, which, after disinfection, meets the coliform standards for drinking water; and does not leave any unacceptable residues in the shellstock; **[C]**

(iii) Test wash water daily for bacteriological water quality; and **[$S^{C/K}$]**

(iv) Clean, service, and test disinfection units at the frequency necessary to ensure effective disinfection. **[K]**

(c) The dealer may use ultra-violet (UV) disinfection in his recirculating wash water system, provided that the turbidity of the water to be disinfected:

(i) shall not exceed twenty (20) nephelometric turbidity units (NTUs); **[K]** and

(ii) Is measured using the method in the APHA *Standard Methods for the Examination of Water and Wastewater*. **[K]**

(d) Food contact plumbing which is designed and installed to permit effective cleaning and sanitization shall be used. **[C]**

(4) Depuration Process Water. The dealer shall:

(a) Continuously treat process water with a disinfection system approved by the Authority that does not leave any unacceptable residue in the shellstock; **[C]** and

(b) Verify that the disinfection system produces process seawater with no detectable coliform organisms as measured using an NSSP approved method in the tank influent according to the following sampling protocols.

(i) If the source water is an approved growing area, approved well, or other approved source, then the tank influent produced by each disinfection unit is evaluated once per process batch; **[C]**

(ii) If the source water is a restricted growing area, then:

a. A study meeting the requirements of Chapter VII. .04 C. is required; **[C]**

b. The tank influent produced by each disinfection unit is evaluated daily; and **[C]**

c. Source water prior to final disinfection must meet the water quality criteria for restricted for depuration in accordance with Chapter IV. @.02 G-H. **[C]**

(iii) If the source water is a recirculating water system, then:

a. A study meeting the requirements of Chapter VII. .04 C. **[C]** is required; and

b. The tank influent produced by each disinfection unit is verified daily. **[C]**

c. A prohibited growing area may not be used for source water. **[C]**

(5) Plumbing and Related Facilities.

(a) The dealer shall design, install, modify, repair, and maintain all plumbing and plumbing fixtures to:

(i) Prevent contamination of water supplies; **[S$^{C/K}$]** and

(ii) Prevent any cross-connection between the pressurized potable water supply and water from an unacceptable source. **[S$^{C/K}$]** The dealer shall install and maintain in good working order devices to protect against backflow and back siphonage. **[K]**

(b) Depuration Plant Design and Construction. The dealer shall ensure that:

(i) Depuration tanks, processing containers, and piping are fabricated from non-toxic corrosion-resistant materials and are easily cleanable; **[K]**

(ii) Depuration tank design, hydraulics, and typical container configuration are such that process water is evenly circulated throughout all the shellfish containers within a given tank; and **[K]**

(iii) Shellfish containers allow process water to flow freely and uniformly to all shellfish within each container. **[K]**

(6) Depuration unit. Depuration unit including depuration tanks, all reservoir tanks, and related piping shall be fabricated from safe materials, and depuration unit construction is such that it:

(a) Is easily accessible for cleaning and inspection; **[K]**

(b) Is self-draining; **[K]** and

(c) Meets the requirements for food contact surfaces. **[K]**

Additional Guidance: Section IV Guidance Documents Chapter III. Section .01

B. Condition and Cleanliness of Food Contact Surfaces.

(1) Equipment and utensil construction for food contact surfaces.

(a) The dealer shall use only equipment which conforms to Shellfish Industry Equipment Construction Guides (August 1993), U.S. Department of Health and Human Services. **[K]**

(b) The dealer shall use only equipment and utensils, including approved plastic ware which is:

(i) Constructed in a manner and with materials that can be cleaned, sanitized, maintained or replaced in a manner to prevent contamination of shellfish products; **[K]**

(ii) Free from any exposed screws, bolts, or rivet heads on food contact surfaces; and **[K]**

(iii) Fabricated from food grade materials.**[K]**

(c) The dealer shall assure that all joints on food contact surfaces:

(i) Have smooth easily cleanable surfaces; and **[K]**

(ii) Are welded. **[K]**

(d) All equipment used to handle ice shall be kept clean and stored in a sanitary manner, and shall meet the construction requirements in Section .02 B. 1 (a), (b), and (c). **[K]**

(e) Shellstock washing tanks and related plumbing shall be fabricated from safe materials which:

(i) Are easily accessible for cleaning and inspection; and: **[K]**

(ii) Meet requirements for food contact surfaces. **[K]**

(2) Cleaning and sanitizing of food contact surfaces.

(a) Food contact surfaces of the depuration units, equipment and containers shall be cleaned and sanitized to prevent contamination of shellstock and food contact surfaces. Depuration tanks and trays are not considered to be food contact surfaces. The dealer shall:

(i) Provide applicable adequate cleaning supplies and equipment, brushes, detergents, and sanitizers, hot water and pressure hoses; **[K]**

(ii)Sanitize equipment prior to the start-up of each day's activities and following any interruption during which food contact surfaces may have been contaminated; and **[K]**

(iii) Wash and rinse equipment at the end of each day. [**K**]

(b) Containers which may have become contaminated during storage shall be properly washed, rinsed and sanitized prior to use or are discarded. **[K]**

(c) Shellstock depuration tanks shall be cleaned and sanitized on a regular schedule as part of a plant sanitation standard operating procedure. **[K]**

C. Prevention of Cross Contamination.

(1) Protection of shellfish.

(a) Shellstock shall be stored in a manner to protect shellstock from contamination in dry storage and at points of transfer. **[$S^{C/K}$]**

(b) Shellstock shall not be placed in containers with standing water for the purposes of washing shellstock or loosening sediment. **[K]**

(2) Separation of Operations: Manufacturing activities which could result in the contamination of the shellstock shall be separated by adequate barriers. **[K]**

(3) Employee practices.

(a) The dealer shall require all employees to wash their hands thoroughly with soap and water and sanitize their hands in an adequate hand washing facility:

(i) Before starting work; **[K]**

(ii) After each absence from the work station; **[K]**

(iii) After each work interruption; **[K]** and

(iv) Any time when their hands may have become soiled or contaminated. **[K]**

(b) In any area where shellfish are stored and in any area which is used for the cleaning or storage of utensils, the dealer shall not allow employees to:

(i) Store clothing or other personal belongings; **[O]**

(ii) Eat or drink; **[K]**

(iii) Spit; and **[K]**

(iv) Use tobacco in any form. **[K]**

D. Maintenance of Hand Washing, Hand Sanitizing and Toilet Facilities

(1) Hand washing facilities with warm water at a minimum temperature of 100 °F (37.8 °C), dispensed from a hot and cold mixing or combination faucet, shall be provided. **[$S^{K/O}$]**

(2) Hand washing facilities shall be provided which are:

(a) Convenient to work areas; **[O]**

(b) Separate from the three (3) compartment sinks used for cleaning equipment and utensils; **[K]**

(c) Directly plumbed to an approved sewage disposal system; and **[$S^{K/O}$]**

(d) Adequate in number and size for the number of employees, and located where supervisors can observe employee use. **[K]**

(3) The dealer shall provide at each hand washing facility:

(a) Supply of hand cleansing soap or detergent; **[K]**

(b) Conveniently located supply of single service towels in a suitable dispenser or a hand

drying device that provides heated air; **[O]**

(c) Easily cleanable waste receptacle; and **[O]**

(d) Hand washing signs in a language understood by the employees. **[O]**

(4) Sewage **[C]** and liquid disposable wastes **[K]** shall be properly removed from the facility.

(5) The dealer shall provide:

(a) Toilet room doors that are tight fitting, self-closing, and do not open directly into a processing area; **[K]**

(b) An adequate number of conveniently located toilets; and **[K]**

(c) Each toilet facility with an adequate supply of toilet paper **[K]** in a suitable holder. **[$S^{K/O}$]**

E. Protection from Adulterants.

(1) Shellstock shall be protected from contamination while being transferred from one point to another during handling and processing. **[K]**

(2) Any lighting fixtures, light bulbs, skylights, or other glass suspended over food storage or processing activities in areas where shellstock are exposed shall be of the safety type or protected to prevent food contamination in case of breakage. **[O]**

(3) Conveyances or devices used to transport shellstock shall be constructed, maintained and operated to prevent contamination of the shellstock. If overhead monorails or conveyors are used, the dealer shall take precautions to assure that hydraulic fluids or lubricants do not leak or drip onto the shellstock or conveyance surfaces. **[K]**

(4) Adequate ventilation shall be provided to minimize condensation in areas where shellfish are stored, processed or packed. **[$S^{C/K}$]**

(5) Shellstock packing activities shall be conducted to provide adequate protection from contamination and adulteration. **[K]**

(6) Protection of ice used in shellstock shipping.

(a) Any ice which is not made on-site in the depuration facility shall be inspected upon receipt and rejected if the ice is not delivered in a way so as to be protected from contamination. **[$S^{C/K}$]**

(b) Ice shall be stored in a safe and sanitary manner to prevent contamination of the ice. **[$S^{C/K}$]**

(7) The dealer shall assure that any steam used in food processing or that comes in contact with food contact surfaces is free from any additives, or deleterious substances consistent with Federal and State laws and regulations. **[K]**

(8) Air pump intakes shall be located in a protected place. Air filters shall be installed on all blower air pump intakes. Oil bath type filters are not allowed. **[O]**

F. Proper Labeling, Storage and Use of Toxic Compounds.

(1) Storage of toxic compounds.

(a) The dealer shall assure that only toxic substances necessary for plant activities are present in the facility. **[K]**

(b) Each of the following categories of toxic substances shall be stored separately:

(i) Insecticides and rodenticides; **[K]**

(ii) Detergents, sanitizers, and related cleaning agents; **[K]** and

(iii) Caustic acids, polishes, and other chemicals. **[K]**

(c) The dealer shall not store toxic substances above shellfish or food contact surfaces. **[K]**

(2) Use and labeling of toxic compounds.

(a) When pesticides are used, the dealer shall apply pesticides in accordance with applicable Federal and State regulations to control insects and rodents in such a manner to prevent the contamination of any shellfish or packaging materials with residues. **[K]**

(b) Cleaning compounds/supplies, detergents and sanitizing agents shall be used only in

strict accordance with the manufacturer's label instructions and all applicable Federal and State laws and regulations. **[K]**

(c) Toxic substances shall be used only in strict accordance with the manufacturer's label instructions. **[K]**

(d) The dealer shall provide a test kit, strips or other device that accurately measures the parts per million concentration of the chemical sanitizing agent in use. **[K]**

Additional Guidance: Section IV Guidance Documents Chapter III. Section .06

G. Control of Employees with Adverse Health Conditions.

(1) The dealer and the supervisor shall take all reasonable precautions to assure that any employee with a disease in the communicable stage which might be transmissible through food shall be excluded from working in any capacity in which the employee may come in contact with the shellfish or with food contact surfaces. The pathogens causing diseases which are transmissible from food workers through food are those determined by the US Centers for Disease Control and Prevention, in compliance with the Americans with Disabilities Act, and published in the *Federal Register*. These include: **[K]**

(a) Norovirus;
(b) Hepatitis A virus;
(c) *Shigella* spp.;
(d) Enterohemorrhagic or Shiga Toxin-producing *Escherichia coli,* or
(e) *Salmonella typhi.*

(2) All employees shall immediately report to the dealer and/or the supervisor information about their health and activities as they relate to diseases that are transmissible through food. All employees shall report the information in a manner that allows the dealer and/or supervisor to reduce the risk of shellfish-borne disease transmission, including providing necessary additional information, such as the date of onset of symptoms of an illness, or of a diagnosis without symptoms, or if the employee: **[K]**

(a) Has any of the following symptoms:
(i) Vomiting;
(ii) Diarrhea;
(iii) Jaundice;
(iv) Sore throat with fever; or
(v) A lesion containing pus such as a boil or infected wound that is open or draining on any part of the body; or

(b) Has an illness diagnosed by a health practitioner due to:
(i) Norovirus;
(ii) Hepatitis A virus;
(iii) *Shigella* spp.;
(iv) Enterohemorrhagic or Shiga Toxin-producing *Escherichia coli;* or
(v) *Salmonella typhi*;

(c) Had a previous illness, diagnosed by a health practitioner, within the past three (3) months due to *Salmonella typhi,* without having received antibiotic therapy, as determined by a health practitioner;

(d) Has been exposed to, or is the suspected source of, a confirmed disease outbreak, because the employee consumed or prepared food implicated in the outbreak, or consumed food at an event prepared by a person who is infected or ill with:

(i) Norovirus within the past twenty-four (24) hours of the last exposure:
(ii) Enterohemorrhagic or Shiga toxin-producing *Escherichia coli* or *Shigella* spp. within the past three (3) days of the last exposure;
(iii) *Salmonella typhi* within the past fourteen (14) days of the last exposure;
(iv) Hepatitis A virus within the past thirty (30) days of the last exposure; or

(e) Has been exposed by attending or working in a setting where there is a confirmed disease outbreak, or living in the same household as, and has knowledge about, an individual that works or attends a setting where there is a confirmed disease outbreak or living in the same household as, and has knowledge about, an individual diagnosed with an illness caused by:

(i) Norovirus within the past twenty-four (24) hours of the last exposure;
(ii) Enterohemorrhagic or Shiga toxin-producing *Escherichia coli*, or *Shigella* spp. within the past three (3) days of the last exposure;
(iii) *Salmonella typhi* within the past fourteen (14) days of the last exposure; or
(iv) Hepatitis A virus within the past thirty (30) days of the last exposure.

(3) If an employee with an infected wound protects the lesion by keeping it covered with a proper bandage, a dry, durable, tight-fitting impermeable barrier, and a single-use glove for a hand lesion, the dealer and/or supervisor may allow the employee to work in the shellfish processing facility without additional restrictions. **[K]**

(4) The dealer shall notify the Authority and Health Department when *notified* by an employee *of a diagnosis or exhibits symptoms of hepatitis*, and shall ensure that the employee is excluded from working in any capacity in which the employee may come in contact with the shellfish or with food contact surfaces or that may transmit the illness to other employees. **[K]**

H. Exclusion of Pests. The dealer shall operate his facility to assure that pests are excluded from his facility and his activities. Animals shall not be allowed in those portions of the facilities where shellfish are stored, handled, processed, or packaged or where food handling equipment, utensils, and packaging materials are cleaned and stored. **[K]**

.03 Other Model Ordinance Requirements

A. Plants and Grounds.

(1) General. The physical facilities shall be maintained in good repair. **[O]**

(2) Flooding.

(a) Facilities in which shellstock are stored, packed, or repacked shall be located so that these facilities are not subject to flooding during ordinary high tides. **[C]**

(b) If facilities are flooded:

(i) Shellstock processing or repacking activities shall be discontinued until the floodwaters have receded from the building; and the building is cleaned and sanitized; and **[C]**

(ii) Any shellstock coming in contact with the floodwaters while in storage shall be destroyed; or discarded in non-food use. **[C]**

(3) The dealer shall operate his/her facility to provide adequate protection from contamination and adulteration by assuring that dirt and other filth are excluded from the facility and activities. **[$S^{C/K}$]**

(4) The dealer shall employ necessary internal and external insect and vermin control measures to insure insects and vermin are not present in the facility.

(a) Tight fitting, self-closing doors; **[K]**
(b) Screening of not less than fifteen (15) mesh per inch; **[K]** and
(c) Controlled air current. **[K]**

(5) Plant Interior.
(a) Sanitary conditions shall be maintained throughout the facility. **[O]**
(b) Interior surfaces are kept in good repair. **[O]**
(c) All dry area floors are hard, smooth, easily cleanable and in good repair; **[O]** and
(d) All wet area floors used in areas to store shellstock, food processing, and cleaning equipment are constructed of easily cleanable, impervious, and corrosion resistant materials which:
(i) Are graded to provide adequate drainage; **[O]**
(ii) Have even surfaces, and are free from cracks that create sanitary problems and interfere with drainage; and **[O]**
(iii) Have sealed junctions between floors and walls to render them impervious to water. **[O]**
(e) Walls and ceilings. Interior surfaces of rooms where shellstock are stored, handled, processed, or packaged and food handling equipment and packaging materials shall be constructed of easily cleanable, corrosion resistant, impervious and light colored materials. **[O]**

(6) Grounds around the facility shall be maintained to be free from conditions which may result in shellfish contamination. These conditions may include:
(a) Rodent attraction and harborage; **[O]**
(b) Inadequate drainage. **[O]**

B. Plumbing and Related Facilities.

(1) All plumbing and plumbing fixtures shall be properly designed, installed, modified, repaired, and maintained. The water system shall provide an adequate quantity of water under pressure, and includes cold and warm water at all sinks. **[K]**
(2) Adequate floor drainage, including backflow preventers such as air gaps, shall be provided where floors are:
(a) Used in shellstock storage; **[K]**
(b) Used for food holding units (e.g. refrigeration units); **[K]**
(c) Cleaned by hosing, flooding, or similar methods; **[K]** and
(d) Subject to the discharge of water or other liquid waste, including, if applicable, three (3) compartment sinks, on the floor during normal activities. **[K]**
(3) A safe, effective means of sewage disposal for the facility shall be provided in accordance with applicable Federal and State laws and regulations. **[$S^{C/K}$]**
(4) Installation of drainage or waste pipes over processing or storage areas, or over areas in which containers and utensils are washed or stored shall not be permitted. **[K]**
(5) Shellstock washing storage tanks and related plumbing shall be fabricated from safe materials such that it:
(a) Is easily accessible for inspection; and **[K]**
(b) Is self-draining. **[K]**

C. Utilities.

(1) The dealer shall ensure that ventilation, heating, or cooling systems do not create conditions that may cause the shellfish products to become contaminated. **[$S^{C/K}$]**
(2) The dealer shall provide lighting throughout the facility that is sufficient to promote good manufacturing practices. **[$S^{C/K}$]**

D. Disposal of Wastes.

(1) Disposal of waste materials shall be conducted in accordance with appropriate Federal and State laws and regulations. **[O]**

(2) All areas and receptacles used for the storage or conveyance of waste shall be operated and maintained to prevent attraction, harborage, or breeding places for insects and vermin. **[O]**

E. Equipment Condition, Cleaning, Maintenance and Construction of Non-food Contact Surfaces.

(1) The dealer shall use only equipment which is constructed in a manner and with materials that can be cleaned, sanitized, maintained or replaced in a manner to prevent contamination of shellstock. **[O]**

(2) The dealer shall use easily cleanable, corrosion resistant, impervious materials, free from cracks, to construct any non-food contact surfaces in shellfish storage or handling areas. **[O]**

(3) Cleaning activities for the depuration unit and equipment shall be conducted in a manner and at a frequency appropriate to prevent contamination of shellstock and food contact surfaces. **[K]**

(4) All conveyances and equipment which come into contact with stored shellstock shall be cleaned and maintained in a manner and frequency as necessary to prevent shellstock contamination. **[O]**

F. Shellstock Storage and Handling.

(1) The dealer shall assure that shellstock is:

(a) Reasonably free of sediment; **[O]** and

(b) Culled. **[K]**

(2) Shellstock shall be stored in a protected location which assures complete and rapid drainage of water away from the shellstock by:

(a) Placing shellstock at an adequate height off the floor; **[K]** or

(b) Grading the floor. **[O]**

(3) Any mechanical refrigeration equipment used for shellstock storage shall be adequate in size and are equipped with:

(a) An automatic temperature regulating control; **[K]** and

(b) Installed thermometers to accurately measure temperature within the storage compartments. **[K]**

(4) Inspect incoming shipments and shall reject dead or inadequately protected shellstock. **[K]**

(5) Ensure that separate dry storage facilities are provided for depurated and non-depurated
shellfish. **[K]**

(6) Cull and wash the shellstock prior to loading into the depuration tanks. This process may occur before the shellstock is received at the facility by;

(a) Licensed harvester(s) at the harvest site; **[K]** or

(b) Certified dealer(s) at their certified facility. **[K]**

(7) Assure that culled shellfish are destroyed or disposed of in such a manner as to prevent their use for human food. **[K]**

(8) Transport, store, and handle shellstock so that:

(a) Shellstock potential for normal physiological activity during depuration is not compromised; **[K]** and

(b) Shellstock quality is not degraded. **[K]**

(9) Assure that different harvest lots of shellfish are not commingled during washing, culling, processing, or packing. If more than one (1) harvest lot of shellfish is being processed at the same time, the identity of each harvest lot is maintained throughout the stages of depuration. **[K]**

(10) Wash and cull shellstock after depuration and pack the shellstock in clean shipping containers fabricated from safe materials. **[K]**

(11) Depurated packaged shellstock shall be protected from contamination at all times and be held at an ambient temperature not to exceed 45 °F (7.2 °C). **[K]**

(12) All shellstock received from a licensed harvester intended for depuration must be introduced into depuration, adequately iced, or placed in a storage area maintained at 45 °F (7.2 °C) within two (2) hours of receipt.

G. Heat Shock. N/A

H. Supervision.

(1) A reliable, competent individual shall be designated to supervise general plant management and activities. **[K]**

(2) Cleaning procedures shall be developed and supervised to assure cleaning activities do not result in contamination of shellstock or food contact surfaces. **[K]**

(3) All supervisors shall be:

(a) Trained in proper food handling techniques and food protection principles; and **[K]**

(b) Knowledgeable of personal hygiene and sanitary practices. **[K]**

(4) The dealer shall require:

(a) Supervisors to monitor employee hygiene practices, including handwashing, eating, smoking and/or storing personal items and clothing at work stations. **[K]**

(b) Supervisors to assure that proper sanitary practices are implemented, including:

(i) Plant equipment clean up; **[K]**

(ii) Rapid product handling; and **[K]**

(iii) Shellstock protection from contamination. **[K]**

(c) Supervisors to not allow unauthorized persons in those portions of the facility where shellfish are processed, handled, stored or packaged or where food handling equipment, utensils, and packaging materials are cleaned or stored; and **[K]**

(d) All Employees

(i) To be trained in proper food handling and personal hygiene practices; and **[K]**

(ii) To report any symptoms of illness to their supervisor. **[K]**

I. Plant Operations Manual. The dealer shall prepare a written Depuration Plant Operations Manual (DPOM) according to Minimum Requirements of a Depuration Plant Operations Manual (below); and update the DPOM as necessary. A copy of the DPOM shall be kept in a location readily accessible to the trained personnel responsible for the depuration activity. The minimum requirements for a Depuration Plant Operations Manual shall address:

(1) Introduction including:

(a) Status of document (to create, revise, or update DPOM);

(b) Ownership and principal(s) involved with operation of facility;

(c) Address and phone number of owners and principles; and

(d) Summary of proposed use of the depuration facility including statement of objectives of the operation of the plant, species to be processed, proposed periods of facility operation, proposed sources of shellfish, including potential harvest areas, and maximum capacity of plant.

(2) Description of the facility including:

(a) Site plan drawings;

(b) Facility layout including detailed schematic of the entire depuration system;

(c) Schematic drawing of process;

(d) Product flow diagram showing product movement through facility (may be combined with Section 01 B. (3);

(e) Statement that construction materials and fabrication will meet the requirements of Section 03 E. (1) and (2); and

(f) Schematic of seawater delivery and distribution system.

(3) Design specifications of depuration unit including:

(a) Depuration tank diagram including tank dimensions and construction details, influent and effluent locations, operating water level, and typical container configuration;

(b) Process water system describing type of system (flow-through or recirculating), pretreatment and filtration systems, disinfection system, and hydraulic schematic;
(c) Shellfish containers construction and material meets Section .04 and Section .08 of this Chapter; and
(d) List of equipment including washing, culling, and packing equipment, material handling equipment, and cleaning and sanitation equipment.

(4) Laboratory to be utilized for microbial analyses (in house, government agency, private commercial);

(5) Depuration process monitoring including:
(a) Sampling protocols including frequency of sampling, number of samples, sampling locations, and methodology for process water analyzing, incoming shellstock, depurated shellstock, and growing waters;
(b) Monitoring equipment maintenance and calibration procedures and copy of activity log forms that will be used for data entry;
(c) Process water monitoring protocol for physical and chemical parameters; and
(d) Data analysis and evaluation.

(6) Standard Operating Procedure for:
(a) Receiving and holding;
(b) Washing, culling, and placement of non-depurated product in process tanks;
(c) Depuration unit operation;
(d) Monitoring of depuration unit operation;
(e) Removal of depurated product from process tanks;
(f) Storage parameters and procedures;
(g) Labeling/tagging procedures;
(h) Plant cleaning and sanitation; and
(i) Data analysis.
(j) Recall procedures.

(7) Record keeping including a list of categories of information that will be recorded and copies of proposed forms to be used in each category. A single form may be used for several categories if properly designed:
(a) Shipping and receiving records;
(b) Plant Operation Log, including provisions for recording the values for chemical and physical parameters;
(c) Maintenance and Sanitation Log(s); and
(d) Laboratory records.

J. Process Verification.

The Dealer shall continually:

(1) Perform process verification on a continuous basis (i.e., routine verification) according to the following protocol:
(a) Following completion of a minimum of forty-four (44) hours of depuration, collect and assay at least one (1) end-product sample:
(i) From each lot of restricted shellstock to be depurated in the depuration unit; or
(ii) Weekly from each lot of approved shellfish to be depurated in the depuration unit.
(b) Determine daily, or as results become available, the depuration performance indices defined as the geometric mean and 90^{th} percentile of fecal coliform (FC) from assay data of the most recent ten (10) consecutive harvest lots for each species depurated and for each harvest area used.
(c) Compare daily, or as results become available, the depuration performance indices with the Critical Limits for the Indices of Depuration Plant Performance in the table

below.

Limits for Verification of Depuration Plant Performance
Fecal Coliform per 100 grams

Species	Geometric Mean	90th Percentile
Soft Clams (*Mya arenaria*)	50	130
Hard Clams (*Mercenaria mercenaria*)	20	70
Oysters	20	70
Manila Clams	20	70
Mussels	20	70

(d) If the depuration performance indices for a specific species from a specific growing area are less than or equal to the above Critical Limits for the Indices of Depuration Plant Performance, then the process is considered verified for that species from that growing area.

(e) For the purpose of making calculations, FC counts that signify the upper or lower limit of sensitivity of the test (MPN or elevated temperature coliform plates [ETCP]) shall be increased or decreased by one (1) significant figure. Thus, <9.0 becomes 8.9, <17 becomes 16 and >248 becomes 250. Individual plates which are too numerous to count (TNTC) are considered to have >100 colonies per plate. A sample containing TNTC plates is collectively rendered as having a count of 10,000.

(2) Conditional Protocol Verification. If the depuration performance indices for a specific growing area fail to meet the Critical Limits for the Indices of Depuration Plant Performance, or if a new restricted growing area is used as a source of shellfish for depuration, or if a new depuration process has generated less than ten (10) process batches of data, the process is considered to be unverified and the dealer shall adhere to the following conditional protocols:

(a) The depuration processor shall collect and assay at least one (1) zero hour and three (3) end-product samples from each harvest lot;

(b) Environmental parameters including process water temperature, salinity, dissolved oxygen, and turbidity and/or other operational conditions may inhibit the physiological process and must be identified. The condition(s), once identified and quantified, become CCPs for specific species in the specific plant and the hazard analysis and HACCP plan shall be revised accordingly;

(c) Shellstock which are processed during this conditional protocol must meet the following release criteria before they may be released to market:

(i) Geometric mean (from three (3) samples) of soft clams not to exceed 110 and no single sample to exceed 170; or

(ii) Geometric mean (from three (3) samples) of other clam species, mussels, or oysters not to exceed forty-five (45) and no single sample to exceed 100.

(d) If the harvest lot fails to meet the release criteria, the depuration processor may choose to subject the product to additional depuration processing whereupon the shellfish can be resampled for release criteria or the disposition of the shellfish shall be as follows:

(i) The Authority, in consultation with the depuration processor, may order the destruction of the shellfish; or

(ii) The Authority, in consultation with the depuration processor, may allow non-food use of the shellfish; or

(iii) The Authority, in consultation with the depuration processor, may allow the shellfish to be relayed in accordance with Chapter V.

(e) When in Conditional Protocol Verification due to a failure of an established harvest area to meet the above Indices for Depuration Plant Performance, determine daily, or as results become available, the depuration performance indices defined as the geometric mean and 90th percentile of FC from assay data of the most recent ten (10) consecutive end product samples for each species depurated and for each harvest area used

(i) Compare these depuration performance indices with the above Critical Limits for the Indices of Depuration Plant Performance for this species.

(ii) If these depuration performance indices are less than or equal to the above Critical Limits for the Indices of Depuration Plant Performance for this species, the process is then considered to be verified for this species from this particular harvest area; and the process reverts to the Process Verification protocol in Section XV.03.J.(1).

(iii) If either the geometric mean or the 90th percentile values exceed the above Critical Limits for the Indices of Depuration Plant Performance for this species, the process shall remain in Conditional Protocol Verification for this species from this particular harvest area until the above Indices of Depuration Plant Performance are attained.

(f) When in Conditional Protocol Verification due to the use of a new harvest area as the source of shellfish or if a new depuration process has generated less than ten (10) process batches of data, determine daily, or as results become available, the depuration performance indices defined as the geometric mean and 90th percentile of FC from assay data of the most recent ten (10) consecutive harvest lots for each species depurated and for each harvest area used.

(i) Compare these depuration performance indices with the above Critical Limits for the Indices of Depuration Plant Performance for this species.

(ii) If these depuration performance indices are less than or equal to the above Critical Limits for the Indices of Depuration Plant Performance for this species, the process is then considered to be verified for this species from this particular harvest area; and the process reverts to the Process Verification protocol in Section XV.03.J.(1).

(iii) If less than ten (10) process batches of data have been collected or either the geometric mean or the 90th percentile values exceed the above Critical Limits for the Indices of Depuration Plant Performance for this species, from this particular harvest area, the process shall remain in Conditional Protocol Verification for this species from this particular harvest area until ten (10) batches of data have been collected and the above Indices of Depuration Plant Performance are attained.

(3) When depuration units with multiple tanks are used, it is necessary to determine whether the individual tanks are similar.

(a) Tanks are considered similar if the difference between physical tank dimensions and process water flow rate is less than 10%.

(b) If they are not similar, then the process verification protocols contained in Section .03 J. (1) - (2) must be employed for each tank.

(4) The dealer shall ensure that all microbiological assays of end-point samples of shellstock:

(a) Are analyzed by a laboratory which has been evaluated and found to conform to the NSSP pursuant to the requirements in Chapter III, using an NSSP-Approved Method;

(b) Sample size consists of a pool of at least twelve (12) shellfish selected at random from

each designated container (more than twelve (12) individuals may be required in the case of smaller shellfish); and

(c) Samples are collected at locations within the depuration unit that are considered to be most compromised as regards shellfish activity, based on the sampling plan contained in the Depuration Plant Operations Manual.

Chapter XVI. Processes and Procedures for Pathogen Reduction

.01 Processes and Procedures Involving Labeling Claims

A. If a dealer elects to use a process to reduce the level(s) of one (1) target pathogen or some target pathogens, or all pathogens of public health concern in shellfish, and wishes to make labeling claims regarding the reduction of pathogens, the dealer shall:

(1) Have a HACCP plan approved by the Authority for the process that ensures that the target pathogen(s) are at safe levels for the at risk population in product that has been subjected to the process. The HACCP Plan shall include:

(a) Process controls to ensure that the end point criteria are met for every lot; and

(b) A sampling program to periodically verify that the end point criteria are met.

(c) Analytical results used for validation and verification of a PHP shall come from an analytical laboratory that is evaluated by the State and/or FDA and found to be in compliance with applicable NSSP laboratory requirements.

Additional Guidance: Section IV Guidance Documents Chapter II. Section .11

(2) Validate the process by demonstrating that the process will reliably achieve the appropriate reduction in the target pathogen(s). The process shall be validated by a study as outlined in Guidance Documents Chapter IV., Naturally Occurring Pathogens, Section .02 and be approved by the Authority, with concurrence of FDA.

(a) The dealer must demonstrate that the process reduces the level of *V.v.* and/or *V.p.* in the process to non-detectable (<30 MPN/g) and the process achieves a minimum 3.52 log reduction. Determination of *V.v.* and/or *V.p.* levels must be done using the MPN protocols described in Guidance Documents, Chapter IV., Naturally Occurring Pathogens, Section .02 followed by confirmation using methods approved for use in the NSSP.

(b) For processes that target other pathogens the dealer must demonstrate that the level of those pathogens in processed product has been reduced to levels below the appropriate FDA action level, or, in the absence of such a level, below the appropriate level as determined by the ISSC.

(3) Conduct verification sampling to verify that the validated process is working properly. Verification sampling shall be at least equivalent to the verification protocol found in Guidance Documents, Chapter IV., Naturally Occurring Pathogens, Section .02 as determined by the Authority and shall be reviewed annually by the Authority.

(4) Package and label all shellfish in accordance with all requirements of this Ordinance. This includes labeling all shellfish which have been subject to the process but which are not frozen in accordance with applicable shellfish tagging and labeling requirements in Chapter X. .05 and X. .06.

(5) Keep records in accordance with Chapter X. .08.

B. A dealer who meets the requirements of this section may label product that has been subjected to the reduction process as:

(1) "Processed for added safety", if the process reduces the levels of all pathogens of public health concern to safe levels for the at risk population;

(2) "Processed to reduce [name of target pathogen(s)] to non-detectable levels," if the process reduces one (1) or more, but not all, pathogens of public health concern to safe levels for the at risk population, and if that level is non-detectable; or

(3) "Processed to reduce [name of target pathogen(s)] to non-detectable levels for added

safety," if the process reduces one (1) or more, but not all, pathogens of public health concern to safe levels for the at risk population, and if that level is non-detectable; or
(4) A term that describes the type of process applied (e.g., "pasteurized," "individually quick frozen," "pressure treated") may be substituted for the word "processed" in the options contained in B. (1) - (3).

Additional Guidance: Section IV. Guidance Documents Chapter III. Section .07

C. For the purpose of product temperature the receiving and storage critical control points of Chapter XI., shall apply to shellstock prior to PHP processing. Following PHP processing, if the product is dead, the product shall be treated as in-shell or shucked product. If the product is live, the product shall be treated as shellstock.

.02 Processes and Procedures Not Involving Labeling Claims

D. If a dealer elects to use PHP to reduce the levels of a naturally occurring pathogen(s) of public health concern in shellfish, the dealer shall:
   1. Have a HACCP plan (approved by the Authority) for the control(s) that reduces the target pathogen(s).
      a. The dealer must validate that the PHP reduces naturally occurring pathogen(s). The validation study must be approved by the Authority with FDA concurrence.
      b. The ability of the PHP to reliably achieve the appropriate reduction in the target pathogen(s) shall be verified at a frequency determined by the Authority.
   2. Package and label all shellfish in accordance with the requirements of this Ordinance.
   3. Keep records in accordance with Chapter X. 08.

Chapter XVII Shellfish Gardening

@ .01 Shellfish Gardening

If a State recognizes shellfish gardening the Authority:

A. Shall permit or register shellfish gardening activities;
B. Shall establish permit or registration conditions and determine classification of waters where shellfish gardening can take place prior to its implementation;
C. Shall provide information to the shellfish gardener on the risk of consuming shellfish from private docks, piers, and shellfish floats attached to piers or docks and from waters not classified and open to harvest for direct consumption; and
D. May require that the shellfish gardener maintain records on the disposition of the shellfish product and provide these records to the Authority.

.01 Requirements for the Shellfish Gardener

A. Shellfish gardening shall be practiced only in strict compliance with the provisions of the permit issued by the Authority for the oyster/shellfish gardening activity.
B. Shellfish gardeners shall document that they understand the risks associated with consumption for shellfish grown from docks or private piers.
C. If required by the Authority, shellfish gardeners shall keep accurate records on the fate or final destination of all shellfish grown at their shellfish garden site and provide these records to the Authority upon request.

Section III. Public Health Reasons and Explanations

Introduction

Oysters, clams, and mussels are unique foods that have been enjoyed by consumers for many years. The popularity of shellfish as a food can be traced through several centuries of American history. The value of these renewable natural resources to the early settlers was reflected in colonial legislation designed to encourage their wise use.

Public health controls of shellfish became a national concern in the U.S. in the late 19th and early 20th century when public health authorities noted a large number of illnesses associated with consuming raw oysters, clams, and mussels. During the winter of 1924, there occurred a widespread typhoid fever outbreak, which resulted in a request that the Surgeon General of the United States Public Health Service develop necessary control measures to ensure a safe shellfish supply to the consuming public. In accordance with this request, the Surgeon General called a conference, which was held in Washington, D.C., on February 19, 1925.

The members of the conference recommended eight (8) resolutions for the sanitary control of the oyster industry, which formed the basis for development of the NSSP. The conference also established a committee to develop further necessary guidelines to recommend practices for the sanitary control of the shellfish industry.

The basic concepts in formulating a program of national public health controls were reiterated by the Surgeon General in his letter of August 12, 1925, to State health officers and all others concerned. This letter set forth the following understandings:

1. "The Public Health Service considers that the responsibility for the sanitary control of the shellfish industry rests chiefly upon the individual States; and that the requisite coordination and uniformity of control may best be achieved by mutual agreement among the States, with the assistance and cooperation of the Public Health Service..."
2. "In accordance with this principle, it is considered that each producing State is directly responsible for the effective regulation of all production and handling of shellfish within its confines, not merely for the protection of its own citizens, but equally for safeguarding such of its product as goes to other States..."
3. "In order that each State may have full information concerning the measures carried out in other States, the Public Health Service will undertake systematic surveys of the machinery and efficiency of sanitary control as actually established in each producing State, and will report thereon for the information of the authorities of other States. It is believed that, in addition to furnishing valuable information, these reports will have an important influence in stimulating the development of better sanitary control and in promoting substantial uniformity on a higher plane." "The officers of the Public Health Service assigned to this survey work will assist the State agencies in determining their sanitary problems, in formulating plans for adequate sanitary control, and in making actual sanitary surveys as far as practicable."
4. "In addition to the above, the Public Health Service will continue to extend the services which it is already rendering, especially in conducting scientific investigations of fundamental importance to control, and in serving as a clearinghouse for the interchange of information and the discussion of policies between State authorities."

To implement this program, the members of the 1925 conference agreed that the producing States would issue "Certificates," i.e., a permit to operate, to shellfish shippers that met agreed upon sanitary standards.

The Public Health Service would serve as a clearinghouse for information on the effectiveness of the State control programs.

The procedures used by the Public Health Service in fulfillment of its obligations under the Public Health Service Act resulted from an understanding that implementation and enforcement of the necessary public health controls could best be accomplished under State laws with Federal technical support and industry participation. The NSSP is dependent entirely upon the States adopting the recommended requirements and the cooperative and voluntary efforts of State regulatory agencies and the shellfish industry.

The NSSP went beyond the original objective set forth in the 1925 Conference of insuring that shellfish shipped interstate would not be the cause of communicable disease. In the 1940's paralytic shellfish poison became a matter of public health concern and steps were taken to protect the public against this hazard. In 1957 it was recognized that shellfish might concentrate certain radionuclides and that a radiation surveillance activity might become a necessary addition to the established procedures. In the 1960's and 1970's it became apparent that shellfish have the ability to concentrate poisonous and deleterious substances such as metals, pesticides, hydrocarbons, etc. to potentially unsafe levels. To ensure the safety of shellfish, the State must supervise the growing, harvesting, relaying and transportation of shellfish. It is also important that shellfish be protected against contamination.

If State supervision is to be effective, the activity must be supported by legal authority. This authority may be either a specific law or a regulation. The success with which the State is able to regulate the several components of the shellfish industry provides a measure of the adequacy of the statutory authority. The unique nature of shellfish as a food consumed whole and raw also makes it necessary for the State shellfish control agency to have authority to take immediate emergency action, without recourse to lengthy administrative procedures, to halt harvesting and processing of shellfish. This authority should include placing restrictions on harvesting on the basis of a potential as well as an actual public health hazard. As examples, a State may find it necessary to close a shellfish growing area following a breakdown of a WWSD or the unexpected finding of marine toxin(s), or when a growing area is implicated in confirmed illnesses.

Periodic revisions of State shellfish laws or regulations may be necessary to cope with new public health hazards and to reflect new knowledge. Examples of changes or developments which have called for revision of State laws include: (1) the increased use of pleasure boats with the resulting probability of contamination of shellfish growing areas with fresh untreated fecal material, (2) the conditionally approved area concept resulting from the construction of wastewater treatment facilities, (3) the effect of non-point source pollution, and (4) the ability of shellfish to concentrate certain radionuclides and hazardous chemicals. Experience has demonstrated that all actual and potential shellfish growing waters of the State must be classified by their sanitary suitability for shellfish harvesting. Harvesting should be permitted only from those areas that have been found by sanitary survey to meet the criteria of this Model Ordinance. Harvesting should be specifically prohibited from areas which do not meet the criteria, or which have not been surveyed, or which have outdated survey information.

The NSSP is the Federal/State cooperative program recognized by the FDA and the Interstate Shellfish Sanitation Conference (ISSC) for the sanitary control of shellfish produced and sold for human consumption. The purpose of the NSSP is to promote and improve the sanitation of shellfish (oysters, clams, mussels and scallops in any form, except when the final product form is the adductor muscle only) moving in interstate commerce through Federal/State cooperation and uniformity of State shellfish programs. Participants in the NSSP include agencies from shellfish producing States, FDA, and the shellfish industry. Under international agreements with FDA, foreign governments also participate in the

NSSP. Other components of the NSSP include program guidelines, State growing area classification and dealer certification programs, and FDA evaluation of State program elements.

In 1984, the FDA entered into a Memorandum of Understanding (MOU) with the ISSC recognizing the ISSC as the primary voluntary national organization of State shellfish regulatory officials that provides guidance and counsel on matters for the sanitary control of shellfish. The purpose of the ISSC is to provide a formal structure for State regulatory authorities to participate in establishing updated regulatory guidelines and procedures for uniform State application of the Program. The ISSC has adopted formal procedures for State representatives to review shellfish sanction issues and develop regulatory guidelines. Following FDA concurrence, these guidelines are published in revision of the NSSP Model Ordinance.

The NSSP Guide for the Control of Molluscan Shellfish consists of a Model Ordinance, supporting guidance documents, recommended forms, and other related materials associated with the Program. The Model Ordinance includes guidelines to ensure that the shellfish produced in States in compliance with the guidelines are safe and sanitary. The Model Ordinance provides readily adoptable standards and administrative practices necessary for the sanitary control of molluscan shellfish.

Chapter I. Shellfish Sanitation Program

Requirements for the Authority

@.01 Administration

A. Scope.

Because shellfish can be contaminated either in the growing area before harvest or during activities involved in harvesting, processing, distribution, or shipping, State laws or regulations must provide an adequate legal basis for sanitary control of all of these phases of handling shellfish. This legal authority must enable one (1) or more departments or agencies of the State to regulate and supervise the classification of growing areas, harvest, relaying and transport of shellstock at its source; the shipment, tagging and storage of shellstock; the operation of depuration plants; and the shucking, packing, labeling and repacking of shellfish. The State must be able to apply the NSSP requirements to every actual and potential growing area and to all shellfish harvesters to ensure that shellfish available to certified dealers have been produced and harvested under acceptable sanitary conditions. The State must also have the authority to certify and suspend or revoke the certification of interstate shellfish shippers; to conduct laboratory examinations of shellfish; to prevent the sale of unsafe shellfish or shellfish from uncertified dealers by such legal means as detention, monetary fines, seizure, embargo and destruction; and to suspend harvesting and certificates of interstate shippers in public health emergencies.

B. Records.

States must maintain data and files that will provide evidence and demonstrate the effective administrative management of the shellfish sanitary control program as part of their participation in the NSSP. States must keep records in a central file to facilitate the FDA review of their shellfish sanitation programs and must assist the FDA in making such reviews. The purpose of this FDA review is to evaluate the adequacy of each State program in meeting the requirements of the NSSP Model Ordinance. The maintenance of proper records, organized files and adoption of accepted public administrative procedures provides the State control agencies with the means to conduct an effective program. The State program should have clearly written administrative procedures to affect the controls specified in the NSSP Model Ordinance.

C. Shared Responsibilities.

When two (2) or more State agencies are involved in the sanitary control of the shellfish industry, a clear statement of each agency's responsibilities should be developed in the form of a memorandum of understanding. This administrative practice eliminates misunderstandings concerning agency responsibility and ensures that all aspects of shared program responsibility are addressed.

D. Administrative Procedures.

If State supervision is to be effective, the activity must be supported by legal authority applied through law, regulation or appropriate administrative procedures. Periodic revisions of State shellfish laws, regulations or administrative procedures may be necessary to cope with new public health hazards and to

reflect new knowledge. The success with which the State is able to regulate the several components of the shellfish industry provides a measure of the adequacy of the statutory authority.

E. Epidemiologically Implicated Outbreaks of Shellfish-Related Illness.

The intrinsic risk associated with consumption of raw or partially cooked shellfish products compels the shellfish control authority to act quickly and effectively when shellfish are implicated in a food-borne outbreak. Development of administrative procedures in advance of outbreaks supports quick effective action and avoids costly mistakes and inadvertent destruction of evidence through delay.

F. Commingling.

Commingling means the act of combining different lots of shellstock or shellfish from different days in the same growing area, or combining different lots of shellstock from different growing areas. Health departments and other appropriate State and Federal agencies must be able to determine the source of shellfish contamination when an outbreak of disease attributable to shellfish occurs so they can prevent any further illnesses from this source. Separating shellfish from different sources is necessary to maintain lot identity during harvest, transport, storage, shucking, and repacking operations. This lot separation assists in tracing shellfish back to its source when questions of public health safety arise. Maintaining lot identity will prevent implication of sources that are not associated with the outbreak and can prevent unnecessary regulatory action and liability. When commingling is allowed under any State management plan, the objective is to minimize the commingling of different dates of harvest and different growing areas. For additional information concerning commingling, see the NSSP Model Ordinance Guidance Document: *Shellstock Tagging* (ISSC/FDA, 2017).

@.02 Dealer Certification

A. - D. General, Initial Certification, Renewal of Certification, and Revocation or Suspension of Certification.

A principal objective of the NSSP has been to provide a mechanism for health officials and consumers to receive information as to whether lots of shellfish shipped in interstate commerce meet acceptable and agreed upon sanitation and quality criteria. This NSSP objective is achieved through establishment of criteria and procedures to allow a producing or processing State to "certify" to receiving States that the product from a specific dealer has been grown, harvested, transported, processed, or shipped in compliance with the NSSP Model Ordinance guidelines. Dealer certification is dependent on a dealer maintaining acceptable operational and sanitary conditions and is determined through uniform inspections by standardized inspectors. For more information concerning standardized inspections, see the NSSP Model Ordinance Guidance Document: *Shellfish Plant Inspection Standardization Procedures* (ISSC/FDA, 2017).

State officials who certify dealers must fully comply with the administrative requirements for certification for the process to remain viable. For the certification process to be effective, dealers must fully comply with the applicable Model Ordinance sanitation guidelines pertaining to the type of operation involved. For a full discussion of the certification process, see the NSSP Model Ordinance Guidance Document: *Dealer Certification and the Interstate Certified Shellfish Shippers List (ICSSL)* (ISSC/FDA, 2017).

E. Interstate Certified Shellfish Shippers List (ICSSL).

Placement of a dealer on the ICSSL serves as nationwide notification to receiving States and the shellfish industry of dealer certification. Food control officials throughout the United States use the ICSSL to determine that shellfish offered for sale at the wholesale or retail level have been produced under the sanitary guidelines of the NSSP Model Ordinance. These officials generally rely upon the certification process instead of holding up shipments or sales of shellfish lots pending examination. The ICSSL is also used by the seafood and other food industries to find sources of safe shellfish. For a full discussion of the ICSSL purpose and use, see the NSSP Model Ordinance Guidance Documents: *Dealer Certification and the Interstate Certified Shellfish Shippers List (ICSSL)* (ISSC/FDA, 2017).

F. Inspections.

Through inspections by both the shellfish control agency and the dealer, as part of the dealer's HACCP plan, unsanitary conditions may be detected and corrected. Unannounced shellfish control agency inspections serve to verify that NSSP Model Ordinance guidelines are being met by the dealer. For additional information concerning inspections, see the NSSP Model Ordinance Guidance Documents: *Shellfish Plant Inspection Standardization Procedures* (ISSC/FDA, 2017).

G. Performance Based Inspection Program (PIP).

Performance based inspections for dealers with a significant history of satisfactory compliance result in improved regulatory efficiency. Regulatory inspections can be concentrated on more high-risk shellfish operations or operations with poor performance histories. Dealers recognized as having a record of excellent performance may be rewarded with the privilege of a reduced number of inspections.

H. Enforcement.

The unique nature of shellfish as a food consumed whole and raw in the form as it comes from the growing area requires the Authority to have sufficient growing area patrol capacity to enforce the public health based restrictions on harvesting and to obtain meaningful penalties for violation of those harvesting restrictions. Information concerning enforcement activities at the growing area level can be found in the NSSP Model Ordinance, Chapter V. @.04 and Chapter VIII. @.01 B. *Patrol of Growing Areas* (ISSC/FDA, 2017) and in Guidance Documents: *Growing Area Patrol and Enforcement* and *Shellstock Relay* (ISSC/FDA, 2017). Dealer certification is intended to provide an unbroken chain of sanitation control to a lot of shellfish from the moment of harvest to its sale at the wholesale or retail level. Dealers having major nonconformities with the NSSP Model Ordinance should not be certified. Certified dealers found to have major nonconformities should have their licenses or permits suspended or certifications revoked. Information concerning enforcement activities at the dealer certification level can be found in the NSSP Model Ordinance Guidance Documents: *Dealer Certification and the Interstate Certified Shellfish Shippers List (ICSSL)* (ISSC/FDA, 2017).

Chapter II. Risk Assessment and Risk Management

Requirements for the Authority

@.01 Outbreaks of Shellfish-Related Illness

Shellfish are filter feeders and therefore have the ability to concentrate microorganisms, including human pathogens and toxigenic micro-algae, from the water column if these organisms are present in the growing area. Concentrations in the shellfish may be as much as 100 times that found in the water column. If the microorganisms concentrated are harmful to humans, and if, in the case of human pathogens, the shellfish are consumed raw or partially cooked, human disease can result.

When illness has occurred, immediate closure of the implicated growing area and/or recall of implicated product will significantly reduce the chance of additional illnesses. Additional information concerning investigation of an outbreak of shellfish related illness believed to be associated with a naturally occurring pathogen can be found in the NSSP Model Ordinance Guidance Documents: *Guidance for a Time-Temperature Evaluation of a Shellfish Implicated Outbreak* (ISSC/FDA, 2017). Additional information concerning the disease causing potential of shellfish can be found in the NSSP Model Ordinance Guidance Documents: *Sanitary Survey and the Classification of Growing Waters, Guidance for Developing Marine Biotoxin Contingency Plans*, and *Shellstock Relay* (ISSC/FDA, 2017).

Documentation of the information supporting growing area classification, proper tagging and record keeping, expeditious follow-up on reported illnesses, effective recall of implicated product and public warning announcements are all requisite to protecting public health. Shellfish growing areas implicated through epidemiological association between illness and shellfish consumption must be closed immediately to prevent additional implicated product from reaching the consumer. Broad closures of Growing Areas, in addition to reducing the chance of additional illnesses, will: improve identification of specific sites where harvesting is taking place; reduce the size of areas available to harvest; reduce the practice of mixing together shellstock from different growing areas; and reduce illegal harvesting because legitimate harvesters will self-police their ranks to prevent false tagging. In addition, shellfish product from the implicated growing areas should be detained and an effective recall of product initiated.

When the source of the illness is found to be the distribution and processing system, shellfish product should be also detained and an effective recall of product initiated, and the problem immediately corrected.

@.02 Shellfish Related Illnesses Associated with *Vibrio parahaemolyticus (V.p.)*

@.03 Annual Assessment of *Vibrio vulnificus* and *Vibrio parahaemolyticus* Illnesses and Shellfish Production

@.04 Presence of Human Pathogens in Shellfish Meats

Human pathogens have been found in shellfish in the absence of human illness. These pathogens can be present at levels below that of an infectious dose, and may originate either as naturally occurring organisms in the growing area or from contamination of the growing area or of the shellfish during its handling, storage, transport or processing. Continued finding of the presence of human pathogens in shellfish from a specific growing area with no evidence of illness in the consumers may or may not constitute a human health risk. In these circumstances, the shellfish control authority needs to act quickly to initiate a thorough investigation to determine if the pathogen source is either the growing area or the system used for distributing and processing the product. If the source can be determined, the authority needs to take immediate steps to correct the problem through appropriate actions such as eliminating the source, reclassifying the growing area or changing a distribution or processing procedure.

When the source of the organism cannot be identified or if the organism is naturally occurring, the authority should conduct a risk assessment using all available information to determine if the human consumer is at risk. When the risk is determined to be negligible, no further action is required. A determination that some risk exists may prompt further action to protect the consumer such as allowing the shellfish to be harvested with an advisory to immunologically compromised individuals, allowing shellfish to be used only for cooked product, or closing the growing area.

@.05 Presence of Toxic Substances in Shellfish Meats

Because shellfish are filter feeders, they can readily accumulate toxigenic micro-algae and other substances from the water column. These substances include heavy metals, chlorinated hydrocarbons and other poisonous or deleterious substances. The presence of these substances does not necessarily constitute a health risk, as toxicity is dependent on both concentration (dose) and length of exposure.

To protect the consumer, the shellfish control authority needs to evaluate the levels of toxic substances that may be present in the shellfish against known tolerance levels in human foods or other appropriate information, and determine what action, if any, should be taken. Additional information concerning this topic can be found in the NSSP Model Ordinance Guidance Documents: *Action Levels, Tolerances and Guidance Levels for Poisonous or Deleterious Substances in Seafood* (ISSC/FDA, 2017); and *Guidance for Developing Marine Biotoxin Contingency Plans* (ISSC/FDA, 2017) .@.06 *Vibrio vulnificus* Control Plan.

@.06 Vibrio vulnificus Control Plan

@.07 Vibrio parahaemolyticus Control Plan

Chapter III. Laboratory

Requirements for the Authority

@.01 Quality Assurance

Laboratory results from the bacteriological and chemical testing of shellfish growing waters and meats are widely used in the NSSP to determine the safety of shellfish for human consumption. Experience with the bacteriological and toxicological examination of shellfish and shellstock growing waters has indicated that minor differences in laboratory procedures or techniques might cause wide variations in the results. Improper handling of the sample may also cause variations in results during collection or transportation to the laboratory. The American Public Health Association (APHA) *Recommended Procedures for the Examination of Seawater and Shellfish*, which are revised periodically, offer reliable information for minimizing these variations. Assuring uniformity nationwide in the application of a laboratory quality assurance program is necessary to substantiate the validity of analytical results. Integral to laboratory quality assurance is a strong program for the evaluation of laboratory performance.

@.02 Methods

APHA *Recommended Procedures for the Examination of Seawater and Shellfish* shall be followed for the collection, transportation, and examination of samples of shellfish and shellfish waters. The official reference of the NSSP for the examination of shellfish for *Vibrio cholerae, V. vulnificus, and V. parahaemolyticus* is Section IV. Guidance Documents Chapter II. Growing Areas .14 Approved NSSP Laboratory Tests. State laboratories should conduct the test for these organisms when routine tests of marine foods implicated in foodborne outbreaks fail to demonstrate other enteric pathogens or bacterial toxins.

Use of standardized laboratory methods and procedures produces results acceptable to all regulatory agencies and allows comparative evaluation of data across laboratories. The APHA reference and FDA's BAM contain procedures for the virological examination of seawater and shellfish. However, the use of these procedures should be limited to special studies such as the development of new approaches for assessing, controlling, or improving shellfish sanitary quality, investigation of shellfish-borne disease outbreaks and other research studies. Routine virus monitoring of shellfish or their waters is not recommended due to the technical complexity, time required, high cost, and limitations of the detection and recovery method. For methods used in the NSSP, see the NSSP Model Ordinance Guidance Document: *Approved NSSP Laboratory Tests* (ISSC/FDA, 2017).

Chapter IV. Shellstock Growing Areas

Requirements for the Authority

@.01 Sanitary Survey

A. General.

One of the goals of the NSSP is to control the safety of shellfish for human consumption by preventing its harvest from contaminated growing areas. The positive relationship between sewage pollution of shellfish growing areas and disease has been demonstrated many times. Shellfish-borne infectious diseases are generally transmitted via a fecal-oral route. The pathway can become quite circuitous. The cycle usually begins with fecal contamination of the growing waters. Feces deposited on land surfaces can release pathogens into surface waters via runoff. Most freshwater streams eventually empty into an estuary where fecal bacteria and viruses may accumulate in sediment and subsequently can be re-suspended.

Shellfish pump large quantities of water through their bodies during the normal feeding process. During this process the shellfish also concentrate microorganisms, which may include pathogenic microorganisms. Epidemiological investigations of shellfish-caused disease outbreaks have found difficulty in establishing a direct numerical correlation between the bacteriological quality of water and the degree of hazard to health. Investigations made from 1914 to 1925 by the States and the Public Health Service, a period when disease outbreaks attributable to shellfish were more prevalent, indicated that typhoid fever or other enteric diseases would not ordinarily be attributed to shellfish harvested from water in which not more than fifty (50) percent of the one (1) cc portions of water examined were positive for coliforms (an MPN of approximately seventy [70] per 100 ml), provided the areas were not subject to direct contamination with small amounts of fresh sewage which would not be revealed by bacteriological examination.

Following the oyster-borne typhoid outbreaks during the winter of 1924-25 in the United States, the NSSP was initiated by the States, the Public Health Service, and the shellfish industry. Water quality criteria were then stated as: (1) the area is sufficiently removed from major sources of pollution so that the shellfish would not be subjected to fecal contamination in quantities which might be dangerous to the public health, (2) the area is free from pollution by even small quantities of fresh sewage, and (3) bacteriological examination does not ordinarily show the presence of the coli- aerogenes group of bacteria in one (1) cc dilution of the growing area water. Once the standards were adopted in the United States in 1925, reliance on this three-part standard for evaluating the safety of shellfish harvesting areas has generally proven effective in preventing major outbreaks of disease transmitted by the fecal-oral route. Similar water quality criteria have been used in other countries with favorable results.

Nevertheless, some indicators and pathogens are capable of persisting in terrestrial soil, fresh and marine waters, and aquatic sediment for many days while others are even capable of growth external to a host. A small number of shellfish-borne illnesses have also been associated with bacteria of the genus Vibrio. The *Vibrio spp.* are free-living aquatic microorganisms, generally inhabiting marine and estuarine waters. Among the marine *Vibrio spp.* classified as pathogenic are strains of non-01 *Vibrio cholerae*, *V. parahaemolyticus*, and *V. vulnificus*. All three (3) species have been recovered from coastal waters in the United States and other parts of the world. These and other *Vibrio spp.* have been detected in some

environmental samples recovered from areas free of overt sewage contamination and coliform.

In general, shellfish-borne Vibrio infections have tended to occur in coastal areas in the summer and fall when the water was warmer and *Vibrio* spp. counts were higher. *V. parahaemolyticus* and non-01 *V. cholerae* are commonly reported as causing diarrhea illness associated with the consumption of seafood including shellfish. In contrast, *V. vulnificus* has been related to two (2) distinct syndromes: wound infections, often with tissue necrosis and bacteremia, and primary septicemia characterized by fulminant illness in individuals with severe chronic illnesses such as liver disease, hemochromatosis, thalassemia major, alcoholism or malignancy. Increasing evidence shows that individuals with such chronic diseases are susceptible to septicemia and death from raw seafood, especially raw oysters. Shellfish-borne Vibrio infections can be prevented by cooking seafood thoroughly, keeping them from cross contamination after cooking, and eating them promptly or storing them at hot (60 °C or higher) or cold (4 °C or lower) temperatures. If oysters and other seafood are to be eaten raw, consumers are probably at lower risk to Vibrio infection during months when seawater is cold than when it is warm.

In addition to pathogenic microorganisms, poisonous or deleterious substances may enter shellfish growing areas via industrial or domestic waste discharges, seepage from waste disposal sites, agricultural land or geochemical reactions. The potential public health hazard posed by these substances must also be considered in assessing the safety of shellfish growing areas.

The primary responsibility of the Authority is to ensure the public health safety of the shellfish growing areas through compliance with the NSSP Model Ordinance. The Authority must perform a sanitary survey that collects and evaluates information concerning actual and potential pollution sources that may adversely affect the water quality in each growing area. Based on the sanitary survey information, the authority determines what use can be made of the shellstock from the growing area and assigns the growing area to one (1) of five (5) classifications. The survey information must be updated periodically to ensure that it remains current and must be readily accessible to both the Authority and the harvester. Experience has shown that the minimum sanitary survey components required in this chapter are necessary for a reliable sanitary survey. A more detailed explanation is provided in the NSSP Model Ordinance Guidance Documents: *Sanitary Survey and the Classification of Growing Waters* (ISSC/FDA, 2017).

B. Sanitary Survey Required.

The findings of the sanitary survey represent a comprehensive analysis of data from several sources used to determine the proper classification of a growing area. Therefore, the Authority is required to complete the survey before determining the classification of a growing area and the appropriate use of shellstock from the area. If no harvesting is to be permitted in a growing area, the sanitary survey is unnecessary.

C. Sanitary Survey Performance.

Since the sanitary survey must be kept current to routinely verify the classification of the growing area, specified frequencies for updating the various survey components are necessary. Lack of written documentation precludes accurate assessment on a routine basis, and requires that, to protect the public health, the growing area be placed in the prohibited classification or closed status of its classification. A more detailed explanation is provided in the NSSP Model Ordinance Guidance Documents: *Sanitary Survey and the Classification of Growing Waters* (ISSC/FDA, 2017).

D. Shoreline Survey Requirements.

The shoreline survey (also known as the pollution source survey) is the sanitary survey component in which the actual and potential pollution sources that may adversely affect the growing area are identified.

These sources may introduce infectious disease agents or poisonous and deleterious substances to the growing waters where they may be taken up and concentrated by shellfish. Detailed and accurate information concerning the pollution sources is necessary for a proper growing area classification. A more detailed explanation is provided in the NSSP Model Ordinance Guidance Documents: *Sanitary Survey and the Classification of Growing Waters* (ISSC/FDA, 2017).

The key to the accurate classification of shellfish growing areas is the sanitary survey. The principal components of a sanitary survey include: (1) an evaluation of the pollution sources that may affect the areas; (2) an evaluation of the meteorological factors; (3) a review of hydrographic factors that may affect distribution of pollutants throughout the area; and (4) an assessment of water quality.

A pollution source survey should be conducted of the shoreline area and watershed to locate direct discharges (e.g., municipal and industrial waste discharges, package treatment units, and malfunctioning septic tanks) and non-point sources of pollution (e.g., storm water runoff and agricultural and wildlife area runoff). Municipal and industrial wastewater treatment facilities should be evaluated in terms of design capacity versus actual loading, type and concentration of pollutants discharged, and the type and effectiveness of pollution control devices.

Following these evaluations, hydrographic and meteorological characteristics that may affect the distribution of pollutants to the area should be determined. Examples of these are tidal amplitude and type, water circulation patterns, depth, salinity, stratification characteristics, rainfall patterns and intensity, and prevailing winds.

Information from pollution source evaluations and hydrographic studies should be considered in developing an evaluation of the water quality in a growing area. The purpose of this evaluation is to develop specific information to assist in defining classification boundaries. In many instances, bacteriological and related salinity data can be used to develop information on hydrographic characteristics of the area.

In designing a water quality evaluation, the following should be considered. Most water samples should be collected from the surface, since pollution discharged into freshwater streams or brackish estuarine waters usually tends to remain near the surface or above the denser seawater. Sample collection should be timed to be representative of the major pollution impacts, since shellfish respond rapidly to an increase in the number of bacteria in their surrounding waters. A sanitary survey report is needed to integrate data from several sources into a comprehensive analysis to determine the proper classification for the area. This report should include a compilation of relevant data, a data analysis utilizing recognized statistical techniques, conclusions as to the appropriate classification of the area, and recommendations for necessary follow-up actions. The report may also consider relevant resource management, social, economic, or political factors that may influence the establishment of boundaries and open and closed periods for conditionally approved and restricted areas.

Maintaining the sanitary survey consists primarily of routinely evaluating major pollution sources, collecting water quality data from key stations under adverse conditions, and analyzing the data to assure that the sanitary survey continues to be representative of current sanitary conditions in the growing area.

The growing area must be subjected promptly to a more intense and comprehensive sanitary survey reevaluation when routine monitoring reveals a substantial change in the sanitary conditions. A reevaluation report is then needed and a determination must be made as to the proper classification of the area.

Experience with the shellfish certification program indicates a tendency to omit or de-emphasize some components of the sanitary survey unless a central State file of all shellfish sanitary survey reports, maintenance data and analysis, and reevaluation reports is maintained. This is particularly true where responsibility for shellfish sanitation is divided between two (2) or more State agencies. Maintenance of a central State file for all shellfish sanitary survey information will also simplify the appraisal of State programs by the FDA and will prevent loss of historical data which may be useful in evaluating the sanitary quality of an area.

@.02 Bacteriological Standards

A. General.

The NSSP recognizes the use of two (2) different indicator organisms for evaluating shellfish growing water quality. The water quality standards for the two (2) indicators are numerically different from one another but are believed to afford the same level of public health protection (Hunt and Springer, 1974). The Authority may use either indicator and its companion water quality standard in any growing area.

B. Water Sample Stations.

The location of water sample collection stations can markedly affect the water quality detected. The NSSP requires that stations be of sufficient number and located to capture the effect of pollution sources so that the water quality affecting the shellfish can be adequately evaluated.

C. Exceptions.

Application of the water quality standards under the NSSP is based on the collection of a specified minimum number of samples at a specified frequency over a three (3) year period. When a new growing area is under evaluation for classification, three (3) years of historic data may not exist. This section sets the minimum number of samples that must be collected as part of the required sanitary survey to determine the appropriate growing area classification for these new growing areas. The requirements are more stringent for growing areas that have pollution sources that affect water quality. No water quality samples are required to place a growing area in the prohibited classification.

D. - F. Standards for the Approved Classification of Growing Areas in the Remote Status, Affected by Point Sources, or Affected by Nonpoint Sources.

Based on the information gathered in the sanitary survey, the shellfish authority determines the appropriate classification of the shellfish growing area. The shellfish authority makes a decision to place a growing area in either the approved, conditionally approved, restricted, or conditionally restricted growing area classification. The growing area classification determines how the shellstock may be used following harvest. Water samples collected as part of the sanitary survey or as a required update of the sanitary survey are used to determine if the water quality meets the water quality standards for the growing area classification. The NSSP recognizes two (2) water quality-monitoring strategies: adverse

pollution condition and systematic random sampling. Presence of point sources of pollution requires the use of the adverse pollution condition sampling strategy to collect data for the application of the water quality standard. In growing areas not affected by point sources, the Authority may elect to use either system. The presence or absence of point sources of pollution and the water sample monitoring strategy used dictate the frequency of samples that must be collected. If the water quality meets approved classification water quality standards, the growing area is placed in the approved classification. If the water quality does not meet the water quality standards for the approved classification or meets the water quality standards only under certain conditions, the Authority places the area in another more suitable classification. For a fuller explanation of the classification of growing waters and the water quality monitoring strategies, see the NSSP Model Ordinance Guidance Documents: *Sanitary Survey and the Classification of Growing Waters, Systematic Random Sampling Monitoring Strategy,* and *Management Plans for Growing Areas in the Conditional Classification* (ISSC/FDA, 2017).

A field sampling and data analysis design that employs a systematic random sampling plan, assumes that a statistically representative cross section of all meteorological, hydrographic, and/or other pollution events will be included in the data set. Therefore, all shellfish growing area data collected shall be used during classification. This sampling and data analysis design may be applied to approved and restricted shellfish growing areas that are affected by only randomly occurring pollution events. Additionally, this sampling strategy may be used to classify shellfish growing areas where water quality is influenced by seasonal water uses or where harvesting is controlled by seasonal resource management restrictions.

Systematic random sampling cannot be applied to areas impacted by point source pollution. This field sampling and data analysis design presumes that if intermittent, unfavorable changes in water quality occur, they will be revealed in the bacteriological sampling results. These unfavorable sampling results will then contribute to the variation of the data set. Data sets displaying greater levels of variation will consequently exhibit an elevated estimated 90th percentile. The Authority's option to use a systematic random sampling strategy is therefore, contingent upon the acceptance of the estimated 90th percentile, as the statistic to measure the variance of a data set. This statistic shall, along with the geometric mean or median, be used when evaluating each sampling station for compliance with NSSP growing area criteria.

An example of an acceptable systematic sampling plan is one that documents a pre-established sampling schedule in the growing area central file. Monthly or bimonthly sampling regimes are acceptable as long as there is no avoidance of unfavorable conditions and a reasonable attempt is made to collect samples on the pre-established days. Field sampling crews will *not* be required to take unnecessary risks to sample on any particular day. The sampling plan will address unsafe sampling (boating) conditions by designating an alternate sampling day or by allocating extra sampling days in the schedule that may be used when needed.

If the growing area is intended for year-round harvesting, the sampling regime should stipulate the collection of samples throughout the year. If the growing area is intended to be approved for direct harvest for only part of the year, the random sampling plan would need only to address that period when the area is available for harvest. The only exception to this obligation to a random sampling regime is that the Authority will direct sampling to a particular tidal condition, if that condition unfavorably impacts the quality of the growing area.

The estimated 90th percentile was suggested in ISSC Issue 8109 and its addendum, to address the public health concerns associated with variation in shellfish growing water-monitoring data. The estimated 90th percentile will weigh every MPN value in the data set. This statistic will aid the evaluation of the growing water data by accurately describing the results of the field sampling. When environmental events (such as

rainfall) produce unfavorable effects on water quality, a randomly collected set of growing water data may, while still meeting the "10 percent above 43" criterion, display a greater level of variance than that associated with NSSP criteria. The "percentage factor" was not intended to allow for variation in the data caused by changes in environmental conditions at the time of sampling. The "percentage factor" was intended for use with a normally distributed data set, and reflects the inherent variation of the MPN analytical method.

If growing water data collected following unfavorable pollution events are combined with data collected under normal conditions, variation is increased. The estimated 90th percentile will reflect this variation. Therefore, the estimated 90th percentile will facilitate the use of a systematic random sampling strategy, while protecting against the potential public health problems that may result when shellfish are consumed from growing waters that are adversely affected by intermittent pollution events. For more information on systematic random sampling, see the NSSP Model Ordinance Guidance Documents: *Systematic Random Sampling Monitoring Strategy* (ISSC/FDA, 2017).

G. - H. Standard for the Restricted Classification of Growing Areas Affected by Point Sources or Nonpoint Sources and Used as a Shellstock Source for Depuration.

Classification as a restricted growing area used as a shellstock source for depuration is an option available to the Authority as an alternative to placing a growing area in the prohibited classification. Shellstock harvested from these waters are subjected to depuration, which is a process of reducing the levels of pathogenic organisms that may be present in the shellstock by using a controlled aquatic environment as a treatment process. Following successful depuration, the shellfish are safe to eat.

Water samples are collected to determine if the water quality meets the water quality standards for this growing area classification. The NSSP recognizes two (2) water quality-monitoring strategies: adverse pollution condition and systematic random sampling. Presence of point sources of pollution requires the use of the adverse pollution condition monitoring system to collect data for the application of the water quality standard. In growing areas not affected by point sources, the Authority may elect to use either system. The presence or absence of point sources of pollution and the monitoring system used dictate the frequency of samples that must be collected for application of the water quality standards. If the water quality meets the water quality standard for this classification, the growing area is placed in the restricted classification. If the water quality does not meet this water quality standard, or meets the water quality standard only under certain conditions, the Authority places the area in either the prohibited or the conditionally restricted classifications. For a full explanation of the classification of growing waters and the water quality monitoring strategies, see the NSSP Model Ordinance Guidance Documents: *Sanitary Survey and the Classification of Growing Waters*, *Systematic Random Sampling Monitoring Strategy*, and *Management Plans for Growing Areas in the Conditional Classification* (ISSC/FDA, 2017).

@.03 Growing Area Classification

A. General.

The probable presence or absence of pathogenic microorganisms in shellfish waters is important in deciding how shellfish obtained from an area may be used. All actual and potential growing waters should thus be classified according to the information developed in the sanitary survey. Classification should not be revised upward without careful consideration of trends and currently available data. Included in the sanitary survey file should be a written report with analysis supporting the classification.

The classification in which a growing area is placed dictates how the shellstock from that area may be used i.e. sold directly to the consumer to eat or required to be subjected to natural or artificial cleansing prior to sale to the consumer. Therefore, the Authority must use the sanitary survey information to determine the correct classification in which to place the growing area to minimize public health risk to the consumer. Any change from a more restrictive growing area classification to a less restrictive classification requires a written sanitary survey report that carefully and thoughtfully evaluates the changes in the information and data supporting the current classification to justify the less restrictive classification.

The status of a growing area is different from its classification. A growing area is generally in the open status for harvest subject to the limitations of its classification. When the conditions for the open status are not satisfied, the growing area may be placed in the closed status of its classification. For example, in a public health emergency such as deterioration of growing area water quality following a hurricane, a growing area in the approved classification would be placed in the closed status until the water quality is determined to meet the water quality standards for its classification. After a closure, a reevaluation must be made prior to reopening. The growing area would be returned to its open status when the water quality returns to normal provided it continues to meet all other criteria for the approved classification.

Some growing areas are so remote that there is no possibility of contamination. If an area qualifies for remote status, less restrictive monitoring requirements are imposed.

B. Approved Classification.

A review of epidemiological investigations of disease and marine biotoxin outbreaks attributable to the consumption of shellfish reveals that three (3) general situations prevail insofar as contamination of approved growing areas is concerned.

Firstly, improperly conducted or outdated sanitary surveys or misapplication of approved area criteria have unwittingly allowed sewage contamination of approved areas. Such areas have been shown to be the source of shellfish involved in shellfish associated disease outbreaks. The misapplication of approved area criteria includes the improper interpretation of the upper ten (10) percentile criteria to permit an area that is contaminated ten (10) percent of the time to be classified as approved.

A report of a 1910 outbreak of typhoid fever involving forty-one (41) persons notes that raw sewage from a city with a population of 30,000 was discharged only a few hundred feet away from clam beds and floats. In 1947, a case of typhoid fever was attributed to clams harvested 200 yards from the outlet of a municipal sewage treatment plant. In the latter case, the coliform MPN of the harbor water exceeded 12,000 per 100 ml and the area had been posted as closed to shellfish harvesting. In 1961, clams were responsible for at least fifteen (15) cases of infectious hepatitis. Subsequent water quality samples from the area found total coliform levels ranged between 900 to 2,400 MPN per 100 ml. The highest fecal coliform level observed was 2,100 MPN per 100 ml.

In 1978, at least 2,000 persons were victims of oyster-associated food poisoning. The causative agent was determined to be the Norwalk virus. The oysters were contaminated by sewage and runoff during periods of heavy rainfall. In 1977, there were over 700 cases of viral gastroenteritis associated with the consumption of sewage-contaminated cockles. Between November 1, 1980 and April 30, 1981, 450 cases of infectious hepatitis A were reported from the consumption of cockles.

Secondly, shellfish associated illnesses have been caused by chance contamination of growing areas. These growing areas were contaminated by fresh fecal material, which was not diffused throughout the entire area and was not readily detectable by ordinary bacteriological sampling procedures. This possibility of chance contamination was recognized by Dr. Gurion in his report on a 1902 typhoid outbreak in which he noted "There is a zone of pollution established by the mere fact of the existence of a populated city upon the banks of a stream or tidal estuary which makes the laying down of oysters and clams in these waters a pernicious custom if persisted in, because it renders these articles of food dangerous at times, and always suspicious."

In 1956, an outbreak of infectious hepatitis (691 cases) attributed to oysters, which were contaminated in a wet storage area, is another example of chance contamination. Similarly in 1939, eighty-seven (87) cases of typhoid were attributed to fecal contamination of a storage area by a typhoid carrier.

Finally, shellfish illnesses have been traced back to areas where an intermittent pollution source contaminated the shellfish. These areas should have been managed and classified as conditionally approved, or classified as restricted.

Shellfish from waters meeting approved area criteria are unlikely to be involved in the spread of disease that can be attributed to fecal contamination of the shellfish. This is because, in part, a total coliform MPN of 70/100 ml is equivalent to the fecal material contributed from one (1) person diluted in about 2.27×10^8 liters (eight [8] million cubic feet) of coliform-free water. In addition, such a small amount of sewage reaching the growing area is likely to have been so treated, diluted, or aged that it will be of negligible public health significance. This also means an element of time and distance to permit mixing of sewage or fecal material with large volumes of diluting water. An increasing amount of saltwater will increase the rate at which many terrestrial microorganisms die out. Many reports have been published on the natural die-off of microorganisms in the marine environment.

In general, microbial inactivation in seawater occurs by two (2) different processes -physical dilution by diffusion and a process of biological inactivation. The inactivation process appears to be associated with the following factors: specific bacteriophages, sunlight and solar radiation, temperature, absorption and sedimentation, predation, antibiosis, action of inorganic salts, nutrient deficiencies, and action of heavy metals and other substances.

Studies have shown that enteric bacteria in seawater may survive from a few hours to five (5) days and longer. Field and laboratory studies have demonstrated that enteric viruses can survive in marine water and shellfish from a few days to over 130 days. The survival of viruses in seawater becomes greatly prolonged once they become associated with sediments. Virus concentrations may be many-fold greater in sediments than in overlying water. In general, viruses survive longer at lower temperatures, at low salinity, and in waters contaminated by sewage. Evidence from many field studies indicates that a constant relationship does not exist between either pathogen (bacterial or viral) or coliform content of shellfish and overlying water.

The effectiveness of sewage treatment processes must be considered in evaluating the sanitary quality of a growing area since the bacterial and viral content of the effluent will be determined by the degree of treatment which is obtained. The results of bacteriological sampling must also be correlated with sewage treatment plant operation and evaluated in terms of the minimum treatment, which can be expected with the possibility of malfunctioning, overloading, or poor operations.

The ability of shellfish to concentrate chemical pollutants from water and sediment may lead to

accumulation of these poisonous and deleterious substances to levels that may constitute a public health hazard. The degree to which these added substances are concentrated depends upon such variables as the species of shellfish, water temperature and salinity, the level of contaminants in the waters, and the physiological conditions of the shellfish. Concentration factors in oysters may range from near unity for Strontium 90 to as high as 10^4 for DDT. Anatomical distribution in shellfish and biological half-life of the substances are also highly variable.

Although there have been at least nine (9) closures of shellfish growing areas in the United States due to findings of added poisonous or deleterious substances, there have been no documented illnesses attributed to consumption of shellfish from these areas. The level of surveillance for these substances in a shellfish control program may vary widely. Review of existing background data derived from national and international monitoring programs and assessment of potential sources of the substances should enable program managers to determine if a potential problem exists that may indicate a need for further field study. Sampling for specific chemical contaminants in shellfish is recommended only when the pollution source survey reveals a potential problem, or if there is concern due to lack of information.

Limiting maximum permissible concentrations of radioisotopes and unidentified mixtures in water and food has been established. Current standards should be consulted in evaluating public health significance in market shellfish. The NSSP Model Ordinance Guidance Documents: *Action Levels, Tolerances, and Guidance Levels for Poisonous or Deleterious Substances in Seafood*, (ISSC/FDA, 2017) contains current FDA action levels and tolerances for poisonous and deleterious substances in seafood. Existing data are insufficient to establish levels for other substances at this time. Information on procedures for developing action levels and guidelines may be found in the September 30, 1977 *Federal Register*. In the absence of specific levels, decisions must be made on a case-by-case basis utilizing the best available knowledge.

The approved classification for a growing area requires that the sanitary survey has determined that there are no unacceptable concentrations of fecal material, pathogenic microorganisms, or poisonous and deleterious substances. There are no NSSP limitations on the harvest of shellstock from growing areas placed in this classification.

C. Conditional Classification.

The basic concept of the NSSP is to control the safety of shellfish by preventing their harvest from contaminated growing areas. In reviewing growing area classifications and sanitary surveys conducted by national and international control officials, it appears that a common misinterpretation is the classification of an area as *approved* when in fact the area should have been classified as *conditionally approved*. Critical investigations usually reveal that the area is subject to intermittent pollution events. Careful consideration of an intermittent pollution event, development and application of a management plan, and cooperation and compliance by all parties may also allow upgrading of an area to a *conditionally approved* or *conditionally restricted* classification instead of requiring the area to be *restricted* or *prohibited* at all times.

Intermittent pollution to shellfish growing waters has been a significant cause of shellfish-borne infectious disease outbreaks worldwide. In 1978, at least 20,000 persons were involved in an outbreak of oyster-associated gastroenteritis attributed to Norwalk virus. The investigation of the outbreak indicated that a combination of meteorological and hydrographic events had caused inadequately treated and diluted sewage from a nearby municipal facility to reach the area. In an incident in 1982, at least 471 persons developed gastroenteritis after consumption of sewage contaminated oysters when a combination of raw sewage bypasses, high rainfall, strong winds, and abnormally low tides caused contamination of an area

that was classified as approved. In both of these instances, application of the conditionally approved area concept probably could have prevented the outbreaks.

A common situation where this classification might be appropriate is when water quality is, to some degree, dependent upon the operation of a WWSD. For example, the boundaries of an approved shellfish area might be improperly determined during a period when a WWSD is operating at a satisfactory level. If there is some interruption in treatment, it follows that there will be some degradation of water quality in the growing area which may require a relocation of the boundaries. The degree of relocation would depend upon such items as the distance between the pollution source and the growing area, hydrography, the amount of water, and the amount of pollution.

The concept is also applicable to other situations in which there may be a rapid or seasonal change in water quality. Examples of such situations include:

The water quality in a growing area adjacent to a resort community may vary according to seasons of the year. During the summer months, when the community experiences a significant population increase, water quality may be adversely affected. However, during the winter when there are few people in the community, water quality might improve sufficiently to allow approval of the area. In some States, this is known as a seasonal closure.

The water quality in a protected harbor in a sparsely settled area, which provides anchorage for a fishing fleet several months a year, might vary. When the fishing fleet is in, the harbor water might be of poor sanitary quality. However, during the remainder of the year the quality of the harbor water might be satisfactory. The area would be closed for shellfish harvesting when the fishing fleet is using the harbor.

The water quality in an area may fluctuate with the discharge of a major river, or rainfall in the area may cause runoff of pollutants into the growing area. This type of pollution is often referred to as non-point pollution. During periods of low runoff, such an area might be of satisfactory quality and thus be approved for shellfish harvesting.

The first step in determining whether an area should be classified as conditionally approved or conditionally restricted is to determine whether sufficient State resources are available to manage, survey, monitor, control harvesting, affect closures, and reopen the area as required. It should be noted that sources of pollution must be routinely monitored; coordination between State, local and industry officials must be timely; performance standards must be monitored; and closures must be immediate and effective. States electing to classify areas as conditionally approved have found the public resource investment to be substantial.

The second step in determining whether an area should be placed in the conditionally approved or conditionally restricted classification is to evaluate the potential sources of pollution in terms of their effect on water quality in the area. Some potential sources of pollution include: bypasses and overflows within a sewage collection and treatment system, intermittent discharges from boats, seasonally used areas, animals, land runoff, and freshwater flows.

The third step in establishing a conditionally approved or conditionally restricted area is to evaluate each source of pollution in terms of the water quality standards to be maintained, and to formulate performance standards for each pollution source having a significant effect on the sanitary quality of the area. The following are examples of different types of performance standards that might be developed:

Performance standards or closure criteria may be based upon the bacteriological quality of effluent from sewage treatment plants. This might be stated in terms of chlorine residual if the bacteriological quality of the effluent can be positively related to chlorine residual. The following is an example of a performance standard for an effluent discharge: "The median coliform MPN, in any one (1) month, shall not exceed 500 per 100 ml, based on not less than sixteen (16) composite samples per month, and not more than ten (10) percent of the samples shall have an MPN in excess of 10,000 per 100 ml. Determinations of the chlorine residual of the effluent should be made hourly and recorded in the permanent plant records."

A performance standard may be based upon total quality of sewage, which can be discharged from any given unit, or from a combination of units, without causing the basic water quality standards to be exceeded.

A performance standard may be based upon the amount of vessel traffic in the area and the concomitant amount of sewage, which can be expected.

Performance standards may be based upon the amount of rainfall in the immediate area. An example could be: "The area will be closed when there has been five (5) cm (two [2] inches) or more rainfall registered at a rain gauge at (specified area within a 24-hour period)."

Performance standards may be based upon the height of a river stage. An example could be: "When the river at (a specified area) reaches 3.66 meters (twelve [12] feet) or above, the area will be closed."

The design of a waste treatment plant and the plant effluent specifications may be critical to the designation of an area classified as conditionally approved or conditionally restricted. Design criteria which may be useful in determining the quality of sewage which can be discharged into an area without exceeding the desired water quality standards include: population equivalent (coliform) of sewage, predicted survival of coliform in seawater, effectiveness of chlorination and the total quality of clean dilution water in an area. Results of many studies on the survival of bacteria in seawater have been published.

The mechanical equipment at critical sewage treatment or pumping units should be such that interruptions will be minimized. Wherever possible, operations should be automatically recorded on charts. Requirements that might be imposed depend upon the importance of the unit's relationship to water quality. Important design features of a sanitary waste collection system that should be considered include:

Storm water should be excluded from the sanitary system. There should be stand-by equipment to insure that treatment or pumping will not be interrupted. It should be taken into account that interruptions may occur because of damage to a single unit or a power failure.

The pumps and critical units should be fitted with meters or gauges so the regulatory agency can monitor performance standards.

Installation of recording scales to indicate rate of chlorine use is helpful. Chlorine flow meters are available that integrate hydraulic flow with chlorine demand.

Liquid level recording gauges fitted with alarms and located in overflow channels of sewage treatment plants and wet wells of lift stations are useful. They can be set to indicate when overflow takes place. It is good operating procedure to date recording charts. Gauges should be calibrated and maintained so that

indicated discharge rates are accurate.

Automatic devices to warn of failure or malfunctioning at self-operated pumping stations or treatment plants can be an important control.

Another factor to consider in developing a conditionally approved or conditionally restricted area is that a prohibited area must be interposed between the conditionally approved or restricted area and the source of pollution. The size of such area should be based on the total time it would take for the operating agency to detect a failure, notify the Authority, and for the latter agency to issue a notice to stop shellfish harvesting. It is recommended that the area be of such size that the flow time through the safety area is at least twice that required for the notification process to become effective. Due consideration should be given to the possibility that closure actions might be necessary on holidays or at night.

The length of time a conditionally approved or conditionally restricted area should be closed following a temporary closure will depend upon several factors including the species of shellfish, water temperature, shellfish activity and cleansing rates, presence of silt or other chemicals that might interfere with the physiological activity of the shellfish, and the degree of pollution of the area.

The conditional classifications are designed to address growing areas that are subject to intermittent microbiological pollution. These optional classifications offer the Authority an alternative to placing the area in the restricted or prohibited classification year round when during certain times of the year or under certain conditions, the shellstock from the growing area may be safely harvested. Public health protection and the control of shellfish safety in the use of the conditional classifications are afforded through the use of a management plan. The management plan for each growing area placed in a conditional classification is based on the information gathered during the sanitary survey. The plan establishes a strict set of criteria that must be met for the growing area to remain in the open status. Failure to meet the criteria automatically places the growing area in the closed status, with immediate notice to the public, the affected industry, and the plan's participants. Two (2) of the most important components of the management plan are: the acceptance of and the agreement to the conditions of the management plan by the one (1) or more Authorities involved, other local, State and Federal agencies which may be involved, the affected shellfish industry, and the persons responsible for the operation of any treatment plants or other discharges that may be involved; and the annual reevaluation of compliance with the plan to assure public health protection. Use of the conditional classification requires more intense monitoring and more frequent reevaluation because of the intermittent nature of the pollution event.

When the Authority has sufficient resources to manage a conditional classification, the use of the conditional classification could allow the safe use of growing areas that might otherwise not be available to the shellfish industry. For a complete discussion of the conditional classification, see the NSSP Model Ordinance Guidance Documents: *Management Plans for Growing Areas in the Conditional Classification* (ISSC/FDA, 2017). For additional information concerning the classification of growing waters and the sanitary survey, see the NSSP Model Ordinance Guidance Documents: *Sanitary Survey and the Classification of Growing Waters* (ISSC/FDA, 2017).

D. Restricted Classification.

The restricted area classification is an option available to Authorities to use instead of a prohibited classification. The establishment of a restricted area might be considered in instances where an area does not meet approved area criteria but is not grossly polluted. Another common situation where this classification might be appropriate is for areas affected by non-point pollution from either urban or rural

sources that cause the water quality to fluctuate unpredictably or of sufficient frequency that a conditionally approved area is not feasible. In such instances, the State may, at its option, classify these areas as restricted and may limit the use of the shellfish to relaying, container relaying, or depuration operations.

Relaying is a process of reducing the levels of microorganisms that may be present in the shellstock by moving the shellstock to growing areas in the approved classification and using the shellstock's ability to cleanse itself naturally as a treatment process. Depuration is a process of reducing the levels of pathogenic organisms that may be present in the shellstock by using a controlled aquatic environment (i.e. a land based facility) as a treatment process.

The sanitary and bacteriological criteria to be applied by the State for classifying restricted areas are to be developed by the Authority. The criteria may vary according to the use to be made of the shellfish and according to the effectiveness of the relay and/or depuration process to which the shellfish will be subjected. The effectiveness of the process is determined by a study as provided for in the Model Ordinance, Chapter V. Shellstock Relaying and Chapter XV. Depuration. The purpose of this study is to establish the bacteriological quality requirements for the shellfish processing. Effectiveness of the process is likely to vary from one cleansing area to another, from one species of shellfish to another, and from one depuration plant to another. The classification criteria may be based upon the quality of the shellfish or the water in the restricted area in addition to other sanitary parameters.

Before classifying an area as restricted, the Authority should make a determination of whether sufficient State resources are available to monitor pollution sources; to provide coordination between State, local and industry officials; to issue special harvesting permits; and to supervise harvesting and transportation of shellfish to depuration facilities or relay sites. Some States that have classified areas as restricted have found the resource investment to be substantial. For a complete discussion of relay, see the NSSP Model Ordinance Guidance Documents: *Shellstock Relay* (ISSC/FDA, 2017). For a complete discussion of depuration, see the NSSP Model Ordinance Public Health Reasons and Explanations Chapter XV. Depuration (ISSC/FDA, 2017).

E. Prohibited Classification.

The positive relationship between disease and consuming contaminated shellfish has been clearly established. Prevention of consumption of contaminated shellfish is the primary objective of the NSSP. The prohibited area classification is the most restrictive growing area classification, used for areas subject to gross pollution. The use of this classification is also required, as a precautionary measure, for any growing area where the shellfish authority has not performed a sanitary survey, and for a growing area immediately adjacent to a sewage treatment plant outfall, irrespective of the level of effluent treatment provided. The harvesting of shellstock is not allowed for any human food use. For additional information concerning the classification of growing waters and the sanitary survey, see the NSSP Model Ordinance Guidance Documents: *Sanitary Survey and the Classification of Growing Waters* (ISSC/FDA, 2017)

@.04 Marine Biotoxin Control

Marine biotoxins may be ingested by molluscan shellfish feeding on toxic dinoflagellates. Dinoflagellates in their vegetative stage flourish seasonally when water conditions are favorable. Toxic blooms of dinoflagellates or diatoms can occur unexpectedly or may follow predictable patterns. PSP, NSP and Domoic Acid poisoning, also known as ASP are the three (3) types of poisonings most commonly

associated with oysters, clams, mussels and scallops in the United States.

Cases of paralytic shellfish poisoning, including several fatalities resulting from poisonous shellfish, have been reported from both the Atlantic and Pacific coasts. The minimum quantity of poison, which will cause intoxication in the susceptible person, is not known. Epidemiological investigations of paralytic shellfish poisoning in Canada have indicated 200 to 600 micrograms of poison will produce symptoms in susceptible persons. A death has been attributed to the ingestion of a probable 480 micrograms of poison. Investigations indicate that lesser amounts of the poison have no deleterious effects on humans. Growing areas should be closed at a level to provide an adequate margin of safety, since in many instances, toxicity levels will change rapidly.

A review of the literature and research dealing with the source of the poison, the occurrences, and distribution of poisonous shellfish physiology and toxicology, characteristics of the poison, and prevention and control of poisoning has been prepared.

In Gulf coast areas, toxicity in shellfish has been associated with red tide outbreaks caused by massive blooms of the toxic dinoflagellate, *Karenia brevis* (formerly *Ptychodiscus brevis*). Toxic symptoms in mice suggest a type of NSP rather than symptoms of PSP. The most common public health problem associated with *Karenia brevis* blooms is respiratory irritation; however, NSP associated with *Karenia brevis* blooms have been reported in Florida. Uncooked clams from a batch eaten by a patient with neurotoxic symptoms were found to contain 118 mouse units per 100 grams of shellfish meat.

Toxic dinoflagellates or diatoms are indigenous to most coastal and estuarine waters on the Atlantic, Gulf, and Pacific coasts of America, as well as in many other parts of the world. Blooms of these organisms can occur unexpectedly and rapidly. This phenomenon occurred in New England in 1972 when shellfish suddenly became toxic in a previously unaffected portion of the coastline and resulted in many illnesses. During 1991 and 1992, there was a spread of domoic acid producing organisms throughout the world including the detection of high numbers of the diatom *Pseudo-nitzschia pseudo-delcatissima* in Australia and *Pseudo-nitzschia pseudo-seratia* in California. Domoic acid was also recovered from shellfish in Washington and Oregon. All shellfish producing States or MOU countries must have a contingency plan that defines administrative procedures, laboratory support, sample collection procedures, and patrol procedures to be implemented on an emergency basis in the event of the occurrence of shellfish toxins. A model State contingency plan for control of marine biotoxins is provided in the NSSP Model Ordinance Guidance Documents, *Guidance for Developing Marine Biotoxin Contingency Plans* (ISSC/FDA, 2017).

All States or MOU countries must monitor toxin levels to establish a baseline historical reference. Thereafter, States or MOU countries where shellfish toxins are likely to occur must monitor toxin levels on a routine basis to meet the approved area requirements for direct market harvesting. Experience with monitoring for shellfish toxins suggests that an effective program should include the following:

Sampling stations should be located at sites where past experience has shown toxin is most likely to appear first.

Samples should be collected of shellfish species which are most likely to reveal the early presence of toxin and which are most likely to show the highest toxin levels. For example, mussels have been found to be useful for early PSP detection.

The frequency and period for collection of samples should be based upon historical patterns. This

assumes several years of baseline data in order to establish stations and sampling plans.

An information network should be established between the health and marine resource communities and the Authority. Any toxin-like illnesses related to shellfish and environmental phenomena such as algal blooms, fish kills, or bird kills, which might indicate the early stages of an increase in toxin levels, should be rapidly communicated over the network.

Sampling stations and frequency of sampling should be increased when monitoring data or other information suggests that toxin levels are increasing.

Sample collection, sample transportation, and sample analysis procedures should be developed so that in an emergency sample results will be known within twelve (12) hours.

When monitoring data or other information indicates that toxin levels have increased to the quarantine levels, growing area closures must be immediately implemented. The determination of which growing areas should be closed should include consideration of the rapidity with which toxin levels can increase to excessive levels and the inherent delays in the State sample collection procedures. It may be appropriate to close growing areas adjacent to known toxic areas until increased sampling can establish which areas are toxin free and that toxin levels have stabilized.

Shellfish growing areas closed because marine biotoxins have exceeded quarantine levels may be reopened for growing after a sufficient number of samples and other environmental indices, if used, have established that the level of toxin will remain below quarantine levels for an extended period. For example, experience has shown that appropriate reopening criteria include a minimum of three (3) samples collected over a period of at least fourteen (14) days. These samples should show the absence of PSP or levels below 80 micrograms per 100 grams.

A. Contingency Plan.

The suitability of some areas for harvesting shellstock is periodically influenced by the presence of toxigenic micro-algae. Recent increases in toxigenic micro-algae distribution dictate that a more comprehensive series of public health controls be adopted. The need exists to make contingency plans to address the contamination of a growing area by toxigenic micro-algae or a disease outbreak caused by marine biotoxin. This contingency plan must describe administrative procedures, laboratory support, sample collection procedures, and patrol procedures to be implemented on an emergency basis in the event of the occurrence of marine biotoxin in shellstock. The primary goal of this planning should be to ensure that maximum public health protection is provided in growing areas subject to marine biotoxin contamination. For a discussion of marine biotoxin disease and its management in shellfish growing areas, see the NSSP Model Ordinance Guidance Documents: *Guidance for Developing Marine Biotoxin Contingency Plan* (ISSC/FDA, 2017).

B. Marine Biotoxin Monitoring.

The primary purpose of a marine biotoxin-monitoring program is to prevent illness or death among the shellfish consuming public. The monitoring program should use the "indicator station" and "critical species" concepts to develop an early warning system to prevent harvest of biotoxin contaminated shellstock. For a full discussion, see the NSSP Model Ordinance Guidance Documents: G*uidance for Developing Marine Biotoxin Contingency Plan* (ISSC/FDA, 2017).

C. Closed Status of Growing Areas.

In the event of a toxigenic micro-algae bloom, shellstock-growing areas shall be placed in the closed status for harvesting to prevent human consumption of biotoxin-contaminated shellfish. The biotoxin level governing the need to place the growing area in the closed status will vary depending on the species of toxigenic micro-algae and the species of bivalve shellfish. Since the ability to concentrate biotoxins varies among species, it is possible for one (1) species in a growing area to have safe levels of biotoxin while another species in the same growing area will have dangerous biotoxin concentrations. In this situation, the Authority may permit the harvesting of one (1) species with no adverse public health consequences while prohibiting the harvest of another species. In these situations, the Authority must closely monitor the growing area and develop a sufficient database for use in making this determination.

The Authority must develop criteria, which must be met before a growing area can be returned to the open status for harvesting. These criteria should integrate public health, conservation, and economic considerations. The criteria should also employ a sufficient number of samples and other environmental indices, if used, to establish that the level of toxin will remain, for an extended period of time, at levels safe for human consumption. For additional discussion concerning biotoxin contamination of shellstock, see the NSSP Model Ordinance Guidance Documents: *Guidance for Developing Marine Biotoxin Contingency Plan* (ISSC/FDA, 2017).

D. Heat Processing.

Heat treatment can reduce the toxicity of some biotoxins. When heat treatment is used, the Authority must require that the processor provide adequate demonstration of the destruction of the biotoxin and adequate controls to assure that the end product is safe for human consumption.

E. Records.

Good record keeping is essential to the successful management of a Marine Biotoxin Contingency Plan. Appropriate records of monitoring data, evaluation reports, and closure and reopening notices should be compiled and maintained by the Authority. This information is important in defining the severity of the problem, as well as for a retrospective evaluation of the adequacy of the entire control program.

@.05 Marinas

A. Marina Proper.

Under the NSSP, any growing area within the confines of the marina proper is presumed to be contaminated for some period of time. Therefore, no growing area within the marina proper can be placed in the approved classification.

B. Adjacent Waters.

The microbiological and chemical contamination associated with marina facilities may result in the contamination of adjacent shellfish growing waters. The NSSP has developed a set of evaluation criteria to be used in determining if the growing waters adjacent to a marina are affected by microbiological contaminants associated with sewage. Since there are significant regional differences in all factors that

affect pollution loading from marinas, sufficient flexibility must be allowed to account for these differences. The Authority has the option of applying the specified occupancy and discharge rates necessary to conduct a dilution analysis. The Authority may also opt to conduct studies to document different rates for specific areas. Best professional judgment of qualified individuals and best available technology must be applied to determine adequate restrictions on harvesting in and around marinas.

Chapter V. Shellstock Relaying

Requirements for the Authority

@.01 General

Relaying is the practice of harvesting bivalve shellstock from polluted growing or growing areas and placing them in unpolluted bodies of water for a sufficient time for the shellstock to reduce contaminating microorganisms or chemicals to safe levels. Through the natural cleansing process in relaying, shellstock resource that would otherwise not be available for human consumption is made safe and becomes accessible to the shellfish industry and the consumer. As early as 1911, public health officials were investigating the use of natural cleansing through relaying to reduce pathogenic organism levels in oysters. For a complete discussion of relaying activities, see the NSSP Model Ordinance Guidance Documents: *Shellstock Relay* (ISSC/FDA, 2017).

@.02 Contaminant Reduction

Research has shown that shellfish have the ability to purge themselves of certain microbial and chemical contaminants when placed in clean saline water. The rate of purging depends on the specific contaminants, species of shellfish, and environmental factors such as temperature and salinity. The shape of the containers used to hold the shellstock may also affect the purging rate. Because of the differences in purging rates among shellfish species and contaminants, a specific study must be performed in each growing area used for relaying to determine the purging rates, and the relay activity must be carried out in strict conformance with criteria established from the study. For a discussion of the factors effecting contaminant reduction during relay, see the NSSP Model Ordinance Guidance Documents: *Shellstock Relay* (ISSC/FDA, 2017).

@.03 Licenses to Relay Shellstock

Licensing of each person who harvests shellstock is an important control measure to help protect against contaminated shellstock reaching the consumer and to help maintain accurate source identity records. Special permits must be issued to licensed harvesters for taking shellstock from contaminated growing areas and transporting them to other growing areas for the purpose of natural cleansing. Use of special permits with special harvesting conditions facilitates the shellfish authority's prevention of contaminated product being diverted for sale to the consumer prior to treatment rendering the shellstock safe for consumption. For more information concerning relay, see the NSSP Model Ordinance Guidance Documents: *Shellstock Relay* (ISSC/FDA, 2017).

@.04 Management of Relaying Activities

Because shellstock relaying involves the harvesting and transport of contaminated shellstock and its treatment to render it safe for human consumption, great care must be taken to assure that contaminated product does not inadvertently reach the consumer. This requires direct supervision of the operation and

good enforcement by the shellfish authority. Techniques such as special licenses, testing of shellstock before and after relay activities, special tagging of shellstock during relay, special marking of the growing areas used for natural cleansing, record keeping, and additional patrol activities are used to ensure that effective contaminant purging is completed before the shellstock is marketed to the consumer. For additional information concerning the management of shellstock relaying, see the NSSP Model Ordinance Guidance Documents: *Shellstock Relay* (ISSC/FDA, 2017).

Requirements for Harvesters

.01 Harvester License Required

Licensing of each person who harvests shellstock is an important control measure to help protect against contaminated shellstock reaching the consumer and to help maintain accurate source identity records. Harvesters must work with the shellfish authority to foster the use and enforcement of special permits to prevent bypassing of the natural cleansing treatment process. Compliance with permit requirements is extremely important. Prevention of sale of contaminated shellstock to the consumer is the primary objective of the NSSP. Use of special permits with special harvesting conditions facilitates the shellfish authority's prevention of contaminated product being diverted for sale to the consumer prior to treatment rendering the shellstock safe for consumption. For more information concerning relay, see the NSSP Model Ordinance Guidance Documents: *Shellstock Relay* (ISSC/FDA, 2017).

Chapter VI. Shellfish Aquaculture

Oysters, clams, mussels and scallops are filter feeders and therefore have the ability to concentrate microorganisms, including human pathogens and toxigenic micro-algae, and poisonous or deleterious substances from the water column if these organisms or substances are present in the growing area. Concentrations in the shellfish may be as much as 100 times that found in the water column. If the microorganisms concentrated are harmful to humans, and if, in the case of human pathogens, the shellfish are consumed raw or partially cooked, human disease can result. Poisonous or deleterious substances can induce illness or death immediately or through long-term exposure, may contribute to the development of cancer in humans. Additional information concerning the disease causing potential of shellfish can be found in the NSSP Model Ordinance Guidance Documents: G*uidance for Developing Marine Biotoxin Contingency Plan, Sanitary Survey and the Classification of Growing Waters*, and *Shellstock Relay* (ISSC/FDA, 2017).

The culturing of molluscan shellfish in natural and artificial growing areas is known as aquaculture. This may include the cultivation of molluscan shellfish with non-molluscan species in a common aquaculture system known as polyculture. Oysters, clams, mussels and scallops raised in aquaculture operations are subject to the same potential for contamination as they are growing in the wild. In land-based operations, there may be some additional risk of accumulation in the shellstock of animal drugs used to stimulate growth and control mollusk diseases, or fish diseases in the case of polyculture. Since some components of aquaculture such as relaying, wet storage, depuration, growing water classification and tagging, are similar to other activities covered in the NSSP Model Ordinance, they are regulated under those Model Ordinance chapters. The shellfish authority must have an adequate legal basis and sufficient resources to regulate public health concerns pertinent to bivalve shellstock aquaculture.

Polyculture and land-based monoculture operations must be under adequate control to assure the shellstock product harvested will be acceptable for human consumption. The shellstock authority must establish detailed procedures for issuing permits for shellfish aquaculture, approving culturing sites and boundaries, controlling of harvesting, sampling of shellstock, monitoring environmental parameters, keeping records, imposing quarantine measures, controlling the use of animal drugs to stimulate growth or treat diseases, and developing other control measures as may be necessary. The shellfish authority should work with FDA in its review of the plans for a land based aquaculture operation.

Of particular concern in land-based systems is the use of a closed or recirculating water system. Potential exists for shellstock contamination through the failure of the water treatment system to sufficiently disinfect the water to control levels of human pathogens that might be introduced through the water supply or other means. There is also potential for the increased concentration of poisonous and deleterious substances such as animal drugs or anti-fouling agents in the water supply and subsequently the shellstock over time.

Prior to its harvest for sale in interstate commerce, the aquaculturist must demonstrate that the water in the land-based system met the NSSP Model Ordinance criteria for direct sale of shellstock to the consumer. If the water supply does not meet those criteria, the aquaculturist must subject the shellstock to relaying or depuration prior to sale. Relay is a process of reducing the levels of microorganisms that may be present in the shellstock by moving the shellstock to growing areas in the approved classification and using the shellstock's ability to cleanse itself naturally over time as a treatment process. Depuration is a process of reducing the levels of pathogenic organisms that may be present in the shellstock by using a controlled aquatic environment (i.e. a land based facility) as a treatment process.

The cultivation of shellfish with other species in a common aquaculture system is known as polyculture. There are some additional public health concerns related to polyculture. Greater potential may exist for contamination of oysters, clams, mussels and scallops with human pathogens and animal drugs in polyculture. However, the extent of that potential is not known. The extensive use of tanks, sea enclosures, floating rafts, ponds, etc. in polyculture makes the oysters, clams, mussels or scallops highly vulnerable to pollution from various sources, including their association with the other species present in the polyculture operation. The usage of anti-fouling agents (tributyltin, copper, etc.), hormones, and antibiotics in finfish aquaculture has evoked concern about its environmental effects and potential threat to human health through bioaccumulation in shellfish. Therefore, a conservative approach to polyculture is provided in the NSSP Model Ordinance requirements.

Chapter VII. Wet Storage in Approved and Conditionally Approved Growing Areas

The purpose of wet storage is to improve palatability of shellfish by de-sanding or increasing their salt content, or to provide temporary storage for depurated shellfish or shellfish from approved or conditionally approved harvest areas. Wet storage facilities are not designed and operated to increase the safety of shellfish. Therefore, all controls pertaining to shellfish for direct consumption must be applied.

Effective control measures must be established and implemented by the Authority to ensure that wet stored shellfish are protected from becoming contaminated. These control measures include review of the plans for proposed wet storage areas or flats; review of the design and operating procedures for onshore facilities; periodic inspections of wet storage facilities; and, evaluation of the water quality for compliance with the requirements of the NSSP Model Ordinance.

The types, location, and uses of wet storage operations are highly variable and may range from temporary storage near shore in approved areas to onshore tanks using recirculating natural or synthetic seawater for the purpose of de-sanding, temporary storage, or salt uptake. Consequently, it is not possible to provide detailed guidelines in the NSSP Model Ordinance, and it is necessary for each separate operation to be developed and evaluated on its own merit with respect to overall Program guidelines.

Removing shellfish from growing beds for storage in areas close to shore may subject such shellfish to constant or intermittent pollution. Shellfish in wet storage tanks are similarly subjected to pollution if the tank water is obtained from a polluted source. An example of health consequences due to such contamination is the outbreak (691 cases) of infectious hepatitis in Sweden in 1956 attributed to oysters contaminated in a wet storage area.

Shellfish on floats near shore may be more directly exposed to potential contamination from boats and surface runoff than are shellfish in their natural growing areas. Therefore, particular emphasis should be placed on a sanitary survey of the vicinity to ensure that chance contamination does not occur.

Careful consideration must be given to designing and operating onshore wet storage tanks to ensure that shellfish are not contaminated during holding or do not die from physiological stresses such as low dissolved oxygen and unsuitable temperatures or salinity. Excessive mud on the shells and dead shellfish may increase bacterial loads in the tanks and lead to increased microbial levels in the shellfish during wet storage. Hence, washing and culling the shellfish prior to wet storage is essential.

Chapter VIII. Control of Shellfish Harvesting

Requirements for the Authority

Other portions of this section of the Guide have described the public health reasons for limiting shellfish harvesting to areas free of contamination and shellfish toxins. Methods have been described for the evaluation and classification of such areas. However, classification is not effective unless the State can prevent illegal harvesting of shellfish from closed areas. For a full discussion of control activities, see the NSSP Model Ordinance Guidance Documents: *Growing Area Patrol and Enforcement* (ISSC/FDA, 2017).

For the most part, control of illegal harvesting depends upon the police activities as described in this chapter. Adequate delineation of closed areas is fundamental to effective patrol. The type of area identification will be determined by the structure of the local shellfish industry and the legal requirements for each State to permit successful prosecution. Posting a warning sign is one method of informing shellfish harvesters that an area is closed to the taking of shellfish for public health reasons.

Other methods for identification of closures include telephone, maps issued at checkpoints, or with harvesting licenses, direct mail, and news media. It is recommended that the advice of the State's legal counsel be obtained to insure that the marking of closed areas and notifications to shellfish harvesters are such that persons harvesting from closed areas can be successfully prosecuted.

The primary objective of the NSSP is to ensure that shellfish are only harvested from areas free of excessive concentrations of pathogenic microorganisms and poisonous or deleterious substances. Growing areas may be classified as to their public-health suitability for shellfish harvesting on the basis of information obtained by sanitary surveys in accordance with Chapter IV. @.01. However, if local shellfish harvesters are not convinced of the need for restrictions, shellfish may be harvested surreptitiously from closed areas. *Thus, the patrol element of the NSSP is important to ensure compliance with the public-health safeguards resulting from the sanitary survey.* The fact that the law prohibits the removal of shellfish from certain areas will deter the majority of the population from attempting to harvest such shellfish, provided they are aware of the law and of the areas which are closed. Where traditional gathering practices have prevailed, local public opinion may not support the need for such closures. In such cases, favorable opinion may be developed through an educational program or a locally demonstrated need resulting from an outbreak of shellfish-associated illness or intoxication.

The type of patrol needed for any particular situation cannot be specified and is determined by the nature of areas to be patrolled, means of access, methods of harvesting, and species. Patrol equipment should be such that the officers can apprehend persons illegally harvesting shellfish in a closed area. Equipment that has proven effective for apprehension of illegal harvesters includes: small, high-speed, readily transportable boats capable of operating in open waters; automobiles; aircraft; communications for coordinating patrol activities; radar surveillance systems; and night scopes.

Organization of the patrol activity must take into consideration the need for night, weekend, holiday, undercover and surprise patrols. Various patrol methods may be used depending on the nature of the area to be patrolled and the type of industry.

Complete removal of shellfish from polluted areas provides a safeguard against contaminated shellfish

reaching the market. In some cases, depletion may be the method selected to eliminate an irresistible temptation for harvesters. Depletion may be more economical and effective than patrol of closed areas and will serve to protect public health.

Educational programs should be developed for both industry and the public describing the public health necessity for eliminating shellfish harvesting from closed areas. Programs developed specifically for participation of key industry people may be especially helpful in eliciting cooperative efforts of the entire industry. Such programs should focus on incentives to eliminate harvesting and marketing of shellfish from closed areas.

The adequacy of State laws as a basis for prosecution is an important component of this activity. Shellfish patrol will be ineffective and or compromised if State laws are so written or interpreted that violators cannot successfully be prosecuted and if penalties are so small that they are economically unimportant. It is important that periodic assessments are made by the State control or patrol agency of the degree of success of court actions taken in response to illegal harvesting. Information of this nature is necessary for both the analysis of the effectiveness of the program and for education purposes. Prosecution will be difficult where local public opinion does not support the need for the restriction or the courts are not fully aware of the public health hazards associated with the crime.

Requirements for Harvesters

Precautions exercised in gathering shellfish from approved growing areas may be nullified if shellfish are contaminated with bilge water or polluted overboard water, or in the case of trucks, with contaminated water on the floor or hazardous materials on or adjacent to the shellstock. Also, several investigations have been conducted by States and the FDA regarding shipments of shellfish where product deterioration resulted when shellstock was held or shipped under adverse conditions such as direct sunlight and warm temperatures. These studies reaffirm the critical role that adequate shellstock protection and refrigeration plays when ambient temperatures are high. Product deterioration and bacterial growth occurs when shellstock is left exposed for several hours on harvest boats. If this shellstock is transported in trucks without adequate pre-chilling and in-transit refrigeration, product deterioration continues.

The majority of studies on microbiological quality of shellfish point up the need to refrigerate shellstock quickly after harvesting and maintain the product below 10 °C (50 °F) throughout processing, distribution and storage. It should be noted that a study by Cook and Ruple reported in 1989, showed that 10 °C (50 °F) storage of summer harvested Eastern oyster shellstock from the U.S. Gulf Coast, prevented the multiplication of fecal coliforms and *Vibrio spp.*, including *V. vulnificus*. Universally, food control officials consider shellfish as a potentially hazardous food that is capable of supporting rapid and progressive growth of infectious or toxigenic microorganisms. Other foods in this category are milk, milk products, eggs, meat, poultry, and fish. Generally, FDA recommends that potentially hazardous food be held at 5 °C (41 °F) or below, and if large volumes are involved in processing, methods be employed to rapidly cool the product to an internal temperature of 5 °C (41 °F) within four (4) hours.

Several studies have established that some pathogenic Vibrio species and other autochthonous bacteria may be present in marine sediments throughout the year. One study of Vibrio species and *Aeromonas hydrophila* in sediments of Apalachicola Bay, Florida, routinely detected *V. parahaemolyticus, V. alginolyticus,* and *A. hydrophila* and during some portions of the year at relatively high levels (up to 46,000 organisms per gram). Additionally, *V. vulnificus, V. cholerae, V. fluvialis* were detected at levels up to 2,400 organisms per gram of sediment.

Furthermore, there is evidence that some pathogenic organisms will survive in shellfish for a considerable length of time after harvesting and that some bacterial pathogens may multiply in the absence of adequate refrigeration. Vibrio species can also survive on inadequately cleaned equipment in a processing plant. Washing sediments from shellstock at the time of harvest helps to protect the shellfish and the processing equipment from becoming contaminated. Washing shellstock also helps to prevent quantities of mud and other bacteria from being mixed with the shucked shellfish, thereby contributing to high bacteria counts in the finished product. Muddy shellstock also makes it difficult to maintain shucking rooms in a clean, sanitary condition.

Water used for shellstock washing should be of good sanitary quality, to avoid possible contamination of the shellstock. There are instances when shellstock washing by the harvester might introduce a sanitary hazard because of the possible tendency of the harvester to wash the shellstock with polluted water from a harbor area, rather than with clean water from a growing area. Therefore, the Authority may waive the requirement for shellstock washing by the harvester when there are climatic, technical, or sanitary reasons for such action. In such event, the processor becomes responsible for washing shellstock.

It is necessary to protect the shellfish from pollution by disease-causing organisms that may be present in body wastes discharged from boats. This item is intended to protect the shellfish from chance pollution during harvesting. The likelihood of body wastes being discharged from boats will be considered in evaluating the sanitary quality of the harvesting area. If discharges are not adequately controlled, the area cannot meet the classification requirements for an approved harvesting area.

Licensing of each person who harvests shellfish for sale to a certified dealer is an important control measure to help protect against illegally harvested shellfish and to help maintain accurate source identity records. Harvesters must provide information necessary to create a record of the origin, quantity, and date of harvest that can be used to trace lots of questionable shellstock back to the source(s). Investigation of disease outbreaks can be severely hindered if the source of the shellfish cannot be readily identified. This can result in shellfish from the unacceptable source continuing to be used and continuing to cause illness. Health authorities may be forced to close safe areas, to ban safe shipments or to seize safe lots as a public health precaution if the source of contaminated shellfish cannot be accurately and rapidly determined.

Chapter IX. Transportation

Requirements for the Authority

Studies conducted during the period from pre-1925 to 1989 showed that the bacteriological examination of shellfish is an important tool in detecting: product mishandling; temperature abuse; and gross errors in growing area classification. The studies also demonstrated that shellfish will generally reflect the bacteriological quality of the water in which they have grown. However, this relationship is not consistent. Variation reflects differences in species and product forms and seasonal conditions at the time of harvest. Some studies concluded that there is no single uniform bacteriological standard, which could be applied to all species of shellfish.

Efforts to develop satisfactory bacteriological criteria for interstate shipments of shellfish (especially oysters) as received at the wholesale market level were begun in 1950. During the period from 1950 to 1964, there were many studies conducted to determine the bacteriological changes associated with shellfish harvesting, shucking – packing, and marketing. Throughout this period various coliform and plate count standards were developed under the NSSP. However, it wasn't until 1965, that the fecal coliform and standard plate count criteria were applied to all species of shucked oysters at the "wholesale market level" (wholesale market level not defined). In 1968, the NSSP Workshop adopted these criteria, presumably for all species and product forms of oysters, clams, and mussels.

Certified dealers are responsible to assure that shellfish purchased for direct sales, further shipments, or processing are safe and wholesome. The safety of shellfish is predicated on the cleanliness of the growing area waters from which they are obtained, and the sanitary practices applied during harvesting and shipping.

The positive relationship between sewage-polluted shellfish and enteric disease has been demonstrated many times. Because physiologically active shellfish pump and filter large quantities of water as part of their feeding process, rapid intake and concentration of bacteria, viruses, marine toxins, and other poisonous and deleterious substances may occur. Therefore, the shellfish may contain higher levels of chemical contaminants or pathogens than are found in the water in which they grow.

The shellfish-water bacteria ratio depends upon the shellfish species, water temperature, presence of certain chemicals, and varying physiological capabilities of the individual animals. If the water in which the shellfish are grown is polluted, it may be assumed that the shellfish will also contain pathogenic bacteria or viruses capable of causing disease in man.

In addition, shellfish contaminated by added trace metals can result in illness to man if consumed in sufficient quantities. Health hazards also may result from the presence of naturally occurring biotoxins produced by certain marine algae, primarily dinoflagellates. The occurrence of these poisons is related to the concentration of toxic algae in the growing area. The contamination of shellfish by these dinoflagellates usually occurs in well-defined areas and, in some instances, only during certain seasons not widespread over all shellfish producing areas.

Cooking does not necessarily ensure safety of contaminated shellfish since, in ordinary cooking processes; shellfish may not be heated sufficiently to ensure a kill of pathogenic organisms, although a considerable reduction will take place. Also, normal cooking processes cannot be relied upon to destroy heat stable toxins like paralytic shellfish poison (saxitoxin).

Certified dealers have three (3) principal responsibilities to assure that the consumer receives a safe product. The first is to purchase only safe and wholesome raw products. The second is to maintain the product in a sanitary manner. The final responsibility is to ship the product under sanitary conditions. The tagging and shipping records requirements, the sanitary shipping practices requirements, and the raw product inspection requirements are necessary to fulfill these responsibilities.

Chapter X. General Requirements for Dealers

.01 General HACCP Requirements

Hazard Analysis Critical Control Point (HACCP) is a preventive system of hazard control. It consists first of an identification of the likely hazards that could be presented by a specific product, followed by the identification of the critical control points in a specific production process where a failure to control would likely result in a hazard being created or allowed to persist. These critical control points (CCP) are then systematically monitored, and records are kept of that monitoring. Corrective actions are also documented when problems occur.

The application of HACCP controls by the molluscan shellfish industry, coupled with inspections by Shellfish Control Authorities based on the HACCP system, are a more effective and efficient system for ensuring the safety of molluscan shellfish products than the traditional Good Manufacturing Practices-based system. Adoption of HACCP controls by the molluscan shellfish industry will provide a basis for enhanced consumer confidence in the safety of molluscan shellfish.

The first step in the HACCP process, called Hazard Analysis, should include an assessment of both the likelihood that a food safety hazard will occur and its severity if it does occur. To be addressed by the HACCP system, the hazards must be such that their prevention, elimination, or reduction to acceptable levels is essential to the production of safe food. Even factors beyond the control of the processor, such as how the food will be distributed and how it will be consumed, must be considered because these factors could influence how it should be processed. A hazard is a biological, chemical, or physical property that may cause a food to be unsafe.

All dealers must conduct a hazard analysis or have one conducted on their behalf. The hazard analysis need not be performed according to a standardized regime, nor must it be documented in writing for review by the Authority.

The hazard analysis must identify the hazard of pathogen contamination at the receiving CCP as a significant hazard for all raw, molluscan shellfish products. For this reason, all dealers must have and implement a written HACCP Plan. Other hazards may also be identified (e.g., natural toxins, pesticides and environmental contaminants) at receiving and at other CCPs. In general, the CCPs identified in Chapters XI. .01, XII. .01, XIII. .01, XIV. .01, and XV. .01, must be listed in HACCP Plans for molluscan shellfish products. However, a dealer has the option to demonstrate, through the performance of a hazard analysis, that a particular hazard does not exist for a particular product or processing method, or that it can be controlled at another CCP in a manner that provides an equivalent level of public health protection. This option is not provided for the hazard of pathogen contamination at the receiving step.

In addition to listing the food safety hazards that are reasonably likely to occur in the food and the critical control points necessary to control these hazards, the HACCP Plan must establish the critical limits for the preventive measures at each CCP. Critical limits can be thought of as boundaries of safety for each CCP. They may be derived from sources such as regulatory standards and guidelines, literature surveys, experimental studies, and experts. In general, the critical limits listed in Chapters XI. .01, XII. .01, XIII. .01, XIV. .01, and XV. .01 must be listed in HACCP Plans for molluscan shellfish products. However, a dealer has the option to demonstrate that another critical limit provides an equivalent level of public health protection. This option is not provided for the hazard of pathogen contamination at the receiving step.

Monitoring procedures must also be included in the plan. Monitoring is a planned sequence of observations or measurements to assess whether a critical control point is under control and to produce an accurate record for future use in verification. Monitoring: 1) tracks the system's operation so that a trend toward a loss of control can be recognized, and a process adjustment can be made before a deviation occurs; and 2) indicates when loss of control and a deviation has actually occurred, and corrective action must be taken. Monitoring intervals must be frequent enough to permit the dealer to determine whether the hazard is under control.

While the HACCP system is intended to prevent deviations from a planned process from occurring, perfection is rarely, if ever achievable. When a deviation from a critical limit occurs, corrective action must be sufficient to: 1) ensure that no product enters commerce that is injurious to health or is otherwise adulterated as a result of the deviation; and 2) correct the cause of the deviation. These goals can be achieved by either predetermining what corrective actions will be taken when a critical limit failure occurs and then following those procedures, or following the minimum generic-type procedures described in Chapter X. .01. F. (3).

The HACCP Plan must also list the records that are necessary to document the result of monitoring at CCPs. These records must contain the actual values and observations obtained during monitoring. This requirement ensures that preventive monitoring is occurring in a systematic way.

.02 General Sanitation Requirements

General Sanitation Requirements apply to Chapters XI., XII., XIII., XIV., and XV. as appropriate to the activity being conducted and as required in the NSSP Model Ordinance: (1) Safety of Water for Processing and Ice Production; (2) Condition and Cleanliness of Food Contact Surfaces; (3) Prevention of Cross Contamination; (4) Maintenance of Hand Washing, Hand Sanitizing, and Toilet Facilities; (5) Protection from Adulterants; (6) Proper Labeling, Storage, and Use of Toxin Compounds; (7) Control of Employees with Adverse Health Conditions; (8) Exclusion of Pests.

.03 Other Model Ordinance Requirements

Other Model Ordinance Requirements apply to Chapters XI., XII., XIII., XIV., and XV. as appropriate to the activity being conducted: (1) Plants and Grounds; (2) Plumbing and Related Facilities; (3) Utilities; (4) Disposal of Other Wastes; (5) Equipment Condition, Cleaning, Maintenance and Construction of Non- Food Contact Surfaces; (6) Shellfish Storage and Handling; (7) Heat Shock; (8) Supervision.

.04 Certification Requirements

A principal objective of the NSSP has been to provide a mechanism for health officials and consumers to receive information as to whether lots of shellfish shipped in interstate commerce meet acceptable and agreed upon sanitation and quality criteria. Although these requirements pertain only to interstate shipments, it is recommended that the same requirements be imposed on intrastate operations. To accomplish this, the NSSP includes criteria and procedures to assure that producing and processing States receive only product that has been grown, harvested, transported, processed, and/or shipped in compliance with NSSP guidelines. Certification is dependent on a dealer maintaining acceptable operational and sanitary conditions. The State must have adequate legal authority to regulate the sanitary

requirements for harvesting, transporting, shucking-packing, and repacking of shellfish to be shipped interstate. This authority may be either a specific law or a regulation. The success with which the State is able to regulate all components of the shellfish industry provides a measure of the adequacy of the statutory authority.

The unique nature of shellfish as a food eaten whole and raw also makes it necessary that the Authority have authority to take immediate emergency action to halt sale and distribution of shellfish without recourse to lengthy administrative procedures. As an example, a State may find it necessary to detain lots of shellfish following reports of illness traced to a certain source of shellfish before confirmatory laboratory analysis can be conducted to document the causative agent. In taking such action, the responsible regulatory agency should be cognizant of the need to use rapid analytical methods for determining status of these highly perishable products. Periodic revisions of State shellfish laws or regulations may be necessary to cope with new public health hazards and to reflect new knowledge. Examples of changes or developments that have called for revision of State laws include the construction of depuration plants, changes in conservation laws, or the exploitation of a new resource.

State officials who certify dealers must fully comply with the requirements for certification for the process to remain viable. Certification is intended to provide an unbroken chain of sanitation control to a lot of shellfish from the moment of harvest to its sale at the wholesale or retail level. For the certification process to be effective, certified dealers must fully comply with the applicable sanitation requirements pertaining to the type of operation involved.

The minimum plant sanitation and management guidelines for interstate shellfish shippers are described in NSSP Model Ordinance Chapters XI., XII., XIII., XIV., and XV. Only those shellfish firms that meet the guidelines are eligible for certification as Interstate Certified Shellfish Shippers and may be listed in FDA's monthly publication of the Interstate Certified Shellfish Shippers List (ICSSL). Plants having major nonconformities should not be certified and certified plants found to have major nonconformities should have their license or permits suspended or certification canceled. Food control officials throughout the United States use the "List" to determine that shellfish offered for sale or used in food service establishments have been produced under the sanitary guidelines of the NSSP. These officials are asked to rely upon the certification process by not holding up shipments or sales of shellfish lots pending examination.

Inspections of certified shellfish dealers should be conducted at such frequency as is necessary to assure compliance with NSSP requirements. The recommended frequency of inspection of certified shellfish dealers is:

Depuration plants (when operating):	at least monthly
Shucker packers and repackers:	at least quarterly
Shellstock shippers and reshippers:	at least semi-annually

To conduct effective inspections, it is necessary that inspectors have adequate equipment and supplies to measure compliance with applicable requirements. Since the type of equipment and supplies required for an inspection will vary with the type of establishment, it is recommended that a checklist of equipment be developed for each dealer classification.

.05 -.07 Shellstock Identification, Shucked Shellfish Labeling, Shipping Documents and Records

The NSSP requires that the product be identified with certain information showing that the shellfish were harvested by licensed diggers and shipped and processed by certified dealers. This information assists in tracing the product back through the distribution system to the growing area in the event the shellfish are associated with a disease outbreak. The requirement for placing the certificate number and shucked marking on the lid or bottom of packages holding 1873 ml (64 fluid ounces) or more is to discourage re- use of these containers for illegal purposes.

In case of an outbreak of disease attributable to shellfish, it is necessary that health departments and other appropriate State and Federal agencies be able to determine the source of contamination, and thereby to prevent any further outbreaks from this source. This can be done most effectively by following the course of a shipment, through all the various dealers who have handled it, back to the point of origin by means of records kept by the shellfish dealers. Maintaining adequate records is considered by some industry members to be a burden. This has resulted in various unacceptable practices being encountered by health officials, including no written records of purchase, undated shippers tags maintained in an unordered manner, new shipping tags being placed on a lot without records to correlate the original identity of the lot with the new identity, and shellfish on the premises with no tags. Although these dealers often have "records" in the most general sense, these records are not in the form that meets the intent of the NSSP certification requirement to provide traceability on a lot-by-lot basis. As a result, follow-up investigations of disease outbreaks have been stymied, identification of the cause of the outbreak has been delayed, and outbreaks have continued. The NSSP Guide Section V. Suggested Forms contains an example of a typical ledger that may be used to provide the required information.

An example where the failure to maintain adequate records was identified as one of the principal contributing factors to a series of continuing disease outbreaks was in 1981 and 1982. The outbreaks continued for several months and affected thousands of people. An investigation by the States involved and FDA revealed that some States were unable to enforce the record keeping and tagging requirements of the NSSP. FDA found in one State that approximately one-third or the certified dealers inspected failed to maintain adequate records. State officials realized that an improved labeling or manifest system was needed to track shellfish in the marketplace back to the distributor and to the digger. However, they also recognized that no single source identity and record keeping system would be applicable to all situations in each State. Therefore, specific requirements should be developed by each State to achieve the NSSP requirements.

Additionally, the Federal Food, Drug and Cosmetic Act requires that food labels provide an accurate statement which includes the name and address of either the manufacturer, packer, or distributor; the net amount of food in the package; the common or usual name of the food; and the ingredients, unless the product conforms to standard of identity requirements. Foods shipped in interstate commerce having labels that do not meet these requirements are deemed misbranded and in violation of Section 405 of the Food, Drug and Cosmetic Act.

.08 Wet Storage in Artificial Bodies of Water

The purposes of wet storage are the temporary storage of approved shellfish, de-sanding and improving palatability. Wet storage facilities are not designed and operated to increase safety of the shellfish. Therefore, all controls pertaining to shellfish for direct consumption should be applied.

The types, locations, and purposes of wet storage operation are highly variable and may range from temporary storage near shore in approved areas to onshore tanks using recirculating, synthetic seawater for the purpose of de-sanding and salt uptake. Consequently, it is not possible to provide detailed guidelines in the Model Ordinance and it is necessary for each separate operation to be developed and evaluated on its own merit with respect to overall program guidelines.

Removing shellfish from growing beds to storage areas close to shore and habitations may subject such shellfish to constant or intermittent pollution. Shellfish in wet storage tanks are similarly subjected to pollution if the tank water is obtained from a polluted source. An example of such contamination is the 1956 outbreak of infectious hepatitis in Sweden (691 cases) attributed to oysters contaminated in a wet storage area.

Shellfish on floats near shore may be more directly exposed to potential contamination from boats and surface runoff than are shellfish in their natural growing areas. Therefore, particular emphasis should be placed on a sanitary survey of the vicinity to assure that chance contamination does not occur.

Careful consideration must be given to designing and operating onshore wet storage tanks to assure that shellfish are not contaminated during holding or do not die from physiological stresses such as low dissolved oxygen and unsuitable temperatures or salinity. Excessive mud on the shells and dead shellfish may increase bacterial loads in the tanks and lead to increased microbial levels in the shellfish during storage. Hence, washing and culling the shellfish prior to storage is essential.

Proper hydraulic design of the tank is important to assure an adequate quantity and quality of water with minimum turbulence at suitable temperatures to achieve the intended purpose of the storage operation. Inadequate flow or "dead spots" can lead to oxygen deficiency and shellfish mortality if the shellfish are physiologically active. Minimum turbulence will permit feces and pseudo-feces generated by active shellfish to settle out without being resuspended and ingested. Tanks fabricated with safe material, which are easily cleanable, will prevent possible adulteration with chemicals migrating from the tank into the water and will facilitate cleaning and sanitizing.

Commingling of bivalve mollusks with other species in tanks may subject the bivalve mollusks to contamination from pathogenic organisms from the non-molluscan animals. Fish, crabs, lobsters, and other marine species may be harvested from polluted areas and may have ingested pathogens or accumulated them on their body surfaces. Therefore, holding such animals in the same tank with bivalve mollusks presents a risk of cross contamination. This risk can be avoided by using separate tanks for non-bivalve molluscan species. Where the same water is used for all tanks, effective disinfection must be provided prior to entering the tank holding the bivalve species.

Chapters XI., XII., XIII., and XIV. - Shellfish Processing and Handling

Requirements for Dealers

.01 Critical Control Points

[NOTE: these Critical Control Points apply to Chapters XI., XII., XIII., and XIV. as appropriate to the activity being conducted and as required in the Model Ordinance.]

A. Receiving Critical Control Point.

Certified dealers are responsible to assure that shellfish purchased for direct sales, further shipments, or processing are safe and wholesome. The safety of shellfish is predicated on the cleanliness of the growing area waters from which they are obtained and the sanitary practices applied during harvesting and shipping. The positive relationship between sewage-polluted shellfish and enteric disease has been demonstrated many times. If the water in which shellfish are grown is polluted, it may be assumed that the shellfish will also contain pathogenic bacteria or viruses capable of causing disease in man. Harvesters and shippers must provide information necessary to create a record of the origin, quantity, and date of harvest, which can be used to trace lots of questionable shellfish back to the sources(s).

B. Shellstock Storage Critical Control Point.

There is evidence that some pathogenic organisms will survive in shellfish for a considerable length of time after harvesting and that some bacterial pathogens may multiply in the absence of adequate refrigeration.

C. Processing Critical Control Point.

The bacteria count of the final pack is related to the elapsed time after shucking when the shellfish are held at temperatures favorable to the rapid growth of bacteria. Factors which influence the length of time required to lower the temperature of shucked shellfish to 7.2 °C (45 °F) include the temperature of blower or other process water, the speed of the individual shucker or shucking machinery, the frequency with which the shucking containers are delivered to the packing room, ambient air temperature in the plant, and the temperature of the shellstock being shucked. To maintain optimum bacteriological quality, it is preferable that the elapsed time between shucking and cooling to a temperature of 7.2 °C (45 °F) does not exceed four (4) hours. More rapid processing is very desirable.

D. Shucked Meat Storage Critical Control Point.

Shucked shellfish are an excellent medium for the growth of bacteria. Thus, it is very important that the packaged shellfish be cooled and refrigerated promptly so that bacteria growth is minimized. Studies have shown that bacterial growth is significantly reduced at storage temperatures of less than 7.2 °C (45 °F) and that storage in wet ice is the most effective method for refrigeration of shucked meats.

.02 Sanitation Requirements

[NOTE: these General Sanitation Requirements apply to chapters XI., XII., XIII., and XIV. as appropriate to the activity being conducted and as required in the Model Ordinance.]

A. Safety of Water for Processing and Ice Production.

Water should be safe and sanitary to avoid contamination of food-contact surfaces and the product. Ice may become contaminated by non-potable water or may become contaminated during freezing or in subsequent storage or handling. When non-hermetically sealed containers of shellfish are stored in unsanitary ice, a partial vacuum may form within the containers and draw water from the melting ice into the container and contaminate packed shellfish. Special attention should be given to ice used for direct contact chilling of shellfish meats to assure that the ice is of acceptable quality. Water used for shellstock washing should be of good quality, to avoid possible contamination of the shellstock. The organisms causing typhoid fever, hepatitis, and other gastrointestinal diseases may be present in the body discharges of cases or carriers, and thus be present in the drainpipes in the plants. Correctly installed plumbing protects the water supplies against cross connections and back-siphonage.

B. Condition and Cleanliness of Food Contact Surfaces.

Colanders, shucking pails, skimmers, blowers, and other equipment or utensils which come into contact with the shucked shellfish and which have cracked, rough, or inaccessible surfaces or are easily cracked or chipped, or which are made of improper material, are apt to harbor accumulations of organic material in which bacteria or other microorganisms may grow. These microorganisms may later cause illness among those who eat the shellfish or spoilage in the shucked shellfish. Slime and foreign material, which accumulate in blower pipes below the liquid level, afford an excellent breeding place for bacteria. This material may be dislodged and forced into the batch of shellfish in the blower, thus increasing the bacterial content of the shellfish. Cleaned and sanitized equipment and utensils reduce the chance of contaminating shellfish during shucking and processing. Shellfish furnish an excellent growth medium for spoilage microorganisms, and small numbers of these microorganisms on improperly sanitized equipment may multiply to very high levels in the finished pack. Use of sanitizers is not effective unless the equipment is first thoroughly cleaned and rinsed.

C. Prevention of Cross Contamination.

The nature of shellfish operations is such that the shellfish require protection from undesirable microorganisms, chemicals, filth, or other extraneous materials. This protection is achieved by properly selecting the plant location so that it is not contaminated by floodwaters. It is normal during shucking operations for a shucker's clothing to become very soiled. If shuckers enter the packing room, shucked stock, cans, and other equipment may become contaminated. A delivery window has proven to be an effective means of keeping shuckers out of the packing room. If shellstock are stored where polluted ground or surface water or floor drainage can accumulate, the shellstock may become contaminated.

D. Maintenance of Hand Washing, Hand Sanitizing, and Toilet Facilities.

Hand washing by employees is an important public health measure. Providing convenient, properly

constructed and plumbed facilities, supplied with soap and towels encourages employees to wash hands frequently and correctly. Washing of hands with soap and drying with single service towels or a hand-drying device improves the sanitizing of the hands. Disease-causing microorganisms may be present in body discharges of employees that are cases or carriers of communicable disease organisms. When sewage disposal facilities are of a satisfactory type, there is less possibility that the shellfish being processed may become contaminated with fecal material carried by flies, rodents, or by other means.

E. Protection from Adulterants.

Shielded light fixtures help protect the food, equipment, and employees from glass fragments should the fixture break. Ventilation, plumbing, and air intakes for blowers can all introduce adulterants into the area where shellfish are stored or processed. Care must be exercised to prevent the entrance or leakage of adulterants. Shellfish can also be contaminated by hydraulic fluid or other lubricants, dirt or other filth, or contaminated ice. Care must be used to prevent adulterants in these items from contacting shellfish.

F. Proper Labeling, Storage, and Use of Toxic Compounds.

In order to reduce the potential for contamination, stored poisonous or toxic materials should be limited to those necessary to maintain the establishment. Proper labeling, use, storage, and handling are essential to prevent accidental contamination of shellfish and to assure the safety of workers and the consumer.

G. Control of Employees with Adverse Health Conditions.

It is considered good public health practice for any person who, by medical examination or supervisory observation, is shown to have, or appears to have, an illness, open lesion, including boils, sores, or infected wounds, or any other abnormal source of microbial contamination by which there is a reasonable possibility of food, food-contact surfaces, or food-packaging materials becoming contaminated, to be excluded from any operations which may be expected to result in such contamination until the condition is corrected. Personnel should be instructed to report such health conditions to their supervisors.

H. Exclusion of Pests.

Controlling flies, cockroaches, and other insects may prevent shellfish and food-contact surfaces from being contaminated with disease organisms. Controls should be directed at preventing the entrance of insects, rodents, and other vermin into the building, and at depriving them of food, water, and shelter.

.03 Other Model Ordinance Requirements

A. Plants and Grounds.

The plant and building facilities should be kept clean so as to minimize the chance of contamination of shellfish during processing. Rooms or lockers should be provided for clothing, aprons, and gloves to eliminate the tendency to store such articles on the shucking benches or in packing rooms, where they interfere with plant clean up and operations. Properly graded floors, of durable, impervious material, maintained in good condition, permit rapid disposing of liquid and solid wastes, and facilitate easy

cleaning of the plant. Smooth, washable walls and ceilings are more easily kept clean and are, therefore, more likely to be kept clean. A light colored paint or finish aids in the distribution of light and in the detection of unclean surfaces. Clean walls and ceilings are conducive to sanitary handling of shellfish. Maintaining the plant grounds and using physical barriers provides protection from filth, chemicals, microorganisms, or other extraneous materials. Miscellaneous equipment and articles may interfere with plant operations and make clean up more difficult.

B. Plumbing and Related Facilities.

Adequate toilet and hand washing facilities, including running water, soap, and sanitary drying facilities also are essential to personal cleanliness of the workers. Adequate floor drainage and backflow preventers are installed where appropriate. Drainage or waste pipes are not installed over shellfish processing or storage areas; nor, are they installed in areas in which shellfish containers and utensils are stored. Such precautions will minimize the potential for cross contamination.

C. Utilities.

Adequate lighting encourages and facilitates keeping rooms, equipment, and the product clean by making dirt and unsanitary conditions conspicuous. Comfortable working conditions increase the efficiency of the workers, and may promote sanitary practices. Adequate ventilation reduces condensation and aids in retarding the growth of mold. Excessive temperatures also promote growth of spoilage microorganisms in shellfish and on food-contact surfaces.

D. Insect and Vermin Control.

Controlling flies, cockroaches, and other insects may prevent shellfish and food-contact surfaces from becoming contaminated with disease organisms. Controls should be directed at preventing the entrance of insects, rodents, and other vermin into the building, and at depriving them of food, water, and shelter. Fly control measures, such as insecticide spraying, may also be necessary on the shell pile.

E. Disposal of Other Wastes.

Shellstock shipping and shucking facilities can protect against infestation by vermin if building entrances are protected, the grounds do not provide harborage, and there is no food available in the buildings or on the grounds. Removing shell and organic processing wastes from the plant and properly disposing of these wastes can play a key role in controlling vermin. Methods found to be suitable for removing these materials without contaminating the shucked product include conveyors, baskets, barrels, wheelbarrows, and shell drop-holes. When shells are to be temporarily piled or stored on the premises, special controls may be needed. Organic wastes, including culled shellfish, clam siphons, and surf and ocean quahog viscera, need to be discarded into separate containers from the shells in the plant during shucking. These wastes can then be disposed of separately from the shell at, for example, a landfill. Proper disposal and prompt removal of shell and non-edible wastes from the plant also makes it possible to keep the premises clean, and decreases the likelihood that any product or food-contact surfaces will become contaminated.

F. Equipment Construction for Non-Food Contact Surfaces.

Unless shucking benches, stands, blocks, and stalls are made of smooth material and are easily cleaned, they will become very dirty and may contaminate the shellfish.

G. Cleaning of Non-Food Contact Surfaces.

Determining an adequate cleaning procedure for facilities and equipment will depend upon which method of sanitizing is selected and what equipment and utensils are identified to be washed in a sink or washed "in place." Detergents and brushes, including special brushes that may be needed for cleaning equipment, such as blower lines, should be available. Cleaning and sanitizing of equipment and utensils should be initiated immediately after processing operations are finished. Postponing clean-up operations results in more difficult cleaning, creates conditions conducive to growth of bacteria and mold, which may not be completely removed, and may result in product contamination.

H. Shellfish Storage and Handling.

The sanitary requirements for individual shellfish dealers are variable since they may engage in several different phases of processing and distribution. Some shellstock shippers may have only a truck that is used to ship shellstock from a harvester to a processor or the market. Other shippers must have a building where shellstock is stored, repacked, or labeled. Consequently, the applicable sanitary controls must be based on an evaluation of the individual characteristics of the operation. Single-service and single-use containers, which have not been stored and handled in a sanitary manner, may become contaminated and thus may contaminate the packaged shellfish. Unacceptable practices that can interfere with the prompt handling, packing, and refrigerating of shellfish include holding shucked meats at the shucking station for prolonged periods, return of overage to the shucker, and bench grading of shucked meat.

I. Heat Shock.

The primary objective of heat shock is to facilitate shucking of shellfish. Due consideration in developing the scheduled process must be given to a large number of factors which affect the heat shock process. Heat penetration into the shellfish will vary with species and size. Even regional variations in shell thickness and shape may affect the length of time required to reach the desired internal temperature. The temperature and time of exposure must be such that the adductor muscle is sufficiently relaxed to open easily but must allow the shellfish to remain alive. The scheduled process may be developed from studies conducted by the State, by a knowledgeable processor in cooperation with authorities, by shellfish experts such as university biologists, or by any other person with adequate knowledge of the technical control procedures. The person responsible for developing the scheduled process should retain all records of process operations so the FDA may review them and authority if questions arise regarding the adequacy of the scheduled process or its use.

J. Post-Harvest Processing.

V. vulnificus has been identified as an organism of concern to at-risk consumers of shellfish. Post-harvest treatments which can demonstrate that the process achieves end point criteria of non-detectable (<30 MPN/gram) for *V. vulnificus* can provide a product that has a reduced level of risk for these at-risk consumers. Applying those processes enables the dealer to label treated products "Processed to reduce *V. vulnificus* to non-detectable levels."

K. Toxic Materials.

Proper labeling, use, storage, and handling are essential to prevent accidental contamination of shellfish and to ensure the safety of workers and the consumer.

L. Personnel.

Disease producing agents may be carried on the hands of shuckers and packers unless proper hand washing is practiced. Finger cots, gloves, and shields, unless effectively sanitized periodically, will accumulate bacteria that may contaminate the shucked shellfish. Employees handling shucked shellfish need to sanitize their hands as an added public health control practice.

M. Supervision.

Hand washing by employees is an important public health measure. Unless someone is made specifically responsible for this practice, it is apt to be forgotten or overlooked. Similarly, one (1) person must be responsible for plant clean up. In general, it is considered to be good practice to clearly assign supervisory personnel the responsibility for assuring compliance by all personnel with all requirements.

Chapter XV. Depuration

Requirements for the Authority

@.01 Administration

Depuration is intended to reduce the number of pathogenic organisms that may be present in shellfish harvested from moderately polluted (restricted) waters to such levels that the shellfish will be acceptable for human consumption without further processing. The process is not intended for shellfish from heavily polluted (prohibited) waters nor to reduce the levels of poisonous or deleterious substances that the shellfish may have accumulated from their environment. The acceptability of the depuration process is contingent upon the Authority exercising very stringent supervision over all phases of the process.

The depuration process shall be under the effective supervision of the Authority. The Authority shall have a management plan which details procedures for regulating the harvesting from restricted areas; controlling the transport of shellfish between the harvest area and to the depuration plant; approving plant design and operation, including subsequent changes; certifying and inspecting plants in accordance with the requirements of the NSSP Model Ordinance*;* and, prohibiting interstate shipments in the event that nonconformities are found which compromise the validity of the process. A Memorandum of Understanding (MOU) shall be developed between appropriate Authorities when more than one (1) Authority is involved in the management plan.

Extensive administrative procedures are essential if the Authority is to adequately control a very complex operation such as depuration. There are numerous critical control points where significant deviation can result in the distribution of contaminated shellfish. Control over the harvesting areas is needed to ensure that the shellfish are not so contaminated that cleansing will be inadequate. Adequate control measures must be taken to prevent diversion of non-depurated shellfish into the marketplace. Shellstock delivered to the depuration plant must be properly identified with information necessary to trace each harvest lot back to the harvest area, date of harvest, and harvester or group of harvesters.

Shellfish destined for depuration plants shall be protected as necessary during harvesting and transporting to prevent further contamination and undue physiological stress that could reduce the effectiveness of the depuration process. Thermal and physical shock can adversely affect the pumping action of shellfish and reduce the rate of elimination of microorganisms. Additional contamination of the shellfish during harvest could raise bacterial levels to such a point that adequate depuration will not occur. Thermal abuse may also cause bacterial levels to reach the point that depuration may not be effective in 48 hours. The types of protection that may be provided to prevent thermal abuse include; but, are not limited to: furnishing shade in warm weather; providing refrigeration in transit; ensuring rapid transit to the depuration plant; preventing freezing in cold weather; preventing breakage of shells; and, optimizing holding or storage time before depuration.

Depurated shellfish require an increased level of control compared to shellfish from approved areas because of the increased potential for contamination. These controls must include packaging and labeling that will serve to help identify the deputation cycle of each harvest lot and to deter illegal commingling of non-depurated shellfish with depurated shellfish. Such controls include prohibition against commingling of harvest lots during packing, tags that identify the shellfish as being depurated, and a prohibition

against repackaging after the shellfish leave the depuration plant. It is recommended that tamper-evident seals be used on the packages as a further deterrent. Design, construction and operation of the plant must adhere to guidelines established in the NSSP Model Ordinance. Finally, the inspection program must be adequate to detect critical deviations and to effect immediate correction or prevent the sale of suspect shellfish.

Requirements for the Depuration Processor

.01 Critical Control Points

A. Receiving Critical Control Point

Shellfish intended for depuration must be harvested only from growing areas meeting the water quality requirements for approved, conditionally approved, restricted, or conditionally restricted areas in the open status.

It has been amply demonstrated that shellfish harvested from prohibited areas should not be used for depuration. Depuration studies have been conducted on the relationship of initial levels of indicator bacteria and viruses to the levels of these indicators after varying lengths of time. These studies have indicated that consistent reductions of both bacteria and viruses to low levels can be achieved with moderately polluted shellfish, but satisfactory results cannot be obtained with heavily contaminated shellfish.

It is also essential that shellfish harvested from restricted or conditionally restricted areas be controlled so these shellfish are not illegally diverted and sold. This usually necessitates special procedures for monitoring harvest operations and tagging the shellfish. Methods that may be employed include the use of specially designed, labeled, or colored containers; or the use of colored or distinctly shaped tags. If shellfish are transported in bulk, other methods to distinguish the shellfish as originating from restricted or conditionally restricted areas may need to be employed. Recommended measures include continuous surveillance of the boat or truck, transporting in trucks sealed with a serially numbered, tamper-evident seal, or a count by the Authority of the quantity shipped and quantity received at the depuration plant.

B. Processing Critical Control Points

Depuration is a complex biological process. Individual species respond in different ways to various combinations of operational criteria including water turbidity, salinity and temperature, depth of shellfish in the baskets, and tank design. Consequently, it is necessary to establish process effectiveness on a continuous basis. Continuous process verification is accomplished by comparing the means and variability of end-product data from consecutive harvest lots for each species of shellfish harvested with species- specific critical limits for these parameters established empirically through extensive field work. The depuration process is considered to be verified or operating effectively for the harvest lot and species harvested if the end-product data meets these established species-specific critical limits. New harvest areas, harvest areas having little end-product data, and harvest areas which have failed process verification are all subject to addition, more rigorous requirements under the conditional protocol. This process is designed to prevent potentially adulterated shellfish from unproven or ineffective depuration

from reaching the marketplace.

C. Finished Shellstock Storage Critical Control Point

Depurated shellfish must be stored in a manner that maintains quality and prevents the shellfish from becoming contaminated. Two (2) options are available to meet this requirement. The first is to bring and maintain the product under appropriate temperature control 7.2 °C (45 °F) by icing or refrigeration. In this way any low levels of bacteria that remain in the shellfish after depuration will be prevented from growing and reaching the point at which they may become harmful. The second option is to wet store depurated shellfish in waters of appropriate sanitary quality which meet the requirements of Chapters VII. or X. in the NSSP Model Ordinance.

.02 Sanitation

A. Safety of Water for Processing and Ice Production.

The source of the process water and the water treatment system must be such that an adequate volume and quality of process water can be provided to accomplish effective depuration. Currently all plants in the United States use ultraviolet light (UV) for disinfection of process water. Numerous studies have shown UV treatment to be highly effective for inactivating bacteria and viruses provided the units are properly operated and maintained. In choosing a UV treatment system, consideration should be given as to whether the process water will be recirculating or flow through and whether the type of plant and flow rate is compatible with the UV treatment system.

As with any disinfection system, microbial inactivation is strongly dependent on the dose-time relationship which, for UV treatment is primarily a function of water depth and turbidity. Contact time is a function of the flow rate of the water and cross-sectional area or volume of the unit. In order for the UV lights to remain effective, the tubes must be kept clean to prevent build-up of materials which reduce radiation intensity. The amount of radiation must be monitored and the UV tubes replaced when they are no longer effective.

Ozone has been used for many years in Europe for treating depuration process water. Care must be taken in using ozone or other chemicals which may react with organic and inorganic components in the water to form compounds which adversely affect physiological activity. Disinfection with ozone and other chemicals could constitute a food additive situation requiring FDA approval before use.

Ice should be produced using potable water to avoid contamination. Care should also be exercised to avoid contamination of the ice during freezing or in subsequent storage and handling.

Shellfish washing should make use of water of good sanitary quality to avoid possible contamination or added contamination of the shellfish. Whatever the source, shellfish wash water must be of the sanitary quality of potable or drinking water.

B. Condition and Cleanliness of Food Contact Surfaces.

The need to effectively clean and sanitize processing tanks, containers and pipes carrying process water is well established. The inadequate cleaning and sanitizing of process equipment can result in microorganisms being resuspended in the process water and increasing the bacterial loading to such a level that adequate depuration will not occur.

Processing tanks and containers used to hold shellfish that have cracked, rough or inaccessible surfaces, or made of improper material, are apt to harbor accumulations of organic material in which bacteria, including pathogens, may reside and grow. Such organisms can be regularly introduced into the system and these potentially may contaminate the shellfish. Surfaces, therefore, must be smooth and easily cleanable if bacteria are to be flushed out in the cleaning and sanitizing process. Surfaces that cannot be cleaned can result in inconsistent depuration effectiveness, and, possibly, the reintroduction of pathogens into the shellfish.

C. Prevention of Cross Contamination.

Shellfish must be stored in a manner that will protect them from contamination while in dry storage and at transfer points. Employees should be encouraged to practice good personal hygiene, as they may be a source of cross-contamination.

D. Maintenance of Hand Washing, Hand Sanitizing, and Toilet Facilities.

Adequate toilet, hand washing and sanitizing facilities must be provided. Hand washing by employees is an important public health measure. Providing convenient, properly constructed and plumbed facilities, supplied with soap and towels encourages employees to wash their hands frequently and correctly. Washing of hands with soap and drying with single service towels or a hand-drying device improves the sanitizing of the hands.

E. Protection from Adulterants.

Shielded light fixtures help protect the shellfish from contamination with glass fragments should the fixture break. Ventilation, plumbing, and air intakes can all introduce adulterants into the area where shellfish are stored or processed. Shellfish can also be contaminated by hydraulic fluid or other lubricants, dirt or other filth, or contaminated ice. Care must be used to prevent adulterants from any source from contacting the shellfish or shellfish contact surfaces.

F. Proper Labeling, Storage, and Use of Toxic Compounds.

In order to reduce the potential for contamination, stored poisonous or toxic materials should be limited to those necessary to maintain the plant. Proper labeling, use, storage, and handling are essential to prevent accidental contamination of shellfish and to assure the safety of workers and the consumer. Only those chemical agents necessary for plant operations shall be present in the plant and shall be used only in accordance with labeling.

G. Control of Employees with Adverse Health Conditions.

It is considered good public health practice for any person who, by medical examination or supervisory observation, is shown to have, or appears to have an illness, open lesion, including boils, sores, or infected wounds, or any other abnormal source of microbial contamination by which there is a reasonable possibility of shellfish, shellfish contact surfaces, or shellfish packaging materials becoming contaminated, to be excluded from any operations which could be expected to result in such contamination until the condition is corrected. Personnel should be instructed to report such health conditions to their supervisors.

H. Exclusion of Pests.

Controlling flies, cockroaches, and other insects may prevent shellfish and shellfish contact surfaces from being contaminated with disease causing organisms. Controls should be directed at preventing the entrance of insects, rodents, and other vermin into the plant and at depriving them of food, water, and shelter.

.03 Other Model Ordinance Requirements

A. Plants and Grounds.

Physical facilities of the plant including the processing system shall be kept in good repair, and are cleaned and sanitized as necessary. No miscellaneous equipment is stored in processing or holding areas. The plant and building facilities should be kept clean so as to minimize the chance of contamination of shellfish during processing. Rooms or lockers should be provided for clothing, aprons and gloves to eliminate the tendency to store such articles where they may interfere with plant cleanup and operations. Properly graded floors, of durable, impervious material, maintained in good condition, permit rapid disposing of liquid and solid wastes, and facilitate easy cleaning of the plant. Smooth, washable walls and ceilings are more easily kept clean and, therefore, are more likely to be kept clean. A light colored paint or finish aids in the distribution of light and in the detection of unclean surfaces. Clean walls and ceilings are conducive to sanitary handling of shellfish. Maintaining the plant grounds and using physical barriers provides protection from filth, chemicals, microorganisms, or other extraneous materials. Miscellaneous equipment and articles may interfere with plant operations and make cleanup more difficult.

The grounds about a depuration plant must be free from conditions that may result in contamination of shellfish at any time during processing and storage. The plant building or structure shall be suitable in size, construction, and design to prevent contamination of shellfish by animals and other pests; to keep untreated and treated shellfish separate; and to facilitate adequate cleaning, sanitizing, operation, and maintenance of the depuration facilities. Processing tanks, containers, piping and conveyances must be enclosed within a protective structure.

It is essential that depuration plants be designed and constructed so shellfish will be adequately protected and consistently depurated. Research on the depuration process and experience gained in commercial facilities has led to some generally accepted standards that are critical for effective depuration. Other design and construction criteria are less clearly defined, and only general guidance is available. Additionally, the plant must be designed and constructed so adequate cleaning and sanitizing can be accomplished, and to facilitate proper operation.

B. Plumbing and Related Facilities.

Adequate toilet and hand washing facilities, including running water, soap, and sanitary drying facilities are essential to personal cleanliness of the workers. Adequate floor drainage and backflow preventers are installed where appropriate. Drainage or waste pipes are not installed over shellfish processing or storage areas; nor, are they installed in areas in which shellfish containers and utensils are stored. Such precautions will minimize the potential for cross contamination.

C. Utilities.

Adequate lighting encourages and facilitates keeping rooms, equipment, and the product clean by making dirt and unsanitary conditions conspicuous. Comfortable working conditions increase the efficiency of the workers, and may promote sanitary practices. Adequate ventilation reduces condensation and aids in retarding the growth of mold. Adequate ambient temperature control prevents excessive temperatures that promote growth of spoilage microorganisms and potential pathogens in shellfish and on shellfish contact surfaces.

D. Insect and Vermin Control.

Controlling flies, cockroaches, and other insects may prevent shellfish and shellfish contact surfaces from becoming contaminated with disease causing organisms. Controls should be directed at preventing the entrance of insects, rodents, and other vermin into the plant and at depriving them of food, water, and shelter.

E. Disposal of Wastes.

Depuration facilities can protect against infestation by vermin if building entrances are protected, the grounds do not provide harborage, and there is no food available in the plant or on the grounds. Removing shell culled shellfish and organic processing wastes from the plant and properly disposing of these wastes can play a key role in controlling vermin. Proper disposal and prompt removal of shell and non-edible wastes from the plant make it possible to keep the premises clean and decreases the likelihood that any shellfish or shellfish contact surfaces will become contaminated.

F. Equipment Construction for Non-Food Contact Surfaces.

Unless storage and handling equipment are made of smooth material and are easily cleaned, they will become very dirty and may contaminate the shellfish.

G. Cleaning of Non-Food Contact Surfaces.

Cleaning of the non-food contact surface equipment must be performed in a manner and at a frequency that will preclude the potential for contamination of the shellfish or shellfish contact surfaces.

H. Shellfish Storage and Handling.

Washing of shellfish prior to depuration rids shells of sand, mud, and detritus that may interfere with depuration and may make tank cleaning difficult. The type of harvest method may negate the need for additional washing however. At other times, thorough washing at the plant may be necessary to adequately remove mud. Depurated shellfish shall be washed and culled after depuration and packaged in clean containers fabricated from safe materials. Different harvest lots of shellfish must not be commingled during packing. After depuration, washing removes feces and pseudo-feces that may cling to shells and may re-contaminate the shellfish meats during processing or consumption. Non-depurated shellfish must be stored in a manner that maintains their physiological ability to cleanse themselves and prevents post- harvest contamination. Otherwise, depuration may not be effective. Depurated shellfish must be stored in a manner that will maintain their quality and prevent recontamination.

I. Personnel.

Personnel are not allowed to store clothing or other belongings, eat, drink or smoke in areas where shellfish are processed or stored. Such activities could lead to cross contamination of the shellfish or shellfish contact surfaces.

J. Supervision.

Management shall clearly designate a knowledgeable and competent individual to be present at the plant and be accountable that appropriate operating procedures and proper personal hygiene practices are followed. The supervisor will also maintain complete and accurate records that will permit each batch of depurated shellfish to be traced back to its source, and will account for all product sample results and measurements of critical parameters for each cycle. One (1) person must be responsible for plant cleanup. In general, it is considered to be good practice to clearly assign supervisory personnel the responsibility for ensuring compliance by all personnel with all requirements.

K. Plant Operating Manual.

The plant must prepare a written Depuration Plant Operations Manual (DPOM). A copy of this Manual must be kept in a location that is accessible to plant personnel responsible for the depuration activity. The DPOM will be kept current and contain all the information and records relevant to the operation of the depuration plant, and will be formatted to include the following:

(1) Introduction.

The introduction must contain information relative to the current status of the DPOM (create, revise, update, etc.), ownership of the plant, proposed schedule of operation, potential harvest areas and plant capacity.

(2) Description of the Facility.

The DPOM must contain site plan drawings for the plant, the facility layout including a detailed schematic of the entire depuration system, a schematic drawing of the process, shellfish flow diagram showing the movement of the shellfish throughout the plant, and a schematic of the process water delivery and distribution system. Essentially, the documentation provided should show that the plant has the capability to achieve effective depuration of the shellfish, provide adequate storage before and after depuration, and prevent commingling of both depurated and non-depurated shellfish and treated shellfish from different harvest lots.

(3) Design Specifications of the Depuration Unit.

During design and construction of depuration systems, careful consideration must be given to hydraulic flow through the tank. Non-uniform flow may result in dead spots and oxygen depletion that lead to inadequate depuration at some locations in the tank. Choice of' design criteria may be based on existing studies or new studies which verify effectiveness of any new designs. Furfari reports accepted design criteria for tank loading rates, water flow, and container arrangement. Tank water volume is recommended to be at least 6,400 liters per cubic meter of shellfish (eight [8] cubic feet of water per U.S. bushel) for hard clams and eastern oysters and 4,000 liters per cubic meter of shellfish (five [5] cubic feet per bushel) for soft clams. A minimum flow rate of 107 liters

per minute per cubic meter of shellfish (one [1] gallon per bushel) is recommended to maintain adequate oxygen levels. A clearance space of at least 7.6 cm (three [3] inches) is recommended for separating containers of shellfish in the tanks and between the shellfish containers and the bottom and sides of the tanks.

(4) Laboratory to be Utilized for Microbial Analyses.

Sample analyses shall be conducted by a laboratory approved by the Authority pursuant to the requirements of Chapter III. in the NSSP Model Ordinance. Use of an approved laboratory ensures the quality and reliability of the analytical results.

(5) Depuration Process Monitoring.

If shellfish are released for sale before they are adequately depurated, adulterated shellfish may reach the market. It is essential; therefore, to implement an adequate sampling program designed to determine if critical environmental conditions are being met and if the shellfish being released to the market meet accepted criteria. Extensive field-testing has resulted in a set of species-specific critical limits being established which indicate the effectiveness of depuration process. These limits are referred to as the Critical Limits for the Indices of Depuration Plant Performance.

(6) Standard Operating Procedures.

Since effective depuration is dependent upon the control of a wide range of interrelated variables, it is essential that a set of Standard Operating Procedures (SOPs) be developed which specify the exact procedures to be used for every aspect of the depuration process from receipt of the shellfish to data analysis, labeling and tagging. Use of SOPs help to ensure that appropriate actions are taken at each stage in the depuration process. By so doing, the probability that effective depuration and safe handling will be achieved is considerably increased and the incidence of processing mistakes is minimized.

(7) Record Keeping.

It is essential that detailed identification information be maintained on all harvest lots and shipping containers of depurated shellfish. In the events that an outbreak of illness occurs, or a question arises concerning the product, responsible State and Federal authorities must be able to trace the implicated shellfish back to a specific depuration cycle, and to the harvest area. Additionally, maintaining complete and accurate records of all transactions serves to promote business integrity wherein all harvesters, processors, and dealers are fully accountable for their product. Records of product samples and critical parameters within the plant are necessary to determine if the plant is operating in accordance with the DPOM. Plant records should be kept for at least two (2) years in order that adequate investigations can be conducted in the event of a suspected illness and in order that the Authority can make process reviews.

L. Process Verification

Depuration is a complex biological process. Individual species respond in different ways to various combinations of operational criteria including water turbidity, salinity and temperature, depth of shellfish in the baskets, and tank design. Consequently, it is necessary to establish process effectiveness on a continuous basis. Continuous process verification is accomplished by comparing the means and

variability of end-product data for consecutive harvest lots for each species of shellfish with species-specific critical limits for these parameters established empirically through extensive fieldwork and referred to as the Critical Limits for the Indices of Depuration Plant Performance. The depuration process is considered to be verified or operating effectively for the harvest lot and species harvested if the end-product data meets the established species-specific critical limits for the Indices of Depuration Plant Performance.

New harvest areas, harvest areas having little end-product data, and harvest areas which have failed process verification are all subjected to additional, more rigorous requirements under what is known as the conditional protocol. This process is designed to prevent potentially adulterated shellfish from unproven or ineffective depuration from reaching the market.

Chapter XVI. Background & Performance of Post-Harvest Processing (PHP) Validation/ Verification Protocols

Background

A PHP to reduce the levels of pathogenic *Vibrio* spp. in shellfish, must be capable of reducing potentially high summer levels to a level that presents a negligible health risk. Cook et al. 2002 indicated that a concentration of *V. parahaemolyticus* or *V. vulnificus* of 100,000 per gram was not uncommon in market oysters harvested from the Gulf Coast during summer months. A WHO/FAO (2005) Risk Assessment indicated that a *V. vulnificus* concentration of below thirty (30) per gram is a negligible health risk. Therefore, in an attempt to validate a post- harvest process to be used throughout the year, the ISSC adopted as interim guidance, a protocol to assure that the process is capable of reducing levels of *Vibrio* spp. from an initial MPN level of 100,000/gram to <30/gram.

Obtaining an initial level of 100,000/gram was difficult to achieve consistently in some locations (even with temperature abuse) except during the hottest part of the summer. This limited the time that a validation could be conducted to three (3) months of the year or less. In an attempt to allow validation during other times of the year, the ISSC proposed a validation procedure based upon a 3.52 log reduction (this is equivalent to reducing from 100,000 to 30) regardless of the initial level. A new validation protocol was developed which specified an initial level between 10,000 and 100,000 and reduction by 3.52 logs resulting in a final concentration of <30.

Validation

Validation is the initial check of a PHP to assure that the process can reduce the concentration of *V. vulnificus* and *V. parahaemolyticus* in shellfish by 3.52 logs and to levels <30 as shown in Table 1. Determining the log reduction for validation uses knowledge of both the initial and final concentrations. The interval containing the initial concentration determines a test on a single sample for the final concentration. A multiple dilution test is preferred for finding a concentration and the single dilution for indicating whether the concentration is above a threshold. For the initial concentration, a serial dilution with three (3) tubes at each of three (3) or four (4) dilutions was chosen. Four (4) samples are taken to determine the initial concentration and the adjusted geometric mean is used to combine the MPN results. If four (4) samples from a lot of shellfish with a true concentration of 100,000 per gram are examined by the MPN procedure, the probability of the geometric mean of the MPNs showing 100,000 or greater is about fifty (50) percent. In an attempt to improve the probability of samples being accepted when the true concentration is 100,000 per gram, an adjustment factor of 1.3 was selected based upon examining tables of the probability of getting various results from simulated outcomes.

For a process to be validated, no more than three (3) samples out of thirty (30) may fail. Depending upon the initial load, failure of a single sample is determined according to the table below.

Table 1

AGM Interval	Grams Per Tube	Positive Tubes Allowed
59,995 or Greater	**.01**	**2**
37,174 – 59,994	**.01**	**1**
23,449 – 37,173	**.1**	**4**
12,785 – 23,448	**.1**	**3**
10,000 – 12,784	**.1**	**2**

The choice of intervals for each test in Table 1 tried to keep the probabilities near the original test. The original test used .01 grams/tube and allowed two (2) of the five (5) tubes to have growth. It tried to test for 30 cfu/gram. At 30cfu/gram the probability of a tube with .01 grams of homogenate not having growth equals exp (-30* .01) from a Poisson. From putting this value into a binomial at a final concentration of 30 cfu/gram a single sample has a probability of passing the original test of .88656. The table gives initial concentrations which can be converted to target final concentrations by multiplying by $30/100{,}000 \approx -3.52$ log10.

A change from one test to another was done at a concentration where the probability of passing both tests was the same distance from the probability of passing the original test. For example, an initial concentration of 59,995 becomes a target final concentration of

$$(30/100{,}000)*59{,}995=17.9985$$

At this target final concentration and .01 grams/tube the probability of two (2) or fewer growth tubes equals .96562. The probability of one (1) or fewer growth tubes equals .80751. Since .96562 - .88656 and .88656 - .80751 are equal up to rounding, the initial concentration of 59,995 was chosen as the value to change between these two (2) tests.

Since validation tries to assure that a PHP gives the desired log reduction and gets the final concentration below thirty (30) per gram, an operational characteristic curve is used to determine how well the process works. For an initial concentration, an operational characteristic curve indicates the probability of passing validation for various final concentrations.

The probability of passing validation for each pair depends on the initial and final concentrations. The initial concentration indicates which of the five (5) tests in the validation procedure is used. The final concentration and the test used give the probability of the sample passing.

The probability of passing any of the five (5) tests in the validation procedure is calculated from the final concentrations. In addition, simulations generated outcomes from the initial concentration. The adjusted geometric means for the MPNs of these outcomes indicate the probability of each of the five (5) tests given the initial concentration. The product of the probability of each test times the probability of passing with the test were added over all five (5) tests. This gives the probability a sample would pass. Calculating with a binomial gave the probability that at most three (3) of the thirty (30) samples would fail for a validation. The following table (Table 2) gives the probability of passing validation with various combinations of initial and final concentrations.

Table 2
Final Concentrations

Initial Concentration	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51
10,000	.96	.14	.00														
20,000	1	.93	.39	.04	.00												
30,000	1	.99	.89	.56	.21	.05	.01	.00									
40,000		1	.97	.85	.62	.36	.18	.07	.03	.01	.00						
50,000		1	.99	.96	.86	.69	.49	.31	.17	.09	.04	.02	.01	.00			
60,000			1	.99	.95	.87	.73	.56	.38	.24	.13	.06	.03	.01	.00		
70,000				1	.98	.93	.84	.70	.53	.36	.22	.12	.06	.03	.01	.00	
80,000				1	.99	.96	.90	.78	.63	.45	.29	.17	.09	.05	.02	.01	.00
90,000				1	.99	.97	.92	.82	.68	.51	.34	.20	.11	.06	.03	.01	.00
100,000					1	.98	.93	.84	.70	.53	.36	.23	.13	.06	.03	.01	.00

Highlighted areas represent a 3.52 log reduction between initial concentration and final concentration. The original reason for using thirty (30) samples for validation was to be able to select one (1) each week for thirty (30) weeks during the warm weather. This would have given an idea how the post- harvest process performed under various conditions throughout the summer. In order for this to be more feasible for industry, this arrangement was changed to ten (10) measurements on a single lot on each of three (3) days.

Verification

After initial validation of a PHP, verification of the process must be done monthly. In the verification process, the output of the PHP is tested to determine if it is below thirty (30) per gram. If a PHP fails verification, then it has to be revalidated in order to use labeling claims as approved by the ISSC. Any verification that is not excessively burdensome may miss some problems with the process. Consequently, if other evidence indicates a problem then action may be needed regardless of verification results.

Samples can be taken throughout a month on different lots of product. Although testing different lots could help find intermittent problems, a small processor during a slow month may not be able to test many different lots. Consequently, the decision of how many lots are tested for verification may be left up to the processor with the approval of the Authority.

In order to determine the probability of verification failures that would result in revalidation, 1000 simulations were run with each simulation mimicking nine (9) months and counting the number of passes. Nine (9) months represents the number of months in a year that oysters might be expected to have high Vibrio counts. The count for nine (9) months that passed indicates how likely the post- harvest process would be of not needing revalidation.

Based upon a verification procedure that requires thirty (30) tubes per month be tested with no more than eleven (11) of the thirty (30) tubes being positive for the process to be verified for that month and

assuming that all months are independent and identically distributed, the table (Table 3) below indicates the probability of failing verification in at least one (1) of nine (9) months and at least twice in nine (9) months for various final concentrations.

Table 3

Final Concentration	Probability of 1 failure in 9	Probability of 2 failures in 9 months
20	4	0
25	17	1
30	45	11
35	76	39
40	93	73

Example: If a final concentration of thirty (30) has been achieved by the PHP, there is an eleven (11) percent chance that revalidation will be required based upon two (2) verification failures within a nine (9) month period. Likewise, at a final concentration of thirty (30), there is a forty-five (45) percent chance that one (1)failure would occur within nine (9) months.

Cook, D.W., P. O'Leary, J.C. Hunsucker, E.M. Sloan, J.C. Bowers, R.J. Blodgett, and A. DePaola. 2002. *Vibrio vulnificus* and *Vibrio parahaemolyticus* in U.S. retail shell oysters: A national survey June 1998 to July 1999. J. Food Prot. 65:79-87.

FAO and WHO. Risk assessment of *Vibrio vulnificus* in raw oysters: Interpretative summary and technical report. 2005. Rome, Italy, FAO. Microbiological Risk Assessment Series No. 8.

Section IV. Guidance Documents

Chapter I. General

.01 Evaluation Standards

Background: 1995 Evaluation Standards Committee

As the result of an issue submitted at the 1994 ISSC annual meeting, the 1995 ISSC Evaluation Standards Committee was created. The Committee was charged with reviewing the standards of the Evaluation Research Society and making a recommendation to the ISSC as to whether these standards should be included in the NSSP and the form the inclusion should take. The Committee reviewed these standards as well as the American Evaluation Association's (AEA) *Guiding Principles for Evaluators*. The Committee recommended that the ISSC adopt the five (5) principles of the AEA. The Committee consensus was that these principles should apply to all participants of the ISSC and should be included in the FDA State program evaluation manual currently in development. The Committee also submitted a resolution to the ISSC voting delegates recommending that the principles be adopted by the ISSC and that FDA incorporate these principles into its State program evaluation manual. The ISSC adopted both the Committee's recommendation and resolution at its 1995 Annual meeting for use in the NSSP.

Evaluation Standards

In 1995, at its Annual Meeting, the ISSC adopted the following principles of the American Evaluation Association and requested that the FDA conduct its evaluations consistent with these principles.

- *Systematic Inquiry:* Evaluators conduct systematic, data based inquiries about whatever is being evaluated.
- *Competence*: Evaluators provide competent performance to stakeholders.
- *Integrity/Honesty:* Evaluators ensure the honesty and integrity of the entire evaluation process.
- *Respect for People:* Evaluators respect the security, dignity and self-worth of the respondents, program participants, clients, and other stakeholders with whom they interact.
- *Responsibilities for General and Public Welfare:* Evaluators articulate and take into account the diversity of interest and values that may be related to the general and public welfare.

.02 Procedures for Initiating a New State Program Under the National Shellfish Sanitation Program

The requirements of the NSSP are contained in its Model Ordinance. Implementation of the Model Ordinance is a shared responsibility of Federal, State, tribal and local governments and the shellfish industry. The Model Ordinance establishes the minimum requirements necessary to effectively manage and enforce an interstate program, and is written for ease of legal adoption at all levels of government. It is intended to be adopted by State and tribal regulators to address the interstate movement of shellfish. The Model Ordinance provides a uniform legal instrument for enforcement, better nationwide public health protection, and facilitates the shipment of high quality shellfish in interstate commerce.

The ISSC provides the formal structure wherein State regulatory authorities, with FDA concurrence, can change the Model Ordinance and establish other guidelines and procedures for the sanitary control of the shellfish industry. For additional Information concerning the origin of the Model Ordinance and the

ISSC, see the historical overview by Clem (1994) and the NSSP Guide for the Control of Molluscan Shellfish (ISSC/FDA, 2017).

To ensure uniformity in the administration and implementation of the requirements of the NSSP Model Ordinance at the State and tribal regulatory agency level, the FDA reviews their programs on an annual basis. New State or tribal regulatory programs under the NSSP are required to have their proposed program reviewed prior to its initiation to assure that any shellstock produced under the State or tribal program for movement in interstate commerce meets the requirements of the Model Ordinance.

New State or Tribal Program

The Authority must apply to the FDA for evaluation and be found in conformity with the NSSP before initiating a State or tribal shellfish sanitation program or a new program element within an existing State or tribal program. The FDA will act on any application submitted by the Authority within thirty (30) days. If the FDA has not acted within thirty (30) days, the Authority may proceed with the new shellfish sanitation program.

When two (2) or more State or tribal agencies will be involved in the sanitary control of the shellfish industry, a clear statement of each agency's responsibilities should be developed in the form of a memorandum of understanding. This administrative practice eliminates misunderstandings concerning agency responsibility and ensures that all aspects of shared program responsibility are addressed.

States and tribes are responsible for maintaining shellfish programs that conform to the requirements contained in the Model Ordinance. These requirements should be mandatory within each State program.

Chapter II. Growing Areas

.01 Total Coliform Standards

Note: The NSSP allows growing areas to be classified using either a total or fecal coliform standard. The NSSP further allows the application of either standard to different water bodies within the State. Once properly classified applying either standard for classification, the NSSP allows the use of the adverse pollution condition or the systematic random sampling strategy for routine classification monitoring as appropriate to the situation in the growing area. For maximum flexibility, a State may wish to adopt the use of both standards and both monitoring strategies as appropriate with each standard. At the Interstate Shellfish Sanitation Conference's annual meeting in 1992, Task Force II recommended that this portion of the *Model Ordinance* be codified according to the standard used and the monitoring strategy employed. The *Model Ordinance* has subsequently been recodified in this manner. This codification represents the delineation of the standards based on total coliforms. The division of the standards based on fecal coliforms is outlined in the main body of the *Model Ordinance* (Chapter IV.).

A. General. Either the total coliform or fecal coliform standard shall be applied to a growing area.
B. Sampling Stations. The Authority shall ensure that the number and location of sampling stations is adequate to effectively evaluate all pollution inputs into the growing area.
C. Exceptions.
    (1) Except for growing areas classified as prohibited, in any growing area where there are nonpoint pollution sources which impact the water quality, a minimum of thirty (30) samples, collected under various environmental conditions, shall be required to classify a growing area not previously classified under Chapter IV. @.03.
    (2) Except for growing areas classified as prohibited or when systematic random sampling is applied in growing areas where there are no pollution sources having an effect on the water quality, a minimum of fifteen (15) samples shall be required to classify any growing area not previously classified under Chapter IV. @.03 when there are no pollution sources impacting the water quality.
    (3) The Authority is not required to apply the total coliform standard if a detailed study verified by laboratory findings demonstrates that the coliforms recovered from the growing area are not of direct fecal origin and do not indicate a public health hazard.
D. Standard for the Approved Growing Area Classification in the Remote Status.
    (1) Water Quality. The bacteriological quality of every station in the growing area shall meet the total coliform standard below.
    (2) Total Coliform Standard for the Remote Status. The total coliform geometric mean MPN of the water sample results for each sampling station shall not exceed 70 MPN per 100 ml; and not more than ten (10) percent of the samples shall exceed an MPN of:
        (a) 230 MPN per 100 ml for a 5-tube, decimal dilution test;
        (b) 330 MPN per 100 ml for a 3-tube, decimal dilution test; or
        (c) 140 MPN per 100 ml for the 12-tube, single dilution test.
    (3) Required Sample Collection.
        (a) A minimum of two (2) samples per sampling station shall be collected annually.
        (b) A minimum of the most recent fifteen (15) samples collected per sampling station shall be used to calculate the geometric mean and ten (10) percent criteria of the data to determine compliance with the standard established for the approved classification of remote growing areas.
E. Standard for the Approved Classification of Growing Areas Affected by Point Source Pollution.
    (1) Water Quality. The bacteriological quality of every station in the growing area shall meet

the total coliform standard in E Section (2).

(2) Total Coliform Standard for Adverse Pollution Condition Monitoring. The total coliform geometric mean MPN of the water quality sample results for each sampling station shall not exceed 70 MPN per 100 ml, and, not more than ten (10) percent of the samples shall exceed an MPN of:

(a) 230 MPN per 100 ml for a 5-tube, decimal dilution test;

(b) 330 MPN per 100 ml for a 3-tube, decimal dilution test; or

(c) 140 MPN per 100 ml for the 12-tube, single dilution test.

(3) Required Sample Collection.

(a) A minimum of five (5) samples shall be collected annually under adverse pollution conditions from each sample station in the growing area.

(b) A minimum of the most recent fifteen (15) samples collected under adverse pollution conditions from each sample station shall be used to calculate the geometric mean and ten (10) percent criteria of the data to determine compliance with this standard.

(c) Sampling station locations shall be adjacent to actual or potential sources of pollution.

F. Standard for the Approved Classification of Growing Areas Affected by Nonpoint Source Pollution.

(1) Exception. If the tidal stage increases the total coliform concentration, the Authority shall use sample results collected during that tidal stage to classify the area.

(2) Pollution Sources. Harvest waters shall be:

(a) Impacted only by randomly occurring, intermittent environmental events; and,

(b) Not impacted by discharges from sewage treatment facilities or combined sewer overflows.

(3) Water Quality. The bacteriological quality of every station in the growing area shall meet the total coliform standard in Section F (4) or Section F (6) as appropriate to the monitoring strategy being used.

(4) Total Coliform Standard for Systematic Random Sampling. The total coliform geometric mean of the water sample results for each sampling station shall not exceed 70 MPN per 100 ml and the estimated ninetieth (90^{th}) percentile shall not exceed an MPN of:

(a) 230 MPN per 100 ml for a 5-tube, decimal dilution test;

(b) 330 MPN per 100 ml for a 3-tube, decimal dilution test.

(5) Estimated ninetieth (90^{th}) Percentile. The estimated ninetieth (90^{th}) percentile shall be calculated by:

(a) Determining the geometric mean and logarithmic (base ten [10]) standard deviation for the sample result from each sampling station; then

(b) Multiplying the log standard deviation in (a) by 1.28; and

(c) Adding the product from (b) to the log mean of sample results, and;

(d) Taking the antilog of the results in (c) to get the estimated ninetieth (90^{th}) percentile.

(e) MPN values that signify the upper or lower range of sensitivity of the MPN test used in the ninetieth (90^{th}) percentile calculation shall be increased or decreased by one (1) significant digit.

(6) Total Coliform Standard for Adverse Pollution Condition Monitoring. The total coliform geometric mean MPN of the water sample results for each sample station shall not exceed 70 MPN per 100 ml and not more than ten (10) percent of the samples shall exceed an MPN of:

(a) 230 MPN per 100 ml for a 5-tube, decimal dilution test; or

(b) 330 MPN per 100 ml for a 3-tube, decimal dilution test; or

(c) 140 MPN per 100 ml for a 12-tube, single dilution test.

(7) Required Sample Collection.

(a) Adverse Pollution Condition Monitoring. The Authority shall collect samples at the same frequency as described in Section E. (3) for application of the standard under Section E. (2).

(b) Systematic Random Sample Monitoring. The requirement for systematic random sample monitoring shall be met when:

(i) Sample station locations are adequate to produce the data to effectively evaluate all nonpoint sources of pollution;

(ii) Sample collection is scheduled sufficiently far in advance to support random collection with respect to environmental conditions. Compliance requires that prior to implementation; the schedule for random sampling shall be documented in the master file for the growing area and adhered to. If conditions at the time of scheduled sample collection are hazardous to the safety of the individuals assigned to collect samples, sample collection shall be rescheduled in accordance with provisions in the sampling schedule;

(iii) A minimum of six (6) random samples shall be collected annually from each sampling station in the growing area; and

(iv) A minimum of two (2) random samples shall be collected annually from each sample station in the growing area while in the inactive status. The sample collection frequency of six (6) random samples per station per year specified under @.02 F. (7) (b) (iii) must resume at least six (6) months before an area is reactivated; and

(v) A minimum of the thirty (30) most recent randomly collected samples from each sampling station shall be used to calculate the geometric mean and ninetieth (90^{th}) percentile to determine compliance with this standard.

(c) Transition from Adverse Pollution Condition Monitoring to Systematic Random Sample Monitoring. If the Authority:

(i) Does not have thirty (30) recent randomly collected sample results from each station, then the previous fifteen (15) samples collected under adverse pollution conditions may be used with the most recent random samples to meet the minimum thirty (30) sample requirement for a transition period not to exceed three (3) years; and

(ii) Uses the transition period described in (i), as additional random samples are collected, the random samples shall chronologically replace the samples collected under adverse pollution conditions (e.g., sample thirty-one [31] replaces sample one [1])

G. Standard for the Restricted Classification of Growing Areas Affected by Point Source Pollution and Used as a Shellfish Source for Shellfish Depuration.

(1) Water Quality. The bacteriological quality of every sample station in the growing area shall meet the total coliform standard in Section G. (2).

(2) Total Coliform Standard for Adverse Pollution Conditions Monitoring. The total coliform geometric mean MPN of the water sample results for each station shall not exceed 700 per 100 ml and not more than ten (10) percent of the samples shall exceed an MPN of:

(a) 2,300 MPN per 100 ml for a 5-tube, decimal dilution test; or

(b) 3,300 MPN per 100 ml for a 3-tube, decimal dilution test; or

(c) 1,386 MPN per 100 ml for a 12-tube, single dilution test.

(3) Required Sample Collection. Samples shall be collected in accordance with Section E. (3).

H. Standard for the Restricted Classification of Growing Areas Affected by Nonpoint Sources and Used as a Shellfish Source for Shellfish Depuration.

(1) Exception. If the tidal stage increases the total coliform concentration, the Authority shall

use samples collected under that tidal stage to classify the area.

(2) Pollution Sources. Growing areas shall meet the requirements in Section F. (2).

(3) Water Quality. The bacteriological quality of every sample station in the growing area shall meet the total coliform standard in Section H. (4) or Section H. (6) as appropriate to the monitoring strategy being used.

(4) Total Coliform Standard for Systematic Random Sample Monitoring. The total coliform geometric mean MPN of the water sample results for each sample shall not exceed 700 per 100 ml and the estimated ninetieth (90^{th}) percentile shall not exceed:

(a) 2,300 MPN per 100 ml for a 5-tube, decimal dilution test; or

(b) 3,300 MPN per 100 ml for a 3-tube, decimal dilution test.

(5) Estimated ninetieth (90^{th}) percentile. The estimated ninetieth (90^{th}) percentile shall be calculated by the same method described in Section F. (5).

(6) Total Coliform Standard for Adverse Pollution Condition Monitoring. The total coliform geometric mean MPN of the water sample results for each station shall not exceed 700 MPN per 100 ml and not more than ten (10) percent of the samples shall exceed an MPN of:

(a) 2,300 MPN per 100 ml for a 5-tube, decimal dilution test; or

(b) 3,300 MPN per 100 ml for a 3-tube, decimal dilution test; or

(c) 1,386 MPN per 100 ml for a 12-tube, single dilution test.

(7) Required Sample Collection.

(a) Adverse Pollution Condition. The Authority shall collect samples at the same frequency as described in Section E. (3) for application of the standard under Section H. (6).

(b) Systematic Random Sample Monitoring. The Authority shall collect samples in the same manner and at the same frequency as specified in Section F. (7) (b) for application of the standard under Section H. (4).

.02 Guidance for Developing Marine Biotoxin Plans

NSSP guidance documents provide the public health principles supporting major components of the NSSP and its Model Ordinance, which includes the requirements of the program. NSSP *Model Ordinance* requirements apply only to interstate commerce although most States apply the requirements intrastate. For the most up to date and detailed listing of requirements, the reader should consult the most recent edition of the Model Ordinance.

Introduction

Shellfish are filter feeders and, therefore, they have the ability to concentrate toxic phytoplankton from the water column when present in shellfish growing waters. The toxins produced by certain species of phytoplankton can cause illness and death in humans. Toxins are accumulated in the viscera and/or other tissues of shellfish and human exposure occurs when the shellfish are eaten (Gordan *et al.,* 1973). These toxins are not normally destroyed by cooking or processing and cannot be detected by taste. The presence of toxic phytoplankton in the water column or traces of their toxin in shellfish meat does not necessarily constitute a health risk, as toxicity is dependent on concentration (dose) in the shellfish. To protect the consumer, the Authority must evaluate the concentration of toxin present in the shellfish or the toxic phytoplankton concentration in the water column against the levels established in the NSSP Model Ordinance to determine what action, if any, should be taken.

There are a wide range of methodologies developed for screening and confirmation of toxic phytoplankton and their toxins. Only methods adopted into the NSSP can be implemented for the purpose of confirming toxin concentration levels and making decisions to reopen growing areas.

Additionally, some screening methods have been evaluated by the ISSC and found fit for purpose for the NSSP, thereby providing confidence in their use for specific screening purposes. Toxin methods fall into two (2) categories in the NSSP: Approved Methods for Marine Biotoxin Testing (Section IV. Guidance Documents Chapter II Growing Areas .14 Table 2.) and Approved Limited Use Methods for Marine Biotoxin Testing (Section IV. Guidance Documents Chapter II Growing Areas .14 Table 4.). These methods range from mouse bioassays to immunochromatography and other antibody based platforms to chemical analytical methods such as high performance liquid chromatography (HPLC). Information available in the referenced Tables above provides references for the methods and, as applicable, what limitations are placed on the use of the method within the NSSP. For toxins that have no method adopted into the NSSP, best available science is employed.

There are five (5) types of shellfish poisonings which are specifically addressed in the NSSP Model Ordinance: PSP, NSP, ASP (also known as Domoic Acid poisoning), DSP and AZP. Of these five (5) types of shellfish poisoning, PSP, NSP and ASP are the most dangerous. PSP and ASP can cause death at sufficiently high exposures. In addition, ASP can cause lasting neurological damage. PSP is caused by saxitoxins produced by the dinoflagellates of the genus *Alexandrium* (formerly *Gonyaulax*). The dinoflagellate *Pyrodinium bahamense* is also a producer of saxitoxins. NSP is caused by brevetoxins produced by the dinoflagellates of the genus *Karenia* (formerly *Gymnodinium*). ASP is caused by domoic acid and is produced by diatoms of the genus *Pseudo-nitzchia*. Certain *Dinophysis* spp. and *Prorocentrum* spp. produce okadaic acid and dinophysis toxins that cause DSP. *Azadinium* spp. is the producer of azaspiracids, which cause AZP.

Both *Alexandrium* and *Karenia* can produce "red tides", i.e. discolorations of seawater caused by blooms of the algae; however, they may also reach concentrations that cause toxic shellfish without imparting any water discoloration. Toxic blooms of these dinoflagellates can occur unexpectedly or follow predictable patterns. The unpredictability in occurrence of toxic blooms was demonstrated in New England in 1972 when shellfish suddenly became toxic in a previously unaffected portion of the coastline and resulted in many illnesses (Schwalm, 1973). Historically, *Alexandrium* blooms have occurred between April and October along the Pacific coasts from Alaska to California and in the Northeast from the Canadian Provinces to Long Island Sound (U.S. Public Health Service, 1958); but these patterns may be changing. The blooms generally last only a few weeks and most shellfish (with the exception of some species of clams and scallops which retain the toxin for longer periods) clear themselves rapidly of the toxin once the bloom dissipates. Occurrence of *Karenia* blooms extends from the Carolinas south throughout the Gulf Coast States. DSP and AZP cause similar symptoms mostly related to diarrhea and abdominal pain. DSP toxin-producing phytoplankton have been documented to occur off the coasts of Washington (Trainer et al. 2013) and Texas (Deeds et al. 2010) as well as off the coast in the Northeast (e.g., Massachusetts [Tong et al. 2015]).While AZP has occurred in the U.S., the contaminated shellfish was imported (Klontz et al. 2009). Harvesting closures in the U.S. have not been documented due to AZP toxins.

The minimum concentration of PSP toxin that will cause intoxication in susceptible persons is not known. Epidemiological investigations of PSP in Canada, however, have indicated 200 to 600 micrograms of PSP toxin will produce symptoms in susceptible persons. A death has been attributed to the ingestion of a probable 480 micrograms of PSP toxin. Investigations indicate that lesser amounts of the toxin have no deleterious effects on humans. Shellfish growing areas should be closed at a PSP toxin level, which provides an adequate margin of safety, since in many instances PSP toxicity levels can change rapidly.

The NSSP Model Ordinance requires that growing areas be placed in the closed status when the PSP toxin concentration is equal to or exceeds the action level of 80 micrograms per 100 grams of raw shellfish (FDA,

1977; FDA, 1985).

In shellfish growing areas where low levels of PSP toxin routinely occur, harvesting for thermal processing purposes may be an alternative to consider. Thermal processing as defined by applicable FDA regulations (21 CFR 113) will reduce the PSP toxin concentration of the shellfish via dilution, not destruction. If thermal processing is practiced, the Authority must develop and implement procedures to control the harvesting and transportation of the affected shellfish to the processing plant.

In Gulf coast areas, toxicity in shellfish has been associated with red tide outbreaks caused by massive blooms of the toxic dinoflagellate, *Karenia brevis*. The most common public health problem associated with *Karenia* blooms is respiratory irritation; however, neurotoxic shellfish poisonings associated with *Karenia brevis* blooms have been reported in Florida (Center for Disease Control, 1973 [a] and [b]). Uncooked clams from a batch eaten by a patient with neurotoxic symptoms were found to contain 118 mouse units per 100 grams of shellfish meat. The NSSP Model Ordinance mandates that growing areas be placed in the closed status when any NSP toxin is found in shellfish meat at or above 20 MU per 100 grams of shellfish, or when the cell counts for members of the genus *Karenia* in the water column equal or exceed 5,000 cells per liter of water.

ASP is caused by domoic acid, which is produced by diatoms of the genus *Pseudo-nitzschia*. Blooms of *Pseudo-nitzschia* are of varying intensity, duration and extent. During a 1991-1992 incident in Washington and a 2015 event on the west coast from Washington to California, high toxin levels persisted for several months (Liston, 1994; McCabe et al. 2016). There was also an extensive event in the Northeast from Maine to Rhode Island in 2016, with different regions showing varying toxicity and species dominance within the bloom. The event started in late September in eastern Maine and ended in October; however, Rhode Island experienced another bloom in February of 2017. The NSSP Model Ordinance requires that growing areas be placed in the closed status when the domoic acid concentration is equal to or exceeds 20 parts per million raw shellfish.

The suitability of some growing areas for shellfish harvesting is periodically influenced by the presence of marine biotoxins such as those responsible for PSP, NSP, ASP, DSP and AZP. The occurrence of these toxins is often unpredictable, and the potential for them to occur exists along most coastlines of the United States and other countries having shellfish sanitation Memoranda of Understanding (MOU) agreements with the United States. As a result, States or countries with MOUs with the U.S. need to have management plans and/or contingency plans to address shellfish-borne intoxications.

Controlling Marine Biotoxins in Shellfish

There are two (2) types of plans defined in the NSSP MO for the control of marine biotoxins. A contingency plan is developed by an Authority that has no history or reason to expect toxin-producing phytoplankton in their growing areas. A marine biotoxin management plan is developed by an Authority that has historic occurrence of toxin-producing phytoplankton and toxicity in shellfish from their growing areas.

The Contingency Plan

The contingency plan is primarily for reactive management to an illness outbreak or an emergence of a toxin-producing phytoplankton in a growing area that has not historically occurred before. The contingency plan must describe administrative procedures, laboratory support, sample collection procedures, patrol procedures to be implemented on an emergency basis and reopening criteria (Wilt, 1974). The contingency plan is only appropriate for a shellfish Authority that has no history or reason to

expect toxin-producing phytoplankton in their growing areas. The primary goal of the contingency plan should be to ensure that maximum public health protection is provided. To achieve this goal the following elements should be included:

- A process for immediate precautionary closures;
- A sampling plan that considers water samples to evaluate the extent and intensity of the toxic phytoplankton distribution;
- A sampling plan that considers species-specific shellfish sampling;
- Access to biotoxin tests: both screening and approved methods;
- Trained staff to carry out sample collection and testing if necessary; and
- Reopening criteria.

Under the certification provisions of the NSSP, FDA and receiver States should have the assurance that shellfish producing States or MOU countries are taking and can take adequate measures to prevent harvesting, shipping, and consumption of toxic shellfish. To provide this assurance, the NSSP requires the Authority to develop and adopt a marine biotoxin contingency plan for all marine and estuarine shellfish growing areas. The Authority's plan should specify how each of the objectives listed above will be accomplished. This document provides recommended guidelines to be used in preparing a plan to meet these objectives.

The Marine Biotoxin Management Plan

The marine biotoxin management plan is primarily for proactive management of marine biotoxins for growing areas with a history of toxin-producing phytoplankton and toxicity in shellfish and/or a previous illness event or outbreak. The management plan must describe an early warning system, administrative procedures, laboratory support, sample collection procedures, patrol procedures to be implemented and reopening criteria (Wilt, 1974). A management plan is required for a shellfish Authority that has a history of toxin-producing phytoplankton, toxicity in shellfish and/or an illness event or outbreak attributed to their growing areas. A shellfish Authority might have a management plan for certain marine biotoxins like PSP toxins but a contingency plan for toxins like AZP toxins. The primary goal of the management plan should be to prevent illnesses from toxic shellfish and ensure that maximum public health protection is provided. To achieve this goal the following elements should be included:

- An early warning system should be developed and implemented.
- Procedures should be established to define the severity of occurrences.
- The Authority should be able to respond effectively to minimize risk of illness.
- Adequate intelligence and surveillance information should be gathered and evaluated by the Authority.
- Procedures should be instituted to return the biotoxin contaminated areas to the open status of their growing area classification.

Recommended Contingency Plan Guidelines

** Provide an early warning system:*

1. Communication procedures should be established with other appropriate agencies to rapidly report to the Authority any abnormal environmental phenomenon that might be associated with shellfish growing areas such as bird or fish kills, water discoloration or abnormal behavior of shellfish or marine scavengers.

2. The Authorities should establish procedures for health agencies to report any toxin-like illnesses.
3. An early warning phytoplankton and/or shellfish-monitoring program should be implemented. These monitoring programs should use the "primary station" (for both phytoplankton and shellfish monitoring) and "critical species" concepts (for shellfish monitoring).

   * Sampling stations (primary stations) should be located at sites where past experience has shown toxin is most likely to appear first.

   * When monitoring shellfish, samples should be collected of species which are most likely to reveal the early presence of toxin and which are most likely to show the highest toxin levels (critical species). For example, mussels have been found to be useful for early detection. Sampling design should always consider what species are present in the growing area and commercially harvested.

   * The frequencies and geographic distribution for collection of samples should be established recognizing the randomness of toxic algal blooms. This assumes several years of baseline data in order to establish stations and sampling plans.

   * Frequency and geographic distribution of sampling should be adequate to monitor for fluctuations in coastal phytoplankton populations and the influence of meteorological and hydrographic events. For example, a large rain storm may cause nutrient loading in coastal waters and trigger a toxic phytoplankton bloom or a hurricane may drive offshore phytoplankton blooms onshore.
4. Channels of communication concerning shellfish toxicity should be established with other States, countries (in the case of MOU countries), FDA, and other responsible officials. A marine biotoxin control official should be designated by the Authority to receive and distribute all marine biotoxin related information. Consultation with adjacent jurisdictions, marine biologists and other environmental officials is also useful (Felsing, 1966; Quayle, 1969; Prakash *et al*., 1971).

** Define the severity of the problem:*

1. A procedure should be established to promptly expand the sampling program for marine biotoxins in the event of increased toxicity/cell counts at any indicator monitoring stations identified within the plan. Sampling stations and frequencies of sampling should be increased when monitoring data or other information suggests that toxin levels are increasing. The procedure should include plans for obtaining the additional resources necessary to implement the expanded sampling and laboratory analysis program.
2. Information should be available concerning the location of commercial shellfish resource areas and species present in the State.
3. Criteria should be developed to define the circumstances under which growing areas will be placed in the closed status because of marine biotoxin contamination. The criteria should integrate public health, conservation, and economic considerations. Principal items of concern include consideration of the rapidity with which toxin levels can increase to excessive levels, the inherent delays in sample collection and results, the number of samples required to initiate action, the size of the area to be closed (including a safety zone), and the type of harvesting restrictions to be invoked (all species or specific species). It may be appropriate to close harvesting areas adjacent to known toxic areas until increased sampling can establish which areas are toxin free and that toxin levels have stabilized.
4. Procedures should be established to promptly identify which shellfish products or lots might be potentially contaminated, and to determine the distribution of these products or lots.

** Respond effectively to minimize illness:*

1. A summary should be provided citing the laws and regulations in the State (or MOU country)

that promptly and effectively allow the Authority to restrict harvesting, withdraw interstate shipping permits, and to embargo/recall any potentially toxic shellfish already on the market in the event of a marine biotoxin event. The plan should clearly define the timeframe involved in taking appropriate legal action.

2. The administrative procedures necessary to place growing areas in the closed status, to withdraw interstate certification of dealers, and to embargo and recall shellfish should be delineated. The timeframe necessary to accomplish these actions should also be specified.
3. A plan should be developed which will define what type of patrol program is necessary to properly control harvesting in toxin contaminated growing areas. The program should be tested to ensure prompt implementation in the event it is needed.
4. Procedures should be developed to promptly disseminate information on the occurrences of toxic phytoplankton blooms to the industry and local health agencies. It is helpful to establish relationships and procedures with other agencies such as the State CDC and Poison Control and Authorities in advance of any serious biotoxin event.
5. Procedures should be established to coordinate control activities taken by State and Federal agencies or departments and district, regional, or local health authorities.

** Gather follow-up data:*

1. Appropriate records of illnesses should be compiled and maintained by the Authority. These records should include data on the incidence of illness and appropriate case history data. This information may be important in defining the severity of the problem, as well as for a retrospective evaluation of the adequacy of the entire control program.
2. Records of shellfish sample results from toxin testing should include analysis of trends, detoxification curves, phytoplankton and water sample analyses, and pertinent environmental observations.
3. Whenever possible the Authority should archive shellfish homogenates for additional analysis.

** Return growing areas to the open status of their NSSP classification:*

1. Once a growing area is placed in the closed status because of marine biotoxin contamination, a procedure should be instituted to gather data necessary to decide when the area can be returned to the open status of its classification. A system of representative samples to establish detoxification curves should be part of this procedure.
2. The Authority should develop a set of criteria that must be met before a growing area can be returned to the open status. These criteria should integrate public health, conservation, and economic considerations, and employ a sufficient number of samples and other environmental indices, if used, to establish that the level of toxin or cell counts are below the closure level. For example, experience has shown that appropriate reopening criteria for PSP include a minimum of three (3) samples collected over a period of at least fourteen (14) days. These samples should show the absence of PSP or levels below 80 micrograms per 100 grams of shellfish tissue.
3. A program of consumer education should be continued as long as any area remains in the closed status because of marine biotoxin contamination.

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.03. Determining the Size of Closed Area as a Result of Illnesses

A. Barriers that would inhibit pathogen and toxin distribution within the growing area (based on documented data/information in the sanitary survey considering the following, as applicable:
   (1) Salinity
   (2) Temperature
   (3) Stratification
   (4) Circulation
   (5) Hydrographic patterns and bathymetry

B. Water movement (based on documented information in sanitary survey) considering the following, as applicable:
   (1) Tidal influence and range
   (2) Flows
   (3) Precipitation
   (4) Wind

C. Laboratory results and/or field measurements and/or other relevant information or data.

D. Closure boundaries
   (1) Must be enforceable.
   (2) May be part of one area, a whole area, or all or parts of multiple areas depending on size of areas and pattern of harvest-related illnesses.

(3) Configuration of area may change over time as more information is available, or water quality/tissue samples show no exceedance.

E. If sufficient data listed in .03 (A. - D.) is not available then the entire growing area(s) should immediately be closed. If data is obtained at a later date that can further define the spatial extent of source of the implicated shellfish a more defined closure area within the shellfish growing area(s) may be designated by the authority with subsequent changes to associated embargoes or recalls.

F. Species subject to closure.
Closure may be limited to where specific species are harvested in an area or limited to certain species (NSSP Chapter II @.01.G (4)).

.04. Determining the Harvesting Periods Associated with Implicated Product for Identifying Shellfish to be Included in the Recall

A. Identify the harvest date of all reported illness(es).
B. Determining the likelihood of product remaining in the marketplace with consideration of shellstock vs. in-shell vs. fresh shucked vs. frozen shucked.
C. Identify the date of [last] most recently reported illness(es) and the date of growing area closure.

.05 Determining the Scope of Implicated Product for Conducting a Recall

A. Are illnesses related to:
(1) single harvester
(2) single dealer or
(3) single route of transportation
(4) single retailer
(5) single consumption event (e.g. party)
(6) single product type or species
(7) single growing area or harvest area

B. Have any post-harvest handling issues been identified that may have contributed to the occurrence of illness(es) including but not limited to harvesters, dealers, restaurants, retail, common carriers, or consumers.
C. Production Consideration
(1) Harvest event(s) and amount of production from growing area or areas (if commingling has occurred).
(2) Number of harvesters associated with implicated shellfish
(3) Number of dealers associated with implicated shellfish
(4) Determine likelihood of product remaining in the marketplace (shellstock vs. in-shell vs. fresh shucked vs. frozen shucked).
(5) Harvest or culture practices including wet storage, relay, resubmergence, transplant, etc.
D. Strength of evidence, i.e. the evaluation should consider strength of evidence collected in relation to items .05 A., B., and C. above.

.06 Protocol for the Landing of Shellfish from Federal Waters

Harvest of molluscan shellfish in Federal Waters not routinely monitored for toxins in shellfish (such as the Federal waters on Georges Bank closed due to PSP risks) may be authorized provided the Authority in the State of landing in cooperation with appropriate Federal agencies shall develop agreements or memoranda of understanding between the Authority and individual shellfish harvesters or individual shellfish dealers. The following guidance provides descriptions of the specific information to be included in the protocol.

A. Harvest Permit Requirements

If harvesting from Federal waters closed due to toxins, the Authority in the landing State will only allow the landing of shellfish from vessels in possession of an appropriate Exempted Fishing Permit (EFP) issued by the National Marine Fisheries Service (NMFS) by vessels participating in the Federal Vessel Monitoring System (VMS). The NMFS shall receive concurrence from the Authority in the State of landing. Vessels operating in open Federal waters will also need applicable permits.

B. Training

The Authority shall ensure that all shipboard persons conducting onboard testing have been trained by a U.S. FDA LEO (LEO) or an FDA marine biotoxin expert to conduct onboard toxin screening using an NSSP recognized method(s). Shipboard persons conducting onboard toxin testing must receive refresher training every three (3) years. A designee of the FDA LEO or FDA marine biotoxin expert may be appointed in writing to provide the training and/or refresher training.

C. Vessel Monitoring

The Authority shall monitor the harvesting location(s) of each landing vessel.

D. Identification of Shellfish

Prior to landing each vessel Captain or Mate shall provide the Authority with a Harvest Record, which may be electronic provided that it is made available to the authorized individual at dockside, for each harvesting trip identifying each lot of shellfish as follows:

1. Vessel name and Federal Fishing Permit number;
2. Name and telephone number of the vessel Captain and vessel owner;
3. Date(s) of harvest;
4. Number of lots and volume of catch per lot or number of containers per lot;
5. Location(s) of harvest (GPS coordinates or latitude/longitude coordinates in degrees:minutes:seconds);
6. Identification of each harvest lot, including cage tag numbers for surf clams and ocean quahogs, and container numbers or identification codes for other shellfish species;
7. Location (GPS coordinates or latitude/longitude coordinates in degrees:minutes:seconds) of each toxin screening sample;
8. Results of each toxin screening test; and
9. Destination(s) and purchaser(s) of each lot and amount of each lot to each destination

The Captain or Mate shall sign the Harvest Record. The Harvest Record shall be checked by the

individual authorized to sample the harvested shellfish. Failure to provide complete and accurate information will result in revocation or suspension of the NMFS EFP and rejection of the entire lot(s) of harvested shellfish. Four (4) copies of the Harvest Record shall be prepared. One (1) copy shall remain with the vessel, one (1) copy shall be provided to the Authority in the State of landing, one (1) copy shall accompany the catch to the processing firm(s), and one (1) copy shall be retained by the laboratory authorized to conduct lot sample analyses.

Container Labeling:

Each container of shellfish shall be clearly labeled (indelible and legible) with the following NSSP required information at the time of harvest:

1. Surf clams and ocean quahogs existing NMFS tagging requirements.
2. All other molluscan shellfish (including Stimpson clams also known as Arctic surf clams) using durable, waterproof, Authority sanctioned prior to use tags:
   a. Vessel name;
   b. Type and quantity of shellfish;
   c. Date of harvest; and
   d. Harvest lot area defined by GPS coordinates or latitude/longitude coordinates in degrees:minutes:seconds.

E. Pre-Harvest Sampling

Prior to harvesting of molluscan shellfish, a minimum of five (5) screening samples shall be collected within each area of intended harvest (lot area) and tested for marine biotoxins that are likely to occur in accordance with an NSSP recognized method. Each screening sample shall be collected during a separate and distinct gear tow. Screening sample tows shall be conducted in a manner that evenly distributes the five (5) samples throughout the intended harvest area for each area of intended harvest (see Section H.). Only shipboard officials trained by an FDA LEO or FDA marine biotoxin expert (or their designee as expressly indicated in writing) in the use of the designated NSSP method may conduct these tests. Each of the five (5) samples must test negative for toxins (i.e., below half of the established criteria in Section II. Model Ordinance Chapter IV @04.C. (1)). A positive result from any one (1) sample shall render the lot area unacceptable for harvest. The harvest vessel Captain shall immediately report all positive screening test results, by telephone or email, to the Authority within the intended State of landing, the FDA Shellfish Specialist, and the processor. The FDA shall notify the NMFS. The NMFS shall notify permitted harvesters to advise them to cease fishing in the affected area(s). For each screening test, whether positive or negative, the remaining sample material (homogenate) shall be maintained under refrigeration for later use should the Authority in the State of landing request confirmatory testing using an NSSP recognized method.

Each screening sample shall be comprised of at least twelve (12) whole animals with the exception of mussels and “whole” or “roe-on” scallops. For mussels each sample shall be comprised of thirty (30) animals. For “whole” scallops each sample shall be comprised of twenty (20) scallop viscera and gonads. For “roe-on” scallops each sample shall be comprised of twenty (20) scallop gonads.

F. Submittal of Onboard Screening Homogenates and Test Results

All screening results shall be recorded on the Harvest Record as stipulated in Section D. of this Protocol. Upon landing of the harvest vessel, the Harvest Record and screening homogenates shall be provided to the Authority or designee and the testing of those samples for toxins using an NSSP method by an NSSP conforming laboratory in the State of landing authorized to sample the harvested shellfish as described in Section G. of this Protocol.

G. Dockside Sampling

After dockside samples are collected by the Authority or designee, molluscan shellfish may be processed while awaiting toxin results. Each lot must be identified and segregated during storage while awaiting dockside sample test results. Under no circumstances will product be released from the processor prior to receiving satisfactory toxin results that demonstrate that toxin levels are below the established criteria in Section II. Model Ordinance Chapter IV @04.C.(1).

The dockside sampling protocol for molluscan shellfish shall be as follows:

1. For each lot of molluscan shellfish, a minimum of seven (7) composite samples, each comprised of at least twelve (12) whole animals, shall be taken at random by the individual authorized by the Authority to sample, with the following exceptions:
   a. For each lot of mussels, a minimum of seven (7) composite samples, each comprised of at least thirty (30) whole animals, shall be taken at random by the individual authorized to sample.
   b. For each lot of "whole" scallops, a minimum of seven (7) composite samples, each comprised of twenty (20) scallop viscera and gonads, shall be taken at random by the individual authorized to sample.
   c. For each lot of "roe-on" scallops, a minimum of seven (7) composite samples, each comprised of twenty (20) scallop gonads, shall be taken at random by the individual authorized to sample.
2. Shellfish samples collected in accordance with G.1 shall be tested for the presence of toxins using an NSSP recognized method(s).
3. Laboratory test results for each lot of shellfish shall be forwarded to the Authority in the State in which the shellfish is being held prior to the product being released by the Authority in the State of landing, or if processed in another State, the Authority in the State of processing.

H. Holding and Lot Separation

A harvest lot is defined as all molluscan shellfish harvested during a single period of uninterrupted harvest activity within a geographic area not to exceed three (3) square miles. Once harvesting has ceased and the harvest vessel moves to another location, regardless of the distance, a new harvest lot will be established. Any harvest vessel containing more than one (1)lot shall clearly mark and segregate each lot while at sea, during off loading, and during transportation to a processing facility. Prior to harvesting in Federal waters, each harvest vessel shall submit to the NMFS a written onboard lot segregation plan. The Authority in the intended State of landing and the FDA Shellfish Specialist must approve the proposed lot segregation plan.

I. Disposal of Shellfish

If test results of any one (1) of the seven (7) samples collected in accordance with G.1 equal or exceed the established criteria in Section II. Model Ordinance Chapter IV@.04 C. (1) (e.g., 80 µg /100 g for PSP toxins)(n=7, c=0), the entire lot must be discarded or destroyed at the cost of the harvester under the supervision of the Authority in accordance with State laws and regulations except when:

A lot of "whole" or "roe-on" scallops equals or exceeds the established criteria in Section II. Model Ordinance Chapter IV@.04C.(1), the adductor muscle may be shucked from the viscera and/or gonad and marketed. The remaining materials (viscera and/or gonad) must be discarded or destroyed under supervision of the Authority in accordance with State laws and regulations.

Dockside toxin testing shall be according to NSSP recognized methods and shall be conducted by laboratories evaluated in accordance with NSSP guidelines. Private laboratories may be used if evaluated by an LEO in accordance with NSSP guidelines.

J. Notification Prior to Unloading

Prior to the issuance of an EFP, the harvester shall be responsible for notifying the Authority in the State of landing and in a manner approved by the Authority that molluscan shellfish is being harvested for delivery to the intended receiving processor.

Each vessel shall give at least twelve (12) hours' notice to the individual authorized to sample prior to unloading shellfish. Notice of less than twelve (12) hours may be approved by the authorized individual at his/her discretion. Authorities may appoint a designee in writing for sampling and sample transport to the NSSP certified testing laboratory in accordance with the practices and procedures used by the Authority under the NSSP. The procedures, as well as training and certification records, must be available for evaluation.

Shellfish from a Federal water harvest area(s) must be kept separate and not sold until so authorized by the Authority in the State of landing or, if processed in another State, the Authority in the State of processing.

Failure to comply with the provisions of this Protocol will result in the suspension or revocation of the vessel's permits through the NMFS.

K. Unloading Schedule

Unloading shall take place between 7:00 A.M. and 5:00 P.M. Monday through Friday, unless otherwise mutually agreed upon by the individual authorized to sample, the processing plant manager, the harvest vessel captain, and the Authority in the State of landing.

L. Access for Dockside Sampling

Individuals authorized to sample shall be provided access to the catch of shellfish.

M. Record Keeping

Record keeping requirements shall be as follows:

1. The vessel shall maintain Harvest Records for at least one (1) year.
2. The processor(s) shall maintain Harvest Records for at least one (1) year or two (2) years if the product is frozen.
3. The Authority in the State of landing shall retain Harvest Records for at least two (2) years.

N. Early Warning/Alert System

Toxin data acquired as a result of onboard screening and dockside testing shall be transmitted to the FDA. These data, both screening and dockside, shall be transmitted to the FDA by the NSSP certified laboratory conducting toxin testing of the sampled lot(s) within one (1) week of the completion of the toxin analyses. The data provided shall include the following:

1. Shellfish species;
2. Harvest location name and coordinates (GPS or latitude/longitude);
3. Harvest date;
4. Onboard screening test method, date, and results; and
5. Laboratory test date, test method, and test results for dockside samples.

Results of all samples having acceptable levels of toxins (e.g.,<80 µg/100 g for PSP toxins) shall immediately be reported to the Authority in the State of landing. If the results of any one (1) sample equal or exceed the established criteria in Chapter IV @.04(c)(1) the testing laboratory shall immediately notify the FDA Shellfish Specialist, the Authority, and the processor by telephone. The FDA shall notify the NMFS. The NMFS shall notify permitted harvesters to advise them to cease fishing in the affected area(s).

NOTE: Due to the resources necessary to meet the requirements of this Protocol, Authorities (may find it necessary to require industry to fund associated costs. These costs may include sample collection, screening, transportation, analysis, inspection, enforcement, and other related expenses.

.07 Sanitary Survey and the Classification of Growing Waters

NSSP Guidance Documents provide the public health principles supporting major components of the NSSP and its Model Ordinance, and summaries of the requirements for that component. NSSP Model Ordinance requirements apply only to interstate commerce although most States apply the requirements intrastate. For the most up to date and detailed listing of requirements, the reader should consult the most recent edition of the Model Ordinance.

Oysters, clams, mussels and scallops are filter feeders that pump large quantities of water through their bodies when actively feeding. During this process, molluscan shellfish can concentrate microorganisms, toxigenic micro-algae and poisonous or deleterious substances from the water column when they are present in the growing waters (Kennedy *et al.*, 1996). Concentrations in the shellfish may be as much as 100 times that found in the water column. If human pathogens are concentrated to an infective dose, and if the shellfish are consumed raw or partially cooked, human disease can result. If toxigenic micro-algae are present and producing toxin, human illness or death can occur, and cooking is not reliable as an effective barrier against intoxication.

The goal of the NSSP is to control the safety of shellfish for human consumption by preventing harvest

from contaminated growing waters. In implementing this concept, the NSSP uses five (5) classifications for growing areas: approved, conditionally approved, restricted, conditionally restricted, and prohibited. The placement of a growing area in any one classification is based upon the growing area's conformance with the requirements established for that classification. Conformance with a classification's requirements is established through the sanitary survey.

The positive relationship between sewage pollution of shellfish growing areas and disease has been demonstrated many times (Rippey [a] and [b], 1994). Shellfish-borne infectious diseases are generally transmitted through a fecal-oral route (i.e., the shellfish become contaminated by sewage and are eaten by humans). The pathway can be quite circuitous. The cycle usually begins with fecal contamination of the growing waters. Feces deposited on land surfaces can release pathogens into surface waters via storm water runoff or collected wastes can be discharged directly into a waterway. The runoff or discharge may go directly into the growing area or indirectly, as is the case with wastes transported by freshwater streams to estuarine or marine waters. Information concerning the relationship between sewage pollution of bivalve shellfish growing areas and human disease is available in several good summaries (Hackney and Potter 1994 [a] and [b]; Jaykus *et al.*, 1994; Stelma and McCabe, 1990).

Epidemiological investigations of shellfish-caused disease outbreaks have found difficulty in establishing a direct cause and effect between a numerical correlation and pollution source strength, bacteriological quality of water, and the degree of hazard to health. Tidal fluctuations and pollution source variations contribute to a high degree of variability in water quality. Investigations made from 1914 to 1925 by the States and the Public Health Service, a period when disease outbreaks attributable to shellfish were more prevalent, indicated that typhoid fever or other enteric diseases would not ordinarily be attributed to shellfish harvested from water in which not more than fifty (50) percent of the one (1) cc (cubic centimeter) portions of water examined were positive for the coliform group (an MPN of approximately 70 per 100 ml), provided the areas were not subject to direct contamination with small amounts of fresh sewage which could not be detected by bacteriological examination.

Following the oyster-borne typhoid outbreaks during the winter of 1924-25 in the United States (Lumsden, 1925), the National Shellfish Certification Program, now the NSSP, was initiated by the States, the Public Health Service, and the shellfish industry (Frost, 1925). The 1925 criteria for safe growing areas were stated as: (1) the area is sufficiently removed from major sources of pollution so that the shellfish would not be subjected to fecal contamination in quantities which might be dangerous to the public health, (2) the area is free from pollution by even small quantities of fresh sewage, and (3) bacteriological examination does not ordinarily show the presence of the coli- aerogenes group of bacteria in one (1) cc dilutions of the growing area water. The collective application of these criteria was known as the sanitary survey, which was used to determine if an area was safe for shellfish harvesting for human consumption. These criteria were adopted in the United States in 1925. Reliance on these criteria and others to measure excess variability in water quality were combined together with sanitary reconnaissance (shoreline survey), hydrographic and meteorological considerations, and patrol of closed harvest areas has generally proven effective in preventing major outbreaks of disease transmitted by the fecal-oral route. For a complete discussion of the history of the NSSP, see the historical overview by David Clem (1994) and the NSSP Guidance Document, *History of the Interstate Shellfish Sanitation Program* (ISSC/FDA, 2017).

The ability of shellfish to concentrate chemical pollutants from water and sediment can lead to accumulation of these poisonous and deleterious substances to levels that constitute a public health hazard (Kurland *et al.*, 1960; Texas Dept. of Health, 1977). These poisonous or deleterious substances may enter shellfish growing areas through industrial or domestic waste discharges, seepage from waste

disposal sites, agricultural land, geochemical reactions, or naturally occurring toxigenic micro-algae (O'Connor and Beliaeff, 1995; Liston, 1994). The degree to which these substances are concentrated depends upon such variables as the species of shellfish, water temperature and salinity, the level of contaminants in the waters, and the physiological conditions of the shellfish (Capuzzo, 1996; Roderick and Schneider, 1994; Rosijadi, 1996). The potential public health hazard posed by these substances must also be considered in assessing the safety of shellfish growing areas.

For a full discussion of the public health risk associated with micro-toxigenic algae, see the NSSP Guidance Document, *Guidelines for Developing a Marine Biotoxin Contingency Plan* (ISSC/FDA, 2017).

Components of the Sanitary Survey

A review of epidemiological investigations of disease outbreaks attributable to the consumption of bivalve shellfish reveals that three (3) general situations occur in the contamination of growing areas placed improperly in the approved classification. First, improperly conducted or outdated sanitary surveys or misapplication of water quality data have unwittingly allowed harvesting from sewage contaminated growing areas. Second, fresh fecal material present and not diluted, diffused, or not detected by ordinary bacteriological sampling procedures caused shellstock contamination (Lumsden, 1925). Dr. Gurion recognized the possibility of chance contamination as early as 1902 in his report on a typhoid outbreak:

"There is a zone of pollution established by the mere fact of the existence of a populated city upon the banks of a stream or tidal estuary which makes the laying down of oysters and clams in these waters a pernicious custom if persisted in, because it renders these articles of food dangerous at times, and always suspicious (Gurion, 1917)."

Third, shellfish illnesses have been traced back to areas where an intermittent pollution source contaminated the shellfish. Some of these areas could have been placed in the conditionally approved classification and managed to avoid harvest of polluted shellstock, provided the occurrences of the sources of pollution could be predicted and the boundaries of their effects determined. For a full discussion of the use of the conditional classifications, see the NSSP Guidance Document, *Management Plans for Growing Areas in the Conditional Classifications* (ISSC/FDA, 2017).

The first critical control point in preventing food-borne illness from shellfish consumption is identifying growing areas of acceptable sanitary quality. The completion of a sanitary survey is of paramount importance in making the distinction between acceptable and unacceptable growing areas, and is the key to accurate growing area classification as approved, conditionally approved, restricted, conditionally restricted, or prohibited. Under the NSSP Model Ordinance, a sanitary survey is required for each growing area prior to its approval by the State as a source of shellfish for human consumption or as a source for shellfish to be used in a depuration or relay operation. A sanitary survey is an in-depth evaluation of all environmental factors that have a bearing on the water quality in a shellfish growing area. The environmental factors include both actual and potential pollution sources, whether natural or man-made, and meteorological and hydrographic characteristics of the growing area. The principal components of a sanitary survey are: (1) identification and evaluation of the pollution sources that may affect the areas, (2) an evaluation of the meteorological factors, (3) an evaluation of hydrographic factors that may affect distribution of pollutants throughout the area, and (4) an assessment of water quality. For a complete discussion of the sanitary survey, see *Sanitary Surveys of Growing Waters* (Garreis, 1994).

(1) *An evaluation of the pollution sources that may affect the growing areas.* A pollution source survey (also known as a shoreline survey) must be conducted of the growing area shoreline and watershed to

locate direct discharges (e.g., municipal and private sewage and industrial waste discharges, sewage package treatment units, malfunctioning septic tanks and animal manure treatment lagoons) and non-point sources of pollution (e.g., storm water runoff, and runoff from agricultural and wildlife areas). Municipal and industrial wastewater treatment facilities should be evaluated in terms of actual loading versus design capacity, type and concentration of pollutants discharged, effectiveness of their treatment processes and pollution control devices. For additional information concerning sewage treatment plant discharges and their control, see the NSSP Guidance Document, *Management Plans for Growing Areas in the Conditional Classifications* (ISSC/FDA, 2017) and the U.S. Environmental Protection Agency documents concerning increasing reliability of sewage treatment plants (USEPA [a] and [b], 1974).

The following survey procedures should be followed in the shoreline survey.

● Survey Assignment

Each shoreline survey area must be determined and assigned by the Authority. Each survey area must be identified by a unique designation. All survey data must be identified by this unique designation that allows for tracking of all forms used in the survey. All shoreline survey data must be documented and filed promptly.

● Examination of Individual Properties for Pollution Sources

* The boundaries of the shoreline survey area must be determined by an in-field investigation of the area topography and the proximity of individual properties to the growing area. Those properties with the potential to impact growing water quality must be included within the boundaries of the shoreline survey area. Once the boundaries of the shoreline survey area have been determined, all businesses and residences must be examined and all potential discharges of wastes (raw sewage, kitchen wastes, laundry wastes, agricultural wastes, etc.) must be evaluated.

* The location of each property with a pollution source adversely impacting the growing area must be provided.

* If the property has a pollution source adversely impacting a growing area, one (1) of the two (2) notations listed below must be made concerning its impact on water quality.

a) Direct Impact: A pollution source having direct impact is defined as any waste discharge which has immediate impact on the growing area. An attempt should be made to quantify the volume of the discharge.
b) Indirect Impact: A pollution source having an indirect impact is defined as any waste discharge which reaches the growing area in a roundabout way. An attempt should be made to quantify the volume of the discharge.

* All sanitary, industrial, or agricultural pollution sources must be located on a map of the survey area.

* All animal farms must be evaluated. Evaluation must include the number and type of animals.

* All marinas must be evaluated in accordance with the requirements of the Model Ordinance.

* Notations must be made of any flocks of waterfowl and an estimation of their number given. Populations of wild animals such as deer and muskrat should be noted and where possible an estimation

of their number given.

* Drainage ditches must be evaluated.

* Any other potential source of pollution, which in the surveyor's opinion might influence water quality, must be noted.

* At the end of each shoreline survey, the surveyor must write a summation. The surveyor must also provide a comprehensive map of the survey area identifying the location of each pollution source found.

The level of surveillance for poisonous and deleterious substances in a shellfish control program may vary widely. The intensity of the surveillance is frequently driven by a history of marine biotoxin contamination, sanitary survey findings, or findings from investigations by other State or Federal agencies or academia. Review of existing background data derived from national and international monitoring programs can also be useful (O'Connor, 1996; Beliaeff *et al.*, 1997). An assessment of possible sources in the sanitary survey should enable shellfish control program managers to determine if a potential problem exists and whether a need for further field study exists. Sampling for specific chemical contaminants in shellfish is recommended only when the pollution source survey reveals a potential problem, or if there is concern because of a lack of information.

When poisonous or deleterious substances are found in shellstock, the Authority must evaluate the levels that may be present against known tolerance levels in human foods or other appropriate information, and determine what action, if any, should be taken. Additional information concerning this topic can be found in the NSSP Guidance Documents: *FDA Action Levels, Tolerances and Other Values for Poisonous or Deleterious Substances in Seafood* (ISSC/FDA, 2017); *Shellstock Relay* (ISSC/FDA, 2017); and *Guidance for Developing Marine Biotoxin Contingency Plans* (ISSC/FDA, 2017). In the absence of specific tolerance or action levels, decisions must be made on a case-by-case basis using the best available knowledge.

(2) *An evaluation of meteorological factors.* Climate and weather can affect the distribution of pollutants or can be the cause of pollutant delivery to a growing area. Prevailing winds can determine the distribution of pollutants in a growing area. Rainfall patterns and intensity can affect water quality through pollutant delivery in runoff or cause flooding which can affect the volume and duration of pollutant delivery. An example of the effects of meteorology occurred in 1982. In the late fall, the arrival of cold fronts caused strong winds, abnormally low tides and high rainfall which resulted in raw sewage bypasses from overloaded sewage treatment plants. This combination of meteorological events resulted in raw sewage reaching a growing area causing shellfish- borne illness in 471 persons (Casper, 1982).

(3) *An evaluation of hydrographic factors that may affect distribution of pollutants throughout the area.* Examples of hydrographic factors are tidal amplitude and type, water circulation patterns, and the amount of fresh water. These factors, along with water depths and stratification caused by density (salinity and temperature) differences, and wastewater and other waste flow rates are used to determine dilution, and time of transport. Tracer dye studies provide site-specific dilution, dispersion and time of travel information, and can be used in calibration of site-specific hydrodynamic models.

(4) *An assessment of water quality.* In general, microbial reduction in seawater occurs by two (2) different processes - physical dilution by advection and diffusion, and a process of biological inactivation. Dilution factors are physical and predictable with a direct relationship between pollution loads and dilution water available. The inactivation process is more variable and appears to be associated

with the following factors: sunlight and solar radiation, absorption and sedimentation, temperature, predation, antibiosis, action of inorganic salts, nutrient deficiencies, the action of heavy metals and other substances, and effects of specific bacteriophage. Kator (1994) has provided a good summary of current knowledge concerning inactivation of bacteriological and chemical indicators caused by the effects of environmental factors.

Field and laboratory studies have demonstrated that enteric viruses can survive in marine water and shellfish from a few days to several months (Jaykus, 1994). In general, viruses survive longer at lower temperatures, at low salinity and when bound to sediments.

Evidence from many field studies indicates that a constant relationship does not exist between the bacterial pathogen, viral pathogen or coliform group levels in shellstock and the presence of these organisms in the overlying water column (Kator, 1994; Jaykus *et al*, 1994). Experience in the NSSP, however, has shown that shellstock from waters meeting the water quality standards for the approved classification are unlikely to be involved in shellfish-associated disease outbreaks attributed to fecal contamination of the growing area. In part, this is because the coliform group (total coliform) water quality standard of 70 MPN per 100 milliliters of growing water is equivalent to the fecal material contributed from one (1)person diluted in about 2.27×10^8 liters (8 million cubic feet) of water free from the coliform group. Such a small amount of sewage reaching the growing area is likely to have been so treated, diluted, or aged that it will be of negligible public health significance.

The NSSP in its Model Ordinance allows for the Authority to classify a growing area using either a total coliform group or fecal coliform MPN standard as part of its sanitary survey. The two (2) standards are believed to afford the same level of public health protection (Hunt and Springer, 1974). The NSSP Model Ordinance further allows the application of either standard to different water bodies within the State. The NSSP Model Ordinance also recognizes two (2) distinct water quality monitoring strategies to collect the total coliform group or fecal coliform monitoring data for application of the standards: Adverse pollution conditions are to be established for initial classification, but if no point source pollution source impact is found the systematic random sampling monitoring strategy can be used for monitoring. The Authority may adopt the use of both the total coliform group and fecal coliform standards and both monitoring strategies, if applicable, for each standard.

The difference between the adverse pollution condition monitoring strategy and the systematic random sampling monitoring strategy is determined by three (3) factors:

(1) The presence or absence of point source impact in the growing area;
(2) The timing of water sample collection; and
(3) The way in which the MPN data are calculated for comparison to the standard.

An adverse pollution condition (APC) is a state or situation, caused by meteorological, hydrological or seasonal events or point source discharges that has historically resulted in elevated total coliform group or fecal coliform levels in a particular growing area. In using this monitoring strategy, sample collection must be timed to be representative of the major pollution impacts, since shellfish respond rapidly to an increase in the number of microorganisms in their surrounding waters. The APC monitoring strategy must be used in initial growing area classification to assess the impact by sewage treatment facilities, combined sewer overflows, or other point source discharges and to evaluate the impact of nonpoint pollution. The results of bacteriological sampling must be correlated with sewage treatment plant operation and evaluated in terms of treatment and nonpoint pollution contributions at the time of sampling. These results, combined with considerations for malfunctions, overloads, poor operation, and nonpoint triggering conditions are used in the initial classification.

The systematic random sampling monitoring strategy can be used in approved or restricted growing areas except those that are affected by point source pollution. This strategy assumes that monitoring conducted on a pre-established schedule at an adequate frequency will capture weather or rainfall conditions that trigger nonpoint pollution contribution. For a full discussion of this strategy, see the NSSP Guidance Document, *Systematic Random Sampling Monitoring Strategy* (ISSC/FDA, 2017).

Total coliform group or fecal coliform data collected under either the APC or the systematic random sampling monitoring strategy are reported as a MPN (i.e., a statistical estimate of the number of bacteria per unit volume of water) and is determined from the number of positive results in a series of fermentation tubes used in a particular laboratory test. A complete discussion of the MPN test can be found in *Standard Methods for the Examination of Water and Wastewater* (APHA, 1985). In the APC monitoring strategy, the application of the two (2) part water quality standards for both total coliform group and fecal coliform involves use of a median or geometric mean and a "percentage factor". The "percentage factor" corrects for the inherent variation of the MPN analytical method when used with a normally distributed data set. In the systematic random sampling strategy, the application of the two (2) part water quality standards for both the total coliform group and fecal coliform involves use of a median or geometric mean and an estimated 90th percentile as the statistic to measure the variance of the data set. The use of the strategy requires that the times of samples be scheduled in advance, so monitoring runs are made with no consideration for meteorological conditions. For a more in-depth explanation, see the NSSP Guidance Document, *Systematic Random Sampling Monitoring Strategy* (ISSC/FDA, 2017).

A written sanitary survey report is needed to integrate the data from the pollution source survey, the hydrographic and meteorological investigations, and the water sampling into a comprehensive information analysis. The purpose of this analysis is to determine the appropriate classification for the growing area and the geographic boundaries of the classification. This report must include a compilation of relevant data, a water sample data analysis using appropriate data sorting to determine adverse pollution conditions and recognized statistical techniques, conclusions as to the appropriate growing area classification, and recommendations for necessary follow-up actions. The report may also consider relevant resource management, social, economic, or political factors that may influence the establishment of the classification boundaries, and the time periods for the open and closed status when conditionally approved and conditionally restricted classifications are proposed. Pollution conditions that cause closure, and conditions and time periods for seasonal openings must be included in the management plan.

Keeping the sanitary survey current consists primarily of routinely evaluating major pollution sources, collecting water quality data from sampling stations under the selected NSSP water quality monitoring strategy, and analyzing the data to assure that the classification continues to represent current sanitary conditions in the growing area. The sanitary survey must be repeated fully every twelve (12) years. In the interim, the sanitary quality of each growing area must be reviewed as often as is necessary to ensure that the classification is appropriate. Certain sanitary survey components are required by the Model Ordinance to be updated annually and triennially (every third year). The growing area must be subjected promptly to a more intense and comprehensive sanitary survey reevaluation when monitoring or other information reveals a substantial change in the sanitary conditions. A reevaluation report is required and must include a determination as to whether a change in growing area classification is necessary.

The Authority is required to collect and maintain survey data and information for each growing area in a centrally located file. Experience with the sanitary survey program for determining the appropriate classification for each growing area indicates a tendency to omit or de-emphasize some components of the sanitary survey unless a central State file of all sanitary survey reports, update information, and reevaluation reports is maintained. This is particularly true when responsibility for shellfish sanitation is

divided between two (2) or more State agencies. Maintenance of a central State file also simplifies the appraisal of State programs by the FDA and prevents loss of useful historical data.

Minimum Requirements of the Sanitary Survey Report

The following outline contains the minimum requirements for the written growing area sanitary survey report required in the NSSP Model Ordinance.

A. Executive Summary
B. Description of Growing Area
    (1) Location map or chart showing growing area
    (2) Description of area and its boundaries
    (3) History of growing area classification
        * Date of last sanitary survey
        * Previous classification(s) map(s)
C. Pollution Source Survey
    (1) Summary of Sources and Location
        * Information gathered under the shoreline survey procedures outlined above.
        * Map or chart showing the location of major sources of actual or potential pollution in the survey area.
        * Table of sources of pollution cross-referenced to the survey area map.
    (2) Identification and evaluation of pollution sources
        * Domestic wastes (discussion and maps)
        * Storm water
        * Agricultural waste (farms, feedlots, & slaughterhouse operations)
        * Wildlife areas
        * Industrial wastes
D. Hydrographic and Meteorological Characteristics
    (1) Tides (type and amplitude), and currents (velocity and direction)
    (2) Rainfall
        * Amount
        * When (e.g. time of year)
        * Frequency of significant rainfalls
        * Winds (Seasonality and effects on pollution dispersion)
    (3) River discharges (volume and seasonality)
    (4) Discussion concerning effects of pollution distribution and hydrographic factors (dilution, dispersion, and time of travel) on water quality throughout the growing area
        * Salinity, depth, and stratification characteristics
        * Computer model verification if used for classification.
E. Water Quality Studies
    (1) Map of sampling stations
    (2) Sampling plan and justification
        * Adverse condition sampling
        * Random sampling
    (3) Sample Data Analysis and Presentation: Tables containing the basic NSSP statistics (number of samples, median or geometric mean, and the respective variability factors)
        * Station by station monitoring data array collected under the adverse condition or systematic random sampling monitoring strategy
        * Daily sampling results and number of samples collected for survey
        * Overall compliance with NSSP criteria

* Sorting of data by environmental pollution condition
* Classification assigned to each station

F. Interpretation of Data in Determining Classification to Be Assigned to Growing Area: A discussion of how actual or potential pollution sources, wind, tide, rainfall, etc. affect or may affect water quality, that will address the following:
   (1) Effects of meteorological and hydrographic conditions on bacterial loading
   (2) Variability in the bacteriological data and causes

G. Conclusions
   (1) Map or chart showing classification assigned to growing area(s) (closure lines, boundary lines separating various classifications)
   (2) Legal description of growing area boundaries
   (3) Management plan for growing area if in the conditionally approved or conditionally restricted classification
   (4) Recommendations for sanitary survey improvement
      * Changes in monitoring schedules, addition of sampling stations or station relocation, etc.
      * Comments

Growing Area Classifications

As a result of the information gathered during the sanitary survey, the Authority should be able to distinguish those growing areas suitable for harvest of shellstock for direct human consumption, those growing areas where the shellfish will require treatment to make them safe for human consumption, and those growing areas unsuitable to harvest for human consumption. The probable presence or absence of pathogenic microorganisms, marine biotoxin or other poisonous or deleterious substances in growing area waters is important to the Authority in deciding how the shellfish obtained from the growing area should be used. The Authority's decision, based on the sanitary survey information, will place all actual and potential growing areas in one (1) of the five (5) possible NSSP growing area classifications.

The five (5) growing area classifications are approved, conditionally approved, restricted, conditionally restricted and prohibited. Except for an emergency situation such as conditions following a hurricane when a growing area in the approved classification may be placed temporarily in the closed status, a growing area in the approved classification is always in the open status. The remaining four (4) growing area classifications all place some type of restriction on shellstock harvesting. For more information concerning the enforcement of these restrictions, see the NSSP Guidance Document, *Growing Area Patrol and Enforcement of Growing Area Restrictions* (ISSC/FDA, 2017).

Growing areas are placed in the approved classification when the sanitary survey information and marine biotoxin surveillance data indicate that fecal material, pathogenic microorganisms, poisonous, or deleterious substances are not present in the growing area in unacceptable concentrations. Shellstock harvested from these growing areas may be sold directly to the public for consumption raw or cooked.

Use of the conditionally approved and conditionally restricted classifications by the Authority is optional. The conditional classifications are designed to address growing areas that are subject to intermittent microbiological pollution. These classifications offer the Authority an alternative to placing the area in the restricted or prohibited classification year round when, during certain times of the year or under certain conditions, the shellstock from the growing area may be safely harvested. The concept also applies to situations where conditions are acceptable for harvest when wastewater treatment plant operation is satisfactory, but not when a malfunction occurs. A management plan is required that describes the controls to provide public health protection in the use of the conditional classifications. For

a full explanation of the conditional classifications and their use, see the NSSP Guidance Document, *Management Plans for Growing Areas in the Conditional Classifications* (ISSC/FDA, 2017).

A growing area may be placed in the restricted classification instead of the prohibited classification when the sanitary survey indicates a limited degree of pollution. This option may be used when the sanitary survey for the growing area indicates that the levels of fecal material or poisonous or deleterious substances in the growing area are such that additional treatment through depuration or relay can render the shellstock safe for human consumption. A common situation in the use of the restricted classification occurs when a growing area is affected by non-point source pollution from either urban or rural sources. In this situation, the water quality fluctuates unpredictably or with sufficient frequency that the use of the conditionally approved classification is precluded. The Authority should use the restricted classification only when sufficient depuration or relay studies have been conducted to establish raw product quality requirements at the harvest level; and when the Authority has sufficient administrative and technical resources to properly administer this classification. These resources include monitoring of pollution sources; providing coordination between State, local and industry officials; issuing special harvesting permits; and supervising the harvesting and transport of shellstock to relay sites or depuration facilities.

For a complete discussion of the supervision requirements at the harvest level, see the NSSP Guidance Document, *Shellstock Relay* (ISSC/FDA, 2017).

Use of the restricted classification requires the Authority to develop the controls necessary to assure that the shellfish are relayed or depurated prior to consumption. Bacteriological water quality standards are applied on a growing area specific basis. The criteria may vary according to the use to be made of the shellstock and the effectiveness of the relay or depuration process used to cleanse the shellstock. Process effectiveness is determined through a study, which establishes the fecal coliform density in the shellstock at the time of harvest, and the density that can be achieved at the completion of the process. Effectiveness of the process is likely to vary between growing areas used for natural cleansing treatment in relay operations and between depuration facilities used for controlled cleansing treatment. The species of shellstock may also affect the effectiveness of the relay or depuration process. For a complete discussion of relay, see the NSSP Guidance Document, *Shellstock Relay* (ISSC/FDA, 2017).

A growing area is placed in the prohibited classification when the sanitary survey or marine biotoxin surveillance program indicates that fecal material, pathogenic microorganisms, poisonous or deleterious substances, marine biotoxin, or radionuclides may reach the harvest area in excessive concentrations. The NSSP Model Ordinance also requires that a growing area for which there is no sanitary survey be placed in the prohibited classification as a precautionary measure. Taking shellstock from a prohibited area for any human food purpose is not allowed.

Depletion of prohibited areas can be an effective deterrent to illegal harvesting as it provides a safeguard against contaminated shellfish reaching the market and eliminates a temptation for harvesters. Depletion may be more economical and effective than patrol of prohibited areas in protecting public health. In a depletion operation, all market sized shellstock and as many of the smaller sized shellstock as can be gathered by reasonable methods are removed from the growing area. To be effective, depletion operations should be conducted at sufficient intervals to keep growing areas free of commercial quantities of market-sized shellstock. When commercial harvesters conduct depletion operations, the Authority or the Patrol Authority must provide effective supervision.

The NSSP Model Ordinance also requires that an area in the prohibited classification (closed safety zone) must be established between any sewage treatment plants or other waste discharge of public health significance and any growing area placed in the approved, conditionally approved, restricted, or

conditionally restricted classification. The size of the prohibited area should be based on the effectiveness and level of sewage treatment; the location of the shellstock resource that would be affected; the classification of adjacent waters, the total time it would take for the person responsible for the operation of the sewage treatment facility to detect a failure and notify the Authority; the time it would take the Authority to issue a notice to stop shellstock harvesting, and the degree of effluent dilution. Due consideration should be given to the possibility that emergency actions might be necessary on holidays or at night.

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.08 Action Levels, Tolerances and Guidance Levels for Poisonous or Deleterious Substances in Seafood

Because shellfish are filter feeders, they can readily accumulate substances from the water column. The types of poisonous or deleterious substances that have been recovered from shellfish include heavy metals, pesticides, petroleum products, polychlorinated biphenyls, and naturally occurring marine biotoxins. The source of these contaminants may be industrial, agricultural, mining, spillage, sewage, dredging operations, sludge dumps, and naturally occurring toxigenic marine organisms.

The FDA has established action levels, tolerances, and guidance levels for poisonous or deleterious substances to control the levels of contaminants in human food, including seafood (FDA Federal Register, 1977; FDA, 2002). Action levels are established and revised according to criteria specified in the ***Code of Federal Regulations*** (21 CFR 109 and 509), and are revoked when a regulation establishing a tolerance for the same substance and use becomes effective. Action levels and tolerances represent limits at or above which FDA will take legal action to remove adulterated products, including shellfish, from the market. Action levels and tolerances are established based on the unavoidability of the poisonous or deleterious substance and do not represent permissible levels of contamination where it is avoidable.
Guidance levels are used to assess the public health impact of the specified contaminant.

Table 1 lists action levels, tolerances and guidance levels established by the FDA for poisonous or deleterious substances in seafood, including shellfish. Notices are published in the ***Federal Register*** as new action levels are established or as existing action levels are revised or revoked. Should any of these notices affect Table 1, FDA will issue an interpretation advising NSSP participants of this revision or addition.

Table 1
Action Levels, Tolerances and Guidance Levels for Poisonous or Deleterious Substances in Seafood

Class of Substance	Substance	Level	Food Commodity	Reference
Deleterious Substance	Aldrin/Dieldrin[c]	0.3 ppm	All Fish	CPG sec 575.100b
	Chlordane	0.3 ppm	All Fish	CPG sec 575.100b
	Chlordecone[d]	0.3 ppm	All Fish	CPG sec 575.100b
	DDT, DDE, TDE[e]	5.0 ppm	All Fish	CPG sec 575.100b
	Diquat[g]	2.0 ppm	All Fish	40 CFR 180.226
	Diquat[g]	20.0 ppm	Shellfish	40 CFR 180.226
	Glyphosate[g]	0.25 ppm	Fin Fish	40 CFR 180.364
	Glyphosate[g]	3.0 ppm	Shellfish	40 CFR 180.364
	Carbaryl	0.25 ppm	Oysters	40 CFR 180.169
	Endothall and its Monomethyl ester	0.1 ppm	All Fish	40 CFR 180.293
	Methyl Mercury	1.0 ppm	All Fish	CPG sec 540.600
	Heptachlor / Heptachlor Epoxide[f]	0.3 ppm	All Fish	CPG sec 575.100
	Mirex	0.1 ppm	All Fish	CPG sec 575.100
	Polychlorinated Biphenyls (PCBs)[g]	2.0 ppm	All Fish	21 CFR 109.30
	2,4-D[g]	0.1 ppm	Fish	40 CFR 180.142
	2,4-D[g]	1.0 ppm	Shellfish	40 CFR 180.142
Chemotherapeutics	Chloramphenicol	No Residue	All Fish	21 CFR 530.41
	Clenbuterol	No Residue	All Fish	21 CFR 530.41
	Diethylstilbestrol (DES)	No Residue	All Fish	21 CFR 530.41
	Demetridazole	No Residue	All Fish	21 CFR 530.41
	Ipronidazole and other nitroimidazoles	No Residue	All Fish	21 CFR 530.41
	Furazolidone and other nitrofurans	No Residue	All Fish	21 CFR 530.41
	Fluoroquinolones	No Residue	All Fish	21 CFR 530.41
	Glycopeptides	No Residue	All Fish	21 CFR 530.41
Natural Toxins	Paralytic Shellfish Poisoning (PSP) toxins	80 μg/100g	All Fish	CPG sec 540.250
	Neurotoxic Shellfish Poisoning (NSP) toxins	20 MU/100g	Clams, mussels, oysters, fresh frozen or canned	NSSP MO
	Azaspiracid Shellfish Poisoning (AZP) toxins	0.16 mg/kg	Clams, mussels, oysters, fresh frozen or canned	NSSP MO
	Diarrhetic Shellfish Poisoning (DSP) toxins	0.16 mg/kg	Clams, mussels, oysters, fresh frozen or canned	NSSP MO
	Amnesic Shellfish Poisoning (ASP) toxins	20 mg/kg	All Fish (except in the viscera of Dungeness crab where 30 mg/kg is permitted)	Compliance Program 7303.842

Note: the term "fish" refers to fresh or saltwater fin fish, crustaceans, other forms of aquatic animal life

other than birds or mammals and all mollusks as defined in *21 CFR 123.3(d)*.

Footnotes for Table 1

a) Unless otherwise specified, the action levels, tolerances and other values listed apply to both the raw and processed food commodity. Procedures for sample collection and analyses are specified in Sections 420 and 450 of the ***FDA Investigations Operation Manual***; ***FDA Pesticide Analytical Manual*** **(PAM)** Volume I or II; ***AOAC Official Methods of Analysis***; ***APHA Recommended Procedures for the Examination of Sea Water and Shellfish***, Fourth Edition, 1970; or, peer reviewed literature for Domoic Acid (ASP) methodologies.

b) References designated as CPG represent the FDA Compliance Policy Guides and all associated numbers as they appear in appropriate sections of FDA's Compliance Policy Guides Manual.

c) The action level for aldrin and dieldrin are for residues of the pesticides individually or in combination. However, in adding amounts of aldrin and dieldrin do not count aldrin or dieldrin found at the level below 0.1 ppm for fish.

d) Previously listed as Kepone, the tradename for chlordecone.

e) The action level for DDT, TDE, and DDE are for residues of the pesticides individually or in combination. However, in adding amounts of DDT, TDE, and DDE do not count any of the three (3) found below 0.2 ppm for fish.

f) The action level for heptachlor and heptachlor epoxide are for the pesticides individually or in combination. However, do not count heptachlor or heptachlor epoxide found below 0.1 ppm.

g) The levels published in 21 CFR and 40 CFR represent tolerances rather than guidance levels or action levels.

References

1. Food and Drug Administration. 1977. Poisonous Or Deleterious Substances In Food. *Federal Register*. 42(190):52814-52819.
2. Food and Drug Administration. 1985. *Action Levels For Poisonous Or Deleterious Substances In Human Food And Animal Feed*. U.S. Department of Health and Human Services, Public Health Service, Washington, D.C. 13 pages.
3. Food and Drug Administration. 2001. *Fish and Fisheries Products Hazards & Controls Guidance*, Third Edition. U.S. Department of Health and Human Services, Public Health Service, Office of Seafood, 5100 Paint Branch Parkway, College Park, Maryland 20740-3835. 326 pages.

.09 Management Plans for Growing Areas in the Conditional Classification

NSSP Guidance Documents provide the public health principles supporting major components of the NSSP and its Model Ordinance, and summaries of the requirements for that component. NSSP Model Ordinance requirements apply only to interstate commerce although most States apply the requirements intrastate. For the most up to date and detailed listing of requirements, the reader should consult the most recent edition of the Model Ordinance.

The goal of the NSSP is to control the safety of shellfish for human consumption by preventing its harvest from contaminated growing areas. In implementing this goal, the NSSP uses five (5) classifications for growing areas: approved, conditionally approved, restricted, conditionally restricted, and prohibited. The placement of a growing area in any one (1) classification is based upon the growing area's conformance with the requirements established for that classification. For a full explanation of this concept, see the public health explanation in NSSP Guidance Document, *Sanitary Survey and the Classification of Growing Waters* (ISSC/FDA, 2017).

The conditional classifications are designed to address growing areas that are subject to intermittent microbiological pollution. These classifications offer the Authority an alternative to placing the area in the restricted or prohibited classification year-round when during certain times of the year or under certain conditions, the shellstock from the growing area may be safely harvested. Public health protection from unsafe shellfish in the use of the conditional classifications is afforded through the use of a management plan. Using a thorough investigation conducted as part of the sanitary survey, the Authority determines that the growing area will be in the open status of its conditional classification for a reasonable period of time; that the factors which determine this period of time are known, predictable and are not so complex that the factors cannot be reasonably managed; and that the bacteriological water quality can be correlated with the factors affecting the distribution of pollutants in the growing area. The management plan for each growing area placed in a conditional classification is based on the information gathered during the investigation. The plan establishes a strict set of criteria, which must be met for the growing area to remain in the open status. Failure to meet the criteria automatically places the growing area in the closed status, with immediate notice to the public, the affected industry, and the plan's participants. Two (2) of the most important components of the management plan are the acceptance of and the agreement to the conditions of the management plan by the one (1) or more Authorities involved, other local, State and Federal agencies which may be involved, the affected shellfish industry, and the persons responsible for the operation of any treatment plants or other discharges that may be involved; and the annual reevaluation of the compliance with the plan to assure public health protection.

The criteria for the approved classification of the NSSP require that the growing area not be subject to human or animal fecal matter at levels that present an actual or potential public health risk, and not be contaminated with pathogenic organisms, poisonous or deleterious substances or marine biotoxin. From the review of growing area classifications and sanitary surveys conducted by national and international Authorities, it appears that a common misuse of the approved classification is the placement of a growing area in the approved classification when the use of the conditionally approved classification would have been more appropriate. Critical investigation usually reveals that the growing area is improperly classified because it is subject to intermittent pollution events, which is a contravention of the criteria for the approved classification.

Intermittent pollution events have been identified as a significant cause of shellfish-borne infectious disease outbreaks worldwide. As an example, in the fall of 1982, at least 471 persons developed gastroenteritis after consumption of sewage contaminated oysters from a growing area that had been placed in the approved classification (Casper, 1982). An investigation into the outbreak demonstrated that the growing area could probably be safely open to harvesting in the summer when the prevailing winds are southerly and tides are high. In the late fall, the arrival of cold fronts can cause high rainfall, strong winds and abnormally low tides and raw sewage bypasses from overloaded sewage treatment plants. Under these conditions, sewage reached the growing area causing the outbreak. As a result of the investigation, the Authority learned that it should have placed the growing area in the conditionally approved classification and developed a management plan to automatically close the area in the late fall through spring when climatic conditions were likely to render the growing area unsafe. Under the management plan, the area would be reopened to harvesting in the summer when favorable conditions prevailed and would be intensively monitored to ensure that the summer conditions were met. In this instance, application of the conditionally approved area concept probably could have prevented the outbreak.

Use of the Conditional Classification

Use of the conditional classifications is a voluntary option for the Authority. There are two (2) types of conditional areas: conditionally approved and conditionally restricted. Any growing area in the conditionally approved classification must meet the criteria for the approved classification when it is in the open status of this classification. When the growing area is in the closed status of this classification, it may be used for relaying or depuration if it meets the requirements for the restricted classification and if this use is specified in its management plan, or it may be closed to any use. Any growing area in the conditionally restricted classification must meet the criteria for the restricted classification when it is in the open status of this classification and no harvesting is permitted when it is in its closed status.

Growing areas that are subject to intermittent microbiological pollution from predictable pollution events may be placed in the conditionally approved or conditionally restricted classification under the NSSP. Examples of predictable pollution events include the failure of wastewater treatment facilities to maintain a performance standard needed to maintain an established effluent quality; changes in seasonal populations affecting growing area water quality; and nonpoint source pollution events such as caused by as certain rainfall intensities. Conditional classifications may also be used to manage growing areas affected by toxigenic micro-algae that produce marine biotoxins.

An example of a common situation where use of the conditionally approved classification might be appropriate is when water quality is dependent upon the operation and performance of a sewage treatment plant. In this example, the growing area would meet the criteria for the approved classification when the sewage treatment plant is performing satisfactorily. If there is some interruption in sewage treatment, the likely result will be degradation of water quality in the growing area. This degradation would require the establishment of a prohibited area large enough to dilute and assimilate the effluent discharged during the interruption in treatment. If an interruption can be predicted and is at a manageable frequency necessitating repeated closings (e.g., one (1) or two (2) times a year), the Authority may consider a conditionally approved classification for a portion of the growing area classified as prohibited. Interruptions could include a disinfection failure or certain climatic conditions which are known to affect the wastewater treatment facility's performance). Although many Authorities are burdened by administrative procedures, the use of a management plan for the conditional classification allows the Authority to act quickly to implement closures, and avoid unnecessary delays in returning the conditionally approved portion of the growing area to the open status. The added administrative burden might be offset by the shellfish resource gained by upgrading a prohibited portion of a growing area to the conditionally approved classification.

The concept of the conditionally approved classification is also applicable to other situations in which there may be a rapid or seasonal change in water quality. Examples include:

* The water quality in a growing area adjacent to a resort community may vary according to seasons of the year. During the summer months, when the community experiences a significant population increase, water quality may be adversely affected. However, during the winter when there are few people in the community, water quality might improve sufficiently to allow the growing area to be placed in the open status. In some States, this is known as a seasonal closure.

* The water quality in a protected harbor in a sparsely settled area, which provides anchorage for a fishing fleet several months a year, might vary. When the fishing fleet is in the harbor, the water might be of poor sanitary quality. The area would be closed for shellstock harvesting when the fishing fleet is using the harbor. During the remainder of the year, however, the quality of the harbor water might meet the criteria for the approved classification and be opened to shellstock harvesting.

* The water quality in an area may fluctuate with the discharge of a major river, or rainfall in the area may cause runoff of pollutants from adjacent land surfaces (non-point pollution) into the growing area. During periods of low runoff or river discharge, the area might meet the criteria for the approved classification.

The use of the conditional classification option offers the Authority the ability to increase the availability of water for shell fishing that would otherwise be closed. The management plan dictates the circumstances and procedures for immediate response to situations requiring closure. The administrative procedures included in the management plan allows the Authority to reopen the area to harvesting as soon as the pollution condition is over and the water quality and shellstock have returned to acceptable quality.

Suitability of the Conditional Classification

The first step is to determine, through a thorough investigation conducted as part of the sanitary survey, if the growing area is suitable for conditional management by evaluating the potential sources of pollution in terms of their effect on water quality. Information must be gathered to support the supposition that the growing area will be in the open status of its conditional classification for a reasonable period of time; that the pollution events which determine this period of time are known, predictable and are not so complex that the factors of these events cannot be reasonably managed; and that the bacteriological water quality can be correlated with the factors affecting the distribution of pollutants in the growing area. The investigation may also consider relevant resource management, social, economic, or political factors that may influence the open and closed periods, and the establishment of boundaries, for the conditional classification of a growing area. The management plan for each growing area placed in a conditional classification is based on the information gathered during the investigation. Some potential sources of pollution which could be managed under a conditional classification management plan include: bypasses and overflows within a sewage collection and treatment system, intermittent discharges from boats, seasonally related pollution occurrences, animals, land runoff, and freshwater flows.

The second step in determining the suitability of conditional classifications is to determine whether the Authority has sufficient resources available to survey, manage, monitor, control harvesting, close and reopen the area as required. Use of these classifications imposes additional manpower and resource burdens on the Authority. For example sources of pollution must be routinely monitored; coordination between State, local and industry officials must be timely; performance standards must be monitored; and closures must be immediate and effective. Any Authority that has elected to use the conditionally approved or conditionally restricted classifications has found the resource investment to be substantial and this investment must be balanced against the benefit of the additional shellfish resource available.

The third step is to evaluate each source of pollution in terms of the pollution load and to determine if performance standards can be formulated for each pollution source having a significant effect on the sanitary quality of the growing area. The conditional classification management plan must establish a strict set of criteria, which must be met for the growing area to remain in the open status. The following are examples of different types of performance standards that could be used:

* Performance standards might stipulate the bacteriological quality of effluent from sewage treatment plants. The microbiological quality can be monitored in terms of disinfection residual or dosage for ultraviolet light disinfection. An example of a performance standard for an effluent discharge is: "The median fecal coliform MPN, in any one (1) month, shall not exceed 200 per 100 ml, based on not less than sixteen (16) samples per month, and not more than ten (10) percent of the samples shall have an MPN in excess of 1,000 per 100 ml. This fecal coliform limit shall be presumed to be met if the chlorine residual in the effluent is at least 1.0 ppm and the chlorine residual in the effluent is continuously

recorded on a chart by chlorine residual analyzer or is measured hourly and recorded in the daily monitoring records as required for the plant's NPDES permit."

* For disinfection by ultraviolet (UV) light, the disinfection is based on dosage. An example of a performance standard is, "A minimum UV dose of 37 mW-Sec/cm^2 is to be maintained. The calculation of intensity of the UV light is to include factors for effluent quality, including turbidity, suspended solids, and transmittance. The effluent factors contributing to the dose, including turbidity, suspended solids, transmittance, and flow will be continuously measured and recorded. An alarm will be activated if any of the factors are above design limits."

* Performance standards might be based upon the amount of vessel traffic in the area and the concomitant amount of sewage that can be expected.

* Performance standards might be based upon the amount of rainfall in the immediate area. An example is: "The growing area will be closed to harvesting for (number of days) when there has been two (2) inches or more rainfall registered at a rain gauge at (specified location) within a 24-hour period."

* Performance standards might be based upon the height of a river stage. An example could be: "When the river at (a specified area) reaches 3.66 meters (twelve [12] feet) or higher, the growing area will be closed."

The design of a waste treatment plant and the plant effluent specifications are critical to the use of the conditional classifications. Design criteria which may be useful in determining the quality of sewage which can be discharged into an area without exceeding the desired water quality standards include: population equivalent (fecal coliform) of sewage, predicted survival of fecal coliform in seawater, effectiveness of disinfection and the amount of clean dilution water in an area.

The mechanical equipment at critical sewage treatment or plant components should be such that interruptions will be minimized. Requirements, which might be imposed, depend upon the importance of the unit's relationship to maintenance of water quality in the growing area. Important design features, which should be considered in the design of the sewage collection system, include:

* Exclusion of storm water runoff from sewer collection systems and use of devices such as flow equalization tanks to control effects of storm water infiltration on treatment plant performance;
* Provision of standby power at critical sewage pumping stations through the use of on-site emergency generators, or other alternate power sources;
* Use of gauges, charts and other recording devices to monitor flows and performance standards; and
*Use of alarms, telemetering or other devices to report immediately failure of any critical components at the WWSD and in the collection system at sewage pumping stations.

A detailed discussion of ways to increase the reliability of sewage treatment plants can be found in *Protection of Shellfish Waters* (USEPA, 1974) and *Design Criteria for Mechanical, Electric and Fluid System Component Reliability* (USEPA, 1974).

The fourth step is to determine the water quality, which will occur in the growing area when the performance standards are not met, and what portion of the growing area will be affected. Once these determinations are made, the Authority can select the appropriate management strategy for the portion of the growing area that will be placed in the closed status when performance standards are not met, and can select the boundaries for the closed status. The boundaries of that portion of the growing area to be placed

in the closed status would depend upon such items as the distance and travel time from the pollution source to the area, the concentration of pollutants in the discharge during the breakdown condition, amount of effluent and hydrographic factors including dilution available in the receiving water.

The use of the conditional classification where a sewage treatment plant is the pollution source being managed requires a fifth step. An area in the prohibited classification (closed safety zone) must be established between the sewage treatment plant and the growing area placed in the conditionally approved or conditionally restricted classification. The size of the prohibited area should be based on the level of sewage treatment; the total time it would take for the person responsible for the operation of the sewage treatment facility to detect a failure and notify the Authority; and the time it would take the Authority to issue a notice to stop shellstock harvesting. The size of the area in the prohibited classification should allow for an effluent travel time through the prohibited area that is at least twice that required for the notification process to become effective. Due consideration should be given to the possibility that emergency actions might be necessary on holidays or at night. A minimum effluent dilution is to be determined at the prohibited boundary and can be the controlling factor in situations where there is efficient detection and notification of breakdowns.

The length of time that a growing area should be in the closed status of its conditional classification will depend upon several factors. These factors include the degree of pollution in the growing area and flushing capacity of the estuary, the species of shellfish, water temperature, shellstock activity and cleansing rates, and presence of silt or other chemicals that might interfere with the physiological activity of the shellstock. Additional information on the natural cleansing of shellstock is provided in the NSSP Guidance Document, *Shellstock Relay* (ISSC/FDA, 2017).

Minimum Requirements for a Conditional Area Management Plan

The management plan for a growing area in the conditionally approved or conditionally restricted classification must meet certain minimum requirements to ensure that the safety of the shellfish for human consumption is maintained. The use and success of the conditional classification depends upon a thorough and accurate management plan. Therefore, it is important that all aspects of the management plan be fully considered and implemented. The minimum requirements to be addressed are:

E. An understanding of and an agreement to the conditions of the management plan by the one (1) or more Authorities involved, other local, State and Federal agencies which may be involved, the affected shellfish industry, and the persons responsible for the operation of any treatment plants or other discharges that may be involved;

F. A written management plan for the growing area being placed in the conditional classification, which includes a general description of the growing area with a map showing the area's boundaries, and which addresses all items in C. through H..

G. A sanitary survey that shows the growing area will be in the open status of its conditional classification for reasonable periods of time. The survey must provide a description of the factors determining the growing area's suitability for being classified conditionally approved or conditionally restricted, and the supporting information and data.

H. A description of the predictable pollution event or events that are being managed and the performance standards established for each pollution source contributing to the pollution event including:

(1) For a wastewater treatment facility, the performance standard should be based on:

* Peak effluent flow
* Bacteriological quality of the effluent

* Physical and chemical quality of the effluent
* Bypasses from the treatment plant or its collection system
* Design, construction, and maintenance to minimize mechanical failure or overloading (i.e., the reliability of the treatment system and collection system components)
* Provisions for verifying and monitoring efficiency of the wastewater treatment plant and the feedback system for addressing inadequate treatment.
* Identification of conditions that lead to WWSD failure and closure of the conditionally approved area.

(2) For meteorological or hydrological events, the performance standard should be based on:

* Identification of the specific meteorological and/or hydrologic event that will cause the growing area to be placed in the closed status;
* Discussion and data analyses concluding that effects on water quality from these specific meteorological and/or hydrologic events are predictable, and that the data are sufficient to establish meaningful performance standards or criteria for the establishment and implementation of a management plan for the growing area placed in the conditional classification; and
* The predicted number of times, based on historical findings, that the pollution event will occur within one (1) year.

(3) For seasonal events, such as marina operation, seasonal rainfall, and waterfowl migration, the performance standard should be based on:

* Identification of the seasonal event that will cause the growing area to be placed in the closed status, including its estimated duration; and

Discussion and data concluding that the seasonal event is predictable, and that the data are sufficient to establish meaningful performance standards or criteria for the establishment and implementation of a management plan for a growing area placed in the conditional classification;

I. A description of the plan for monitoring water quality including numbers and frequency;

J. A description of how the closed status for the conditional classification will be implemented, which must include:

(1) A clear statement that when the performance standards are not met, the growing area will immediately be placed in the closed status;

(2) A requirement to notify the Authority or Authorities that the management plan performance standards have not been met, including:

* The name of the agency or other party responsible for notifying the Authority;
* The anticipated response time between the performance standards not being met and notification of the Authority; and
* The procedures for prompt notification including contingencies such as night, weekend and absences of key personnel;

(3) A description of the implementation and enforcement, including:

* The response time between the notification to the Authority of the failure to meet performance standards and activation of the legal closure of the growing area by the Authority;
* The procedures and methods to be used to notify the shellfish industry; and
* The procedures and methods to be used to notify the patrol agency (enforcement agency) including:
  - The name of the responsible patrol agency;
  - The anticipated response time between the Authority's legal closure of the growing area and notification of closure to the patrol agency; and
  - A description of the patrol agencies anticipated activities to enforce the closed status.

K. A description of the criteria that must be met prior to reopening a growing area in the closed status, including the need to determine that:
   (1) The performance standards established in the management plan are again fully met;
   (2) The flushing time for pollution dissipation is adequate;
   (3) A time interval has elapsed which is sufficient to permit reduction of human pathogens as measured by the coliform indicator group in the shellstock;
   (4) Where necessary, the bacteriological quality of the water must be verified; and
   (5) Shellstock feeding activity is sufficient to achieve reduction of pathogens to levels present prior to the pollution event.

L. A commitment to a reevaluation of the management plan at least annually using, at a minimum, the reevaluation requirements in the NSSP Model Ordinance.

References

1. Casper, Victor L. 1982. *Memorandum, Quarterly Report - Shellfish, October 1, 1982 Through December 31, 1982; Oyster Related Gastroenteritis Outbreaks*. U.S. Food and Drug Administration, Washington, D.C.
2. Interstate Shellfish Sanitation Conference. 2017. Sanitary Survey and the Classification of Growing Waters. *In* ISSC (ed.), NSSP Guide for the Control of Molluscan Shellfish. Interstate Shellfish Sanitation Conference, Columbia, SC.
3. Interstate Shellfish Sanitation Conference. 2011. Shellstock Relay. In ISSC (ed.), NSSP Guide for the Control of Molluscan Shellfish. Interstate Shellfish Sanitation Conference, Columbia, SC.
4. U.S. Environmental Protection Agency. 1974. *Design Criteria for Mechanical, Electric, and Fluid System and Component Reliability*. EPA 430/9-74-001.
5. U.S. Environmental Protection Agency. 1974. *Protection of Shellfish Waters*. Office of Water Program Operations. EPA 430/9-74-010.

.10 Shellstock Relay

NSSP Guidance Documents provide the public health principles supporting major components of the NSSP and its Model Ordinance, and summaries of the requirements for that component. NSSP Model Ordinance requirements apply only to interstate commerce although most States apply the requirements intrastate. For the most up to date and detailed listing of requirements, the reader should consult the most recent edition of the Model Ordinance.

Relaying is the practice of harvesting shellstock from polluted growing areas and placing them in unpolluted bodies of water for a sufficient time for the shellstock to reduce contaminating microorganisms and chemical contaminants to safe levels. When adequate controls are used during the relay process, shellstock resources that would otherwise not be available for human consumption are made safe through natural cleansing, and become accessible to the shellfish industry and the consumer.

Research has shown that shellstock has the ability to purge itself of certain microbial and chemical contaminants when placed in clean saline water. The rate of purging depends on the specific contaminants, species of shellstock, and several environmental factors. As early as 1911, public health officials were investigating the use of natural cleansing through relaying to reduce pathogenic organism levels in oysters (Clem, 1994).

Factors Affecting Natural Cleansing

Shellstock which is heavily contaminated with microorganisms may require additional time for natural cleansing. (Metcalf and Stiles, 1968; Canzonier, 1971; Metcalfe, 1979) The length of time required for the cleansing process is influenced by many factors including level of pollution in the shellstock when it is removed from the polluted waters. Roderick and Schneider (1994) have prepared an excellent summary of the current knowledge concerning depuration and relaying of shellstock. Their work identifies four (4) critical factors that affect the physiological activity, pumping rate and behavioral responses of shellstock: water temperature, salinity, dissolved oxygen, and turbidity and suspended solids. Shumway (1996) reports that temperature is the most important factor affecting the Eastern oyster. Both temperature and salinity have an important effect on Eastern oyster pumping rates, which is important for natural cleansing, with temperature being the most important parameter.

Investigations by marine biologists have confirmed that the physiological activities of shellstock are reduced when the water temperature falls below a certain value. This finding is important because viruses, other pathogens and chemical contaminants cannot be eliminated from shellstock if the shellstock is not actively pumping water. Loosanoff (1958) showed that pumping rates in the Eastern oyster rose steadily as water temperature climbed from 8 °C to 28 °C. Pumping was reported as severely reduced or non-existent below 2 °C. Generally investigators agree that the pumping rates in the Eastern oyster are reduced at less than 10 °C (50 °F) (Shumway, 1996).

Cabelli (1971) reported that few coliform organisms were recovered from the northern quahog (*Mercenaria mercenaria*) when the temperature was below 10 °C (50 °F), even though they were collected from heavily polluted waters. Cabelli (1970) also reported the lower limit of the water temperature of the water acceptable for cleansing of soft clams is about 10 °C (50 °F). Burkhardt et al. (1992) found that hibernating shellfish become very active after the threshold temperature is reached and that bacterial and viral indicators accumulate and eliminate differently.

Jaykus et al. (1994) have prepared a good summary of the current knowledge concerning the viruses associated with shellstock and their elimination through relaying and depuration. In their discussion of the relationship between viruses in shellstock and the coliform indicators used as bacteriological standards, the investigators report "no meaningful relationships have been found between virus presence in clams and oysters and a variety of bacteriological and physicochemical parameters for water and shellfish."

There is considerable information available, particularly for the Eastern oyster *(Crassostrea virginica)*, concerning the bioaccumulation and elimination of metals and lipophilic organic contaminants from shellstock (Roesijadi, 1996; Capuzzo, 1996). Pringle (1968) showed that different species of shellstock accumulate varying levels of heavy metals depending upon the pollution level. The chemicals become incorporated into the tissues of the various organs. The rate of release of metals depends on initial levels and species of shellstock. Some metals in some species of shellstock took up to 84 days to deplete. Morrison (1979) reported that the slower depletion of metals as compared to microbiological contaminants indicates that the fourteen (14) day cleansing period traditionally used in relaying is not appropriate for removal of metals and their isotopes.

Similarly, most chemicals are not significantly reduced by depuration. It has been found that in soft shell clams, reduction of benzo-a-pyrene to its biological half-life (50% removal) took up to eleven (11) days, depending on temperature and initial level (Jackim, 1977). Removal of over 90% of the polynuclear aromatic (PNA) hydrocarbons took more than 5½ weeks in the same series of experiments. In depuration studies of the pesticide kepone in oysters relayed from the James River to non-kepone contaminated waters of the York and Rappahannock Rivers in Virginia, Bender (1977) found dramatic effects of temperature on the depuration rates. In the summer, the biological half-life of kepone was about one (1) week, while during

the winter about forty (40) days were required for residue levels to decline by the same amount.

Use of containers to hold shellstock during the natural cleansing process may have some effect on rate of contaminant elimination. Quayle (1976) demonstrated rapid purging rates of *E. coli* from Pacific oysters held in wire mesh baskets. Within 48 hours, the level of bacteria in the oysters was the same as the level in oysters harvested from local areas in the approved classification. Becker (1977) reported depth of oysters in baskets was a critical factor. Full baskets did not show effective cleansing in 96 hours, while single layers were effectively cleansed in 48-96 hours.

When use of containers is proposed to hold shellstock during the natural cleansing process, special studies should be made to evaluate the design of the container and its effect on the rate of natural cleansing. Such studies should be conducted for each container relay operation, each harvesting area, and each relay site.

Relaying Operations

The NSSP recognizes two (2) methods of handling the shellstock during the natural cleansing process: (1) replanting the shellstock directly on the bottom in clean waters; and (2) placing the shellstock in containers (container relaying) which are then floated, suspended from racks, or placed on the bottom in clean waters.

Shellstock may be harvested and transferred for natural biological cleansing from growing areas in the restricted classification, in the closed status of the conditionally approved classification, or in the open status of the conditionally restricted classification. All growing areas used for natural cleansing must be in the approved classification or in the open status of the conditionally approved classification. For more information concerning the classification of growing waters, see the NSSP Guidance Document: *Sanitary Survey and the Classification of Growing Waters* (ISSC/FDA, 2017).

Prior to the initiation of the relaying operation, a decision is required as to whether the purpose of the operation is natural shellstock cleansing to remove microbial contaminants or poisonous or deleterious substances or both. Requirements, particularly the time allotted for natural cleansing, may differ depending on the type of contaminant. If the intent of the relay operation is to reduce shellstock microbial contaminants, the shellstock must not also be contaminated with poisonous or deleterious substances that would not be effectively reduced to acceptable levels during the cleansing period. For more information concerning acceptable levels of poisonous or deleterious substances in shellstock, see the NSSP Guidance Document: *Action Levels, Tolerances and Other Values for Poisonous or Deleterious Substances in Seafood* (ISSC/FDA, 2017).

Licensing of each person who harvests shellstock is an important control measure to help protect against contaminated shellstock reaching the consumer and to help maintain accurate source identity records. This is particularly important when harvesters are transporting contaminated shellstock as part of a relay operation. Special permits must be issued to licensed harvesters for taking shellstock from contaminated growing areas and transporting them to other growing areas for the purpose of natural cleansing. The permits must be good for no more than one (1) year, must be issued only for a specific relay operation, and must specify any limitations and conditions for harvesting.

The water quality in the harvest area to which the shellstock are relayed and the bacteriological and/or chemical quality of the relayed lots of shellstock to be subjected to natural cleansing must be verified throughout the relay process. In addition, the identity of the relayed shellstock should be maintained throughout harvesting, transport, processing, packaging, and distribution in the event the shellfish needs to be traced back to its source.

The generally accepted minimum time period for elimination of microbial contaminants from shellstock is fourteen (14) days when environmental conditions are suitable for natural cleansing. Longer periods may be required if environmental conditions are not optimum. Shorter time periods may be permitted at some locations or during some periods of the year if there is an adequate study to support the reduced time frame and there is intensive monitoring during the process. Container relaying is particularly amenable to shorter time periods for microbial elimination.

The Authority or the shellfish industry may conduct relay operations. The relay operation must be effectively supervised by the Authority to assure that all the shellstock are actually relayed to harvest areas in the approved classification or in the open status of the conditionally approved classification and sufficiently cleansed. Relay control procedures should preclude any opportunity for shellstock to be inadvertently diverted to sale for human consumption before the natural cleansing process is completed. Controls must be applied to all phases of the operation including initial harvesting, transportation, replanting, the cleansing period, and final harvesting for marketing.

Control procedures must, at a minimum:

(1) Require that the source, destination, and species of shellstock being relayed be identified;
(2) Require information concerning:
    (a) The quality (bacteriological or chemical) of the water and the shellstock prior to harvest for relay;
    (b) The quality of the water and the shellstock indigenous to the area to be used for natural cleansing; and
    (c) The quality of the shellstock when the required period of natural cleansing has ended;
(3) Specify the time period of the year when relaying may be conducted;
(4) Use special markings to designate portions of harvest areas where relayed shellstock may be placed for natural cleansing;
(5) Require special harvesting permits for relay operations;
(6) Specify the method of shellstock transportation to the site of natural cleansing, the shellstock deposition method and the method by which different lots of shellstock will be separated during cleansing;
(7) Specify the records to be maintained and filed with the Authority; and
(8) Meet the requirements of the NSSP Model Ordinance.

Control procedures may include monitoring environmental parameters, establishing interagency agreements, imposing quarantine measures, increasing patrols, and developing unique control measures as may be necessary.

A record of water temperature, salinity, and other critical variables must be maintained when it is known that the limiting values of environmental factors may be approached and when minimum relay times are being used.

When container relaying is used, a system of container identification is necessary to locate and avoid re-harvesting of shellfish from containers that have not been left in place long enough for sufficient cleansing.

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Maryland System, College Park, MD.

.11 Systematic Random Sampling Monitoring Strategy

NSSP Guidance Documents provide the public health principles supporting major components of the NSSP and its Model Ordinance, and summaries of the requirements for that component. NSSP Model Ordinance requirements apply only to interstate commerce although most States apply the requirements intrastate. For the most up to date and detailed listing of requirements, the reader should consult the most recent edition of the Model Ordinance.

The first critical control point in preventing food-borne illness from shellfish consumption is identifying shellfish growing areas of acceptable sanitary quality. The completion of a sanitary survey is of paramount importance in making the distinction between acceptable and unacceptable growing areas, and is the key to accurate growing area classification as approved, conditionally approved, restricted, conditionally restricted, or prohibited. A sanitary survey is required under the NSSP Model Ordinance for each growing area prior to its approval by the State as a source of shellfish for human consumption or as a source for shellfish to be used in a depuration or relay operation. The principal components of a sanitary survey are: (1) identification and evaluation of the pollution sources that may affect the areas; (2) an evaluation of the meteorological factors; (3) an evaluation of hydrographic factors that may affect distribution of pollutants throughout the area; and (4) an assessment of water quality. For an in depth discussion of the sanitary survey, see the NSSP Guidance Document, *Sanitary Survey and the Classification of Growing Waters* (ISSC/FDA, 2017).

The NSSP in its Model Ordinance allows the Authority to classify a growing area using either a total or fecal coliform standard as part of its sanitary survey. The two (2) standards are believed to afford the same level of public health protection. The NSSP Model Ordinance also recognizes two (2) distinct water quality monitoring strategies to obtain total coliform or fecal coliform monitoring data: the adverse pollution condition strategy to be used for initial classification and for monitoring; and the systematic random sampling strategy that can be used only for monitoring if no input from point source pollution is present.

Total coliform or fecal coliform monitoring data collected under either the adverse pollution condition or the systematic random sampling strategy and the data collected for initial classification are reported as MPN values. An MPN or most probable number is a statistically derived estimate of the number of bacteria per unit volume of water sampled. The value of the MPN is determined from the combination of positive and negative results obtained from a series of fermentation tubes used in a particular laboratory test. A complete discussion of the MPN test can be found in *Standard Methods for the Examination of Water and Wastewater* (APHA, 1985).

NSSP water quality standards for growing area classification have two (2) components. The first component establishes a median MPN value. The second component, intended for use with data collected under uniform conditions, represents the variability inherent in the testing procedure and a small allowance for some additional variability peculiar to the changing conditions in the water being sampled. The original NSSP "variability factor" for the total coliform group, an MPN of 230 per 100 milliliters of sample was developed to include 90% of the samples collected under uniform conditions in which the only sources of variability operational are due to the test procedure and the allowance for some additional variability arising from changing conditions in the water being sampled. Therefore, if only these two (2) sources of variability are active in the sample data, then no more than ten (10) percent of the samples derived under these conditions will exceed an MPN value of 230 per 100 milliliters of sample when the 5- tube, decimal dilution MPN procedure is used. This is referred to in the NSSP as the ten (10) percent criteria where no more than ten (10) percent of the samples should exceed the variability factor established for the standard

and the testing procedure being used.

This same type of reasoning has been applied to both the total and fecal coliform groups and appropriate ten (10) percent criteria developed for the MPN test employed (330 and 140 MPN per 100 milliliters for the total coliform group tested by the 3-tube, decimal dilution and the 12-tube, single dilution MPN procedures, respectively, and 43, 49 and 28 MPN per 100 milliliters for the fecal coliform group tested by the 5-tube and 3-tube, decimal dilution and 12-tube, single dilution MPN procedures, respectively).
Because these variability factors were derived for use with data sets collected under uniform conditions, they do not address wide swings in water quality that result from changing environmental conditions driven by random pollution events such as runoff carried pollutants following rainfall. Therefore, the ten (10) percent criteria is not considered sufficient to protect public health when shellfish are taken from growing area waters adversely affected by known meteorological or hydrological events that occur intermittently and are shown to degrade water quality.

While many growing area waters may meet the NSSP median value and ten (10) percent criteria, some shellfish growing area sampling stations still display a considerable level of variation in the MPN sample results. Sampling data of this type may indicate that the shellfish growing areas are intermittently polluted during adverse pollution conditions and pose a risk to the shellfish consuming public. The NSSP has never intended to place a growing area that is polluted ten (10) percent of the time in the approved classification. The dilemma facing the Authority, therefore, is how to distinguish between the inherent variation of the MPN test and the variability resulting from intermittent environmental conditions that degrade water quality. When environmental events (such as rainfall) produce unfavorable effects on water quality, the data may contain data points that vary widely from the median value of the established classification. Such a data set would probably contain upper outliers that represent periods when the shellfish may be exposed to significantly greater quantities of pollution. In this situation, the determination of NSSP conformity to the established classification standard for a set of growing water samples from a particular station may become an arbitrary function of the mechanics of sampling (timing and/or frequency) rather than an actual characteristic of the growing area. Use of a statistical method, the estimated 90^{th} percentile, will detect these random pollution events that may cause a data set to be skewed because of a few high MPN values.

When shellfish water sampling data collected following intermittent pollution events are combined with data collected under normal conditions, variability is increased. The estimated 90^{th} percentile will reflect this increased variability. Therefore, use of the estimated 90^{th} percentile will protect against the potential public health problems that may result when shellfish are consumed from growing waters that are adversely affected by intermittent pollution events and improperly classified.

The method for calculating the ninetieth 90^{th} percentile for use in evaluating growing water bacteriological data was suggested by the Georgia Department of Natural Resources, as an addendum to Interstate Shellfish Sanitation Conference (ISSC) Issue 8109. The ISSC adopted the systematic random sampling monitoring strategy and the method recommended for calculating the 90^{th} percentile at its 1989 ISSC Annual Meeting.

Water Quality Assessment

In the adverse pollution condition monitoring strategy, the water quality standards for both total and fecal coliforms use the ten (10) percent criteria, the variability portion of the standard to adjust for the inherent variability of the MPN testing procedure in data with uniform bacterial densities. In the systematic random sampling strategy, the application of the water quality standard employs the variability portion of the standard to detect the impact of intermittent environmental events on water quality above and beyond those attributed by the MPN testing procedure alone.

A field sampling and data analysis design that employs a systematic random sampling plan for routine monitoring assumes that a statistically representative cross section of all meteorological, hydrographic, or other pollution events will be included in the data set. Therefore, all shellfish growing area data collected under the systematic random sampling plan are used to determine compliance with the appropriate total coliform or fecal coliform water quality standard. This sample collection and data analysis design may be applied only to growing areas that are affected by randomly occurring pollution events triggered by rainfall and runoff and that meet the standard for the approved or restricted classification. This sampling strategy may also be used to monitor growing areas where water quality is influenced by seasonal water uses or where harvesting is controlled by seasonal resource management restrictions. In this situation, monitoring must be done during the season when the growing waters are open. Systematic random sampling is not intended to nor should it be applied to areas impacted by point source pollution.

The systematic random sampling monitoring strategy and data analysis design presumes that if intermittent, unfavorable changes in water quality occur, they will be revealed in the bacteriological sampling results. These unfavorable sampling results will contribute to the variability of the data set. Data sets displaying high levels of variability will consequently exhibit an elevated estimated 90^{th} percentile. The Authority's option to use the systematic random sampling strategy is, therefore, contingent upon acceptance of the estimated 90^{th} percentile as the statistic used to measure the variability of the data set. Also required is that timing of monitoring runs be pre-planned far in advance so that effects of random non-point pollution events will be captured if they occur. This statistic, along with the geometric mean of the data set, can be used when evaluating each sampling station for compliance with the NSSP water quality standards.

An example of an acceptable systematic sampling plan is one that documents a pre-established sampling schedule in the growing area central file. Monthly or bimonthly sampling regimes are acceptable and the schedule is maintained so there is no avoidance of unfavorable conditions. A reasonable attempt must be made to collect samples on the pre-established days regardless of navigational conditions. Field sampling crews, however, are not required to take unnecessary risks to sample on any particular day. The sampling plan must address unsafe sample collection (boating) conditions by designating an alternate sampling day or by allocating extra sampling days in the schedule that may be used when needed.

If the growing area is to be used year-round for harvesting, the random sampling plan should stipulate the collection of samples throughout the year. If the growing area is intended to be approved for direct harvest for only part of the year, the random sampling plan would need only to address that period when the area is available for harvest. The only exception to this obligation in a random sampling regime is that the Authority will require sampling during a particular tidal condition, if that condition unfavorably impacts the water quality of the growing area.

Estimating the 90^{th} Percentile

Use of the systematic random sampling strategy involves calculating the estimated 90^{th} percentile of the data. This statistic measures variability in the data and should not be exceeded by random pollution events if the growing area is properly classified. When the Authority elects to employ the systematic random sampling strategy, the following guideline must be used to calculate the estimated 90^{th} percentile.

The estimated 90^{th} percentile must be obtained using the following equation: Est.

90^{th} percentile value = Antilog $[(S_{log})1.28^{A} + x_{log}]$

Where

S_{log} = base 10 logarithmic standard deviation. x_{log} = base 10 log mean

[A] The value 1.28 is obtained from the standard normal distribution

Other

* For the purpose of mathematical calculations, MPN values that signify the upper or lower range of sensitivity for that test shall be increased or decreased 1 significant number. (MPN counts are reported in the form of two (2) significant numbers.) For example, an MPN value of 'less than 2' shall be decreased by 1 to 1.9 to indicate the lower level of sensitivity of the 5-tube, decimal dilution MPN test. In a similar manner, 2.9 shall be used to indicate the MPN value of 'less than 3' for the 3-tube, decimal dilution MPN test. Therefore, it would follow that an MPN value of 1700 shall be used to indicate the MPN value 'greater than 1600' for the 5-tube MPN test.

* Logarithms may be rounded to 3 decimal places.

* Antilogs of log MPN calculations may be rounded to the ***next lower integer*** (zero decimal places) [example - antilog (0.556) = 3]

* The standard deviation of the log MPN data shall be calculated in the following manner:

$$S_{log} = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

Application of the Guideline

Example 1

(1) Convert MPN values to base 10 logarithms.

Obs	**MP**	**Log_{10}**	**Obs**	**MPN**	**Log_{10}**
1	2.9	0.462	16	3.6	0.556
2	2.9	0.462	17	3.6	0.556
3	2.9	0.462	18	3.6	0.556
4	2.9	0.462	19	9.1	0.959
5	2.9	0.462	20	9.1	0.959
6	2.9	0.462	21	9.1	0.959
7	2.9	0.462	22	9.1	0.959
8	2.9	0.462	23	9.1	0.959
9	3.6	0.556	24	9.1	0.959
10	3.6	0.556	25	23	1.362
11	3.6	0.556	26	23	1.362
12	3.6	0.556	27	23	1.362
13	3.6	0.556	28	43	1.633
14	3.6	0.556	29	43	1.633
15	3.6	0.556	30	460	2.663

(2) Calculate Geometric Mean and Standard Deviation.

Median - 3.6
Percentage greater than 43 - 3.3 %
Geometric Mean (Antilog x_{log}) - (Antilog 0.834) or 6.8
Log Standard Deviation (S_{log}) - 0.506
(3) Calculate Estimated 90th Percentile using above equation. Est. 90^{th} = Antilog $[(S_{log})1.28 + x_{log}]$
= Antilog $[\underline{(0.506)}1.28 + \underline{0.834}]$
Est. 90^{th} = Antilog [1.482] or 30

(3) Interpret.

The geometric mean of the data set is less than 14 and the estimated 90^{th} percentile is less than 49 (3-tube, decimal dilution test). This station meets the NSSP fecal coliform water quality standard for the approved classification.

Example 2

(1) Convert MPN values to base 10 logarithms.

Obs	MPN	Log_{10}	Obs	MPN	Log_{10}
1	1.9	0.279	16	2.0	0.301
2	1.9	0.279	17	4.5	0.653
3	1.9	0.279	18	4.5	0.653
4	1.9	0.279	19	7.8	0.892
5	1.9	0.279	20	7.8	0.892
6	1.9	0.279	21	7.8	0.892
7	1.9	0.279	22	11	1.041
8	1.9	0.279	23	11	1.041
9	2.0	0.301	24	23	1.362
10	2.0	0.301	25	23	1.362
11	2.0	0.301	26	23	1.362
12	2.0	0.301	27	23	1.362
13	2.0	0.301	28	33	1.519
14	2.0	0.301	29	540	2.732
15	2.0	0.301	30	1700	3.230

(2) Calculate Geometric Mean and Standard Deviation.

Median - 2.0
Percentage greater than 43 - 6.6 %
Geometric Mean (Antilog x_{log}) - (Antilog 0.788) or 6
Log Standard Deviation (S_{log}) - 0.737

(3) Calculate Estimated 90th Percentile using above

equation - Est. 90^{th} = Antilog $[(S_{log})1.28 + x_{log}]$
= Antilog [(0.737)1.28 + 0.788]
Est. 90^{th} = Antilog [1.731] or 53

(4) Interpret.

While this station's geometric mean is less than14, the standard deviation that resulted from the high values in this data set would lead one to conclude that water quality may have been adversely affected by storm water runoff or another intermittent pollution event. The estimated 90^{th} percentile was 53 (greater than 43 for the 5-tube, decimal dilution MPN test). Therefore this station ***would not meet*** the NSSP fecal coliform water quality standard for the approved classification.

References

1. U.S. Food and Drug Administration (FDA). 1965. National Shellfish Sanitation Program Manual of Operations, Part I. FDA, Washington, D.C., p. 11, footnote 6.

2. Interstate Shellfish Sanitation Conference. 2017. Sanitary Survey and the Classification of Growing Waters. *In* ISSC (ed.), NSSP Guide for the Control of Molluscan Shellfish. Interstate Shellfish Sanitation Conference, Columbia, S.C.
3. American Public Health Association. 1985. *Standard Methods for the Examination of Water and Wastewater*, 16th Ed. American Public Health Association, American Water Works Association, Water Pollution Control Federation, Washington D.C.

.12 Growing Area Patrol and Enforcement

NSSP Guidance Documents provide the public health principles supporting major components of the NSSP and its Model Ordinance, and summaries of the requirements for that component. NSSP Model Ordinance requirements apply only to Interstate commerce although many States apply the requirements intrastate. For the most up to date and detailed listing of requirements, the reader should consult the most recent edition of the Model Ordinance.

The primary objective of the NSSP is to ensure that shellstock is only harvested from areas free of excessive concentrations of pathogenic microorganisms, biotoxins, and poisonous or deleterious substances. Under the NSSP, growing areas, based on their public-health suitability for shellstock harvesting, are placed in one (1) of five (5) shellstock harvesting classifications. Information obtained from sanitary surveys sets the basis to determine the appropriate growing area classification. All classifications, except for the approved classification, place some type of restriction on harvesting. For more information concerning growing area classification, see the NSSP Guidance Document, *Sanitary Survey and the Classification of Growing Waters* (ISSC/FDA, 2017).

If harvesters are not convinced of the need for the restrictions, shellstock may be harvested surreptitiously from areas in the closed status or the in prohibited classification. Therefore, the patrol element of the NSSP is vital to ensure compliance with the public-health safeguards resulting from the classification of growing waters. The fact that the law prohibits the removal of shellstock from contaminated areas will deter the majority of the population from attempting to harvest the shellstock.

Patrol Activity

Control procedures are necessary in a comprehensive shellfish sanitation program to assure that shellstock are harvested only from growing areas in the approved classification or the open status of the conditionally approved classification. Under special permits and close supervision of the Patrol Authority, shellstock may also be harvested from growing areas in the restricted or conditionally restricted classification for cleansing treatment through relay or depuration prior to sale to the consumer.

The Patrol Authority is responsible to provide sufficient personnel and equipment that will act as a deterrent to illegal shellstock harvesting from growing areas in the closed status or in the prohibited classification. In addition, the Patrol Authority must have sufficient legal authority to apprehend and to effectively prosecute persons apprehended harvesting shellstock illegally. Penalties for such violations must be sufficient to discourage illegal harvesting.

Specific patrol requirements applicable to technical and administrative situations vary from State to State. Consequently, the NSSP requires each Patrol Authority to develop a patrol policy document and to keep it current. This policy document must fully describe the Patrol Authority's organization and its activities to deter illegal harvesting. In addition, it must include information concerning the Patrol

Authority's legal basis and the laws and regulations to be enforced, personnel, equipment, training in shellfish patrol techniques, patrol activities and record keeping. The NSSP requires the policy document to be updated and reviewed annually.

The type of patrol needed for any particular situation cannot be specified and is determined by the nature of areas to be patrolled, means of access, methods of harvesting, and species. Patrol equipment allows the officers to apprehend persons illegally harvesting shellstock. Equipment that has proven effective for apprehension of illegal harvesters includes: small, high-speed, readily transportable boats; automobiles; aircraft; communications for coordinating patrol activities; radar surveillance systems; and night scopes. Organization of the patrol activity must take into consideration the need for night, weekend, holiday, and undercover patrols. Various patrol methods may be used depending on the nature of the area to be patrolled and the type of industry.

Adequate delineation of growing areas in the closed status or prohibited classification is fundamental to effective patrol enforcement. The type of growing area identification used will be determined by the structure of the local shellfish industry and the legal requirements that permit successful prosecution in each State or local jurisdiction. Posting a warning sign is one (1) method of informing shellstock harvesters that an area is off-limits to the taking of shellstock for public health reasons. Other identification methods for off-limit growing areas include information access through toll free or other telephone systems, maps issued at checkpoints or with harvesting licenses, direct mail, and news media. The Patrol Authority or other appropriate Authority should seek the advice of the State's legal counsel to ensure that the marking of growing areas in the closed status or prohibited classification and notifications to shellstock harvesters are sufficient to provide for the successful prosecution of persons harvesting from these areas.

Application of legal penalties sufficient to defer the taking of shellstock from growing areas in the closed status or the prohibited classification is a necessary component for effective enforcement in a shellfish sanitation program. The adequacy of State or local laws as a basis for prosecution is important to this activity. The Patrol Authority will be ineffective or compromised if State or local laws are written or interpreted so that violators cannot successfully be prosecuted and if penalties are so small that they are economically unimportant. Periodic assessments, by the Patrol Authority or another appropriate Authority, of the degree of success of court actions taken in response to illegal harvesting is necessary for both the analysis of the effectiveness of the program. Prosecution will be difficult if the courts are not fully aware of the public-health hazards associated with the crime. Written policies or guidelines that are used to recommend penalties on specific cases to the courts must be developed by the Patrol Authority or another appropriate Authority. Courts should be encouraged to apply effective penalties, and records should be kept to determine the effectiveness of the penalty system.

Licensing shellstock harvesters is an important control measure to help protect against illegally harvested shellstock. The appropriate Authority shall license each person who harvests shellstock. In the case of leased land, either the lessee or the person who harvests from the lease must be licensed. The appropriate Authority must maintain a record of all licenses granted. Special permits must be issued to licensed harvesters for taking shellstock from contaminated growing areas for use in relay or depuration operations.

Depletion of prohibited areas can be an effective deterrent to illegal harvesting, and may be more economical and effective in protecting public health than patrol of prohibited areas. Complete removal of shellstock from prohibited areas provides a safeguard against contaminated shellstock reaching the market and eliminates a temptation for harvesters. In a depletion operation, all market sized shellstock and as many of the smaller sized shellstock as can be gathered by reasonable methods are removed from

the growing area. To be effective, depletion operations should be conducted at sufficient intervals to keep growing areas free of commercial quantities of market-sized shellstock. When commercial harvesters conduct depletion operations, the Authority or the Patrol Authority must provide effective supervision.

All relay operations must be under the effective supervision of the Patrol Authority or other appropriate Authority. Supervision must ensure that shellstock harvested for relay cannot be illegally diverted to the market and only shellstock that have completed the required period of treatment are marketed. The supervising official must be authorized and equipped to enforce the relay operation procedures and to supervise the harvest, transport, and re-deposition of the shellstock. The Patrol Authority must also provide effective supervision of the relay area until completion of the relaying operation. For additional information concerning relay operations, see the NSSP Guidance Document, *Shellstock Relay* (ISSC/FDA, 2017).

All shellstock harvested for depuration must also be under the effective supervision of the Patrol Authority or other appropriate Authority so that the shellstock cannot be illegally diverted to the market before depuration. The supervising official must be authorized and equipped to enforce the depuration operation procedures and to supervise the harvest and transport of shellstock to the depuration operation. For a complete discussion of depuration, see the NSSP Public Health Reasons and Explanations Chapter XV. Depuration (ISSC/FDA, 2017).

Recommendations for FDA Evaluation of State Program Patrol Element

The NSSP requires the FDA to evaluate the patrol of growing areas and its enforcement component on an annual basis. Technical assistance may be provided to FDA by a representative of a patrol agency(ies) through use of these procedures that have been agreed to by the FDA and the ISSC. Both FDA and the ISSC have agreed that these procedures do not apply to special investigations by either party.

The following procedures should be used in conducting patrol evaluations:

A. The person in charge of the patrol agency must be advised of the intent to conduct patrol evaluations, approximate patrol dates desired, recommended patrol areas or districts, and other pertinent information.
B. If requested by the State Shellfish Patrol Agency, FDA will meet with the person in charge or his designee prior to participating in patrols to gain a better understanding of patrol program activities.
C. Agency patrol documents and past FDA reports of areas to be evaluated should be reviewed.
D. The FDA Standardized Patrol Evaluation Format must be used in conducting patrol evaluations.
E. FDA evaluators must allow adequate time in the field with primary patrol officers to fully evaluate an area.

Following individual patrol evaluations, the FDA evaluator must:

A. Prepare draft reports for the individual patrol areas evaluated and an overall draft patrol evaluation report and promptly send them for review to the technical advisor who participated in the evaluation.
B. Send copies of draft reports to the person in charge of the patrol agency for comment prior to finalizing evaluation reports.
C. Meet with the person in charge of the Patrol Authority, if requested by the Patrol Authority to further qualify the accuracy of the final report.

When an FDA evaluator, in the field and unaccompanied by a patrol officer, observes an alleged

violation, the FDA evaluator must immediately report the alleged violation to the Patrol Authority.

FDA Standardized Patrol Evaluation

When an FDA evaluator conducts an evaluation of a patrol area, the following information must be collected:

1. Background information such as:
   * Patrol evaluation date and time.
   * Accompanying officer(s).
   * Patrol area name and/or number.
   * Weather, tide, and other pertinent information.
   * Type of harvest (recreational or commercial).
2. Agency and patrol area organization including identification of:
   * Laws, regulations and policies which apply to shellfish control activities.
   * Number and positions of personnel within the region and within the patrol area
   * Supervision for that patrol area and region.
3. Patrol area information including:
   * An officer's or officers' knowledge of the area and experience within the agency and related agencies.
   * Variations in patrol area coverage (days, nights, weekends, and holidays).
   * Transplants, relay, or aquaculture operations in the patrol area (if appropriate).
   * Coverage of adjacent areas, and back-up to primary officer(s) for this patrol area.
   * Equipment used for patrolling the area including the primary vehicle, boats and motors, radios, visual assisting tools and other equipment.
4. Coverage of markets and retail stores as appropriate.
5. Other responsibilities of officer or officers while on patrol.
6. Records of enforcement activities for the area during the last year.
7. Problems unique to the patrol area.

To comply with Standardized Evaluation Criteria, the Authority shall:

Criteria Item		**Item Type**
1.	Have a patrol policy document.	CRITICAL item
2.	Update patrol policy document every year.	KEY item
3.	Meet the NSSP patrol training requirements.	KEY item
4.	Patrol all areas that require patrol.	CRITICAL item
5.	Meet NSSP requirements for frequency of patrol.	KEY item
6.	Have formalized MOA with other agency per Chapter VIII. @.01. B. (5).	KEY item
7.	Have a risk management plan per Chapter VIII. @.01 B. (3) (b) (c) (d).	CRITICAL item
8.	Have a complete risk management plan per Chapter VIII. @.01 B. (3) (b) (c) (d).	Other item

The Authority shall ensure the following COMPLIANCE CRITERIA procedures are implemented when an FDA evaluation identifies deficiencies with NSSP MO criteria.

(a) During the closeout meeting for patrol evaluation, the Shellfish Specialists shall identify any patrol deficiency to the State patrol agency;
(b) Within fifteen (15) days of the closeout meeting, the Shellfish Specialist should provide a

written Program Element Evaluation Report (PEER), including supporting documentation, to the State patrol agency;
(c) Within thirty (30) days of receiving the PEER, the State patrol agency should provide a written response that indicates:
The item(s) was corrected;
A correction plan has been developed with a completion date;
or, The reasons why the State disagrees with FDA's finding(s).
(d) Within fifteen (15) days of receipt FDA should review the State response, and respond to the State;
(e) Any CRITICAL item deficiency should be corrected within thirty (30) days of acceptance by FDA of the correction plan;
(f) Any KEY item deficiency should be corrected within one (1) year of acceptance by FDA of the correction plan.
(g) An OTHER item deficiency should be corrected within sixty (60) days of acceptance by FDA of the correction plan.

FDA Shellfish Specialists shall be responsible for monitoring the progress of State action plans.

References

1. Interstate Shellfish Sanitation Conference (ISSC). 2017. Sanitary Surveys and the Classification of Growing Waters. In ISSC (ed), NSSP Guide for the Control of Molluscan Shellfish. Interstate Shellfish Sanitation Conference, Columbia, S.C.
2. Interstate Shellfish Sanitation Conference (ISSC). 2017. Shellstock Relay. In ISSC (ed), NSSP Guide for the Control of Molluscan Shellfish. Interstate Shellfish Sanitation Conference, Columbia, S.C.

.13 Control of Shellfish Harvesting

Requirements for the Authority.

Other portions of this section of the Guide have described the public health reasons for limiting shellfish harvesting to areas free of contamination and shellfish toxins. For a full discussion of control activities, see the NSSP Guidance Document, *Growing Area Patrol and Enforcement of Growing Area Restrictions* (ISSC/FDA, 2017).

For the most part, control of illegal harvesting depends upon the patrol activities as described in this Chapter @.01 B. Adequate delineation of closed areas is fundamental to effective patrol. The type of area identification will be determined by the structure of the local shellfish industry and the legal requirements for each State to permit successful prosecution. Posting a warning sign is one method of informing shellfish harvesters that an area is closed to the taking of shellfish for public health reasons.

Other methods for identification of closures include telephone, maps issued at checkpoints, or with harvesting licenses, direct mail, and news media. It is recommended that the advice of the State's legal counsel be obtained to ensure that the marking of closed areas and notifications to shellfish harvesters are such that persons harvesting from closed areas can be successfully prosecuted.

However, if local shellfish harvesters are not convinced of the need for restrictions, shellfish may be

harvested surreptitiously from closed areas. *Thus, the patrol element of the NSSP is important to ensure compliance with the public-health safeguards resulting from the sanitary survey.* The fact that the law prohibits the removal of shellfish from certain areas will deter the majority of the population from attempting to harvest such shellfish, provided they are aware of the law and of the areas which are closed.

The type of patrol needed for any particular situation cannot be specified and is determined by the nature of areas to be patrolled, means of access, methods of harvesting, and species. Patrol equipment should be such that the officers can apprehend persons illegally harvesting shellfish in a closed area. Equipment that has proven effective for apprehension of illegal harvesters includes: small, high-speed, readily transportable boats capable of operating in open waters; automobiles; aircraft; communications for coordinating patrol activities; radar surveillance systems; and night scopes.

Organization of the patrol activity must take into consideration the need for night, weekend, holiday, undercover and surprise patrols. Various patrol methods may be used depending on the nature of the area to be patrolled and the type of industry.

Complete removal of shellfish from polluted areas provides a safeguard against contaminated shellfish reaching the market. In some cases, depletion may be the method selected to eliminate an irresistible temptation for harvesters. Depletion may be more economical and effective than patrol of closed areas and will serve to protect public health.

Conversely, shellstock densities in prohibited areas can be increased through aquaculture or shellfish gardening intended for ecosystem/habitat enhancement. These activities must be permitted or registered with the Authority noting the location and quantity of shellstock involved in the aquaculture operation. Such activities in prohibited areas are typically not intended to produce marketable shellfish. However, the Authority should assure that this information is available when determining the NSSP patrol risk and patrol frequencies for the growing area, since the activity can increase the likelihood of illegal harvest.

Educational programs should be developed for both industry and the public describing the public health necessity for eliminating shellfish harvesting from closed areas. Programs developed specifically for participation of key industry people may be especially helpful in eliciting cooperative efforts of the entire industry. Such programs should focus on incentives to eliminate harvesting and marketing of shellfish from closed areas.

The adequacy of State laws as a basis for prosecution is an important component of this activity. Shellfish patrol will be ineffective and or compromised if State laws are so written or interpreted that violators cannot successfully be prosecuted and if penalties are so small that they are economically unimportant. It is important that periodic assessments are made by the Authority or patrol agency of the degree of success of court actions taken in response to illegal harvesting.

Information of this nature is necessary for both the analysis of the effectiveness of the program and for education purposes. Prosecution will be difficult where courts are not fully aware of the public health hazards associated with the crime.

.14 Approved NSSP Laboratory Tests

1. Approved Methods for Microbiological Testing

	Indicator: Total Coliform	Indicator: Fecal Coliform	Application: Growing Area Survey And Classification Sample Type: Seawater	Application: Growing Area Survey and Classification Sample Type: Shellfish	Application: Controlled Relaying Sample Type: Seawater	Application: Controlled Relaying Sample Type: Shellfish	Application: Wet Storage Sample Type: UV Treated Seawater	Application: Wet Storage Sample Type: Untreated Seawater	Application: Wet Storage Sample Type: Shellfish	Application: Controlled Purification Sample Type: UV Treated Seawater	Application: Controlled Purification Sample Type: Untreated Seawater	Application: Controlled Purification Sample Type: Shellfish	Application: Market Shellfish Sample Type: In Shell and Shucked
APHA Decimal Dilution[1]	X		X		X			X			X		
12 tube single dilution[2,12]	X		X		X			X			X		
Other APHA[3]	X						X			X			
mEndo LES agar MF [13]	X						X			X			
A-1M Decimal dilution MPN[4]		X	X		X			X			X		
A-1M 12 tube single dilution MPN[5,12]		X	X		X			X			X		
APHA Decimal dilution MPN[6]		X	X	X	X	X		X	X		X	X	X
12 tube single dilution MPN[7,12]		X	X		X			X			X	X	
mTEC[8]		X	X		X			X			X		
ETCP[9]		X										X	

Standard Plate Count[10]				X									X

Footnotes:

[1]Total Coliform Decimal Dilution MPN Methods (seawater) American Public Health Association. 1970. Recommended Procedures for the Examination of Sea Water and Shellfish, 4th Edition, APHA, New York, N. Y. [Decimal Dilution MPN test]

[2]Total Coliform Single Dilution MPN Method (seawater) Redman, J. H. 1974. A simpler multiple fermentation tube test for monitoring the bacteriological quality of shellfish harvest waters; the examination of twelve 1.0 ml sample portions, p.123-124. In Wilt, D. S. (ed.), *Proceedings 8th National Shellfish Sanitation Workshop,* U.S. Food and Drug Administration, Washington, D.C. [12-tube, Single Dilution MPN test] and Springer, J. A. 1974. Statistical considerations in using the twelve-tube MPN test for routine monitoring of shellfish waters, p.125-126. In Wilt, D. S. (ed.), *Proceedings 8th National Shellfish Sanitation Workshop*. U.S. Food and Drug Administration, Washington, D.C. [12-tube, Single Dilution MPN test]

[3]Total Coliform Other Multiple Tube Fermentation Methods American Public Health Association, American Water Works Association, and Water Environmental Federation. 1992. Section 9221. Examination of a 100 ml aliquot by the Multiple Tube Fermentation Method (MTF). Standards Methods for the Examination of Water and Wastewater, 18th Edition, APHA/AWWA/WEF. Washington, D.C.

[4]Fecal Coliform A-1M Decimal Dilution MPN Methods (seawater) A-1M, 1990 AOAC International - Official Methods of Analysis, 15th Edition. Association of Official Analytical Chemists. Washington, D.C.

[5]Fecal Coliform A-1 Single Dilution MPN Method (seawater) U.S. Food and Drug Administration. 2001. (Revised 12-8-02). NSSP Interpretation 09-III-@.02-100, Options for use of the 12-tube, single dilution MPN test.

[6]Fecal Coliform APHA Decimal Dilution MPN Methods (seawater and shellfish) American Public Health Association. 1970. Recommended Procedures for the Examination of Sea Water and Shellfish, 4th Edition, APHA, New York, N.Y.

[7]Fecal Coliform APHA Single Dilution Methods (seawater and shellfish) U.S. Food and Drug Administration. 2001. (Revised 12-8-02). NSSP Interpretation 09-III-@.02-100, Options for use of the 12-tube, single dilution MPN test (for seawater). U.S. Food and Drug Administration. 2001. (Revised 12-8-02). NSSP Interpretation 09-XV-.03-100, Method for determining fecal coliform levels in end product depurated shellfish (for controlled purification of shellfish).

[8]Fecal Coliform Methods (mTEC) Rippey, Scott, et. al, Enumeration of Fecal Coliforms and E. coli in marine and estuarine waters: an alternative to the APHA-MPN approach. Journal Water Pollution Control Federation. August 1987, pg. 795-798.

[9]Fecal Coliform Methods (ETCP) Cabelli, V.J. and W.P. Heffernan. 1970. Accumulation of Escherichia coli by the northern quahog. Appl. Microbiol. 19:239-244. (ETCP for the controlled purification of hard-and soft-shelled clams).

[10]Standard Plate Count Method American Public Health Association. 1970. Recommended Procedures for the Examination of Sea Water and Shellfish, 4th Edition, APHA, New York, N.Y.

[11]The use of A-1 Medium Minus Salicin is optional with the following condition. Any State that eliminates Salicin must show equivalency with a minimum of 30 samples seasonally (4 sets of 30 samples). The samples must generate results and the results must not be significantly different as shown by using a T test. The data generated to support the elimination of Salicin must be submitted to FDA for review and concurrence prior to State action to eliminate the use of Salicin.

[12]The 12-tube single dilution MPN is not acceptable for use in conjunction with the analysis of growing waters under Systematic Random Sampling. U.S.Food and Drug Administration. 2003. NSSP Interpretation 15-IV-@.02-102.

[13]Standard Methods for the Examination of Water and Wastewater, 20th Edition, American Public Health Association, American Water Works Association and Water Pollution Control Federation. 1989. Section 9222 B. Standard Total Coliform Membrane Filter Procedure. 5d. Alternative single- step direct technique. Washington DC.

2. Approved Methods for Marine Biotoxin Testing

	Biotoxin Type: Amnesic Shellfish Poisoning (ASP)	**Biotoxin Type: Diarrhetic Shellfish Poisoning (DSP)**	**Biotoxin Type: Neurotoxic Shellfish Poisoning (NSP)**	**Biotoxin Type Paralytic Shellfish Poisoning (PSP)**	**Application: Growing Area Survey & Classification Sample Type: Shellfish**	**Application: Dockside Testing Program Sample Type: Shellfish**	**Application: Controlled Relaying Sample Type: Shellfish**
APHA Mouse Bioassay[1]			X	X	X	X	X
Receptor Binding Assay (RBA)[2]				X	X	X	X
PCOX[3]				X	X	X	X
Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS) (Clams Only)[4]		X			X	X	X
HPLC[5]	X				X	X	X

Footnotes:

[1]Paralytic Shellfish Poisoning (PSP) and Neurotoxic Shellfish Poisoning (NSP) Methods American Public Health Association. 1970. *Recommended Procedures for the Examination of Sea Water and Shellfish*, 4th Edition, APHA, New York, N.Y.

[2] Receptor Binding Assay (RBA) for Paralytic Shellfish Poisoning (PSP) Toxicity Determination. Dr. Fran Van Dolah. Alternative Method to Mouse Bioassay for PSP in Mussels. ISSC 2015 Summary of Actions Proposal 13-114.

[3]Rourke et al. 2008. Rapid Postcolumn Methodology for Determination of Paralytic Shellfish Toxins in Shellfish Tissue. Journal of AOAC International. Vol.91, No 3: 589-597.

[4] Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS) ISSC 2017 Proposals for Consideration, Proposal 17-103 (page 374).

[5]M.A. Quilliam, M.Xie and W.R. Hardstaff. 1991. Rapid Extraction and Cleanup Procedure for the Determination of Domoic Acid in Tissue Samples. NRC Institute for Marine Biosciences, Technical Report #64, National Research Council Canada #33001. This method may also be used direct without cleanup.

3. Approved Limited Use Methods for Microbiological Testing

	Indicator: MSC	Application: Growing Area Survey and Classification Sample Type: Seawater	Application: Growing Area Survey and Classification Sample Type: Shellfish	Application: Controlled Relaying Sample Type: Seawater	Application: Controlled Relaying Sample Type: Shellfish	Application: Wet Storage Sample Type: Untreated Seawater	Application: Wet Storage Sample Type: Shellfish	Application: Controlled Purification Sample Type: Untreated Seawater	Application: Controlled Purification Sample Type: Shellfish	Application: Market Shellfish Sample Type: In Shell
Modified Double Agar Overlay Method[1]	X		X							

Footnotes:

[1]Modified Double Agar Overlay Method for Determining Male-specific Coliphage In Soft Shelled Clams and American Oysters. ISSC Summary of Actions 2009. Proposal 05-114, Page 50 and Method for Determining Male-specific Coliphage in Quahogs. ISSC Summary of Actions 2015. Proposal 13-120.

4. Approved Limited Use Methods for Marine Biotoxin Testing

	Biotoxin Type: Amnesic Shellfish Poisoning (ASP)	**Biotoxin Type: Paralytic Shellfish Poisoning (PSP)**	**Biotoxin Type: Neurotoxic Shellfish Poisoning (NSP)**	**Application: Growing Area Survey & Classification Sample Type: Shellfish**	**Application: Onboard Testing Program Sample Type: Shellfish**	**Application: Controlled Relaying Sample Type: Shellfish**	**Application: Controlled Harvest End Product Testing**
Abraxis Shipboard ELISA[2]		X			X		
SRT[1]		X		X	X	X	
Reveal 2.0 ASP[3]	X			X	X	X	
RBA[4]		X		X	X	X	
MARBIONC Brevetoxin ELISA[5]			X	X	X	X	X

Footnotes:

[1]Scotia Rapid Test for PSP, formerly Jellett Rapid Testing Ltd.

a. Method can be used to determine when to perform a mouse bioassay in a previously closed area.

b. A negative result can be substituted for a mouse bioassay to maintain an area in the open status.

c. A positive result shall be used for a precautionary closure.

[2]Saxitoxin (PSP) ELISA Kit. Method can be used in conjunction with rapid extraction method using 70% isopropanol (rubbing alcohol): 5% acetic acid (white vinegar) 2.5:1. ISSC Summary of Actions, Proposal 05-111 (page 15) and 09-107 (page 140).

[3]Reveal 2.0 ASP. Neogen Corporation. Screening Method for Qualitative Determination of Domoic Acid Shellfish. ISSC 2013 Summary of Actions Proposal 13-112.

[4]Receptor Binding Assay (RBA) for Paralytic Shellfish Poisoning (PSP) Toxicity Determination. Dr. Fran Van Dolah. Method for Clams and Scallops for the Purpose of Screening and Precautionary Closure for PSP. ISSC 2013 Summary of Actions Proposal 13-114

[5]MARBIONC Brevetoxin ELISA, MARBIONC Development Group, LLC. Method can be used in place of an Approved Method for oysters, hard clams, and sunray venus clams within these parameters:

a. A negative result (≤ 1.6 ppm in hard clams and sunray venus clams and ≤ 1.80 ppm in oysters) can substitute for testing by an Approved Method for the purposes of controlled relaying, controlled harvest end-product testing, or to re-open a previously closed area.

b. A positive result (> 1.6 ppm in hard clams and sunray venus clams and > 1.80 ppm in oysters) requires additional testing by an Approved Method or could support the same management actions as samples failing by an Approved Method.

ISSC 2017 Proposals for Consideration, Proposal 17-107 (page 466)

5. Approved Methods for Vibrio Enumeration

	Vibrio Type:	**Application: PHP Sample Type: Shucked**	**Application: Reopening**
EIA[1]	***Vibrio vulnificus (V.v.)***	X	
MPN[2]	***Vibrio vulnificus (V.v.)***	X	
SYBR Green 1 QPCR-MPN[5]	***Vibrio vulnificus (V.v.)***	X	
MPN[3]	***Vibrio parahaemolyticus (V.p.)***	X	
PCR[4]	***Vibrio parahaemolyticus (V.p.)***	X	
MPN-Real Time PCR[6]	***tdh+ and trh+ Vibrio parahaemolyticus (V.p.)***	X	X
MPN-Real Time PCR[7]	***Vibrio parahaemolyticus (V.p.)***	X	X
Direct Plating Method[8]	***Vibrio parahaemolyticus (V.p.)***		X

Footnotes:

1 EIA procedure of Tamplin, et al, as described in Chapter 9 of the FDA Bacteriological Analytical Manual, 7th Edition, 1992.

2 MPN method in Chapter 9 of the FDA Bacteriological Analytical Manual, 7th Edition, May 2004 revision, followed by confirmation using biochemical analyses or by the DNA -alkaline phosphatase gene probe for vvhA as described by Wright et al., or a method that a State can demonstrate is equivalent.

3 MPN method in Chapter 9 of the FDA Bacteriological Analytical Manual, 7th Edition, May 2004 revision, followed by confirmation using biochemical analyses or the DNA-alkaline phosphatase gene probe for tlh as described by McCarthy et al., or a method that a State can demonstrate is equivalent.

4 MPN method in Chapter 9 of the FDA Bacteriological Analytical Manual, 7th Edition, May 2004 revision, and as described in the "Direct Plating Procedure for the Enumeration of Total and Pathogenic *Vibrio parahaemolyticus* in Oyster Meats" developed by FDA, Gulf Coast Seafood Laboratory, or a method that a State can demonstrate is equivalent.

5 *Vibrio vulnificus*, ISSC Summary of Actions 2009. Proposal 09-113, Page 123.

6 MPN-Real Time PCR Method for the tdh and trh Genes for Total *V. parahaemolyticus* as described in Kinsey et al., 2015. ISSC 2015 Summary of Actions Proposal 15-111, Page 397.

7 MPN-Real Time PCR Method for the *tlh* gene for total *V. parahaemolyticus* as described in Kinsey et al., 2015. ISSC 2015 Summary of Actions Proposal 15-113, Page 418

8 Direct Plating Procedure in Chapter 9 of the FDA Bacteriological Analytical Manual, 7th Edition, May 2004 revision, and as described in the 'Direct Plating Procedure for the Enumeration of Total and Pathogenic *Vibrio parahaemolyticus* in Oyster Meats' developed by FDA, Gulf Coast Seafood Laboratory.

6. Emerging Methods for Vibrio Enumeration

	Vibrio Indicator Type:	**Application: PHP Sample Type: Shucked**	**Application: PHP Sample Type: In-Shell**
qPCR for CTX Gene[1]	***Vibrio Cholera (V.c.)***	X	X

Footnotes:

[1]Real Time PCR (qPCR) Assay for the detection of the Cholera Toxin Gene CTX. 2011 ISSC Biennial Meeting, Laboratory Methods Review Committee Report.

7. Other

	Application: Controlled Purification Sample Type: Seawater
Nephelometer[1] Turbidity	X

Footnotes:

[1]Nephelometer [seawater] American Public Health Association. 1970. Recommended Procedures for the Examination of Sea Water and Shellfish, 4th Edition, APHA, New York, N. Y.

.15 Evaluation of Laboratories by State Shellfish Laboratory Evaluation Officers Including Laboratory Evaluation Checklists

NSSP Guidance Documents provide the public health principles supporting major components of the NSSP and its Model Ordinance, and summaries of the requirements for that component. NSSP Model Ordinance requirements apply only to interstate commerce although most States apply the requirements intrastate. For the most up to date and detailed listing of requirements, the reader should consult the most recent edition of the Model Ordinance.

Laboratory results from the microbiological and marine biotoxin testing of shellfish and shellfish growing waters are widely used in the NSSP to aid in determining the safety of shellfish for human consumption. Experience with the microbiological and marine biotoxin analyses of shellfish and shellfish growing waters have indicated that minor differences in laboratory procedures or techniques might cause wide variations in the results. To ensure uniformity NSSP wide in the application of standards for shellfish and shellfish growing waters, a comprehensive, effective laboratory quality assurance (QA) program is necessary to demonstrate the validity of analytical results. The laboratory QA program is the systematic application of the practices essential to remove or minimize errors that may occur in any laboratory operation caused by personnel, equipment, media, reagents, and analytical methodology. Integral to laboratory quality assurance is a strong program for the external assessment or evaluation of laboratory performance.

The laboratory evaluation process has evolved over the years to accommodate changes in microbiology and marine biotoxin procedures brought about by NSSP Workshops and more recently by the Interstate Shellfish Sanitation Conference (ISSC). In 1985, FDA issued an interpretation entitled “Evaluation of Laboratories by State Shellfish Laboratory Evaluation Officers” (SS#35). This Interpretation allowed NSSP laboratories which had been previously evaluated by FDA Shellfish LEOs to be subsequently evaluated by qualified State personnel as certified State Shellfish LEOs. This guidance describes the procedure for the certification of these individuals as State Shellfish LEOs.

General Provisions

1. If the Authority uses the analytical services of private/commercial/fee for services laboratories to support the NSSP, then the Authority must select a qualified individual to become certified as a State Shellfish LEO.
2. If the Authority uses the analytical services of multiple public laboratories (state, county, parish town, etc.) to support the NSSP, then the Authority may select a qualified individual to become a State Shellfish LEO.
3. If the Authority chooses not to participate in the certification process, FDA can evaluate the State’s public laboratories. FDA, however, does not normally evaluate private/commercial/fee for services laboratories. FDA may, under certain circumstances as resources permit, evaluate these laboratories on a case-by-case basis at the request of the Authority. This request must be in writing and made through the FDA Shellfish Specialist.
4. State Shellfish LEOs will perform official NSSP evaluations of laboratories which have been previously evaluated by FDA and been found to fully conform to NSSP laboratory requirements.
5. State Shellfish LEOs may evaluate laboratories in a different State under a memorandum of understanding between the States involved and FDA consistent with NSSP requirements.
6. State Shellfish LEOs may not evaluate laboratories in which they are employed or which they supervise or laboratories within the same supervisory chain of command to ensure complete objectivity in the evaluation process and avoid the appearance of a conflict of interest.

7. To qualify for certification, the prospective State Shellfish LEO must:
    a. Be a State employee;
    b. Have a minimum of two (2) years of shellfish laboratory experience or a laboratory background with a minimum of three (3) years of bench level experience with the method types that will be evaluated;
    c. Have experience performing laboratory evaluations or supervising a laboratory; and,
    d. Be free from any commercial, financial or other pressures or conflicts of interest that might cause or appear to cause the prospective State Shellfish LEO to act in other than an impartial or non-discriminatory manner.
8. If the prospective or current State Shellfish LEO is employed by the laboratory supporting the NSSP, that laboratory must be fully conforming to NSSP requirements or the individual will not be certified and if currently certified, certification will be revoked.

Responsibilities of the FDA National Laboratory Standard

1. The FDA National Laboratory Standard(s) will be responsible for standardizing all LEOs.
2. The FDA National Laboratory Standard will conduct certifications/recertifications. The Standardization evaluation process will consist of a minimum of one (1) practice evaluation in areas under consideration for certification and one (1) formal standardization evaluation. The evaluation will be checklist specific and the State Shellfish LEO will be standardized to evaluate the methods only for which they have been certified.
3. FDA Standard Operating Procedure for Laboratory Evaluations will be provided to every LEO candidate for the purpose of evaluation standardization.

Responsibilities of the Authority

1. The Authority must ensure that appropriate written documentation is provided to FDA to demonstrate that a prospective State Shellfish LEO is adequately qualified to assume the responsibilities of a State Shellfish LEO as described above.
2. The Authority must provide or ensure that adequate time, resources and support are made available to the State Shellfish LEO to fully participate in the certification process and to fulfill his/her obligation as a State Shellfish LEO.
3. The Authority will provide, or ensure adequate opportunity for State Shellfish LEOs to maintain communication with FDA LEOs, as needed, to provide guidance and updates relevant to the NSSP laboratory evaluation program and any changes to their State programs.

FDA's Responsibilities

1. FDA is responsible for the certification/recertification of State Shellfish LEOs.
2. As a result FDA must:
    a. Select qualified individuals to receive training based upon the documentation supplied by the Authority;
    b. Develop and provide training that will enable prospective and current State Shellfish LEOs to consistently and uniformly apply evaluation criteria in determining the competence of laboratories to support or continue to support the NSSP;
    c. Certify prospective State Shellfish LEOs that successfully complete the certification process;
    d. Maintain communication with State Shellfish LEOs as needed to provide guidance and updates relevant to the NSSP laboratory evaluation program;
    e. Recertify current State Shellfish LEOs pursuant to the criteria established for satisfactory performance below;
    f. Monitor the performance of State Shellfish LEOs to ensure that the evaluation process is being performed consistent with NSSP requirements as described in the current

NSSP Guide for the Control of Molluscan Shellfish and this guidance;

g. Maintain communication as needed with the Authority and other pertinent state officials, prospective and current State Shellfish LEOs and FDA Shellfish Specialists relevant to the certification/recertification process;
h. Revoke certification of State Shellfish LEOs for cause; and,
i. Void certification when the need for a State Shellfish LEO no longer exists within the state shellfish sanitation program or when the State Shellfish LEO is no longer employed by the State.

State Shellfish Laboratory Evaluation Officer's Responsibilities

1. Conduct on-site laboratory evaluations at least every three (3) years. However, more frequent evaluations are strongly encouraged and may be necessary with marginally performing laboratories, or when major changes in workloads or priorities have occurred or when there has been a substantial turnover of personnel, or, at the specific request of the Authority.
2. Provide appropriate post-evaluation follow-up for each laboratory evaluated (i.e., monitoring corrective actions and resolutions of all nonconformities).
3. Prepare narrative evaluation reports within thirty (30) days for all laboratories evaluated. The report should consist of the completed FDA Shellfish Laboratory Evaluation Checklist for the component(s) evaluated and a narrative discussion that accurately and concisely describes the overall operation of the laboratory. All nonconformities noted should be described in this narrative; and, where relevant, an explanation provided relating the potential impact of the deficiency to the analytical results. Completed corrective actions should be included in the narrative report only if they were corrected during the evaluation. Recommendations for corrective action or, if applicable, suggestions to enhance laboratory operations should also be included in the narrative report.
4. Distribute completed evaluation reports with checklists to FDA LEOs and to the appropriate FDA Shellfish Specialist.
5. Inform FDA Shellfish LEOs when a laboratory has been found to be in nonconforming status the same day as the evaluation is completed. A letter informing FDA National Laboratory Standard of upgraded status by way of a separate Completed Corrective Action Memo will be sent, should one be necessary.
6. Coordinate proficiency testing at least yearly for all laboratories in the State supporting the microbiology component of the NSSP.
7. Prepare annually (in December) a summary list of all laboratories, qualified analysts, and methods performed in each NSSP laboratory and transmit it to the FDA Shellfish LEOs.

Certification Process

Certification of qualified individuals is designed to be accomplished through individualized training and field standardization. Individuals are certified for evaluating microbiological and Vibrio detection and/or marine biotoxin components of the NSSP depending on their qualifications and the needs of the State shellfish sanitation program. Certification is dependent upon the prospective State Shellfish LEO satisfying all the following performance criteria.

a. Demonstration of familiarity with evaluation requirements.
b. Demonstration of a thorough knowledge of the evaluation methods and documents.
c. Demonstration of the technical knowledge/familiarity with the analytical procedures being used.
d. Ability to communicate effectively both orally and in writing.
e. Successful completion of both training course and field standardization.

Field Standardization

1. Field standardization is designed to evaluate the prospective State Shellfish LEO's ability to determine the competence of the laboratory to meet NSSP laboratory requirements, recognize laboratory practices inconsistent with NSSP requirements when they occur, make appropriate recommendations for corrective action, and provide the necessary follow-up activity to bring the laboratory into conformity with the NSSP.
2. Field standardization consists of a minimum of one (1) practice and one (1) final onsite evaluation with the FDA National Laboratory Standard. For the final standardization assessment, the onsite evaluation, all "Critical" nonconformities cited, or lack thereof, must be in agreement between the FDA National Laboratory Standard and the State LEO candidate. Additionally, for "Key" and "Other" nonconformities, the evaluation checklists completed by the prospective State Shellfish LEO candidate and the FDA National Laboratory Standard should be in 90% agreement.
3. During all joint field evaluations the State Shellfish LEO Candidate will be the lead evaluator. He or she will be responsible for requesting documents, assessing records, and conducting the evaluation. FDA Standard Operating Procedure for inspection will be followed regarding assessment requests. The Candidate shall also conduct the "exit" interview and discuss all significant findings with management.
4. The narrative evaluation report must be prepared by the State Shellfish LEO candidate for each joint but independent evaluation conducted. The report(s) should consist of the completed FDA Shellfish Laboratory Evaluation Checklist(s) and a narrative discussion that accurately and concisely describes the overall operation of the laboratory. All nonconformities noted should be described in the narrative; and where relevant an explanation provided relating the potential impact of the deficiency to the analytical results. Recommendations for corrective action or, if applicable, suggestions to enhance laboratory operations should be included in this narrative report(s).
5. Final field standardization should be performed in NSSP laboratories within the prospective State Shellfish LEO's home State to provide realistic evaluation scenarios. The draft narrative report(s) with accompanying checklist(s) must be submitted to the certifying FDA Shellfish LEO within thirty (30) days of the evaluation(s). All documents submitted will be reviewed for appropriate content, accuracy and uniformity of approach by the certifying FDA National Laboratory Standard.
6. Field standardization is pass/fail.
7. After successfully completing the Field Standardization Exercise, the State Shellfish LEO Candidate will be granted the title of LEO. A certificate recognizing that accomplishment will be forwarded to the State Shellfish LEO Candidate, along with formal notification to the State Shellfish LEO Candidate's supervisor, within thirty (30) days.

Failure to be Certified

1. If a prospective State Shellfish LEO fails to satisfy any of the performance criteria listed above, he/she will not be certified.
2. As resources permit, the prospective State Shellfish LEO may receive additional training to better prepare him/her to be certified; including attending the Shellfish Program Laboratory Methods and Evaluation Procedures Course. If the LEO candidate is unsuccessful in his/ her final standardization attempt he/ she must repeat two (2) practice evaluations before attempting the final standardization evaluation again. If failure continues after the second attempt, the candidate will not be eligible for a third attempt at standardization without the expressed permission of the National Laboratory Standard.
3. The requesting Authority may withdraw the prospective State Shellfish LEO from consideration.

Recertification

1. Recertification normally occurs every six (6) years and is contingent upon the continuing need in the State shellfish sanitation program for the services of a State Shellfish LEO.
2. Recertification is based on the State Shellfish LEO satisfactorily meeting the following employment and performance criteria.
   a. The individual must continue to be employed by the State and be free of any commercial, financial or other pressures or conflicts of interest real or perceived that may cause the State Shellfish LEO to act in other than an impartial and non-discriminatory manner.
   b. The individual must demonstrate continued competence in the evaluation of NSSP laboratories by performing evaluations with an FDA Shellfish LEO and providing an appropriate narrative evaluation report to the FDA National Laboratory Standard.
   c. The individual must have performed laboratory evaluations at the minimum frequency prescribed in the current edition of the Guide for the Control of Molluscan Shellfish and have all Narrative evaluation reports up to date.
3. State Shellfish LEOs who successfully complete recertification will be issued a letter of recertification by FDA and be cleared to distribute the completed report(s) to the appropriate Shellfish Specialist. A copy of this letter will be sent to the Authority and appropriate Shellfish Specialist.
4. If FDA is unable to conduct a recertification visit by the expiration of the individual's certification, his/her certification may be extended until such time as recertification can be completed. If requested, a letter extending the certification can be provided as appropriate.

Standardization Maintenance

1. Maintenance will be provided in the form of updated LEO courses, updated field standardization guides, and other guidance/technical assistance activities on an as needed basis.
2. State Shellfish LEOs will be required to attend the Shellfish Program Laboratory Methods and Evaluation Procedures Course every three (3) years if it is offered by FDA.

Revocation of Certification

1. State Shellfish LEO's who fail to meet any of the certification/recertification, employment or performance criteria listed above will have their certification revoked.
2. Certification may be voided when State shellfish sanitation programs no longer have a need for the services of a State Shellfish LEO.
3. Voided certifications may be reactivated at the discretion of FDA if the need for the analytical services of additional laboratories by the State shellfish sanitation program recurs.
4. Revoked certifications will not normally be restored.
5. The National Laboratory Standard will document the reason(s) for revocation of the LEO certification. This information shall be forwarded to the Candidate's supervisor and a copy shall be placed in the FDA file. All evidence and conclusions reached by the FDA shall be documented in writing by the Standard and shall be retained for three (3) years in accordance with the Freedom of Information Act.

References

American Public Health Association. 1985. *Standard Methods for the Examination of Water and Wastewater*. 16th Ed. American Public Health Association, American Water Works Association, Water Pollution Control Federation. Washington, D.C.

Food and Drug Administration. 1994. *Standard Procedures for State Shellfish Laboratory Evaluation*

Officers. U.S. Food and Drug Administration, Center for Food Safety and Applied Nutrition, Office of Field Programs, Division of Cooperative Programs, Shellfish Safety Branch, Washington, D.C.

NOTE: Please click on the link below to view, print or download these documents:

NSSP Laboratory Evaluation Checklists

1. NSSP Laboratory Evaluation Checklist for Microbiology
2. Mouse Bioassay and Scotia Rapid Test for Paralytic Shellfish Poisoning (PSP)
3. Laboratory Evaluation Checklist - Analysis for NSP (Mouse Bioassay)
4. Paralytic Shellfish Poisoning (PSP) HPLC-PCOX Method Evaluation Checklist
5. Shellfish Laboratory Evaluation Checklist for Domoic Acid (Amnesic Shellfish Poisoning; ASP) HPLC-UV
6. Shellfish Laboratory Evaluation Checklist for PCR Microbiology
7. Laboratory Evaluation Checklist – Laboratory Quality Assurance Program

.16 Protocol for Reviewing Classification of Areas Implicated by Pathogens in Shellfish Meat Samples

NOTE: **Please click on the link below to view, print or download these documents:**

Protocol for Reviewing Classification of Areas Implicated by Pathogens in Shellfish Meat Samples

.17 Calculating the Ninetieth (90th) Percentile for End-Product Depurated Shellfish

Process verification in depuration is performed continuously to ensure that the microbial contaminant load is being effectively reduced. Two (2) indices of performance, the geometric mean and the ninetieth (90th) percentile have been developed to describe the effectiveness of the depuration process. Critical limits for these parameters have been established empirically by shellfish species. For soft clams (*Mya arenaria*), a geometric mean of fifty (50) and a ninetieth (90th) percentile of 130 have been set. For hard clams, oysters, manila clams and mussels, a geometric mean of twenty (20) and a ninetieth (90th) percentile of seventy (70) have been adopted.

Geometric means and ninetieth (90th) percentiles are determined daily or as end-product results become available from the analysis of the most recent ten (10) consecutive harvest lots per species, per restricted harvest area used. If the critical limits for either the geometric mean and/or the ninetieth (90th) percentile are exceeded, the process is considered to be unverified; and, additional sampling requirements must be instituted to ensure effective process control.

End-product depurated shellfish samples are analyzed using two (2) different methods of recovery, a pour plate procedure and a single dilution MPN test. Calculation of the ninetieth (90th) percentile for these samples is complicated by the fact that fecal coliforms recovered by the MPN and ETCP methods follow different statistical distributions. To accommodate these differences and maintain a high likelihood for detecting an unacceptable amount of process variability without having to change or alter the formula used requires the use of nonparametric or "distribution free statistics." Using "distribution free statistics," the ninetieth (90th) percentile for end-product depurated shellfish samples is calculated by arraying the fecal coliform count data in ascending order and applying the formula (n + 1)P/100.

As an example of the use of this formula, the Model Ordinance requires that the ninetieth (90th) percentile of the fecal coliform analytical data be calculated from the most recent ten (10) consecutive harvest lots for each shellfish species depurated from each restricted harvest area. Fecal coliform count data, whether from the ETCP or MPN procedure for these ten (10) lots must be arrayed from the smallest to the largest value using the arithmetic (not logarithmically transformed) count data. Applying the formula, n would equal ten (10) for the ten (10) most recent consecutive harvest lots required by the Model Ordinance. P, the percentile of interest would be ninety (90). Multiplying the formula out gives the position of the ninetieth (90th) percentile in the arrayed data. Performing these calculations, 10 + 1 = 11, 11 x 90 = 990/100 = 9.9. Thus, the ninetieth (90th) percentile for end-product depurated shellfish data is the value of the 9.9th sample in the ten (10) sample array.

Using the ten (10) samples as required by the Model Ordinance, the ninetieth (90th) percentile for end-product depurated shellfish samples would always be the value of the 9.9th sample in the ascending array of the arithmetic count data. To calculate this value from the arrayed data, interpolation between samples nine (9) and ten (10) is necessary. This is best illustrated using several samples.

Example 1

For soft clams, the ten (10) most recent consecutive harvest lots from a particular restricted harvest area produced the following end-product fecal coliform count data which has been arrayed in ascending order for ease in calculation.

Sample #	FC Count (MPN/100 grams)
1	8.9 (<9.0)
2	9.0
3	9.0
4	9.0
5	9.0
6	18
7	18
8	18
9	29
10	248

a. By convention and for the purpose of these calculations, fecal coliform counts that signify the upper or lower limit of sensitivity of the test (MPN or ETCP) shall be increased or decreased by one significant figure. For example <9.0 becomes 8.9, <17 becomes 16 and >248 becomes 250. Individual plates which are too numerous to count (TNTC) are considered to have >100 colonies per plate. A sample containing "TNTC" plates is collectively rendered as having a count of 10,000.

b. The ninetieth (90^{th}) percentile for a ten (10) sample array is the 9.9^{th} sample in the array. The value for the 9.9^{th} sample in the array is interpolated by subtracting the value for sample #9 from the value for sample #10 in the array. This value is subsequently multiplied by 0.9 and then added to the value of sample #9 to give the value for the 9.9^{th} sample in the array or the ninetieth (90^{th}) percentile.

c. In this example, sample #9 which is 29 is subtracted from sample #10 which is 248 to give 219. 219 is subsequently multiplied by 0.9 to give 197.1. 197.1 is then added to the value of sample #9, which is 29 to give 226.1. Rounding this off to 226, the value of the ninetieth (90^{th}) percentile becomes 226.

Example 2

Soft clams from another restricted harvest area produced the following end-product depurated fecal coliform counts which have been arrayed in ascending order for ease in calculation.

Sample #	FC Count (MPN/100 grams)
1	16 (<17)
2	16 (<17)
3	16 (<17)
4	17
5	17
6	33
7	50
8	50
9	67
10	84

In this example as above, the ninetieth (90^{th}) percentile equals the value of the 9.9^{th} sample in this ten (10) sample array. The value for the 9.9^{th} sample in the array is interpolated by subtracting the value of sample # 9 which is 67 from the value of sample #10 which is 84 to give 17. 17 is then multiplied by 0.9 to give 15.3 which is added to the value of sample #9 which is 67 to give 82.3. Rounding this value off to 82, the value for the ninetieth (90^{th}) percentile becomes 82.

Example 3

In this case, oysters from a restricted harvest area produced the following end-product depurated fecal coliform counts which have been arrayed in ascending order for ease in calculation.

Sample #	FC Count (MPN/100 grams)
1	8.9 (<9.0)
2	8.9 (<9.0)
3	8.9 (<9.0)
4	8.9 (<9.0)
5	9.0
6	9.0
7	9.0
8	18
9	88
10	88

In this example as in the other two (2), the ninetieth (90^{th}) percentile equals the value of the 9.9^{th} sample in the ten (10) sample array. Unlike the other two (2) examples, however, the values for samples # 9 and #10 are identical making interpolation unnecessary in finding the value for the 9.9^{th} sample in this array. This value is by convention identical to the value for samples #9 and #10. In this case, the value is 88.

Conditional Protocol

In examples one (1) and three (3) above, the values of the ninetieth (90^{th}) percentiles calculated exceeded the critical limits set for the individual shellfish species depurated. Such high levels of variability when detected in the performance of the depuration process subsequently trigger the conditional protocol. Implementation of the conditional protocol requires the institution of a number of additional control measures designed to ensure adequate depuration. One such control measure involves the analysis of at least one (1) zero hour shellfish sample from each harvest lot. Like end-product depurated shellfish samples, the Elevated Temperature Coliform Plate Method may also be used for these analyses. However, the 12-tube, single dilution MPN test must not be used because of its limited effective count range (from 9 to 248). Instead, the 5-tube, 3-decimal dilution MPN test must be used to accommodate the expanded range in fecal coliform counts which may be encountered.

.18 Decision Tree - Shellfish from Non-MOU Countries

NOTE: Please click on the link below to view, print or download this document:

Shellfish from Non-MOU Countries

.19 Classification of Shellfish Growing Waters Adjacent to Waste Water Treatment Plants

Note: NSSP Model Ordinance excerpts are listed in italics.

I. Introduction

One of the goals of the NSSP is to control the safety of shellfish for human consumption by preventing its harvest from contaminated growing areas. The positive relationship between sewage pollution of shellfish growing areas and disease has been demonstrated many times. Shellfish-borne infectious diseases are generally transmitted via a fecal-oral route. The pathway can become quite circuitous. The cycle usually begins with fecal contamination of the growing waters.

The primary responsibility of the Authority is to ensure the public health safety of the shellfish growing areas through compliance with the NSSP Model Ordinance. The Authority must perform a sanitary survey that collects and evaluates information concerning actual and potential pollution sources that may adversely affect the water quality in each growing area. Based on the sanitary survey information, the authority determines what use can be made of the shellstock from the growing area and assigns growing areas one (1) of five (5) classifications.

The shoreline survey (also known as the pollution source survey) is the sanitary survey component in which the actual and potential pollution sources that may adversely affect the growing area are identified. These sources may introduce infectious disease agents or poisonous and deleterious substances to the growing waters where they may be taken up and concentrated by shellfish. Detailed and accurate information concerning the pollution sources is necessary for a proper growing area classification.

The key to the accurate classification of shellfish growing areas is the sanitary survey. The principal components of a sanitary survey include: (1) an evaluation of the pollution sources that may affect the areas; (2) an evaluation of the meteorological factors; (3) a review of hydrographic factors that may affect distribution of pollutants throughout the area; and (4) an assessment of water quality.

A pollution source survey must be conducted of the shoreline area and watershed to locate direct discharges (e.g., municipal and industrial waste discharges and package treatment units) and non-point sources of pollution (e.g., septic tanks, storm water runoff and agricultural and wildlife area runoff). Municipal and industrial wastewater treatment facilities should be evaluated in terms of design capacity versus actual loading, type and concentration of pollutants discharged, and the type and effectiveness of pollution control devices.

Water samples are collected to determine if the water quality meets the water quality standards for this growing area classification. The NSSP recognizes two (2) water quality-monitoring strategies: adverse pollution condition and systematic random sampling. Presence of point sources of pollution requires the use of the adverse pollution condition monitoring system to collect data for the application of the water quality standard. In growing areas not affected by point sources, the Authority may elect to use either system. The presence or absence of point sources of pollution and the monitoring system used dictate the frequency of samples that must be collected for application of the water quality standards.

The original NSSP principles have historically proved effective in controlling bacterial illness associated with shellfish harvested from polluted waters. These principles, namely a robust sanitary survey, regular water and shellfish monitoring using bacterial indicators, controlled harvest times and labelling the origin of shell stock remain applicable as the primary preventative food safety control measures for growing areas.

However, there is now ample scientific evidence to show that the current bacterial indicators are inadequate to predict the risk of viral illness for the following reasons:

(1) Enteric viruses are resistant to treatment and disinfection processes in a Waste Water Treatment Plant (WWTP) and are frequently detected in the WWTP's final effluent under normal operating conditions (Baggi et al. 2001; Burkhardt et al. 2005, Pouillot et al. 2015).
(2) Shellfish can bioaccumulate enteric viruses up to 100-fold from surrounding water (Seraichekas et al. 1968; Maalouf et al. 2011).
(3) Certain enteric viruses are retained by molluscan shellfish to a greater extent and for longer than the indicator bacteria currently used to classify shellfish growing areas (Sobsey et al. 1987; Dore & Lees 1995; Love et al. 2010). It has been well documented that enteric virus detection is not indexed by levels of conventional indicator bacteria.

For several decades now viral illnesses, in particular norovirus (NoV) and hepatitis A (HAV), have been identified as common food safety problems associated with the consumption of bivalve molluscan shellfish (Woods 2010; Iwamoto et al 2010; Scallan et al. 2011; Batz et al. 2012; Hall et al 2012). NoV genogroups I, II and IV and HAV are typically associated with ill-individuals and transferred by the fecal-oral route. Because WWTPs do not completely remove infectious enteric viruses emphasis should be placed on the importance of ensuring there is adequate dilution between a sewage source and a shellfish growing area.

In addition to the risk of enteric viruses present in wastewater, WWTP effluents may also contain chemicals and other deleterious substances including pharmaceuticals, nanoparticles, and other contaminants of emerging concern. Establishment of appropriate classification based upon virus removal efficacy and proximity and source strength of WWTP discharges is an effective strategy to reduce the risk posed by both enteric viruses and other contaminants found in WWTP effluents. NSSP requires that shellfish growing waters be classified into one (1) of five (5) classifications. They include:

(1) Prohibited – A classification used to identify a growing area where the harvest of shellstock for any purpose, except depletion or gathering of seed for aquaculture, is not permitted.
(2) Restricted – A classification used to identify a growing area where harvesting shall be by special license and the shellstock, following harvest, is subjected to a suitable and effective treatment process through relaying or depuration.
(3) Conditionally Restricted - A classification used to identify a growing area that meets the criteria for the restricted classification except under certain conditions described in a management plan.
(4) Conditionally Approved - A classification used to identify a growing area which meets the criteria for the approved classification except under certain conditions described in a management plan.
(5) Approved - A classification used to identify a growing area where harvest for direct marketing is allowed.

This guidance document provides information on the five (5) shellfish harvest classifications and the appropriate use of these classifications impacted by WWTP effluents. A sanitary survey report is required prior to the establishment of the classifications listed above with the exception of areas classified as prohibited.

II. General Requirements for Growing Area Classification

A. Chapter IV. Shellstock Growing Areas

@.01 Sanitary Survey

A. General.

(1) The sanitary survey is the written evaluation report of all environmental factors, including actual and potential pollution sources, which have a bearing on water quality in a shellfish growing area. The sanitary survey shall include the data and results of:

(a) A shoreline survey;

(b) A survey of the microbiological quality of the water. In growing areas adjacent to WWSDs the Authority may utilize MSC results from analysis of shellfish meat samples and the analysis of the data will be included in the sanitary survey report;

(c) An evaluation of the effect of any meteorological, hydrodynamic, and geographic characteristics on the growing area; and

(d) A determination of the appropriate growing area classification.

(2) The sanitary survey shall be periodically updated through the triennial reevaluation and the annual review in accordance with Section C. to assure that data is current and that conditions are unchanged.

(3) The documentation supporting each sanitary survey shall be maintained by the Authority. For each growing area, the central file shall include all data, results, and analyses from:

(a) The sanitary survey;

(b) The triennial reevaluation; and

(c) The annual review.

(4) Wherever possible, the Authority shall provide the necessary information to Federal, State, or local agencies which have the responsibility to minimize or eliminate pollution sources identified in the sanitary survey.

(5) The Authority shall maintain a current comprehensive, itemized list of all growing areas, including maps showing the boundaries and classification of each shellstock growing area.

B. Sanitary Survey Required.

(1) A sanitary survey shall not be required to classify growing areas as prohibited. The findings of a sanitary survey, however, may result in a growing area being classified as prohibited.

(2) A sanitary survey, including the triennial reevaluation, when available, of each growing area shall be required prior to:

(a) The harvest of shellstock for human consumption; and

(b) The classification of a growing area as approved, conditionally approved, restricted, or conditionally restricted.

C. Sanitary Survey Performance.

(1) A sanitary survey of each growing area shall be performed at least once every twelve (12) years and shall include the components in Section A. (1).

(2) When a written sanitary survey report is not completed, the area shall be placed in the closed status.

(3) The growing area classification and the supporting data from the sanitary survey shall be reviewed at least every three (3) years.

(a) This triennial reevaluation shall include:

(i) A review in accordance with Section C. (5) and (6) of the water quality samples;

(ii) Documentation of any new pollution sources and an evaluation of their effect on the growing area;

(iii) Reevaluation of all pollution sources, including the sources previously identified in the sanitary survey, as necessary to fully evaluate any changes in the sanitary conditions of the growing area. The reevaluation may or may not include a site visit;

(iv) A comprehensive report which analyzes the sanitary survey data and makes a determination that the existing growing area classification is correct or needs to be revised; and

(v) If the triennial reevaluation determines that conditions have changed based on the information and data collected during the triennial review and that the growing area classification is incorrect, immediate action shall be initiated to reclassify the area.

(b) When a written triennial reevaluation report is not completed, the Authority shall place the growing area in the closed status.

(4) The triennial reevaluation may include:

(a) Inspection of WWSD or collection of additional effluent samples to determine their impact on the growing area;

(b) Hydrodynamic studies;

(c) Additional field work to determine the actual impact of pollution sources; and

(d) Collection of additional water samples.

(5) On an annual basis, the sanitary survey shall be updated to reflect changes in the conditions in the growing area. The annual reevaluation shall include:

(a) A field observation of the pollution sources which may include:

(i) A drive-through survey;

(ii) Observations made during sample collection; and

(iii) Information from other sources.

(b) Review, at a minimum, of the past year's water quality sample results by adding the year's sample results to the data base collected in accordance with the requirements for the bacteriological standards and sample collection required in Section @.02;

(c) Review of available inspection reports and effluent samples collected from pollution sources;

(d) Review of available performance standards for various types of discharges that impact the growing area; and

(e) A brief report which documents the findings of the annual reevaluation.

(f) The Authority may use MSC meat sampling data and/or MSC waste water sampling data in the annual revaluation of (5) (b), (c), and (d) above to evaluate the viral contributions of the performance standards of WWSD impacts on shellfish growing areas. If MSC meat and/or water data is being used, the Authority shall conduct annual sample collection and analysis in determining performance standards.

(6) If the annual reevaluation determines that conditions have changed based on the information and data collected during the annual review and that the growing area classification is incorrect, immediate action shall be initiated to reclassify the area.

D. Shoreline Survey

Requirements.

(1) In the shoreline survey for each growing area, the Authority shall:

(a) Identify and evaluate all actual and potential sources of pollution which may affect the growing area;

(b) Determine the distance from the pollution sources to the growing area and the impact of each source on the growing area;

(c) Assess the reliability and effectiveness of sewage or other waste treatment systems;

(d) Determine if poisonous or deleterious substances adversely affect the growing area; and

(e) Consider the presence of domestic, wild animal or resident and migrating bird populations for possible adverse effects on growing areas.

(2) The Authority shall assure that the shoreline survey meets the following minimum requirements:

(a) The boundaries, based on the area topography, of each shoreline survey area are determined by an in-field investigation which identifies only the properties with the potential to impact the shellfish waters;

(b) Each shoreline survey area is identified by a unique designation which results in identification of all data associated with each shoreline survey by the unique designation;

(c) Each shoreline survey area is investigated and pollution sources evaluated by qualified, trained personnel; and

(d) Documentation for each pollution source identified by the Authority as affecting a growing area includes:

(i) The location of the site on a comprehensive map of the survey area; and

(ii) The determination that the pollution source has a direct or indirect impact on shellfish waters: and

(e) A written summary of the survey findings.

III. Guidance for Growing Area Classification

As a result of the information gathered during the sanitary survey, the Authority is responsible for distinguishing those growing areas suitable for harvest of shellstock for direct human consumption, those growing areas where the shellfish will require treatment prior to consumption, and those growing areas unsuitable to harvest for human consumption. The probable presence or absence of pathogenic microorganisms, marine biotoxin or other poisonous or deleterious substances in growing area waters is important to the Authority in deciding how the shellfish obtained from the growing area should be used. The Authority's decision, based on the sanitary survey information, will place all actual and potential growing areas in one (1) of the five (5) possible NSSP growing area classifications.

The five (5) growing area classifications are approved, conditionally approved, restricted, conditionally restricted and prohibited. Except for an emergency situation such as conditions following a hurricane when a growing area in the approved classification may be placed temporarily in the closed status, a growing area in the approved classification is always in the open status. The remaining four (4) growing area classifications all place some type of restriction on shellstock harvesting. For more information

concerning the enforcement of these restrictions, see the NSSP Guidance Document, Growing Area Patrol and Enforcement of Growing Area Restrictions (ISSC/FDA, 2017).

IV. Prohibited Classification

A. Definition

A classification used to identify a growing area where the harvest of shellstock for any purpose, except depletion or gathering of seed for aquaculture, is not permitted.

B. Requirements for a Prohibited Area Adjacent to a WWTP

(1) Model Ordinance Chapter IV. Shellstock Growing Areas

@.03 Growing Area Classification.

A. General. Each growing area shall be correctly classified as approved, conditionally approved, restricted, conditionally restricted, or prohibited, as provided by this Ordinance.

(1) Emergency Conditions…

(2) Classification of All Growing Areas. All growing areas which:

(a) Are not subjected to a sanitary survey every twelve (12) years shall be classified as prohibited;

(b) Have a sewage treatment plant outfall or other point source outfall of public health significance within or adjacent to the growing area shall have an area in the prohibited classification established adjacent to the outfall in accordance with Section E. Prohibited Classification; and

(c) Are subjected to…

(3) Boundaries…

(4) Revision of Classifications…

(5) Status of Growing Areas…

(2) Model Ordinance Chapter IV. Shellstock Growing Areas

@.03 Growing Area Classification

E. Prohibited Classification.

(1) Exception…

(2) General…

(3) Sanitary Survey. A growing area shall be classified as prohibited if:

(a) No current sanitary survey exists;

(b) A sanitary survey determines:

(i) The growing area is adjacent to a sewage treatment plant outfall or other point source outfall with public health significance;

(ii) Pollution sources may unpredictably contaminate the growing area;

(iii) The growing area is contaminated with fecal waste so that the shellfish may be vectors of disease microorganisms;

(iv) The concentration of…

(v) The area is contaminated with poisonous or deleterious substances causing the shellfish to be adulterated.

(4) Risk Assessment. A growing area shall be classified as prohibited if a risk assessment performed in accordance with Chapter II. Risk Assessment and Risk Management indicates the shellstock are not safe for human consumption.

(5) Wastewater Discharges.

(a) An area classified as prohibited shall be established adjacent to each

sewage treatment plant outfall or any other point source outfall of public health significance.

(b) The determination of the size of the area to be classified as prohibited adjacent to each outfall shall include the following minimum criteria:

(i) The volume flow rate, location of discharge, performance of the wastewater treatment plant and the microbiological quality of the effluent. The Authority may utilize MSC waste water sample data in the determination of the performance of the sewage treatment plant;

(ii) The decay rate of the contaminants of public health significance in the wastewater discharged;

(iii) The wastewater's dispersion and dilution, and the time of waste transport to the area where shellstock may be harvested; and

(iv) The location of the shellfish resources, classification of adjacent waters and identifiable landmarks or boundaries.

C. Allowable Uses of Shellfish from a Prohibited Growing Area

(1) Depletion

Depletion means the removal, under the direct control of the Authority, of shellstock from a growing area classified as prohibited.

(2) Seed

Seed means shellstock which is less than market size.

D. Model Ordinance Requirements for Depletion and Gathering of Seed

(1) Chapter IV. Shellstock Growing Areas

@.03 Growing Area Classification

E. Prohibited Classification

(1) Exception…

(2) General. The Authority shall:

(a) Not permit the harvest of shellstock from any area classified as prohibited, except for the harvest of shellstock for the gathering of seed for aquaculture or the depletion of the areas classified as prohibited; and

(b) Ensure that shellstock removed from any growing area classified as prohibited is effectively excluded from human consumption unless it is seed to be cultured as outlined in the NSSP Model Ordinance Chapter VI. Shellfish Aquaculture @.02 Seed Shellstock.

(3) Sanitary Survey…

(4) Risk Assessment…

(5) Wastewater Discharges…

(2) Chapter VI. Shellfish Aquaculture

Requirements for the Harvester/Dealer

.03 Seed Shellstock

Seed may come from any growing area, or from any growing area in any classification, provided that:

A. The source of the seed is sanctioned by the Authority; and

B. Seed from growing areas or growing areas in the prohibited classification are cultured for a minimum of six (6) months.

E. Guidance for Determining the Size of Each Prohibited Area Adjacent to a WWTP

There are several important considerations for the shellfish authority to consider when establishing the size of each prohibited area adjacent to a WWTP discharge:

(1) The area is large enough to ensure that there is adequate dilution for the type of classification that will be used adjacent to the prohibited area. If a conditional classification (either conditionally restricted or conditionally approved) is established adjacent to the prohibited area, adequate dilution should be determined when the WWTP is operating as normal. "Normal" means that the WWTP is operating fully within the plant's design specifications, including design flows; treatment stages; disinfection; as well as compliance with all permit conditions that relate to the WWTPs effectiveness in reducing enteric viruses in discharged wastewater.

Should a restricted area for the purposes of relaying or depuration be established adjacent to the prohibited area, establishing the size of the prohibited area should be based on worst case plant operating conditions. This same consideration would apply for an approved area adjacent to the prohibited area.

Below are several scenarios that could occur and are critical for Authorities on evaluating each WWTP when determining appropriate classifications:

(a) Bypassing stage of treatment
A treatment plant should be considered operating outside of normal operation if a treatment stage such as primary or secondary treatment is bypassed which may result in an increased load of solids in the disinfection step and reduce the effectiveness of disinfection. An additional example would be when a WWTP experiences a loss in disinfection and thus the ability to effectively treat the final effluent. SCAs should determine the significance of these types of events and determine appropriate classification for the growing waters adjacent to the prohibited area.

(b) Operating outside design specifications/other types of failures or events
It is not uncommon for a WWTP to periodically experience mechanical failures of equipment that could alter the treatment of sewage. Additionally, a WWTP may also need to periodically perform routine maintenance to the various stages of treatment and may need to temporarily take a portion of a treatment stage off-line for cleaning. Other unexpected maintenance may need to occur. For example cleaning of filters or membranes that have become bio-fouled.

(c) Operating above design flow
Some WWTPs may operate above its design flow and not necessarily bypass any particular stage of treatment. During these events it is typical for WWTP operators to adjust the operation of the WWTP which may include reducing the treatment time in the aeration stage and/or solids separation/settling stage of treatment. Under some circumstances this could lead to a significant reduction in the effectiveness of disinfection. SCAs may consider assessing the efficiency of WWTPs to determine the significance of these type of events.

(d) WWTP permit violations
If a WWTP is exceeding the permitted bacterial indicator levels in the final effluent this indicates that effectiveness of the disinfection step has been reduced. Other measured parameters in the effluent (e.g. Total Suspended Solids (TSS), Biochemical Oxygen Demand (BOD)) may also indicate a

reduction in treatment efficiency has occurred. SCAs may consider assessing the efficiency of WWTPs to determine the significance of these types of events.

Compliance of WWTP operation permit compliance does not necessarily eliminate the potential transmission of pathogens present in wastewater effluent to contaminating shellfish in the impacted area.

There could be situations in which a particular WWTP could be in compliance with a permit, and could still pose a risk to the shellfish harvest area. For example, a WWTP may have permit conditions to allow for flow blending during high flow periods where a portion of the sewage may receive full treatment but a portion of the sewage may only be partially treated and "blended" in the final disinfection step. Although this may be an acceptable practice under a permit it could result in conditions in which the efficiency of the WWTP to remove enteric viruses is considerably reduced. SCAs may consider assessing the efficiency of WWTPs to determine the significance of these events.

(2) The integrity of the collection system. Collection system malfunctions, bypasses or other factors can lead to significant leakages of untreated sewage to the marine environment.

(3) That there is adequate detection and response time when a malfunction occurs to ensure that all harvesting ceases and closures are enforced, so that contaminated product does not reach the market.

F. Guidance for the Use of MSC in Shellfish Meats in determining the size of the prohibited area impacted by WWTP discharge.

MSC has been demonstrated to accurately assess enteric virus dynamics through contaminant mitigation strategies such as relay. MSC levels in shellstock from growing areas adjacent to WWTP discharge are a function of WTTP performance, seasonal persistence of viruses in the environment and the shellfish, species-specific anomalies, and distance from the outfall. The regulatory level of 50 PFU/100 g is a conservative value used for re-opening approved growing areas (after 7 days) after a sewage spill and end point target values for viral relay. Before using MSC for these purposes, the Authority should perform preliminary studies to familiarize themselves with the seasonal viral persistence patterns, regional and species-specific anomalies.

Seasonal persistence of MSC in shellfish meats can vary greatly from warm summer months to the cooler fall, winter, and spring months. MSC levels can be 2 to 3 logs (100 to 1000) higher in the late fall, winter, and early spring months demonstrated by multiple studies from conducted in northern temperate latitudes using both MSC and molecular enumeration using PCR for enteric viruses. This dramatic tendency to accumulate virus particles by 2 to 3 logs over the winter months has species-specific implications for warm-water adapted species such as American oysters and northern quahogs, which tend to shut down as cooling water temperatures approach 10°C. Viruses and bacteria bio-accumulated in shellfish behave very differently; FC is prone to die-off in a week or two over colder months while viruses can persist at high levels under these cold water conditions for months. Cold-water adapted species such as soft-shelled clams, Pacific oysters, European oysters, and mussel all demonstrate the tendency to increase by 2 to 3 log values over the colder months.

If the Authority is interested in using MSC in shellfish meats, it is recommended that monthly samples be taken over the course of a year in multiple growing areas inside the 1000:1 line to understand these seasonal, spatial, and species-specific variations. This data can be very useful to assess the feasibility of using the conditionally restricted classification for the purpose of relay.

G. Use of MSC in Evaluating WWTP Efficiency

At a minimum, MSC may be used in conjunction with conventional bacterial indicators to conduct a comprehensive assessment of WWTP microbiological performance. The differences between influent, pre-disinfection effluent, and final effluent samples taken under normal and challenged conditions can be used to assess the viral deactivation efficiency of a specific waste water treatment process. The analysis is somewhat similar to the determination of WWTP efficacy using bacterial indicators such as E. coli, which is currently used to comply with EPA's National Pollution Discharge Elimination System (NPDES) permit requirements for municipal wastewater treatment plant discharge. Many studies have shown that deactivation of bacterial and viral indicators (and pathogens) can be significantly different in different treatment processes and under challenged conditions. There are several case studies showing that under certain conditions, differential bacterial indicators may indicate highly effective treatment of wastewater while differential MSC samples show little deactivation efficiency.

By collecting differential wastewater samples including influent, pre-disinfection effluent, and final effluent and evaluating these samples for MSC, the viral performance of the wastewater treatment process can be determined. If a comprehensive sampling program includes sufficient samples to assess the WWTP under typical operating conditions as well as challenged condition such as high flow, the viral efficiency of the WWTP can be determined. A comprehensive assessment of WWTP microbiological performance using MSC as well as the conventional bacterial indicators can inform the Authority on the risk associated with a growing area adjacent to a WWTP outfall. An assessment of a WWTP must demonstrate the range of effluent quality during routine operation through an appropriate sampling study and the ability to accurately predict those times when effluent microbiological quality is detrimentally impacted by challenged conditions.

H. Public Health Significance

The positive relationship between disease and consuming contaminated shellfish has been clearly established. Prevention of consumption of contaminated shellfish is the primary objective of the NSSP. The prohibited area classification is the most restrictive growing area classification and is used for areas subject to gross pollution. The use of this classification is also required for all growing areas immediately adjacent to a wastewater treatment plant and where the shellfish authority has not performed a sanitary survey. The harvesting of shellstock is not allowed for any human food use. For additional information concerning the classification of growing waters and the sanitary survey, see the NSSP Model Ordinance. Depletion and Gathering of Seed (Chapter IV @.03 E. Prohibited Classification (2) (a) & (b) and Chapter VI .03 Seed Shellstock A. & B.)

A growing area is placed in the prohibited classification when the sanitary survey or marine biotoxin surveillance program indicates that fecal material, pathogenic microorganisms, poisonous or deleterious substances, marine biotoxin, or radionuclides may reach the harvest area in excessive concentrations. The NSSP Model Ordinance also requires that a growing area for which there is no sanitary survey be placed in the prohibited classification as a precautionary measure. Taking shellstock from a prohibited area for any human food purpose is not allowed.

The NSSP Model Ordinance also requires that an area classified as prohibited must be established between any sewage treatment plants or other waste discharge of public health significance and any growing area placed in the approved, conditionally approved, restricted, or conditionally restricted classification. The size of the prohibited area should be based on the effectiveness and level of sewage treatment; the location of the shellstock resource that would be affected; the classification of adjacent waters, the total time it would take for the person responsible for the operation of the sewage treatment facility to detect a failure and notify the Authority; the time it would take the Authority to issue a notice to stop shellstock harvesting, and the degree of effluent dilution. Due consideration should be given to the possibility that emergency actions might be necessary on holidays or at night.

I. Establishment of Boundaries for the Prohibited Area

The establishment of the boundary for the prohibited area is dependent upon other classification which may be adjacent to the prohibited area. Examples could include water bodies in which the Authority chose to use all five (5) classifications or a situation where the Authority only uses prohibited and approved. The decision of adjacent classifications is often based on shellfish uses for the water body or environmental control and protection efforts by State Water Control Agencies. The requirements of the classification adjacent to the prohibited area and the allowable uses in the areas will often dictate the distance the boundary line for the prohibited area is from the outfall.

Guidance for Dilution Ratios

To determine the impact of a WWTP on adjacent waters, it is imperative that the Shellfish Control Authority assess the waste water dispersal and dilution and the time of transport to the area where shellstock may be harvested. In determining the appropriate dilution for establishing the size of the prohibited area, the Shellfish Control Authority must determine the classification which will be adjacent to the prohibited area. The dilutions below outlines recommended dilution for the boundary line between prohibited and other possible classifications based on dilutions of WWTP effluent, based on initial FC values of 1.4 x 106 FC/100 ml.. Each of these dilutions will be discussed in more detail in the context of each classification.

(1) Prohibited to Restricted Boundary
Minimum dilution – The SCA should determine the effluent quality based on a worst case scenario and should establish a dilution ratio that would accomplish a dilution equivalent to a MPN of 88 (or 163) which is the upper limit restricted standard for depuration and relaying without a contaminant reduction study.

(2) Prohibited to Conditionally Restricted Boundary
Minimum dilution of 320:1 based on "Critical Dilution for Toxics to Ambient (Background)" from the Clean Water Act and EPA's Regulatory Mixing Zone (RMZ).

(3) Prohibited to Conditionally Approved Boundary
Minimum dilution 1000:1 or justified by other data.

(4) Prohibited to Approved Boundary
Minimum dilution >100,000:1 dilution based on worst case scenario or justified by other data.

V. Restricted Classification.

A. Definition

A classification used to identify a growing area where harvesting shall be by special license and the shellstock, following harvest, is subjected to a suitable and effective treatment process through relaying or depuration.

B. Requirements for Use of the Restricted Classification

(1) Chapter IV. Shellstock Growing Areas

@.03 Growing Area Classification

A. General…

B. Approved Classification…

C. Conditional Classifications…

D. Restricted Classification.

(1) General

(a) A growing area may be classified as restricted when:

(i) A sanitary survey indicates a limited degree of pollution; and

(ii) Levels of fecal pollution, human pathogens, or poisonous or deleterious substances are at such levels that shellstock can be made safe for human consumption by either relaying, depuration or low acid-canned food processing.

(b) The Authority shall have effective controls to assure that shellfish are harvested from restricted areas only:

(i) By special license; and

(ii) Under the supervision of the Authority.

(2) Water Quality. Water quality in the growing area shall meet the bacteriological standards in Section @.02 for a growing area in the restricted classification if the growing area is used for depuration. (These standards are included later in this section.)

(3) Shellstock Quality Criteria. The Authority shall establish shellstock quality criteria for use in placing an area in the restricted classification. Depending on the treatment process to be applied to the shellstock, the criteria shall be established in accordance with:

(a) Chapter V. Shellstock Relaying; or

(b) Chapter XV. Depuration

E. Prohibited Classification…

C. Allowable Uses of Shellfish from a Restricted Growing Area

(1) Relay with a Contaminant Reduction Study

Relay means to transfer shellstock from a growing area classified as restricted or conditionally restricted to a growing area classified as approved or conditionally approved for the purpose of reducing pathogens as measured by the coliform indicator group or poisonous or deleterious substances that may be present in the shellstock by using the ambient environment as the treatment process.

(2) Relay without a Contaminant Reduction Study

Relay means to transfer shellstock from a growing area classified as restricted or conditionally restricted to a growing area classified as approved or conditionally approved for the purpose of reducing pathogens as measured by the coliform indicator group or poisonous or deleterious substances that may be present in the shellstock by using the ambient environment as the treatment process.

(3) Depuration

Depuration means the process of reducing the pathogenic organisms that may be present in shellstock by using a controlled aquatic environment as the treatment process.

(4) Seed

Seed means shellstock which is less than market size.

D. Model Ordinance Requirements for Relaying with a Contaminate Reduction Study

(1) Chapter V. Shellstock Relaying

@.01 General

The Authority shall assure that:

A. The shellstock used in relaying activities is harvested from growing areas classified as conditionally approved, restricted, or conditionally restricted;

B. The level of contamination in the shellstock can be reduced to levels safe for human consumption;

C. The contaminated shellstock are held in growing areas classified as approved or conditionally approved for a sufficient time under adequate environmental conditions so as to allow reduction of pathogens as measured by total coliform or fecal coliform or poisonous or deleterious substances that may be present in shellstock. For shellstock harvested from areas impacted by WWSD, MSC may be used as a measure for viral reduction.

D. If shellstock are relayed in containers:

(1) The containers are:

(a) Designed and constructed so that they allow free flow of water to the shellstock; and

(b) Located so as to assure the contaminant reduction required in Section C.; and

(2) The shellstock are washed and culled prior to placement in the containers.

@.02 Contaminant Reduction.

A. The Authority shall establish species-specific critical values for water temperature, salinity, and other environmental factors which may affect the natural treatment process in the growing area to which shellstock will be relayed. The growing area to be used for the treatment process shall be monitored with sufficient frequency to identify when limiting critical values may be approached.

B. The effectiveness of species-specific contaminant reduction shall be determined based on a study. The study report shall demonstrate that, after the completion of the relay activity:

(1) The microbiological quality of each shellfish species is the same microbiological quality as that of the same species already present in the approved or conditionally approved area; or

(2) Contaminant levels of poisonous or deleterious substances in shellstock do not exceed FDA tolerance levels; or

(3) When the source growing area is impacted by WWSD, the viral quality of each shellfish species meets the MSC standard of 50 PFU/100 gm or predetermined levels established by the Authority based on studies conducted on regional species under regional conditions.

C. The authority may waive the requirements for a contaminant reduction study if:
(1) Only microbial contaminants need to be reduced; and
(2) The shellstock are relayed from a conditionally approved, restricted, or conditionally restricted area meeting the bacteriological water quality for restricted areas used for shellstock depuration per Chapter IV. @.02 G. and Chapter IV. @.02 H.; and
(3) The treatment period exceeds sixty (60) days.
D. The time period shall be at least fourteen (14) consecutive days when environmental conditions are suitable for shellfish feeding and cleansing unless shorter time periods are demonstrated to be adequate.
E. When container relaying is used and the Authority allows a treatment time of less than fourteen (14) days, the Authority shall require more intensive sampling including:
(1) Product sampling before and after relay; and
(2) Monitoring of critical environmental parameters such as temperature and salinity; and
(3) For Authorities using MSC, monitoring before and after relay for shellstock relayed from areas impacted by WWSD.
F. The Authority shall establish the time period during the year when relaying may be conducted.

In addition to the requirements of Chapter IV. @.02 G. & H., restricted growing waters used for relaying without a contaminant reduction study must meet the requirements of Chapter IV. @.03 D.

E. Guidance for Restricted Classification for Relaying with a Contaminant Reduction Study

Model Ordinance Chapter IV and V do not include microbial standards for classifying growing areas as restricted that are the source of shellstock for relaying when a contaminant reduction study is required. In establishing of the boundary between prohibited and restricted classifications, the Authority must ensure that levels of fecal pollution, human pathogens, or poisonous or deleterious substances are at such levels that shellstock can be made safe for human consumption by either relaying, depuration or low acid-canned food processing.

In determining an appropriate boundary, the Authority shall consider the following factors associated with the wastewater discharge:

(1) The volume flow rate, location of discharge, performance of the wastewater treatment plant and the microbiological quality of the effluent. The Authority may utilize MSC waste water sample data in the determination of the performance of the sewage treatment plant;
(2) The decay rate of the contaminants of public health significance in the wastewater discharged;
(3) The wastewater's dispersion and dilution, and the time of waste transport to the area where shellstock may be harvested; and
(4) The location of the shellfish resources, classification of adjacent waters and identifiable landmarks or boundaries.

A growing area may be placed in the restricted classification instead of the prohibited classification when the sanitary survey indicates a limited degree of pollution. This option may be used when the sanitary survey for the growing area indicates that the microbiological quality

or poisonous or deleterious substances in the growing area are such that additional treatment through relay can render the shellstock safe for human consumption. The Authority should use the restricted classification only when sufficient relay studies have been conducted to establish raw product quality requirements at the harvest level; and when the Authority has sufficient administrative and technical resources to properly administer this classification. These resources include monitoring of pollution sources; providing coordination between State, local and industry officials; issuing special harvesting permits; and supervising the harvesting and transport of shellstock to relay sites. For a complete discussion of the supervision requirements at the harvest level, see the NSSP Guidance Document, Shellstock Relay (ISSC/FDA, 2017).

Use of the restricted classification for relaying with a contaminant reduction study requires the Authority to develop the controls necessary to assure that the shellfish are relayed prior to consumption. The criteria may vary according to the use to be made of the shellstock and the effectiveness of the relay process used to cleanse the shellstock. Process effectiveness is determined through a study, which establishes the levels of microbiological quality indicators in shellstock at the time of harvest, and the density that can be achieved at the completion of the process. Effectiveness of the process is likely to vary between growing areas used for natural cleansing treatment in relay operations. The species of shellstock may also affect the effectiveness of the relay. For a complete discussion of relay, see the NSSP Guidance Document, Shellstock Relay (ISSC/FDA, 2017).

F. Guidance for Conducting a Contaminant Reduction Study for Relay

The use of the restricted classification for the purpose of relaying with a contaminant reduction study does not require the authority to demonstrate that the growing area meets a microbiological water quality standard. However, in determining the boundary between the prohibited area and the restricted area for relaying with a contaminant reduction study, the authority shall give consideration to the types of contamination that may be in the growing area prior to allowing the area to be in the source of shellfish for relaying. The contaminants may include:

- Pathogenic Organisms
- Poisonous or Deleterious Substances
- Marine Biotoxins
- Physical and Chemical Contaminants

Contaminant Reduction is a specified activity defined in Chapter V. Shellstock Relaying @.02. The authority shall establish species-specific critical values for water temperature, salinity and other environmental factors such as dissolved oxygen and turbidity which may affect the natural treatment process (e.g. relay process). These critical values must be monitored and the Authority shall establish the time of year when relay may be conducted. The relay process requires that shellstock are held in the receiving growing area for a sufficient time under adequate environmental conditions to allow reduction of pathogens as measured by total coliform or fecal coliform. To verify the effectiveness of a relay process, contaminant reduction studies are required. The only exception to this requirement is when water quality in the restricted growing area meets Chapter IV.@.02 G-H, only microbial contaminants need to be reduced, and the treatment period exceeds sixty (60) days. For all other relay operations, the Authority shall establish species-specific critical values for water temperature, salinity, and other environmental factors which may affect the natural treatment process in the receiving growing area. The receiving waters shall be monitored with sufficient frequency to identify when limiting critical values may be approached. The effectiveness of species-specific contaminant reduction shall be determined based on a study. The study shall demonstrates that after the completion of the relay activity, the microbiological quality of each shellfish species is the same microbiological quality as that of the same species already present in the approved or conditionally approved area or

contaminants levels of poisonous or deleterious substances in shellstock do not exceed NSSP tolerance levels. Based on the study, the Authority shall establish the time period during the year when relaying may be conducted. Shellstock shall be relayed for at least fourteen (14) consecutive days when environmental conditions are suitable for shellfish feeding and cleansing unless shorter time periods are demonstrated with the contaminant reduction study to be adequate. If the shellstock are container relayed and the treatment times are less than fourteen (14) days, intensive sampling is required. This intensive sampling includes lot sampling before and after relay as well as monitoring of critical environmental parameters such as seawater temperature and salinity.

Although minimum requirements for contaminant reduction studies have not been specified in the Model Ordinance, there are certain principles of process verification studies that should be considering including; study design, sampling replicates, and data analysis providing statistical reliability. Shellstock and water samples collected during a contaminant reduction study must be analyzed in NSSP-conforming laboratories using NSSP-approved methods. Shellfish samples should be collected at regular intervals from both source and receiving growing areas over the time period of the relay and the natural cleansing process that is proposed. It is important to produce a sufficiently robust database to demonstrate the process is consistently working and the variables affecting the cleansing process are understood. All shellfish samples of ten (10) to twelve (12) animals should be collected in triplicate so that the mean as well as standard deviation or standard error can be calculated. Water temperature and salinity should be measured at both source and receiving waters at the time of shellstock collection. Fecal coliform levels of shellstock already present in the receiving growing area should be collected in triplicate and evaluated for comparison to relayed shellstock microbial levels. Contaminant reduction studies are specific to species, source growing area, and receiving growing area. In States with extensive experience with relay practices, the Authority may approach contaminant reduction studies on a more regionally basis covering multiple source and receiving growing areas.

When the source growing area is adjacent to a WWTP outfall, the authority may utilize MSC in conducting the contaminant reduction study. Should the Authority utilize MSC sampling, the MSC levels in each shellfish species after the relay process must be assessed. The MSC standard of 50 PFU/100 g or pre-determined levels established by the Authority based on studies conducted on regional species under regional conditions are both approved for these assessments. Relay dynamics for bacterial and viral pathogens can be very different and assessing both offers more insight into the potential health risk. Seasonal persistence of bio-accumulated viral particles in shellfish can range 1,000 times higher in the winter months verses the summer months. Depuration rates can vary from 1 log in 44 hours at receiving water temperature above 18 °C to 1 log in 25 days when receiving water temperature fall below 10 °C. Understanding these dynamics for each species and region is paramount to successful relay from restricted or conditionally restricted growing areas adjacent to WWTP outfall. When container relaying is considered and treatment times of less than 14 days are planned, an intensive MSC sampling program based on before and after relay samples can be utilized to assure relayed shellstock are less than the 50 PFU/100 g standard or pre-determined levels established by the authority based on studies conducted on regional species under regional conditions.

G. Guidance for the use of MSC in Contaminant Reduction Studies and Process Control for Shellstock Relay

MSC has been shown to be an appropriate modeling organism for contaminant reduction studies and process verification for shellstock from growing areas impacted by a WWTP outfall. The ability of MSC to model enteric viral dynamics in relay and depuration has been demonstrated

in several studies using different species in different parts of the northern temperate zone. The MSC standard of 50 PFU/100 g used in process end-point samples was shown to be conservative with respect to public health outcomes.

The conditionally restricted classification recommended for relay adjacent to WWTP outfalls where contaminant studies will be used, should have limits such as zero-hour maximum MSC limits in the shellstock from the source growing areas, seasonal limits, and receiving water temperature and salinity limits as determined by comprehensive contaminant reduction studies. This is in addition to controls to assure the continued operation of the adjacent WWTP under the management plan to keep the source growing area in the restricted status. MSC data from sampling shellstock from the source growing area may help determine those times when viral loading and/or viral persistence in the shellstock are low and viral mitigation strategies are feasible. In both viral depuration and viral relay pilot studies using soft-shelled clams in Maine, periods of time were identified using bi-weekly MSC assays of the target species to understand those times when bio-accumulated MSC levels in the shellstock were at a seasonal low (low viral persistence). Receiving waters temperatures were correspondingly high in those summer months resulting in significantly higher depuration rates, especially when water temperature exceeded 64.4 °F (18 °C). Studies showed the depuration rate approached a single log reduction in forty-four (44) hours when water temperatures were above 64.4 °F (18 °C). In contrast, those studies also determined that as water temperature approached 41 °F (5 °C), it would take approximately twenty (20) days to see a comparable single log reduction in MSC levels. The combination of seasonally low MSC levels in the soft-shelled clams and higher summertime depuration rates resulted in successful depuration consistently meeting a shellfish end-point of 50 PFU/100 g.

Species-specific and regional anomalies in persistence and relay and depuration dynamics require that comprehensive contaminant reduction studies be performed for each growing area for each relay or depuration process being considered. In planning a comprehensive contaminant reduction study, sufficient quantities of target specie(s) from the source area should be collected on a regular basis and evaluated for fecal coliform and MSC (triplicate samples of 10-12 animals), during that period of time when the restricted harvest is being considered. Background levels of MSC are not known in a new species or region, the Authority might consider collecting samples year round in the first year to understand the range of viral persistence throughout the year to understand those times when viral mitigation strategies are feasible.

Trial lots of shellstock should be evaluated monthly during the period of time when the relay is being considered. One (1) to two (2) bushels are adequate for relay trials. Triplicate shellfish samples of ten (10) to twelve (12) animals from the approved relay site should be collected at appropriate intervals and analyzed for fecal coliform and MSC. Contaminant reduction studies should use triplicate samples so that variation as well as mean value can be assessed yielding improved statistical reliability for the contaminant reduction studies. If little is known about the depuration rates of the target species, it may be necessary to conduct a separate study using shellfish that are highly contaminated with MSC to assess the viral depuration rate in that region. The goal of contaminant reduction studies is to show those periods of time and the conditions when relay is effective.

The Authority may permit an end-point value other than 50 PFU/100 g based if pre-determined levels established by the Authority based on studies conducted on regional species in regional conditions are known.

H. Model Ordinance Requirements for Relaying without a Contaminant Reduction Study

(1) Chapter V. Shellstock Relaying

@.01 General

The Authority shall assure that:

A. The shellstock used in relaying activities is harvested from growing areas classified as conditionally approved, restricted, or conditionally restricted.

B. The level of contamination in the shellstock can be reduced to levels safe for human consumption;

C. The contaminated shellstock are held in growing areas classified as approved or conditionally approved for a sufficient time under adequate environmental conditions so as to allow reduction of pathogens as measured by total coliform or fecal coliform. For shellstock harvested from areas impacted by WWSD, MSC may be used as a measure for viral reduction, or poisonous or deleterious substances that may be present in shellstock.

D. If shellstock are relayed in containers:

(1) The containers are:

(a) Designed and constructed so that they allow free flow of water to the shellstock; and

(b) Located so as to assure the contaminant reduction required in Section C.; and

(2) The shellstock are washed and culled prior to placement in the containers.

(2) Chapter V. Shellstock Relaying

@.02 Contaminant Reduction

C. The Authority may waive the requirements for a contaminant reduction study if:

(1) Only microbial contaminants need to be reduced; and

(2) The shellstock are relayed from a conditionally approved, restricted, or conditionally restricted area meeting the bacteriological water quality for restricted areas used for shellstock depuration per Chapter IV. @.02 G. and Chapter IV. @.02 H.; and

(3) The treatment period exceeds sixty (60) days

(3) Chapter IV. Shellstock Growing Areas

@.02 Microbiological Standards

G. Standard for the Restricted Classification of Growing Areas Affected by Point Sources and Used as a Shellstock Source for Shellstock Depuration.

(1) Water Quality. The bacteriological quality of every station in the growing area shall meet the fecal coliform standard in Section G. (2).

(2) Fecal Coliform Standard for Adverse Pollution Conditions. The fecal coliform median or geometric mean MPN or MF (mTEC) of the water sample results shall not exceed 88 per 100 ml and the estimated 90th percentile shall not exceed an MPN or MF (mTEC) of:

(a) 300 MPN per 100 ml for a three-tube decimal dilution test;

(b) 173 MPN per 100 ml for a twelve-tube single dilution test; or

(c) 163 CFU per 100 ml for a MF (mTEC) test.

(3) Required Sample Collection. Samples shall be collected in accordance with Section E. (3).

H. Standard for the Restricted Classification of Growing Areas Affected by Nonpoint Sources and Used as a Shellstock Source for Shellstock Depuration.

(1) Exception. If the tidal stage increases the fecal coliform concentration, the Authority shall use samples collected under that tidal stage to classify the area.

(2) Pollution Sources. Growing areas shall meet the requirements in Section F. (2).

(3) Water Quality. The bacteriological quality of every sample station in the growing area shall meet the fecal coliform standard in Section G. (2) or Section H. (4).

(4) Fecal Coliform Standard for Systematic Random Sampling. The fecal coliform median or geometric mean MPN or MF (mTEC) of the water sample results shall not exceed 88 per 100 ml and the estimated 90th percentile shall not exceed a MPN or MF (mTEC) of:

(a) 260 MPN per 100 ml for a five-tube decimal dilution test;

(b) 300 MPN per 100 ml for a three-tube decimal dilution test; or

(c) 163 CFU per 100 ml for a MF (mTEC) test.

(5) Estimated 90th Percentile. The estimated 90th percentile shall be calculated by the same method described in Section F. (5).

(6) Required Sample Collection.

(a) Adverse Pollution Condition Standard. The Authority shall collect samples in the same intensity and frequency as described in Section E. (3) for application of the standard under Section G. (2).

(b) Systematic Random Sampling Standard. The Authority shall collect samples in the same intensity and frequency, and shall apply the sample results in the manner described in Section F. (6) for the application of the standard under Section H. (4).

In addition to the requirements of Chapter IV @.02 G & H., restricted growing waters used for relaying without a contaminant study must meet the requirements of Chapter IV @.03 D. (Page 12)

I. Guidance for Restricted Classification for Relay Without a Contaminant Reduction Study

The NSSP Model Ordinance provides Authorities the option to allow relaying from a restricted area affected by a point source without a contaminant reduction study. The requirement for establishing the restricted classification for this use is different than the requirements for relay with a contaminant reduction study. The Authority must assure that the bacteriological quality of every station meets Chapter IV @.02 G (2). Additionally, the treatment period must exceed sixty (60) days. Should the Authority have viral concerns, the use of MSC sampling of the shellfish would be appropriate. The Authority could use the 50 PFU/100 g level or predetermined levels established by the Authority based on studies conducted in the area.

J. Model Ordinance Requirements for Depuration

(1) Chapter IV. Shellstock Growing Areas

@.02 Microbiological Standards.

G. Standard for the Restricted Classification of Growing Areas Affected by Point Sources and Used as a Shellstock Source for Shellstock Depuration.

(1) Water Quality. The bacteriological quality of every station in the growing area shall meet the fecal coliform standard in Section G. (2).

(2) Fecal Coliform Standard for Adverse Pollution Conditions. The fecal coliform median or geometric mean MPN or MF (mTEC) of the water sample results shall not exceed 88 per 100 ml and the estimated 90th percentile shall not exceed an MPN or MF (mTEC) of:

(a) 300 MPN per 100 ml for a three-tube decimal dilution test;

(b) 173 MPN per 100 ml for a twelve-tube single dilution test; or

(c) 163 CFU per 100 ml for a MF (mTEC) test.

(3) Required Sample Collection. Samples shall be collected in accordance with Section E. (3).

H. Standard for the Restricted Classification of Growing Areas Affected by Nonpoint Sources and Used as a Shellstock Source for Shellstock Depuration.

(1) Exception. If the tidal stage increases the fecal coliform concentration, the Authority shall use samples collected under that tidal stage to classify the area.

(2) Pollution Sources. Growing areas shall meet the requirements in Section F. (2).

(3) Water Quality. The bacteriological quality of every sample station in the growing area shall meet the fecal coliform standard in Section G. (2) or Section H. (4).

(4) Fecal Coliform Standard for Systematic Random Sampling. The fecal coliform median or geometric mean MPN or MF (mTEC) of the water sample results shall not exceed 88 per 100 ml and the estimated 90th percentile shall not exceed a MPN or MF (mTEC) of:

(a) 260 MPN per 100 ml for a five-tube decimal dilution test;

(b) 300 MPN per 100 ml for a three-tube decimal dilution test; or

(c) 163 CFU per 100 ml for a MF (mTEC) test.

(5) Estimated 90th Percentile. The estimated 90th percentile shall be calculated by the same method described in Section F. (5).

(6) Required Sample Collection.

(a) Adverse Pollution Condition Standard. The Authority shall collect samples in the same intensity and frequency as described in Section E. (3) for application of the standard under Section G. (2).

(b) Systematic Random Sampling Standard. The Authority shall collect samples in the same intensity and frequency, and shall apply the sample results in the manner described in Section F. (6) for the application of the standard under Section H. (4).

(2) Chapter XV. Depuration

.01 Critical Control Points.

A. Receiving Critical Control Point - Critical Limits.

(1) The dealer shall…

(2) The dealer shall…

(3) Should a dealer…

(4) The dealer shall receive and depurate only shellstock obtained from a special licensed harvester who has:

(a) Harvested or supervised the harvest of shellstock from a Restricted or Conditionally Restricted area in the open status.

(b) Identified the shellstock…

K. Guidance for Restricted Classification for Depuration

Use of the restricted classification for depuration requires the Authority to conduct a sanitary survey of the growing area as required in Chapter IV @ 01 and establish a monitoring program to ensure the water quality requirements of Chapter IV @ 02 G & H and @03 D.

Depuration process verification described in Chapter XV. @.03 Section J. is based on conditional and approved protocols. The protocol is conditional when statistical analysis of the database containing the 10 most recent FC end point samples fails to meet prescribed species-specific indices. The intent of which is to ensure an appropriate level of testing and quality assurance, including release criteria, during those periods of time when the depuration process is being challenged. These process verification protocols are based on fecal coliform assays of shellfish meats. The requirement for adverse case sampling of the restricted growing area is to assure that water quality in the restricted harvest growing areas does not exceed a median FC score of 88/100 ml (or 163 FC.100 ml) and P90 requirements.

Water quality requirements for the restricted growing area used for depuration were put in place to prevent grossly contaminated shellfish from being processed. It was not the inability to depurate high FC levels from contaminated shellstock, but rather that viruses associated with grossly contaminated shellstock were thought to not effectively depurate viruses in forty-four (44) hours. In contrast, restricted growing areas adjacent to WWTP discharges used for relay with contamination reduction studies are considered effective for viral reductions and do not require a water quality sampling program based on fourteen (14) consecutive days of relay. The inability to detect viruses using fecal coliform based process verification and the lack of any suitable viral indicator assays was the original rationale behind restricted growing areas for depuration requiring water quality limits.

L. Model Ordinance Requirements for Use of a Restricted Area as the Source of Seed

(1) Chapter VI. Shellfish Aquaculture

.03 Seed Shellstock

Seed may come from any growing area, or from any growing area in any classification, provided that:

A. The source of the seed is sanctioned by the Authority; and

B. Seed from growing areas or growing areas in the prohibited classification are cultured for a minimum of six (6) months.

M. Seed

If a restricted growing area is used as a source for seed and the Authority requires that the shellfish must be cultured in the approved growing area for a minimum of six (6) months, the classification requirements for relay and depuration are adequate for this use.

N. Determination of the Boundaries Between Prohibited and Restricted Areas

The establishment of boundaries separating prohibited and restricted growing areas is dependent upon the uses to be allowed within the restricted growing area. MO Chapters IV and V address the classification requirements for allowable shellfish uses in the restricted classification. These uses include the following:

(1) Relay with a contaminant reduction study
(2) Relay without a contaminant reduction study
(3) Depuration

If harvesting for relay with a contaminant reduction study, the boundary line should be based on an acceptable dilution ratio. If harvesting for relay without a contaminant reduction study or depuration, the boundary line must be based on a fecal coliform sampling program. The SCA has the option to utilize MSC.

Guidance for Dilution Ratios

Restricted areas that are the source for shellstock relaying with a contaminant reduction study are not required to meet a microbiological standard. Shellstock from restricted areas used for relaying without a contaminant reduction study or for depuration do have to meet a microbiological standard. In the absence of a microbiological standard, dilution ratios become very important to protect public health. A Shellfish Control Authority should not allow relay with a contaminant reduction study from any portion of a restricted area that does not meet a minimum dilution. The SCA should determine the effluent quality based on a worst case scenario and should establish a dilution ratio that would accomplish a dilution equivalent to a MPN of 88 (or 163) which is the upper limit restricted standard for relaying without a contaminant reduction study and for depuration. This dilution is 16,000:1. Should the Shellfish Control Authority choose to classify waters not meeting a dilution ratio equivalent to the upper limit MPN standard of 88 (or 163), the classification should be supported by fecal or MSC sampling of WWTP effluent to demonstrate a wastewater quality level less than 1.4×10^6 or the results of the contaminate reduction studies conducted over worst-case scenarios at the upstream WWTP discharge.

VI. Establishment of Conditional Classifications

The basic concept of the NSSP is to control the safety of shellfish by preventing their harvest from contaminated growing areas. In reviewing growing area classifications and sanitary surveys conducted by Shellfish Control Authorities, it appears that a common misinterpretation is the classification of an area as approved when in fact the area should have been classified as conditional. Critical investigations usually reveal that the area is subject to intermittent pollution events. Careful consideration of an intermittent pollution event, development and application of a management plan, and cooperation and compliance by all parties may also allow upgrading of an area to a conditionally approved or conditionally restricted classification instead of requiring the area to be restricted or prohibited at all times.

Intermittent pollution to shellfish growing waters has been a significant cause of shellfish-borne infectious disease outbreaks worldwide. In 1978, at least 20,000 persons were involved in an outbreak of oyster-associated gastroenteritis attributed to Norwalk virus. The investigation of the outbreak indicated that a combination of meteorological and hydrographic events had caused inadequately treated and diluted sewage from a nearby municipal facility to reach the area. In an incident in 1982, at least 471 persons developed gastroenteritis after consumption of sewage contaminated oysters when a combination of raw sewage bypasses, high rainfall, strong winds, and abnormally low tides caused contamination of an area that was classified as approved. In both of these instances, application of the conditionally approved area concept probably could have prevented the outbreaks.

A common situation where this classification might be appropriate is when water quality is, to some degree, dependent upon the operation of a WWTP. For example, the boundaries of an approved shellfish area might be improperly determined during a period when a WWTPSD is operating at a satisfactory level. If there is some interruption in treatment, it follows that there will be some degradation of water quality in the growing area which may require a relocation of the boundaries. The degree of relocation

would depend upon such items as the distance between the pollution source and the growing area, hydrography, the amount of water, and the amount of pollution.

The first step in determining whether an area should be classified as conditionally approved or conditionally restricted is to determine whether sufficient State resources are available to manage, survey, monitor, control harvesting, affect closures, and reopen the area as required. It should be noted that sources of pollution must be routinely monitored; coordination between State, local and industry officials must be timely; performance standards must be monitored; and closures must be immediate and effective. States electing to classify areas as conditionally approved have found the public resource investment to be substantial.

The second step in determining whether an area should be placed in the conditionally approved or conditionally restricted classification is to evaluate the potential sources of pollution in terms of their effect on water quality in the area. Potential sources of pollution involving a WWTP include: bypasses and overflows within a sewage collection and treatment system.

The third step in establishing a conditionally approved or conditionally restricted area is to evaluate the source of pollution in terms of the water quality standards to be maintained, and to formulate performance standards for each pollution source having a significant effect on the sanitary quality of the area. The following is an example of performance standards that might be developed:

Performance standards or closure criteria may be based upon the bacteriological quality of effluent from sewage treatment plants. This might be stated in terms of chlorine residual if the bacteriological quality of the effluent can be positively related to chlorine residual. The following is an example of a performance standard for an effluent discharge: "The median coliform MPN, in any one (1) month, shall not exceed 500 per 100 ml, based on not less than sixteen (16) composite samples per month, and not more than ten (10) percent of the samples shall have an MPN in excess of 10,000 per 100 ml. Determinations of the chlorine residual of the effluent should be made hourly and recorded in the permanent plant records."

A performance standard may be based upon total quality of sewage, which can be discharged from any given unit, or from a combination of units, without causing the basic water quality standards to be exceeded.

The design of a waste treatment plant and the plant effluent specifications may be critical to the designation of an area classified as conditionally approved or conditionally restricted. Design criteria which may be useful in determining the quality of sewage which can be discharged into an area without exceeding the desired water quality standards include: population equivalent (coliform) of sewage, predicted survival of coliform in seawater, effectiveness of chlorination and the total quality of clean dilution water in an area. Results of many studies on the survival of bacteria in seawater have been published.

The mechanical equipment at critical sewage treatment or pumping units should be such that interruptions will be minimized. Wherever possible, operations should be automatically recorded on charts. Requirements that might be imposed depend upon the importance of the unit's relationship to water quality. Important design features of a sanitary waste collection system that should be considered include:

Storm water should be excluded from the sanitary system. There should be stand-by equipment to insure that treatment or pumping will not be interrupted. It should be taken into account that interruptions may occur because of damage to a single unit or a power failure.

The pumps and critical units should be fitted with meters or gauges so the regulatory agency can monitor performance standards.

Installation of recording scales to indicate rate of chlorine use is helpful. Chlorine flow meters are available that integrate hydraulic flow with chlorine demand.

Liquid level recording gauges fitted with alarms and located in overflow channels of sewage treatment plants and wet wells of lift stations are useful. They can be set to indicate when overflow takes place. It is good operating procedure to date recording charts. Gauges should be calibrated and maintained so that indicated discharge rates are accurate.

Automatic devices to warn of failure or malfunctioning at self-operated pumping stations or treatment plants can be an important control.

Another factor to consider in developing a conditionally approved or conditionally restricted area is that a prohibited area must be interposed between the conditionally approved or restricted area and the source of pollution. The size of such area should be based on the total time it would take for the operating agency to detect a failure, notify the Authority, and for the latter agency to issue a notice to stop shellfish harvesting. It is recommended that the area be of such size that the flow time through the safety area is at least twice that required for the notification process to become effective. Due consideration should be given to the possibility that closure actions might be necessary on holidays or at night.

The length of time a conditionally approved or conditionally restricted area should be closed following a temporary closure will depend upon several factors including the species of shellfish, water temperature, shellfish activity and cleansing rates, presence of silt or other chemicals that might interfere with the physiological activity of the shellfish, and the degree of pollution of the area.

The conditional classifications are designed to address growing areas that are subject to intermittent microbiological pollution. These optional classifications offer the Authority an alternative to placing the area in the restricted or prohibited classification year round when during certain times of the year or under certain conditions, the shellstock from the growing area may be safely harvested. Public health protection and the control of shellfish safety in the use of the conditional classifications are afforded through the use of a management plan. The management plan for each growing area placed in a conditional classification is based on the information gathered during the sanitary survey. The plan establishes a strict set of criteria that must be met for the growing area to remain in the open status. Failure to meet the criteria automatically places the growing area in the closed status, with immediate notice to the public, the affected industry, and the plan's participants. Two (2) of the most important components of the management plan are: the acceptance of and the agreement to the conditions of the management plan by the one (1) or more Authorities involved, other local, State and Federal agencies which may be involved, the affected shellfish industry, and the persons responsible for the operation of any treatment plants or other discharges that may be involved; and the annual reevaluation of compliance with the plan to assure public health protection. Use of the conditional classification requires more intense monitoring and more frequent reevaluation because of the intermittent nature of the pollution event.

When the Authority has sufficient resources to manage a conditional classification, the use of the conditional classification could allow the safe use of growing areas that might otherwise not be available to the shellfish industry. For a complete discussion of the conditional classification, see the NSSP Model Ordinance Guidance Documents: Management Plans for Growing Areas in the Conditional Classification (ISSC/FDA, 2017). For additional information concerning the classification of growing waters and the sanitary survey, see the NSSP Model Ordinance Guidance Documents: Sanitary Survey and the Classification of Growing Waters (ISSC/FDA, 2017).

A. Requirements for Conditional Area Adjacent to a WWTP

(1) Model Ordinance Chapter IV. Shellstock Growing Areas

@.03 Growing Area Classification.

C. Conditional Classifications. Growing areas may be classified as conditional when the following criteria are met:

(1) Survey Required. The sanitary survey meets the following criteria:

(a) The area will be in the open status of the conditional classification for a reasonable period of time. The factors determining this period are known, are predictable, and are not so complex as to preclude a reasonable management approach;

(b) Each potential source of pollution that may adversely affect the growing area is evaluated;

(c) Microbiological water quality correlates with environmental conditions or other factors affecting the distribution of pollutants into the growing area; and

(d) For Authorities utilizing MSC meat sample data, this data correlates with environmental conditions or other factors affecting the distribution and persistence of viral contaminants into the growing area.

(2) Management Plan Required. For each growing area, a written management plan shall be developed and shall include:

(a) For management plans based on wastewater treatment plant function, performance standards that include:

(i) Peak effluent flow, average flow, and infiltration flow;

(ii) Microbiological quality of the effluent;

(iii) Physical and chemical quality of the effluent;

(iv) Conditions which cause plant failure;

(v) Plant or collection system bypasses;

(vi) Design, construction, and maintenance to minimize mechanical failure, or overloading;

(vii) Provisions for monitoring and inspecting the waste water treatment plant; and

(viii) Establishment of an area in the prohibited classification adjacent to a wastewater treatment plant outfall in accordance with Section E. Prohibited Classification;

(b) For management plans based on pollution sources other than waste water treatment plants:

(i) Performance standards that reliably predict when criteria for conditional classification are met; and

(ii) Discussion and data supporting the performance standards.

(c) For management plans based on WWSD function or pollution sources other than WWSD criteria that reliably predict when an area

that was placed in the closed status because of failure to comply with its conditional management plan can be returned to the open status. The minimum criteria are:

(i) Performance standards of the plan are fully met;

(ii)Sufficient time has elapsed to allow the water quality in the growing area to return to acceptable levels;

(iii) Sufficient time has elapsed to allow the shellstock to reduce pathogens that might be present to acceptable levels. Studies establishing sufficient elapsed time shall document the interval necessary for reduction of coliform levels in the shellstock to pre-closure levels. The study may establish criteria for reopening based on coliform levels in the water. The Authority may utilize MSC in growing areas adjacent to WWSD. Studies establishing sufficient elapsed time shall document the interval necessary for reduction of viral levels in the shellstock. Analytical sample results shall not exceed a level of 50 MSC per 100 grams or pre-determined levels established by the Authority based on studies conducted on regional species under regional conditions. These studies may establish criteria for reopening based on viral levels in the shellfish meats or the area must be in the closed status until the event is over and twenty-one (21) days have passed; and

(iv) Shellstock feeding activity is sufficient to achieve microbial reduction.

(d) For management plans based on a risk assessment made in accordance with Chapter II. Risk Assessment and Risk Management, criteria that reliably determine when the growing area may be placed in the open status and shellfish may be harvested;

(f) Procedures for immediate notification to the Authority when performance standards or criteria are not met;

(g) Provisions for patrol to prevent illegal harvest; and

(h) Procedures to immediately place the growing area in the closed status in 24 hours or less when the criteria established in the management plan are not met.

(3) Reevaluation of Conditional Classification.

(a) The classification shall be reevaluated at least once each year. The reevaluation shall include:

(i) Evaluation of compliance with the management plan;

(ii)Determination of adequacy of reporting of failure to meet performance standards;

(iii) Review of the cooperation of the persons involved;

(iv) Evaluation of water quality in the growing area with respect to the bacteriological standards for its classification;

(v) Field inspection of critical pollution sources, where necessary; and

(vi) Written findings, evaluations and recommendations.

(b) Water Sample Collection.

(i) When the conditional management plan is based on the absence of pollution from marinas for certain times of the year, monthly water samples are not required when the growing area is in the open status of its conditional classification provided that at least three of the water samples collected to satisfy the bacteriological standard for the open status are collected when the growing area is in the open status.

(ii) When the conditional management plan is based on the operation and performance of a WWSD(s); combined sewer overflow(s); or other point sources of pollution, monthly water samples are required when the growing area is in the open status of its conditional classification.

(iii) If a monthly sample cannot be collected due to environmental constraints, the monthly sampling requirement will be satisfied if an additional water sampling run is conducted the following month.

(iv) When the conditional management plan is based on the effects of non-point sources of pollution, such as rainfall events, storm water runoff, and seasonal variations, a minimum of five (5) sets of water samples (when the Adverse Pollution Condition sampling regimen is used) or six (6) sets of water samples (when the Systematic Random Sampling regimen is used) are required. The samples shall be collected when the growing area is in the open status.

(v) When the conditional management plan is based on the effects of non-point sources of pollution, such as rainfall events or storm water runoff, and the area is in the open status for less than six (6) months a minimum of five (5) sets of water samples are required (Adverse Pollution Condition and Systematic Random Sampling). At least one (1) sample shall be collected each month the area is placed in the open status. This sample shall be collected while the area is open. If closed status samples are used to meet the minimum sample requirements only two (2) sets of samples may be utilized and they must have been taken within five (5) days of when the Authority anticipates that the area will be placed in the open status. For growing areas in the open status less than two (2) months, at least one (1) sample must be collected while the area is in the open status. Samples collected during the closed status to meet the minimum five (5) sets of water samples shall be applied to annual and triennial reevaluations of the area.

(vi) When the conditional management plan is based on the seasonal opening and closing of the area, and the area is in the open status for a predetermined period of less than six (6) months, a minimum of five (5) sets of water samples are required (Adverse Pollution Condition and Systematic Random Sampling). All samples shall be collected while the area is in the open status unless the Authority has historical

water quality data to demonstrate that the area meets open status criteria while in the closed status. If closed status samples are used to meet the minimum sample requirements they must be collected within thirty (30) days prior to the area being placed in the open status.

(4) Understanding of and Agreement With the Purpose of the Conditional Classification and Conditions of Its Management Plan by All Parties Involved.

(a) The management plan shall be developed by the Authority in coordination with:

(i) The local shellfish industry;

(ii) The individuals responsible for the operation of any WWSDs involved; and

(iii) Any local or State agencies; and

***(b)** Failure of any one party to agree shall constitute sufficient justification to deny the application of the conditional classification to a growing area.*

(5) Conditional Area Types. There are two (2) types of conditional areas:

(a) Conditionally approved; and

(b) Conditionally restricted

B. Guidance for a Conditional Area Management Plan

The management plan for a growing area in the conditionally approved or conditionally restricted classification must meet certain minimum requirements to ensure that the safety of the shellfish for human consumption is maintained. The use and success of the conditional classification depends upon a thorough and accurate management plan. Therefore, it is important that all aspects of the management plan be fully considered and implemented. The minimum requirements to be addressed are:

(1) An understanding of and an agreement to the conditions of the management plan by the one (1) or more Authorities involved, other local, State and Federal agencies which may be involved, the affected shellfish industry, and the persons responsible for the operation of any treatment plants or other discharges that may be involved;

(2) A written management plan for the growing area being placed in the conditional classification, which includes a general description of the growing area with a map showing the area's boundaries, and which addresses all items in C. through H..

(3) A sanitary survey that shows the growing area will be in the open status of its conditional classification for reasonable periods of time. The survey must provide a description of the factors determining the growing area's suitability for being classified conditionally approved or conditionally restricted, and the supporting information and data.

(4) A description of the predictable pollution event or events that are being managed and the performance standards established for each pollution source contributing to the pollution event including:

(a) For a wastewater treatment facility, the performance standard should be based on:

(i) Peak effluent flow

(ii) Bacteriological quality of the effluent

(iii) Physical and chemical quality of the effluent

(iv) Bypasses from the treatment plant or its collection system
(v) Design, construction, and maintenance to minimize mechanical failure or overloading (i.e., the reliability of the treatment system and collection system components)
(vi) Provisions for verifying and monitoring efficiency of the wastewater treatment plant and the feedback system for addressing inadequate treatment.
(vii) Identification of conditions that lead to WWTP failure and closure of the conditionally approved area.

(b) For meteorological or hydrological events, the performance standard should be based on:
(i) Identification of the specific meteorological and/or hydrologic event that will cause the growing area to be placed in the closed status;
(ii) Discussion and data analyses concluding that effects on water quality from these specific meteorological and/or hydrologic events are predictable, and that the data are sufficient to establish meaningful performance standards or criteria for the establishment and implementation of a management plan for the growing area placed in the conditional classification; and
(iii) The predicted number of times, based on historical findings, that the pollution event will occur within one (1) year.

(c) For seasonal events, such as marina operation, seasonal rainfall, and waterfowl migration, the performance standard should be based on:
i. Identification of the seasonal event that will cause the growing area to be placed in the closed status, including its estimated duration; and
(ii) Discussion and data concluding that the seasonal event is predictable, and that the data are sufficient to establish meaningful performance standards or criteria for the establishment and implementation of a management plan for a growing area placed in the conditional classification;

(5) A description of the plan for monitoring water quality including numbers and frequency;

(6) A description of how the closed status for the conditional classification will be implemented, which must include:
(a) A clear statement that when the performance standards are not met, the growing area will immediately be placed in the closed status;
(b) A requirement to notify the Authority or Authorities that the management plan performance standards have not been met, including:
(i) The name of the agency or other party responsible for notifying the Authority;
(ii) The anticipated response time between the performance standards not being met and notification of the Authority; and
(iii) The procedures for prompt notification including contingencies such as night, weekend and absences of key personnel;
(c) A description of the implementation and enforcement, including:
(i) The response time between the notification to the Authority of the failure to meet performance standards and activation of the legal closure of the growing area by the Authority;

(ii) The procedures and methods to be used to notify the shellfish industry; and

(iii) The procedures and methods to be used to notify the patrol agency (enforcement agency) including:

- The name of the responsible patrol agency;
- The anticipated response time between the Authority's legal closure of the growing area and notification of closure to the patrol agency; and
- A description of the patrol agencies anticipated activities to enforce the closed status.

(7) A description of the criteria that must be met prior to reopening a growing area in the closed status, including the need to determine that:

(a) The performance standards established in the management plan are again fully met;

(b) The flushing time for pollution dissipation is adequate;

(c) A time interval has elapsed which is sufficient to permit reduction of human pathogens as measured by the coliform indicator group in the shellstock;

(d) Where necessary, the bacteriological quality of the water must be verified; and

(e) Shellstock feeding activity is sufficient to achieve reduction of pathogens to levels present prior to the pollution event.

(8) A commitment to a reevaluation of the management plan at least annually using, at a minimum, the reevaluation requirements in the NSSP Model Ordinance.

VII. Conditionally Restricted

A. Definition

A classification used to identify a growing area that meets the criteria for the restricted classification except under certain conditions described in a management plan.

B. Requirements for Conditionally Restricted Area Adjacent to a WWTP

(1) Model Ordinance Chapter IV. Shellstock Growing Areas

@.03 Growing Area Classification.

C. Conditional Classifications. Growing areas may be classified as conditional when the following criteria are met:

(7) Conditionally Restricted Classification. Any growing area in the conditionally restricted classification shall:

(a) Meet the requirements for:

(i) A restricted classification when the conditionally restricted classification is in the open status; and

(ii) A prohibited classification when the conditionally restricted classification is in the closed status; and

(b) Designate in its management plan whether the harvested shellstock are to be relayed or depurated.

(2) Use of the conditionally restricted classifications by the Authority is optional. The conditionally restricted classification is designed to address growing areas that are subject to intermittent microbiological pollution. These classifications offer the Authority an alternative to placing the area in the prohibited classification year round when, under certain conditions, the shellstock from the growing area may be safely harvested for restricted purposes. The concept also applies to situations where

conditions are acceptable for harvest when wastewater treatment plant operation is satisfactory, but not when a malfunction occurs. A management plan is required that describes the controls to provide public health protection in the use of the conditionally restricted classification. For a full explanation of the conditional classifications and their use, see the NSSP Guidance Document, *Management Plans for Growing Areas in the Conditional Classifications* (ISSC/FDA, 2017).

Authorities that allow relaying or depuration may utilize the conditionally restricted classification adjacent to prohibited areas established as a result of a WWTP outfall. The use of the conditionally restricted classification is dependent upon the predictable factors associated with the WWTP discharge. These factors may include volume, treatment efficient, seasonality or other factors which affect the quality of the WWTP effluent. The quality concerns are bacterial, viral, toxic chemical and poisonous deleterious substances. Portions of the prohibited area that are less impacted by the WWTP outfall during predictable time periods can be classified conditional and used as a source of shellfish for relaying and depuration.

The conditionally restricted classification management plan must establish a strict set of criteria, which must be met for the growing area to remain in the restricted status. The following are examples of different types of performance standards that could be used:

(a) Performance standards might stipulate the bacteriological quality of effluent from sewage treatment plants. The microbiological quality can be monitored in terms of disinfection residual or dosage for ultraviolet light disinfection. An example of a performance standard for an effluent discharge is:

"The median fecal coliform MPN, in any one (1) month, shall not exceed 200 per 100 ml, based on not less than sixteen (16) samples per month, and not more than ten (10) percent of the samples shall have an MPN in excess of 1,000 per 100 ml. This fecal coliform limit shall be presumed to be met if the chlorine residual in the effluent is at least 1.0 ppm and the chlorine residual in the effluent is continuously recorded on a chart by chlorine residual analyzer or is measured hourly and recorded in the daily monitoring records as required for the plant's NPDES permit."

(b) For disinfection by ultraviolet (UV) light, the disinfection is based on dosage. An example of a performance standard is, "A minimum UV dose of 37 mW-Sec/cm^2 is to be maintained. The calculation of intensity of the UV light is to include factors for effluent quality, including turbidity, suspended solids, and transmittance. The effluent factors contributing to the dose, including turbidity, suspended solids, transmittance, and flow will be continuously measured and recorded. An alarm will be activated if any of the factors are above design limits."

A detailed discussion of ways to increase the reliability of sewage treatment plants can be found in *Protection of Shellfish Waters* (USEPA, 1974) and *Design Criteria for Mechanical, Electric and Fluid System Component Reliability* (USEPA, 1974).
The fourth step is to determine the water quality, which will occur in the growing area when the performance standards are not met, and what portion of the growing area will be affected. Once these determinations are made, the Authority can select the appropriate management strategy for the portion of the growing area that will be placed in the closed status when performance standards are not met, and can select the boundaries for the closed status. The boundaries of that portion of the growing area to be placed in the closed status would depend upon such items as the distance and travel time from the pollution source to the area, the concentration of pollutants in the discharge during the breakdown condition, amount of effluent and hydrographic factors including dilution available in the receiving water.

The use of the conditional classification where a sewage treatment plant is the pollution source being managed requires a fifth step. An area in the prohibited classification must be established between the sewage treatment plant and the growing area placed in the conditionally approved or conditionally restricted classification. The size of the prohibited area should be based on the level of sewage treatment; the total time it would take for the person responsible for the operation of the sewage treatment facility to detect a failure and notify the Authority; and the time it would take the Authority to issue a notice to stop shellstock harvesting. The size of the area in the prohibited classification should allow for an effluent travel time through the prohibited area that is at least twice that required for the notification process to become effective. Due consideration should be given to the possibility that emergency actions might be necessary on holidays or at night. A minimum effluent dilution is to be determined at the prohibited boundary and can be the controlling factor in situations where there is efficient detection and notification of breakdowns.

The length of time that a growing area should be in the closed status of its conditional classification will depend upon several factors. These factors include the degree of pollution in the growing area and flushing capacity of the estuary, the species of shellfish, water temperature, shellstock activity and cleansing rates, and presence of silt or other chemicals that might interfere with the physiological activity of the shellstock. Additional information on the natural cleansing of shellstock is provided in the NSSP Guidance Document, *Shellstock Relay* (ISSC/FDA, 2017).

C. Allowable Uses of Shellfish from a Conditionally Restricted Growing Area

(1) Allowable Uses When Area is in Restricted Status

(a) Relay without a Contaminant Reduction Study

Relay means to transfer shellstock from a growing area classified as restricted or conditionally restricted to a growing area classified as approved or conditionally approved for the purpose of reducing pathogens as measured by the coliform indicator group or poisonous or deleterious substances that may be present in the shellstock by using the ambient environment as the treatment process.

(b) Relay with a Contaminant Reduction Study

Relay means to transfer shellstock from a growing area classified as restricted or conditionally restricted to a growing area classified as approved or conditionally approved for the purpose of reducing pathogens as measured by the coliform

indicator group or poisonous or deleterious substances that may be present in the shellstock by using the ambient environment as the treatment process.

(c) Depuration
Depuration means the process of reducing the pathogenic organisms that may be present in shellstock by using a controlled aquatic environment as the treatment process.

(d) Seed
Seed means shellstock which is less than market size.

(2) Allowable Uses When Area is in Prohibited Status

(a) Seed
Seed means shellstock which is less than market size.

D. Model Ordinance Requirements for Relay with a Contaminant Study

The Requirements for Relay with a Contaminant Study are defined in Section V. D.

E. Model Ordinance Requirements for Relay without a Contaminant Study

The Requirements for Relay without a Contaminant Study are defined in Section V. H.

F. Model Ordinance Requirements for Depuration

The Requirements for Depuration are defined in Section V. J.

G. Model Ordinance Requirements for Seed

The Requirements for Seed are defined in Section V. L.

H. Determining Boundaries for Conditionally Restricted Growing Areas

Should the Authority utilize the conditionally restricted classification to allow relay or depuration, the area classified as conditionally restricted would be established within the portion of the prohibited area established adjacent to the WWTP. Shellfish uses allowed in the restricted classification would be allowed in the conditionally restricted area when the plant is operating within the satisfactory conditions outlined in the conditionally restricted management plan. (Chapter IV@ .03 C (2). Use of the conditionally restricted classification for relay without contaminant reductions studies and depuration requires the Authority to determine whether the growing area is impacted by additional point and non-point sources of pollution in addition to the management plan which is intended to address all potential problems with the adjacent WWTP. The bacteriological quality of every sample station in the growing area shall meet the fecal coliform standard in Chapter IV.@.02 Section G. (2) or Section H. (3) depending upon whether there is an additional point source or just non-point sources of contamination impacting the conditionally restricted growing area. Sufficient water quality samples shall be collected in accordance with Chapter IV.@.02 Section E. (3) at representative water quality sampling stations throughout the impacted restricted growing area.

The establishment of boundaries separating prohibited and conditionally restricted growing areas is dependent upon the uses to be allowed within the restricted growing area. MO Chapters IV and V address the classification requirements for allowable shellfish uses in the restricted classification. These uses include the following:

(1) Relay with a contaminant reduction study
(2) Relay without a contaminant reduction study
(3) Depuration

If harvesting for relay with a contaminant reduction study, the boundary line should be based on an acceptable dilution ratio. If harvesting for relay without a contaminant reduction study or depuration, the boundary line must be based on a fecal coliform sampling program. The Authority has the option to utilize MSC.

The use of the conditionally restricted classification should not affect other adjacent classifications such as restricted, conditionally approved or approved. The area will be considered in the prohibited status when the management plan criteria are not met.

Guidance for Dilution Ratios

For Authorities that choose to establish conditionally restricted areas, the operating efficiency of the plant must be a primary consideration. A portion of what might be the standard prohibited area could be classified as conditionally restricted when the WWTP is operating efficiently. An explanation for operating efficiency is included in Section VI paged 26 of this document. Conditionally restricted areas, when meeting the NSSP requirement for the restricted classification, can be used for a source for shellstock relaying with a contaminant reduction study. These areas are not required to meet a microbiological standard. Shellstock from restricted areas used for relaying without a contaminant reduction study or for depuration do have to meet a microbiological standard. In the absence of a microbiological standard, dilution ratios become very important to protect public health.

An Authority should not consider any portion of a growing area that does not meet a 320:1 dilution ratio as a source for relaying with a contaminant reduction study. The concept of a 320:1 dilution ratio was first documented in a technical paper written by Virgil Carr of FDA. The technical paper was based on studies conducted at WWTP utilizing UV for disinfection.

This study proposed that the prohibited area, could approach the size requirements for Critical Dilution for Toxics to Ambient (Background) from the Clean Water Act. Similarly, the EPA's Regulatory Mixing Zone (RMZ) is 300:1, which is approximately the transition line from near field dilution zone to far field dilution zone where most mixing has already occurred. The 320:1 dilution ratio is needed to assure that poisonous and deleterious substances are not present in high enough concentrations to present a public health concern.

From a pragmatic point of view, dilution from the outfall to the 320:1 line is a dilution factor of 320 while dilution from 320:1 to 1000:1 is a dilution factor of 3.1. This roughly equates to 100 times more dilution of the originate effluent occurring within the 320:1 dilution line than occurs from the 320:1 dilution line to the 1000:1 dilution line. This is an important factor to consider when one is attempting to understand the viral density in growing waters overlying growing areas adjacent to WWTP discharge and the associated risk.

VIII. Conditionally Approved

A. Definition

A classification used to identify a growing area which meets the criteria for the approved classification except under certain conditions described in a management plan.

B. Requirements for Conditionally Approved Area Adjacent to a WWTP

(1) Model Ordinance Chapter IV. Shellstock Growing Areas

@.03 Growing Area Classification.

C. Conditional Classifications. Growing areas may be classified as conditional when the following criteria are met:

(6) Conditionally Approved Classification. Any growing area in the conditionally approved classification shall:

(a) Meet the requirements for:

(i) An approved area classification when the conditionally approved classification is in the open status; and

(ii) A restricted or prohibited classification when the conditionally approved classification is in the closed status; and

(b) If the closed status meets the criteria for the restricted classification, designate in its management plan whether the shellstock may be harvested for relaying or depuration.

Growing areas are placed in the approved classification when the sanitary survey information and marine biotoxin surveillance data indicate that fecal material, pathogenic microorganisms, poisonous, or deleterious substances are not present in the growing area in unacceptable concentrations. Shellstock harvested from these growing areas may be sold directly to the public for consumption raw or cooked.

C. Allowable Uses of Shellfish in a Conditionally Approved Growing Area

(1) Allowable Uses when the Conditionally Approved Area is in the Open Status

(a) Direct Marketing

Direct Marketing means the sale for human consumption of shellfish which:

(i) Does not require depuration or relaying prior to sale; or

(ii) Has been subjected to depuration or relaying activities

(b) Relay

Relay means to transfer shellstock from a growing area classified as restricted or conditionally restricted to a growing area classified as approved or conditionally approved for the purpose of reducing pathogens as measured by the coliform indicator group or poisonous or deleterious substances that may be present in the shellstock by using the ambient environment as the treatment process.

(c) Depuration

Depuration means the process of reducing the pathogenic organisms that may be present in shellstock by using a controlled aquatic environment as the treatment process.

(d) Seed

Seed means shellstock which is less than market size.

(e) Post-Harvest Processing

Post-Harvest Processing means any process which has been validated using NSSP validation procedures which reduces the levels of pathogenic hazards to below the appropriate FDA action level or in the absence of such a level, below the appropriate level as determined by the ISSC.

(2) Allowable Uses when the Conditionally Approved Area is in the Closed Status

(a) Relay

Relay means to transfer shellstock from a growing area classified as restricted or conditionally restricted to a growing area classified as approved or conditionally approved for the purpose of reducing pathogens as measured by the coliform indicator group or poisonous or deleterious substances that may be present in the shellstock by using the ambient environment as the treatment process.

(b) Depuration

Depuration means the process of reducing the pathogenic organisms that may be present in shellstock by using a controlled aquatic environment as the treatment process.

(c) Seed

Seed means shellstock which is less than market size.

D. Model Ordinance Requirements for Direct Marketing

There are no classification restrictions on shellfish harvested from conditionally approved areas in the open status for direct market.

E. Model Ordinance Requirements for Relay

The Requirements for Relay are defined in Section V. H.

There are no classification restrictions on shellfish harvested from conditionally approved areas in the open status for relay.

F. Model Ordinance Requirements for Depuration

There are no classification restrictions on shellfish harvested from conditionally approved areas in the open status for depuration.

(1) Model Ordinance Chapter XV. Depuration

.01 Critical Control Points.

A. Receiving Critical Control Point - Critical Limits.

(1) <u>The dealer shall receive and depurate only shellstock which is obtained from a licensed harvester who has:</u>

(a) <u>Harvested the shellstock from an Approved or Conditionally Approved area in the open status as indicated by the tag; [C] and</u>

(b) <u>Identified the shellstock with a tag on each container or transaction record on each bulk shipment; [C] and</u>

(c) <u>Harvested the shellstock in compliance with the time/temperature requirements of Chapter VIII. @.02 A. (1), (2) or (3) as determined from records supplied by the harvester described in Chapter VIII. .02 G. (2) [C].</u>

(2) The dealer shall…

(3) Should a dealer…

(4) The dealer shall…

The Requirements for Depuration of shellfish harvested from conditionally approved areas in the closed status are defined in Section V.J.

G. Model Ordinance Requirements for Seed

The Requirements for Seed are defined in Section V.L.

There are no classification restrictions on shellfish harvested from conditionally approved areas in the open status for seed.

H. Model Ordinance Requirements for Post-Harvest Processing

There are no classification restrictions on shellfish harvested from conditionally approved areas in the open status for PHP.

I. Model Ordinance Requirements for Relay with a Contaminant Reduction Study

The Requirements for Relay with a Contaminant Reduction Study are defined in Section V.D.

J. Model Ordinance Requirements for Relay without a Contaminant Reduction Study

The Requirements for Relay without a Contaminant Reduction Study are defined in Section V.H.

K. Determining Boundaries for Conditionally Approved Growing Areas

Should the Authority utilize the conditionally approved classification to allow harvest for direct marketing, the area classified as conditionally approved would be established within the portion of the prohibited or restricted area established adjacent to the WWTP. Shellfish uses allowed in the approved classification would be allowed in the prohibited or restricted area when the plant is operating within the satisfactory conditions outlined in the conditionally approved management plan. (Chapter IV@ .03 C (2).

In addition to meeting the satisfactory conditions outline in the conditionally approved management plan, the area must also conduct a sanitary survey of the growing area as required in Chapter IV @ 01 and establish a monitoring program to ensure the water quality requirements of Chapter IV @ 02 E. The area will be considered in the prohibited or restricted status when the management plan criteria are not met.

Guidance for Dilution Ratios

For Shellfish Control Authorities that choose to establish conditionally approved areas for harvest uses allowable within the approved classification, the operating efficiency of the plant must be a primary consideration. A portion of the prohibited or restricted area could be classified as conditionally approved when the WWTP is operating efficiently. An explanation for operating efficiency is included in Section VI page 26 of this document. The minimum dilution of 1000:1 is recommended for establishing a conditionally approved area adjacent to a WWTP. The rationale for the 1000:1 dilution rate was included in Section IV: Guidance Document Chapter II 19., which was adopted by the ISSC in 2015. Conditionally approved areas, when not in the approved status, can be used for a source for shellstock relaying with a contaminant reduction study, shellstock relaying without a contaminant reduction study and depuration. To utilize shellfish for these purposes, these areas are required to meet the Model Ordinance requirements associated with those uses (e.g. restricted water quality standard).

IX. Approved Classification

A. Definition

A classification used to identify a growing area where harvest for direct marketing is allowed.

B. Requirements for Use of the Approved Classification

(1) Model Ordinance Chapter IV. Shellstock Growing Areas

@.03 Growing Area Classification.

B. Approved Classification. Growing areas shall be classified as approved when the following criteria are met.

(1) Survey Required. A sanitary survey finds that the area is:

(a) Safe for the direct marketing of shellfish;

(b) Not subject to contamination from human or animal fecal matter at levels that, in the judgment of the Authority, presents an actual or potential public health hazard; and

(c) Not contaminated with:

(i) Pathogenic organisms;

(ii) Poisonous or deleterious substances;

(iii) Marine biotoxins; or

(iv) Bacteria concentrations exceeding the bacteriological standards for a growing area in this classification.

(2) Water Quality. The water quality in the growing area shall meet the bacteriological standards for an approved classification in Section @.02.

@.02 Microbiological Standards

E. Standard for the Approved Classification of Growing Areas Affected By Point Sources.

(1) Water Quality. The bacteriological quality of every station in the growing area shall meet the fecal coliform standard in Section E. (2).

(2) Fecal Coliform Standard for Adverse Pollution Conditions. The fecal coliform median or geometric mean MPN or MF (mTEC) of the water sample results shall not exceed fourteen (14) per 100 ml, and not more than ten (10) percent of the samples shall exceed an MPN or MF (mTEC) of:

(a) 43 MPN per 100 ml for a five-tube decimal dilution test;

(b) 49 MPN per 100 ml for a three-tube decimal dilution test;

(c) 28 MPN per 100 ml for a twelve-tube single dilution test; or

(d) 31 CFU per 100 ml for a MF (mTEC) test.

(3) Required Sample Collection.

(a) A minimum of five (5) samples shall be collected annually under adverse pollution conditions from each sample station in the growing area.

(b) A minimum of the most recent fifteen (15) samples collected under adverse pollution conditions from each sample station shall be used to calculate the median or geometric mean and percentage to determine compliance with this standard.

(c) Sample station locations shall be adjacent to actual or potential sources of pollution.

C. Allowable Uses of Shellfish in an Approved Growing Area

(1) Direct Marketing

Direct Marketing means the sale for human consumption of shellfish which:

(a) Does not require depuration or relaying prior to sale; or

(b) Has been subjected to depuration or relaying activities

(2) Depuration

Depuration means the process of reducing the pathogenic organisms that may be present in shellstock by using a controlled aquatic environment as the treatment process.

(3) Seed

Seed means shellstock which is less than market size.

(4) Post-Harvest Processing

Post-Harvest Processing means any process which has been validated using NSSP validation procedures which reduces the levels of pathogenic hazards to below the appropriate FDA action level or in the absence of such a level, below the appropriate level as determined by the ISSC.

D. Model Ordinance Requirements for Direct Marketing

There are no classification restrictions on shellfish harvested from approved areas for direct market.

E. Model Ordinance Requirements for Depuration

The Requirements for Depuration are defined in Section XIII.F.
There are no classification restrictions on shellfish harvested from approved areas for depuration.

F. Model Ordinance Requirements for Seed

The Requirements for Seed are defined in Section V.L.
There are no classification restrictions on shellfish harvested from approved areas for seed.

G. Model Ordinance Requirements for Post-Harvest Processing

There are no classification restrictions on shellfish harvested from approved areas for PHP.

H. Determining Boundaries for Conditionally Approved Growing Areas

In establishing boundaries between approved areas and other classifications adjacent to a WWTP, the Authority should consider dilution ratios and the approved area must meet the microbiological standards for approved growing areas.

Guidance for Dilution Ratios

When determining if a WWTP or collection system discharge within the watershed or catchment area draining to a shellfish estuary potentially impacts a shellfish growing area, the NSSP recommends that a worst case raw sewage discharge be assumed. In this circumstance, if a level of 1.4×10^6 FC/100 ml is assumed for a raw sewage release, a 100,000:1 dilution would be required to dilute the sewage sufficient to meet the approved area standard of 14 FC/100 ml. If dilution analysis determines that the location of the discharge is such that the dilution of effluent would be greater than 100,000:1 then the WWTP could be considered located outside the zone of influence to the shellfish growing area. Different dilution ratios may be applied depending on the known concentration of sewage, a performance history of the treatment and collection system and a database of influent and effluent quality, provided that the water quality objective of the downstream harvest area is met.

.20 Quantitative Analytical Method Verification

This guidance is provided to aid laboratories verifying the performance of an NSSP Approved Method or Approved Limited Use Method of analysis being transferred from the originating laboratory/submitter to the implementing laboratory before being placed in service by the implementing laboratory. When a laboratory implements an NSSP method for the first time, the method performance must be verified in that laboratory. The following performance criteria are to be verified: recovery, measurement uncertainty, precision (repeatability and intermediate precision), linear range, limit of detection (LOD), limit of quantitation (LOQ), and comparability.

Recovery and Measurement Uncertainty.

Recovery is the fraction or percentage of an analyte(s)/organism(s) of interest recovered after sample analysis.

Measurement Uncertainty expresses the possible range of values around the measured result within which the true value is expected to be with a stated degree of probability.

Precision is the closeness of agreement between independent test results obtained under stipulated conditions. There are two (2) components of precision: repeatability and intermediate precision. Repeatability is the

measure of agreement of replicate tests carried out on the same sample in the same laboratory by the same analyst within short intervals of time. Intermediate precision reflects within-laboratory precision obtained under variable conditions, such as different days, different analysts, and/or different instrumentation.

Linear Range, Limit of Detection, and Limit of Quantitation.

Linear Range is the range within the working range where the results are proportional to the concentration of the analyte(s)/organism(s) present in the sample.

Limit of Detection (LOD) is the minimum concentration at which the analyte(s)/organism(s) can be identified. LOD is matrix and analyte dependent.

Limit of Quantitation (LOQ) is the minimum concentration of analyte(s)/organism(s) that can be quantified with an acceptable level of precision and accuracy under the conditions of the test.

Suggested Procedure:

Use samples free of the target analyte(s)/organism(s). For each shellfish type of interest use a minimum of 10-12 animals per sample and prepare as a homogenate. For each sample take a minimum of six (6) aliquots of the homogenate appropriately sized for the work and spike five (5) of the six (6) aliquots with five (5) different concentrations of the target analyte(s)/organism(s) spanning beyond the desired working range and including levels half, at, and twice the action level (or analytical level of interest). Do not spike the sixth aliquot of each sample; this is the sample blank. Process each aliquot including the sample blank to determine the concentration of the target analyte(s)/organism(s) of interest. For each aliquot, excluding the sample blank, sub-aliquot for three (3) replicate analyses. Repeat this process for each shellfish type of interest with a minimum of three (3) samples collected from different growing areas, the same growing area harvested on different days or from different process lots. Use the same spike levels for each sample analyzed.

Comparability is the acceptability of a new or modified method as a substitute/alternative for an established (NSSP) method. (Should be included if intended as an alternative or a substitute for an established method accepted by the NSSP.)

Suggested Test Procedure:

For each shellfish type of interest use a minimum of 10-12 shellfish per sample and prepare as a homogenate. For each sample take two (2) aliquots and analyze one (1) by the established (NSSP) method and the other by the alternative method. Naturally incurred samples having a variety of concentrations spanning the range of the intended application of the method should be used in the comparison. Analyze a minimum of eight (8) paired samples from different growing areas, the same growing area harvested on different days, from different process lots and covering different seasons as necessary. In cases where the occurrence of the target analyte(s)/organism(s) is intermittent, spiked samples may be used as described above.

Suggested Method Acceptance:

Compare the performance criteria calculated in the method verification study with the values obtained in the original single laboratory validation (SLV) submission by calculating the two-sided 95% confidence interval for the laboratory's mean recovery, estimated LOD and LOQ. If the ranges calculated for the recovery, LOD, LOQ and measurement uncertainty encompass (intersect) the values for the mean recovery, LOD, LOQ and measurement uncertainty obtained from the original SLV and the data is linear over the working range/range of

interest with a precision/coefficient of variation which does not exceed that obtained in the original SLV, then it can be concluded that the method (which does not also require comparability testing) has been successfully transferred. For methods that also require comparability testing, the two-sided 95% confidence interval of the regression line relating the established (NSSP) method and the substitute/alternative method should encompass the slope of the regression line relating the two (2) methods in the original SLV. This requirement in addition to the substitute/alternative method meeting the requirements for recovery, LOD, LOQ, measurement uncertainty, precision and linearity are necessary in order to conclude that the method has been successfully transferred.

Chapter III. Harvesting, Handling, Processing, and Distribution

.01 Shellfish Industry Equipment Construction Guide

Introduction

Since 1925 the Public Health Service, the States and the shellfish industry have cooperated in a program designed to maintain a high level of sanitation in the growing, harvesting, and processing of oysters, clams and mussels to be marketed as a fresh or frozen product. The basic sanitary standards used in this program are fully described in PHS Publication No. 33, Manual of Recommended Practice for Sanitary Control of the Shellfish Industry, Parts I and II. General Construction Standards for Equipment used by the shellfish industry are an integral part of these basic standards.

The need for more specific construction guides for equipment used by the shellfish industry was reviewed at the 1958 Shellfish Sanitation Workshop[1] and the Public Health Service (PHS) was requested to initiate development of such guides. As result of this request, the PHS developed drafts of equipment construction guides. Agencies and organizations which received these initial drafts and thus contributed to the development of the completed construction guides included: Oyster Institute of North America, Bureau of Commercial Fisheries, Food and Drug Administration, Canadian Department of National Health and Welfare, and two (2) equipment manufacturing companies. The completed construction guides were reviewed and adopted by the 1961 National Shellfish Sanitation Workshop. Subsequently, the 1993 annual meeting of the Interstate Shellfish Sanitation Conference asked FDA to review and update the definitions to be consistent with other documents such as Model Code, Pasteurized Milk Ordinance, National Sanitation Foundation, and Code of Federal Regulations. FDA agreed to provide an update to the committee.

It is the purpose of this guide to describe construction and fabrication procedures which will ensure that blower tanks, skimmers, returnable shipping containers, shellfish shucking buckets and pans will meet the equipment construction standard of the Cooperative Program and the functional needs of the industry. However, the development of new methods of equipment construction or fabrication with acceptable materials, construction and fabrication is also encouraged. Therefore, shellfish equipment specifications developed which differ in design, material, fabrication, or otherwise do not conform with the following standards, but which in the fabricator's opinion are equivalent to or better may be submitted for consideration.

Scope

This Guide covers the sanitary construction aspects of (1) shellfish blower tanks, including the sanitary piping for air, water, and drain lines; (2) the stand-supported skimmer, including the supporting stand; (3) returnable shipping containers; (4) shellfish shucking buckets; (5) shellfish shucking pans; (6) tables; (7) conveyors; and (8) mechanical shucking devices.

This guideline will aid FDA, State regulatory officials and other interested individuals in making evaluations of the materials, construction and fabrication of equipment used to collect, convey, store, transport, process and package molluscan shellfish products.

This guideline will also provide manufacturers with knowledge of what documentation reviewers might

expect them to provide in order to verify the acceptability of materials, construction and fabrication.

Definitions

1. *Air break* - A piping arrangement in which a drain from a fixture, appliance, or device discharge indirectly into another fixture, receptacle, or interceptor at a point below the flood level rim.
2. *Air Gap* - The unobstructed vertical distance (twice the diameter of largest inlet pipe) through the free atmosphere between the water inlet supplying a tank, plumbing fixture or other device and the effective overflow level of the receptacle.
3. *Air Under Pressure* - The pressure of which has been increased by mechanical means to exceed atmospheric pressure, and which is used for agitation of shucked shellfish.
4. *Alternate Materials* - Is whenever specific materials are mentioned, it is understood that the use of materials proven to be equally satisfactory from the standpoint of sanitation and protection of food is acceptable.
5. *Blower* - A tank-like device for immersion washing of shucked shellfish. Air may be introduced at the bottom of the tank to produce agitation.
6. *Coatings* - The results of a process where a different material is deposited to create a new surface. There is appreciable build-up of new material, typically more than 1µm.
7. *Corrosion Resistant Materials* - Those materials that maintain their original surface characteristics under normal exposure to the foods being contacted, normal use of cleaning compounds and bactericidal, and other conditions of use.
8. *Cleaned-in-place* - Refers specifically to the cleaning and sanitizing of food processing equipment and piping in its assembled condition by recirculation of the necessary rinse, detergent and sanitizing solutions under appropriate conditions of time, temperature, detergency and physical action.
9. *Dead End* - Area or space wherein a product, ingredient, cleaning, or sanitizing agent, or other extraneous matter may be trapped, retained or not completely displaced during operational or cleaning procedures.
10. *Drain gate and chute* - The opening located either in the blower or skimmer through which the washed shellfish are eliminated.
11. *Drain valve* - The valve through which the wash water is released to the floor or waste line.
12. *Easily Cleanable* - A surface which is readily accessible and is made of such materials, has a finish and is so fabricated that residue may be effectively removed by normal cleaning methods.
13. *Equipment* - Blower, skimmer, tables, shucking benches, can seamer, sinks, refrigerators, and similar items other than utensils, used in the operation of a shellfish processing facility.
14. *Filter Media* - Filters for the air intake of a blower shall consist of fiberglass with downstream backing dense enough to prevent fiberglass break off from passing through, cotton flannel, wool flannel, non-woven fabric or other suitable materials which under conditions of use, are non-toxic and non-shedding and which do not release toxic volatile or other contaminants to the air, or volatile which may impart any flavor or odor to the product.
15. *Flood Level Rim* - The edge of the receptacle from which water overflows.
16. *Food contact surface* - Surface of equipment or a utensil which food normally comes into contact; or a surface of equipment or a utensil from which food or liquid may drain, drips, or splash into a food; or onto a surface normally in contact with food. Food contact surfaces include, but are not limited to, equipment and utensils such as; shucking knives and handles, shucking hammers and handles, shucking blocks, ice scoops and shovels, ice bins, skimmer
17. *Metals* - Metals which are nontoxic, nonabsorbent and corrosion resistant under conditions of intended use.
18. *Nonfood Contact Surfaces* - All exposed surfaces other than food or splash contact surfaces.

19. *Nontoxic Materials* - Materials which are free of substances which may render shellfish injurious to health or which may adversely affect the flavor, odor, composition or bacteriological quality of the product and which meet the requirements of the Federal Food Drug and Cosmetic Act as amended.
20. *Plastic* - A material that contains as an essential ingredient an organic substance of high molecular weight, is solid in its finished state, and at some stage in its manufacture or in its processing into finished articles, can be shaped by flow.
21. *Rim* - An unobstructed open edge of a fixture.
22. *Readily accessible* - Exposed or capable of being exposed for cleaning and inspection without the use of tools.
23. *Readily Demountable or Removable* - Capable of being taken away from a unit with the bare hands or the use of simple tools such as screwdriver, pliers or an open end wrench.
24. *Returnable Shipping Container* - Multiple use container for holding or shipping of shucked shellfish.
25. *Safe Materials* - Articles manufactured from or composed of materials that may not reasonably be expected to result, directly or indirectly, in their becoming a component or otherwise affecting the characteristics of any food.
26. *Sealed* - Free of cracks or other openings that permit the entry or passage of moisture.
27. *Molluscan Shellfish* - All edible species of oysters, clams, mussels and whole scallops or roe-on scallops (scallops are excluded when the final product is the shucked adductor muscle only). Shellfish products which may contain any material other than the meats and /or shell liquor of oysters, clams, mussels or scallops will be regarded as a "processed food" and will not be included in the Cooperative Program.
28. *Shellfish Shucking Bucket* - Containers for temporarily holding shucked shellfish during the shucking process.
29. *Shellfish Shucking Pan* - Containers for temporarily holding shucked shellfish during the shucking process.
30. *Shucked Shellfish* - Shellfish, or parts thereof, which have been removed from their shells.
31. *Single Service Articles* - Any metal or plastic containers, lids and closures, wrapping materials such as burlap or hessian bags and similar materials intended for one-time use, one person use and then discarded.
32. *Skimmers* - A perforated tray in which shucked shellfish are sprayed washed and/or drained.
33. *Skimmers Paddle* - The utensils used as the gate on the skimmer exit chute and/or one used to scrape the product through the exit chute.
34. *Smooth* - A surface free of pits and inclusions having a clean ability or better than the following:
    (a) food contact a No. 4 (150 grit) or better finish as obtained with silicon carbide, properly applied on stainless steel surface;
    (b) Non-food contact surfaces free of visible scale.
35. *Splash Contact Surfaces* - Any surfaces other than food contact surfaces which are subject to routine splash (wet or dry), spillage and contamination during normal use.
36. *Toxic* - Having an adverse physiological effect on man.
37. *Utensils* - Any implement used in the preparation, transportation, and storage of molluscan bivalves such as shucking knives, skimmer paddles, strainers, shucking buckets, shucking pans, etc.
38. *Weld* - Permanent seams or joints. When welded seams are used, the weld area and the deposited material shall be as corrosion-resistant as the parent material.

Materials

I. Metals

A. Stainless Steel

Stainless steel is a family of iron based alloys that must contain at least 10.5% Chromium (**Cr**). The presence of chromium creates an invisible surface film that resists oxidation and makes the material "passive" or corrosion resistant (i.e. "stainless"). This family can be simply and logically grouped into five (5) branches. Each of these branches has specific properties and a basic grade or "type." In addition, further alloy modifications can be made to "tailor" the chemical composition to meet the needs of different corrosion conditions, temperature ranges, strength requirements, or to improve welding, machine, work hardening and form.

Stainless is designated by three (3) different systems: Metallurgical structure - Austenitic; Grade - 304 (most used see photos 1 and 2 for Polish No. 3 and No 4) and Unified Numbering System UNS.

Stainless steel product contact surfaces of the American Iron and Steel Institute (AISI) 303, 304, 316 Series[3] or corresponding Alloy Cast Institute (ACI) types.[4] Cast grades of stainless steel corresponding to types 303, 304, and 316 are designated CF-16F, CF-8, and CF-8M, respectively. The chemical compositions of these cast grades are covered by ASTM specifications A351/A351M, A743/A743M and A744/A744M.[5] Metal which under conditions of intended use is at least as corrosion resistant as stainless steel of the foregoing types, and is nontoxic and nonabsorbent, can also be used, except that: Equipment may also be made of stainless steel of the AISI 400 Series that is made as corrosion resistant as AISI 300 Series by surface treatment or coating(s) or made of nontoxic, nonabsorbent metal that is as corrosion resistant, under the conditions of intended use, as stainless steel of the AISI 300 Series.

B. Optional Metal Alloys

Metal alloy of the following types may be used but only in applications requiring disassembly and manual cleaning. (See **Table 1**; values are in percentages). Equipment made of optional metal alloy may have product contact surfaces modified by surface treating or coating.

Photo 1 – *Stainless Steel Type304, No.3*
Polish satisfactory for many industrial and commercial products requiring a good polished surface. Typical applications include vent hoods.

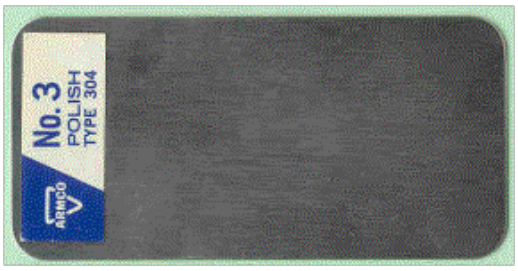


Photo 2 - *Stainless Steel Type 304, No.4*

Polish is exceptionally uniform normally used without further finishing. This is the established standard for dairy and food processing equipment because it is easy to keep clean and sanitary.

C. Electroless Nickel Alloy Coating

An electroless nickel alloy coating having the following composition is acceptable:

- Nickel — 90% minimum
- Phosphorous — 6% minimum and 10% maximum as supersaturated solution of nickel phosphide in nickel
- Trace amounts of carbon, oxygen, hydrogen and nitrogen
- **No other elements**

Equipment to be manually or mechanically cleaned may be covered by an engineering coating of electroless nickel alloy conforming to the applicable provisions of military specification MIL-C-26074 E, as amended. [6]

Equipment may also be made of other nontoxic structurally suitable metal(s) that have their product contact surfaces modified by surface coating(s).

D. Solder

Solder, when used, should be silver bearing solder and should be corrosion resistant, free of cadmium, lead and antimony, nonabsorbent, and should not impart any toxic substance to the product when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment (or sterilization).

Table 1 -- Optional Metal Alloys

	UNS NO8367 ASTM A743 Grade CN-3MN	UNS S21800 ASTM A743 Grade CF-10 SMnN	UNS S20161	UNS N26055 ASTM A494 Grade CY5SnBiM	UNS N26455 ASTM A494 Grade CW-2M	UNS S17400 ASTM A747 Grade CB7Cu-1	UNS S15500 ASTM A747 Grade CB7Cu-2	UNS S32900	UNS R20500 ASTM A560 Grade 50Cr-50Ni	UNS R50400 ASTM B67 Grade C-2
C	0.03	0.1	0.015	0.05	0.02	0.07	0.07	0.2	0.1	0.1
Mn	2.00	7.00-9.00	4.00-6.00	1.5	1.00	0.70	0.70	1.00	0.30	
Si	1.00	3.50-4.50	3.00 - 4.00	0.5	0.80	1.00	1.00	0.75	1.00	
P	0.040	0.040	0.040	0.03	0.03	0.035	0.035	0.040	0.02	
S	0.010	0.030	0.040	0.03	0.03	0.03	0.03	0.030	0.02	
Cr	20.0-22.0	16.00-18.00	15.0-18.0	11.0 - 14.0	15.0-17.5	5.50-17.7	14.0-15.5	23.0-28.0	48.0-52.0	
Ni	23.5-25.5	8.00-9.00	4.00-6.00	Balance	Balance	3.60-4.60	4.50-5.50	2.5-5.0	Balance	
Mo	6.0-7.0			2.0-3.5	15.0-17.5			1.0-2.0		
Cb						0.15-0.35	0.15-0.35			
Cu	0.75					2.5- 3.2	2.5- 3.2			
N	0.18-0.26	0.08-0.18	0.08-0.020			0.05	0.05		0.30	
Fe	Balance	Balance	Balance	2.00	2.00	Balance	Balance	Balance	1.00	0.30
Sn				3.0-5.0						
Bi				3.0-5.0						
W					1.0					
Tl									0.50	Balance
Al									0.25	
Other										H=0.015 N=0.03 O=0.25

NOTE: Metal alloys or metals other than the above may be as corrosion resistant as 300 Series Stainless steel. This may be shown when metal alloys or metals are tested in accordance with ASTM G31 Laboratory Immersion Corrosion Testing of Metals and have a corrosion rate of less than 20 mil per year. The test parameters such as the type of chemical(s), their concentration(s) and temperature(s) should be representative of cleaning and sanitizing conditions used in dairy equipment. **Alloys containing lead, leachable copper or other toxic metals should not be used.**

E. Aluminum

Aluminum is satisfactory for certain dry products applications. Aluminum may be used for liquid or high moisture content product contact surfaces only when a specific functional requirement exists and the parts are not subjected to strong caustic cleaning solutions or to the corrosive action of dissimilar metals.

The aluminum type chosen for the application shall be demonstrated to be appropriate and acceptable for the intended use. (Provisions have been made in existing 3-A (dry product) Standards for Aluminum Association designations 5052, 6061, 6063, A-360, A-380, A-319, A-315G, and C-413, Danish Standards DS#3002 and #4261, and ASTM standards B179, and S12c for certain specified uses.)

F. Nonmetals

Non-metallic materials may be used for food contact and non-food contact equipment and service items. When utilized these materials shall be in compliance with appropriate sections of the 21 Code of Federal Regulations, Parts 170-199 (21 CFR 170-199). These materials shall be relatively inert, resistant to scratching, scoring, and distortion by the temperature, chemicals, and methods to which they are normally subjected in operation, or by cleaning and bactericidal treatment. They shall be non-toxic, fat resistant, relatively non-absorbent, relatively insoluble and shall not release component chemicals or impart a flavor to the product.

(1) **Rubber** and **rubber-like materials** may be used where functionally appropriate. Rubber and rubber-like materials when used for the above specified application(s) should conform with the applicable provisions of the "3-A Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment", Number 18- (or equivalent).

(2) **Plastic materials** may be used where functionally appropriate.
Plastic materials when used for the above specified application(s) should conform with the applicable provisions of the "3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment," number 20 - (or equivalent).
When used in sight and/or light openings and as direct reading gauge tubes, plastic should be of a clear, heat resistance type.

(3) **Durability of rubber and plastic** Rubber and rubber-like materials and plastic materials having product contact surfaces should be of such composition as to retain their surface and conformational characteristics when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment (or sterilization).

(4) **Bonded Rubber** The final bond and residual adhesive, if used, on bonded rubber and rubber-like materials and bonded plastic materials should be nontoxic[7].

G. Materials for Non-product Contact Surfaces

Materials for non-product contact surfaces should be of corrosion-resistant material or material that is rendered corrosion resistant. If coated, the coating used should adhere. All non-product contact surfaces should be relatively nonabsorbent, durable, and cleanable.

Parts removable for cleaning having both product contact and non-product contact

surfaces should not be painted.

II. Fabrication

A. Surface Texture

All product contact surfaces should have a finish at least as smooth as No. 4 ground finish on stainless steel sheets and be free of imperfections such as pits, folds and crevices in the final fabricated form. Surface finish equivalent to 150 grit or better as obtained with silicon carbide, properly applied on stainless steel sheets, constitutes a No.4 ground finish. A maximum Ra of 32 micro-inches (0.80), when measured according to the recommendations in ANSI/ASME B46.1[8] - Surface Texture, is considered to be equivalent to a No. 4 finish.

B. Permanent Joints

(1) **Welding**

Where welding is involved, the carbon content of the stainless steel should not exceed 0.08%. All permanent joints in metallic product contact surfaces should be continuously welded. Welded areas on product contact surfaces should be at least as smooth as No. 4 ground finish on stainless steel sheets, and be free of imperfections such as pits, folds, and crevices when in the final fabricated form except that:

(2) **Soldering**

In such cases where welding is impractical, soldering, may be employed where necessary for essential functional reasons. Silver bearing solder may be used for producing fillets for minimum radii or other appropriate functional purposes.

(3) **Press fits or shrink-fits**

Press-fits or shrink-fits may be used to produce crevice free permanent joints in metallic product contact surfaces when neither welding nor soldering is practical. Joints of these types may only be used to assemble parts having circular cross sections, free of shoulders or relieved areas. For example: they may be used to assemble round pins or round bushings into round holes. In both of these fits the outside diameter of the part being inserted is greater than the inside diameter of the hole.

In the case of the press-fit the parts are forced together by applying pressure. The pressure required is dependent upon the diameter of the parts, the amount of interference and the distance the inner member is forced in.

In shrink-fits, the diameter of the inner member is reduced by chilling it to a low temperature. Dry ice is commonly used to shrink the inner member. Heat may also be applied to the outer member of the press-fit. Less assembly force is required for this type of fit.

The design of these fits depends on a variety of factors. The designer should follow recommended practices to assure that a crevice-free joint is produced. A recognized authoritative reference is Machinery's handbook published by Industrial Press Inc., 200 Madison Avenue, New York, NY 10157.

(4) **Surface finish**

Press-fitting, shrink-fitting or soldering should produce contact surfaces which are at least as smooth as No. 4 ground finish on stainless steel sheets and which are free of imperfections such as pits, folds and crevices.

C. Bonded Materials

Bonded rubber and rubber-like materials and bonded plastic materials having product contact surfaces should be bonded in a manner that the bond is continuous and mechanically sound so that when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment (or sterilization if applicable) the rubber and rubber-like material or the plastic material does not separate from the base material to which it is bonded.

D. Coatings

Coatings, if used, should be free from surface delamination, pitting, flaking, spalling (chipping), blistering and distortion when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment (or sterilization).

E. Cleaning and Inspection

Equipment that is to be mechanically cleaned should be designed so that the product contact surfaces and all non-removable appurtenances thereto can be mechanically cleaned and are easily accessible and readily removable for inspection. Removable parts shall be readily demountable employing simple hand tools, which are available to operating or cleaning personnel; except that equipment that is to be CIP cleaned should have representative product contact surfaces easily accessible for inspection.

Product contact surfaces, not designed to be mechanically cleaned, should be accessible for cleaning and inspection when in an assembled position or when removed.

Appurtenances having product contact surfaces should be readily removable using simple hand tools or they should be cleanable when assembled or installed and should be easily accessible for inspection.

F. Draining

All product contact surfaces, when properly installed, should be self-draining except for normal clingage. However, if the product contact surfaces are not self-draining, they should have sufficient pitch to suitable drain points so they can be drained.

G. Fittings, Valves, Instruments and Similar Appurtenances

Sanitary fittings and connections which conform with the appropriate 3-A Sanitary Standards are acceptable. All other fittings must be reviewed using the criteria in this document.

The thermometer connections and/or openings, if provided or required, should be located so that the thermometer is not influenced by a heating or cooling jacket.

If the fittings for temperature sensing devices do not pierce the tank lining, either the temperature sensing element receptacles should be securely attached to the exterior of the lining or means to attach the temperature sensing element(s) securely to the exterior of the lining should be provided.

H. Sanitary Tubing

All metal tubing should conform with the applicable provisions for welded sanitary product pipelines found in the 3-A Accepted Practices for Permanently Installed Product and Solution Pipelines and Cleaning Systems Used in Milk and Milk Product Processing Plants, Number 605- or equivalent and with the 3-A Sanitary Standards for Polished Metal Tubing for Dairy Products, Number 33- or equivalent.

I. Gaskets

Gaskets having a product contact surface should be removable or bonded.
Grooves in gaskets should be no deeper than their width unless the gasket is readily removable and reversible for cleaning, (i.e., storage tank door gaskets).
Gasket retaining grooves in product contact surfaces for removable gaskets should not exceed 1/4" (6.35 mm) in depth or be less than 1/4" (6.35 mm) wide except those for standard O-rings smaller than 1/4" (6.35 mm) and those allowed in the 3-A Standard for Sanitary Fittings, Number 63.

J. Radii

All internal angles 135° or less on product contact surfaces should have a minimum radii of 1/4" (6.35 mm) except that:

(1) Minimum radii for fillets of welds where head(s) and the side wall(s) of tanks join should not be less than 3/4" (19.05 mm).

(2) Smaller radii may be used when they are required for essential functional reasons. In no case should such radii be less than 1/32" (0.794 mm).

(3) The radii in gasket retaining grooves or grooves in gaskets should be not less than 1/16" (1.59 mm) except for those standard, 1/4" (6.35 mm) and smaller O-rings, and those provided for in the "3-A Standards for Sanitary Fittings", Number 63.

(4) The radii in grooves for standard 1/4 in. (6.35 mm) and smaller O-rings should be at least:

- ☐ 0.016 in. (0.406 mm) for 1/16 in. (1.59 mm) O-rings
- ☐ 0.031 in. (0.787 mm) for 3/32 in. (2.38 mm) O-rings
- ☐ 0.031 in. (0.787 mm) for 1/8 in. (3.18 mm) O-rings
- ☐ 0.062 in. (1.575 mm) for 3/16 in. (4.76 mm) O-rings
- ☐ 0.094 in. (2.388 mm) for 1/4 in. (6.35mm) O-rings

K. Threads

There should be no threads on product contact surfaces accept where necessary for non-permanent joints in piping and for making various attachments to equipment.

In such case(s) the threads should conform with the "Acceptable Sanitary Thread". The thread angle should be not less than 60° and with not more than eight (8) threads to the inch (25.4 mm), nor less than 5/8" (15.88 mm) major basic diameter. The length of the nut should not exceed three-quarters of the basic thread diameter. The nut should be of the open type. Equipment with exposed threads as described above should be manually cleaned. Equipment with enclosed threads, (such as "acorn" nuts used to attach impeller blades to pump shafts), should be designed for mechanical cleaning.

L. Perforated Product Contact Surfaces

Perforations in product contact surfaces may be round, square, or rectangular. If round the

holes should be a minimum of 1/32" (0.794 mm) in diameter. If square, or rectangular, the least dimension should be no less than 0.020" (0.51 mm) with corner radii of no less than 0.0050" (0.13 mm). All perforations should be free of burrs.

M. Shafts and Bearings

Shafts entering equipment should have a seal of the packless type and sanitary design, and should be readily accessible for cleaning and inspection.

Where a shaft passes through a product contact surface, in a milk room or processing area, the portion of the opening surrounding the shaft should be protected to prevent the entrance of contaminants.

Bearings having a product contact surface should be of a non-lubricated type.

Lubricated bearings, including the permanent sealed type, should be located outside the product contact surface with at least 1" (25.4 mm) clearance open for inspection between the bearing and any product contact surface unless specifically provided for in a 3-A standards.

General Equipment and Service Items

I. Blower Tank

A. Material

(1) All product-contact surfaces shall be of A.I.S.I.[2] Type No. 304 stainless steel or equally corrosion resistant metal that is non-toxic and non-absorbent except that:

(a) Plastic materials may be used for the blower tank drain gate and drain valve. These materials shall be relatively inert, resistant to scratching, scoring, and distortion by the temperature, chemicals, and methods to which they are normally subjected in operation, or by cleaning and bactericidal treatment. They shall be non-toxic, fat resistant, relatively nonabsorbent, relatively insoluble, and shall not release component chemicals or impart a flavor to the product[3].

(b) Rubber and rubber-like materials may be used for blower tanks paddles or gate, drain gate, and drain valve. These materials shall be relatively inert, resistant to scratching, scoring, and distortion by the temperature, chemicals, and methods to which they are normally subjected in operation, or by cleaning and bactericidal treatment. They shall be non-toxic, fat resistant, relatively non-absorbent, relatively insoluble and shall not release component chemicals, nor impart a flavor to the product.[3]

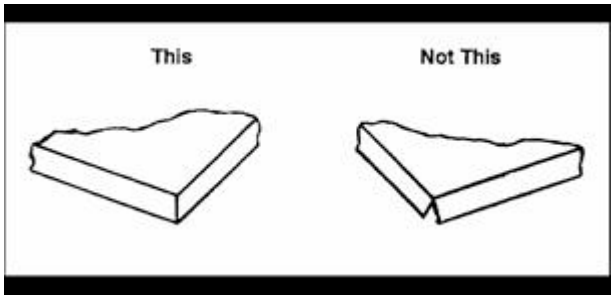
(2) All non-product contact surfaces shall be of inherently corrosion-resistant material, shall be rendered corrosion-resistant, or shall be painted. Surfaces to be painted shall be effectively prepared for painting; and the paint used shall adhere, be relatively non-absorbent, and shall provide a smooth, cleanable and durable surface. Parts having both product-contact and non-product-contact shall not be painted.

B. Fabrication

(1) All product-contact surfaces shall be at least smooth as No. 4 ground finish on stainless steel sheets.

(2) All seams in product-contact surfaces shall be welded with the welds ground smooth and polished to not less than a No. 4 finish. All outside seams shall be smooth and

waterproof. All weld areas and deposited weld material shall be substantially as corrosion-resistant. ***(Figure 1)***



(Figure 1) – Product contact surface seams

(3) All appurtenances, including drain gates and chutes having product-contact surfaces, shall be easily removable for cleaning, or shall be readily cleanable in place.
(4) All product-contact surfaces shall be easily accessible, visible, and readily cleanable, either when in an assembled position or when removed.
(5) All internal angles of 135° or less on product contact surfaces shall have minimum radii of 1/4" (6.35 mm), except that minimum radii for fillets or welds in product-contact surfaces may be smaller for essential functional reasons. In no case shall radii be less than1/8" (3.18 mm). ***(Figure 2)***

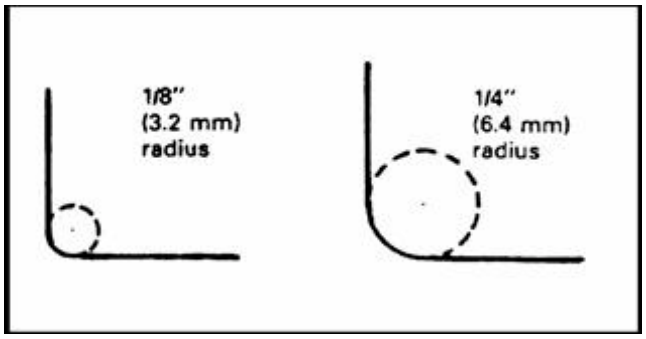


Figure 2 – Internal angles of 135° or less on product contact areas

(6) All sanitary pipe fittings shall conform to "3-A Sanitary Standards for Fittings Used on Milk and Milk Products Equipment," and supplements thereto.[4] (***Figure 3***)

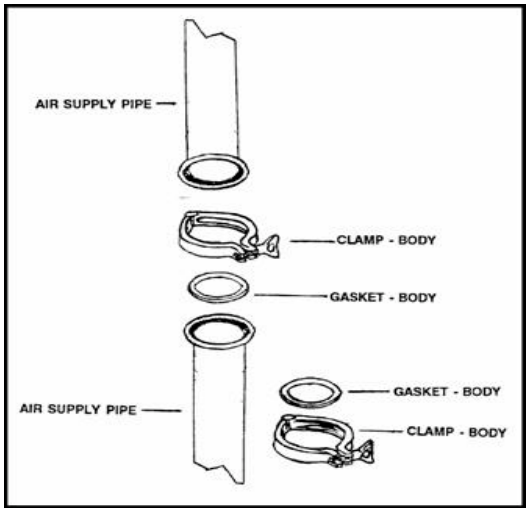


Figure 3 – Sanitary Pipe Fitting

(7) Non-product contact surfaces shall have a smooth finish, be free of pockets and crevices, and readily cleanable.

(8) Legs shall be of sufficient length to provide at least 12" (30.5 cm) clearance between the lowest fixed point of the tank and the floor, shall be smooth with rounded ends, and shall not hollow tube stock, they shall be effectively sealed. If legs are of hollow tube stock, they shall be effectively sealed. ***(See Figures 4 and 5)***

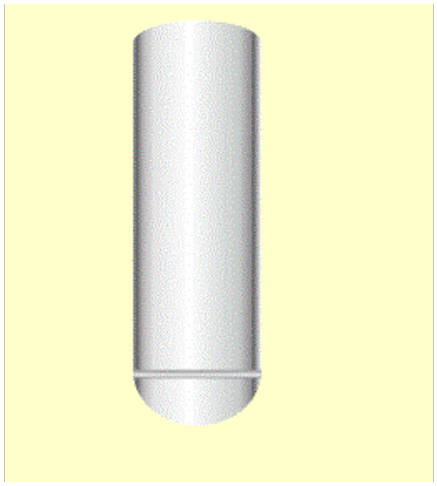


Figure 4 – Blower Tank

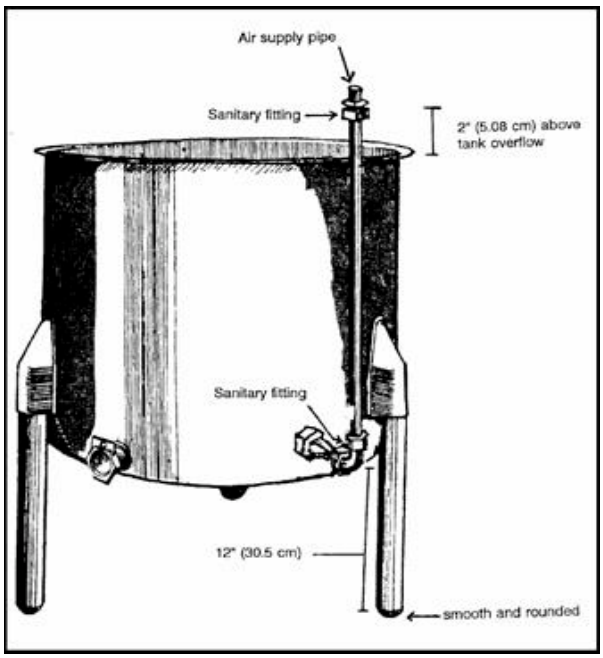


Figure 5 – Close up for a smooth and rounded leg

(9) All threads on product-contact surfaces shall comply with specifications for threads contained in the 3-A Sanitary Standards for Fittings.[4]

(10) External and internal sections of the air pipe shall be easily cleanable to a point at least two (2) inches above the tank overflow level. ***(Figure 4)***

(11) The false bottom shall be so constructed as to be as rigid and, in any event, of at least 16 U.S. Standard gage stainless steel, or equivalent material. ***(Figure 6)***

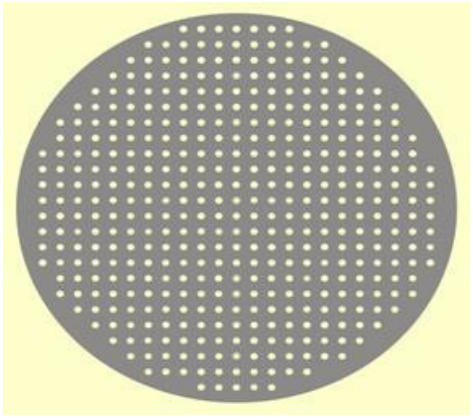


Figure 6 – Blower false bottom plate

(12) Perforations or slots in the false bottom shall not be less than 3/16 inch (4.76 mm) in the minimum diameter and the end radius of the perforations shall be not less than 3/32 inch (2.38 mm). After perforation, the flat surface of the sheet from which the

perforating punch or drill emerges on the down stroke shall be polished to the equivalent of not less than a No. 4 ground finish. ***(Figure 6*)**

(13) The compressing equipment shall be of such design so as to preclude contamination of the air with lubricant vapors and fumes. The air supply shall be taken from a clean space or from relatively outer air, and shall pass through a filter upstream from the compressing equipment. This filter shall be so located and constructed that it is easily accessible for examination, and the filter media are easily removable for cleaning or replacing. The filter shall be protected from weather, drainage,

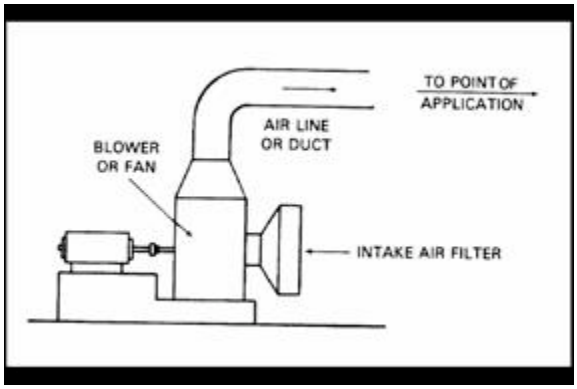


Figure 7 – Air pump

(14) Air distribution piping, fittings, and gaskets between the downstream terminal filter and any product or product contact surface shall conform to sanitary 3-A design.

(15) Air lines shall be easily cleanable construction to a point 2" (5.08 cm) above the tank overflow. ***(Figure 4)***

(16) Filter should be located as close as possible to point of use.

(17) Air distribution piping or manifold located inside the blower tank shall be designed so as to preclude contamination of the product. This manifold shall be designed to be easily removed from the tank and removable end caps to facilitate sanitary cleaning. ***(Figures 8 and 9*)**

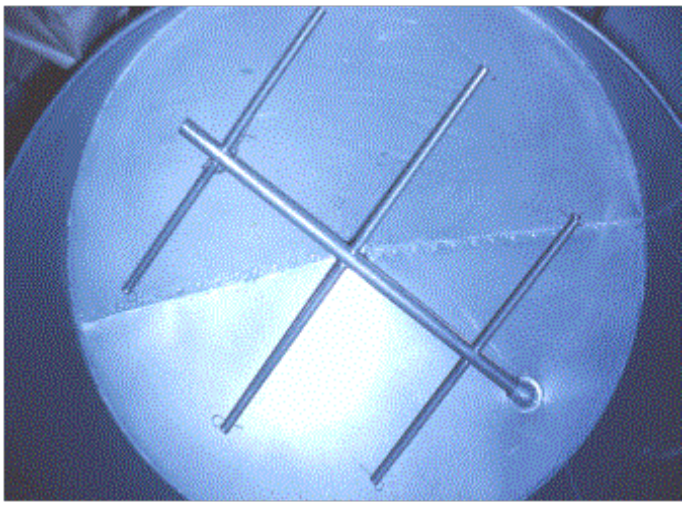


Figure 8 – Air manifold installed inside the blower tank

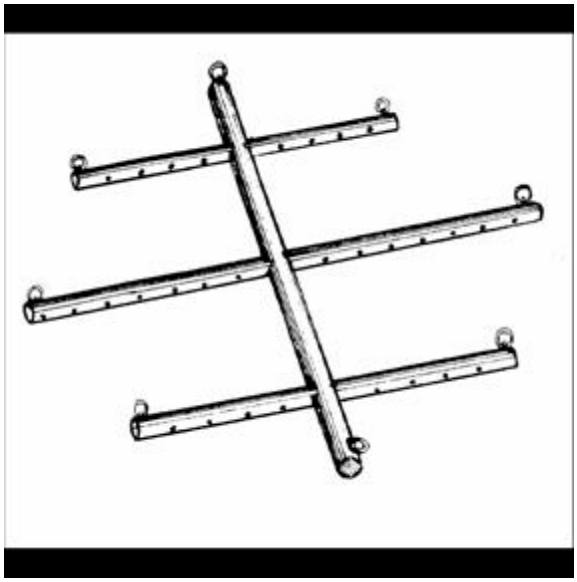


Figure 9 – Air manifold located inside tank

(18) Perforations or slots in the manifold or air distribution pipe shall not be less than 1/8" (3.18 mm) in the minimum diameter. After perforation, the pipe from which the perforation punch or drill emerges on the down stroke shall be polished to the equivalent of not less than a No. 4 ground finish. ***(Figure 9)***

(19) Wire mesh shall not be used as a filter.

(20) The blower tank shall be constructed so that it will not buckle or sag and so that it will be self-draining. Product-contact surfaces shall be constructed of not less than 16 U.S. standard gage stainless steel or equivalent material.

(21) Maximum dimension of the tank from point of overflow to drain valve flange shall

not exceed 40" (101.6 cm).

(22) Drain valves and flange shall comply with the 3-A Sanitary Standards for Fitting used on Milk and Milk Products Equipment. The flange shall be welded to the body of the blower tank.

(23) There shall be no exposed screw, bolt, or rivet heads in product-contact surfaces.

II. Skimmers

A. Material

(1) All product-contact surfaces shall be of A.I.S.I. type No. 304 stainless steel, or equally corrosion-resistant metal that is non-toxic and nonabsorbent, except that:

(a) Suitable plastic materials or rubber and rubber-like materials may be used for the skimmer paddle or gate. These materials shall be relatively inert, resistant to scratching, scoring, and distortion by temperature, chemicals, and methods to which they are normally subjected in operation, or by cleaning and bactericidal treatment. They shall be non-toxic, fat resistant, relatively nonabsorbent, relatively insoluble, and shall not release component chemicals nor impart a flavor to the product.[3]

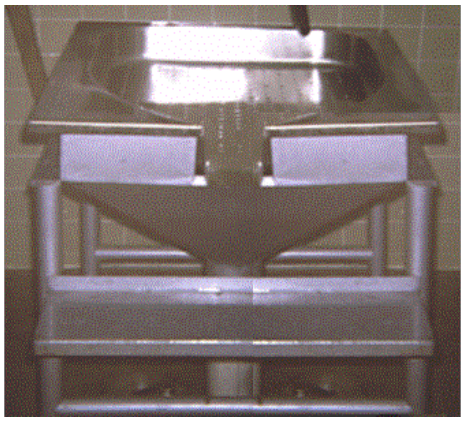


Figure 10 – Photo front view of a skimmer

(2) All non- product contact surfaces shall be inherently corrosion-resistant, and except for funnel drain, shall be painted. Surfaces to be painted shall be effectively prepared for painting and the paint used shall adhere, be relatively nonabsorbent, and shall provide a smooth, cleanable, and durable surface. Parts having both product and non product- contact surfaces shall not be painted.

B. Fabrication

(1) All product-contact surfaces shall be at least as smooth as a No. 4 ground finish on stainless steel sheets.

(2) All seams in product-contact surfaces shall be welded with the welds ground smooth and polished to not less than a No. 4 ground finish. All outside seams shall be smooth

and waterproof. All weld areas and deposited weld metal shall be substantially as corrosion resistant as the parent metal.

(3) All appurtenances having product-contact surfaces shall be easily removable for cleaning, or shall be readily cleanable in place.

(4) All product-contact surfaces shall be easily accessible, visible, and readily cleanable, either when in an assembled position or when removed. The skimmer shall be demountable from the supporting stand for cleaning. (***Figure 11***)

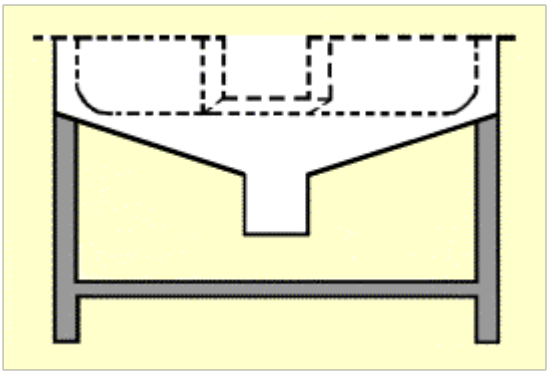


Figure 11 – Front view of skimmer frame; broken lines are the removable part of the skimmer food contact area

(5) All internal angles of 135° or less on product-contact surfaces shall have minimum radii of 1/4" (6.35 mm) except that minimum radii for fillets of welds in product-contact surfaces may be smaller for essential functional reasons. (***Figure 2***)

(6) The skimmer shall be constructed so that it will not buckle or sag while in use, so that both the perforated area and drainage funnel are self-draining, and so as to provide plane surfaces free of depressions, indentations, or bulges which prevent draining when the pitch is not greater than 1" (25.4 mm) in 50" (127 cm). (Corners and rims of a perforated skimmer should be adequately reinforced to prevent damage from handling during cleaning and bactericidal treatment.)

(7) The product-contact surfaces shall be constructed of not less than 16 U.S. standard gage stainless steel or equivalent material. The perforations or slots in the strainer shall be at least 1/4" (6.35 mm) in diameter or width, respectfully (***Figure 12 and Dimension A, Figure 13)*** and not more than 1 1/4" (31.75 mm) apart (***Dimension B, Figure 13***)[5]. The strainer area shall have no perforations within 1/2" (12.7 mm) of the edge (***Dimension C, Figure 13***).[4] After perforations, the flat surface of the sheet from which the perforating punch or drill emerges on the down stroke shall be polished to the equivalent of not less than a No. 4 ground finish. No bracing for the skimmer or the skimmer support stand shall block any perforations unless the brace is made of corrosion- resistant material and fabricated in a manner suitable for a product-contact surface, and unless it can be readily removed for cleaning. A minimum of 3 1/2" (8.89 cm) shall be provided between the strainer and the top of the skimmer (***Dimension E, Figure 13***).

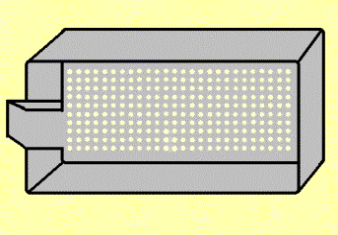


Figure 12 – Skimmer perforations or slots in the strainer shall be at least 1/4 " in diameter

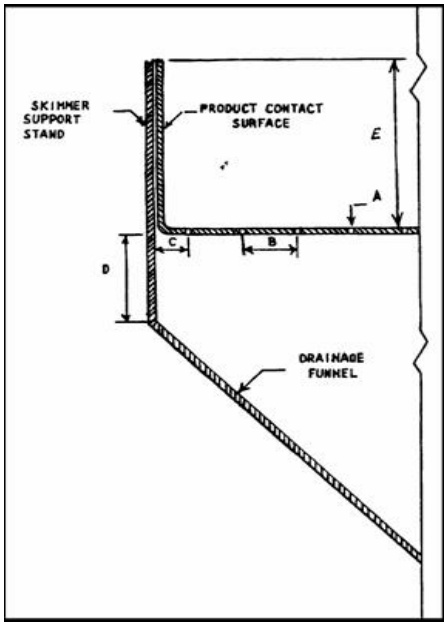


Figure 13 – Skimmer cross sectional side view

(8) A minimum vertical clearance of 2" (5.08 cm) shall be provided between the perforated skimmer area and the drainage funnel. (***Dimension D, Figure 13***).

(9) The funnel drain shall have a discharge opening of a size sufficient to discharge the drainage without pooling above, and be not less than equivalent to a diameter of 4" (10.16 cm). The funnel drain shall terminate in a free discharge, a distance of at least 6" (15.24 cm) above the floor or the drain connection if located at a higher elevation than the floor. (***Figure 13***)

(10) There shall be no threads on product contact surfaces except as provided for in the 3- A Sanitary Standards for Fittings.

(11) Legs shall be smooth with rounded ends, and have no exposed threads. If legs are of hollow tube stock, they shall be effectively sealed. (***Figure 5***)

(12) Frames, frame legs, and supporting edge for the skimmer shall have:

(a) Structural parts not in contact with the product, and parts constructed with a smooth finish so as to be readily cleanable.

(b) Self-draining exterior surfaces.

(c) A minimum of 6" (15.24 cm) of space between the lowest part of the frame and the floor to provide ready access for cleaning legs and feet and those parts not readily removable.

(13) The frame shall provide continuous support for the outside edge of the skimmer strainer. ***(Figure 14)***

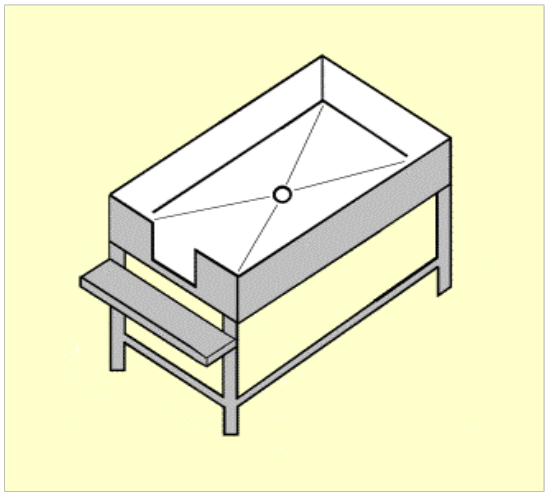


Figure 14 – Skimmer frame table

(14) The receiving-container shelf under the skimmer chute, where provided as an integral part of the skimmer support frame, shall be constructed of nonabsorbent, corrosion-resistant material and located so that the receiving-container rim will be at least two (2) feet above the floor. (***Figure 14***)

(15) All seams in the funnel drain area shall be smooth and waterproof, and substantially as corrosion resistant as the parent metal.

(16) There shall be no exposed bolts, screws, or rivets in the product-contact surfaces.

(17) Caster, rollers can be mounted on the skimmer. These shall be of such material, design and construction as to permit its being easily moved by one person. Casters shall be so installed as to be easily cleanable.

(18) Reinforcing and framing members are to be placed in such a manner as to be easy to clean. All framing and reinforcing members shall be so placed as to eliminate harborage for vermin. The ends of all hollow sections of reinforcing and framing members shall be closed.

(a) Horizontal angle reinforcing and gussets shall not be placed where food or debris may accumulate thereon.

(b) Where angles are used horizontally, they shall have one leg turned down wherever the nature of the equipment permits or shall be formed integral with the sides.

(c) All vertical sections shall be either completely closed or open to the floor.

III. Returnable Shipping Containers

A. Material

(1) All metallic product-contact surfaces shall be of A.I.S.I. type No. 304 stainless steel or Aluminum Association type No. 5052-0 alloy, or equally corrosion-resistant metal that is nontoxic.

(2) Plastic materials may be used as a food-contact surface or non-food contact surface. When used, these materials shall be relatively inert, resistant to scratching, scoring, and distortion by the temperature, chemicals, and methods to which they are normally subjected in operation, or by cleaning and bactericidal treatment. They shall be non-toxic, fat resistant, relatively nonabsorbent, relatively insoluble, and shall not release component chemicals or impart flavor to the product.[3]

(3) If constructed of stainless steel, the containers shall not be constructed of less than 20 gauge material. If constructed of aluminum alloy the material shall not have a thickness less than 0.064" (1.63 mm).

(4) All non-product contact surfaces shall be of corrosion-resistant material, and shall provide a smooth, cleanable, and durable surface.

B. Fabrication

(1) All product-contact surfaces shall be at least as smooth as a number 4-ground finish on stainless steel, or equivalent surface finish on aluminum. All internal angles of 135° or less on product contact surfaces shall have minimum radii of 1/4" (6.35 mm).

(2) There shall be no seams, crevices, or other openings within the food-contact surfaces.

(3) The container rim shall be rolled so as to permit easy and complete cleaning. The bead shall either be an open type with an external radii of not less than 3/16" (4.76 mm) or a sealed closed type.

(4) The container lid shall be so constructed as to afford easy and complete cleaning, shall be reasonably tight fitting, and a lip shall extend at least one inch down the outside of the container. Provisions shall be made for sealing the container so that any tampering will be evident. ***(See Figure 15)***

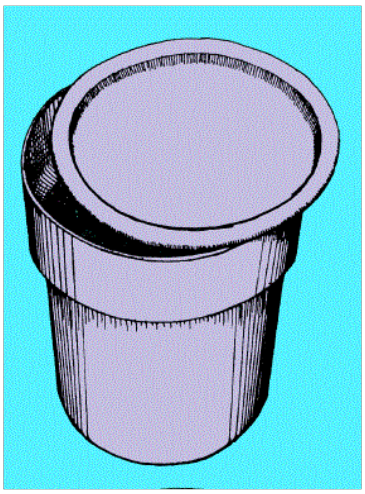


Figure 15 – Returnable container with lid

(5) Handles shall be provided on 5-gallon or larger containers. The handles shall be considered as a non-product contact surface.

IV. Shucking Buckets and Pans

A. Material

(1) All metallic product-contact surfaces shall be of A.I.S.I. type No. 304 stainless steel or Aluminum Association type No. 5052-0 aluminum alloy, or equally corrosion-resistant metal that is nontoxic.

(2) Plastic materials may be used as a food-contact surface or non-food contact surface. When used, these materials shall be relatively inert, resistant to scratching, scoring, and distortion by the temperature, chemicals, and methods to which they are normally subjected in operation, or by cleaning and bactericidal treatment. They shall be non-toxic, fat resistant, relatively nonabsorbent, relatively insoluble, and shall not release component chemicals or impart flavor to the product.[3]

(3) If constructed of stainless steel, the buckets shall not be constructed of less than 22 gauge material and the pans shall not be constructed with less than 24 gauge material or if constructed of aluminum alloy, the material shall not have a thickness less than 0.064"(1.63 mm).

(4) All non-product contact surfaces shall be of corrosion-resistant material and shall provide a smooth, cleanable, and durable surface.

B. Fabrication

(1) All product-contact surfaces shall be as smooth as a number 4 ground finish on stainless steel or equivalent surface finish on aluminum.

(2) All internal angles of 135° or less on product-contact surfaces shall have minimum

radii of 1/4" (6.35 mm)

(3) The shellfish shucking bucket shall not exceed a nine-pint capacity, except for the soft clam (*Mya arenaria*) shucking pan which shall not exceed a four (4) pint capacity. ***(Figures 16 and 17)***

Figure 16 – Mya arenaria shucking pan, four (4) pint capacity

Figure 17 – Oyster shucking bucket, nine (9) pint capacity

(4) There shall be no seams, crevices or other openings within the food-contact surfaces, except that two (2) holes 180° apart shall be permitted in the side of each bucket near the top to accommodate a removable ball-type handle. ***(See Figure 18)***

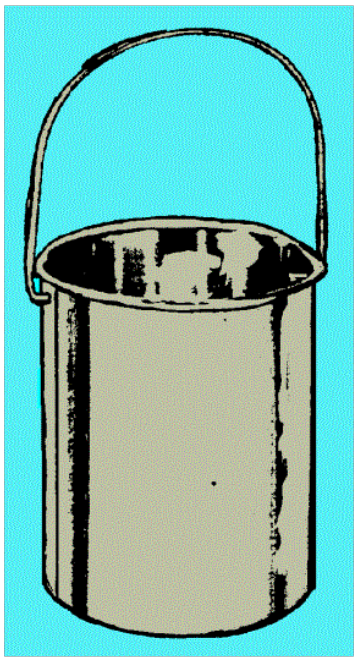


Figure 18 – Shucking bucket handle 180° apart side by side

(5) The container rim shall be so constructed as to afford maximum strength and protection against damage, and shall be so rolled as to permit easy and complete cleaning. The bead shall be open type with an external radii of not less than 3/16" (4.76 mm) or a sealed closed type.

(6) The bail, if provided, shall be considered as contact surface and subject to material specifications as outlined in paragraph A of this standard. The bail shall be not less than 3/16" in diameter (4.76 mm); it shall be so constructed that it will be held into place by spring tension. The bail shall be so constructed that it can be easily removed from the shucking bucket for cleaning purposes.

V. TABLES

A. Materials

(1) All metallic product contact surfaces shall be of A.I.S.I. type No. 304 stainless steel or equally corrosion resistant metal that is nontoxic and non-absorbent.

(2) Only such materials shall be used in the construction of a table as will withstand wear, penetration of vermin, the corrosive action of food, cleaning compounds and such other elements as may be found in the environment. Such materials shall not impart an odor, color, taste or toxic material to the food.

(3) Whenever alternate materials are used, the use of such materials proven to be equally satisfactory from the standpoint of sanitation and protection of food is acceptable.

(4) All non-product contact surfaces shall be inherently corrosion resistant, and shall

provide a smooth, cleanable and durable surface. Parts having both product and non-product contact surfaces shall not be painted.

B. Fabrication

(1) All product contact surfaces shall be at least as smooth as a No. 4 ground finish on stainless steel sheets.

(2) All seams in product contact surfaces shall be welded with the welds ground smooth and polished to not less than a No. 4 ground finish. All outside seams shall be smooth and waterproof. All weld areas and deposited weld metal shall be substantially as corrosion resistant as the parent metal.

(3) All product contact surface shall be easily accessible, visible and readily cleanable, either when in an assembled position or when removed.

(4) All internal angles of 135° or less on product contact surfaces shall have minimum radii of 1/4" (6.35 mm) except that minimum radii for fillets of welds in product contact surface may be smaller for essential functional reasons.

(5) The table shall be constructed so that it will not buckle or sag while in use, so as to provide plane surface free of depressions, indentations, or bulges which prevents draining when the pitch is not greater than 1" (2.54 cm).

(6) The product contact surfaces shall be constructed of not less than 16 U.S. standard gauge stainless steel or equivalent material.

(7) The splash contact surfaces shall be of smooth, easily cleanable and corrosion resistant materials, or they shall be rendered corrosion resistant with a material which is non-cracking, non-chipping and non-spalling. Paint shall not be used.

(8) Non-food contact surfaces shall be smooth and of corrosion resistant material or shall be rendered corrosion resistant or painted. Lead base paint shall not be used.

(9) When welded seams are used, the weld area and the deposited weld material shall be as corrosion resistant as the parent material. The welded area surface requiring routine cleaning in surface in contact with food shall be smooth.

(10) All exposed external angles or corners are to be sealed and smooth.

(11) All joints and seams in the food zone shall be sealed and shall be smooth as the surfaces being joined. Wherever feasible and practical, equipment or parts in the food zone shall be stamped, extruded, formed or cast in one piece.

(12) Exposed threads, screws, bolts and rivet heads, nuts shall be eliminated from the food contact surfaces.

(13) Food contact surfaces which during the course of fabrication are so worked as to reduce their corrosion resistant characteristics, shall receive such additional treatment

as is necessary to render, or to return them to a corrosion resistant state.

(14) All exposed edges and nosings on horizontal surfaces shall be integral with tops, regardless of profiles, and where exposed to fingers and cleaning and cleaning they shall be made smooth.

(a) Nosings shall be open 3/4" (19.05 mm) or completely closed against the body of the unit on all sides to prevent the harborage of insects.

(b) The space between the top and the flange shall be not less than 3/4" (19.05 mm).

(c) The space between the sheared edge and the frame angle shall not be less than 3/4" (19.05 mm) to provide access for cleaning. ***(Figure 19)***

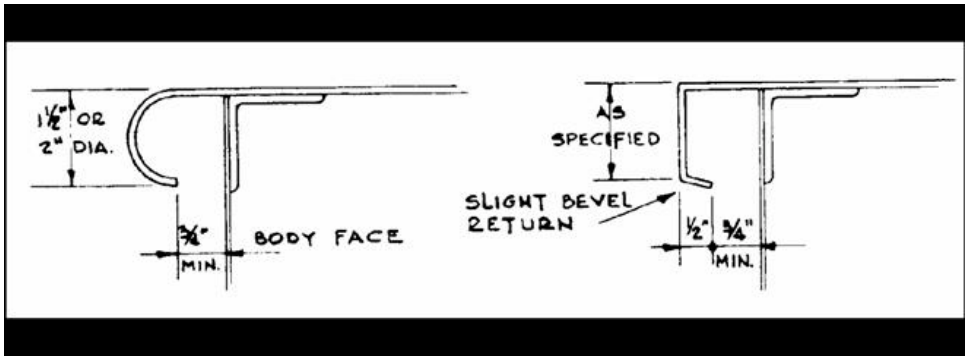


Figure 19 – Exposed edges and nosings on horizontal surfaces

(15) Legs and feet shall be non-absorbent and of sufficient rigidity to provide support with a minimum cross bracing and so fastened to the body of the equipment.***(Figure 20)***

(a) When the outside dimension of the leg is greater that the outside dimension of the foot by 1/2 " (12.7 mm) or more in the same plane, the foot shall, at minimum adjustment extended 1" (2.54 cm) below the leg.

(b) All opening to hollow sections between feet and legs shall be drip proof construction with no opening greater than 1/32" (0.794 mm) All other opening to hollow sections shall be sealed.

(c) Gussets, when used, shall be assembled to the equipment in such a manner as to ensure easy cleanability and to eliminate insect harborage. The assembly shall have no recessed areas or spaces. (***Figure 21***)

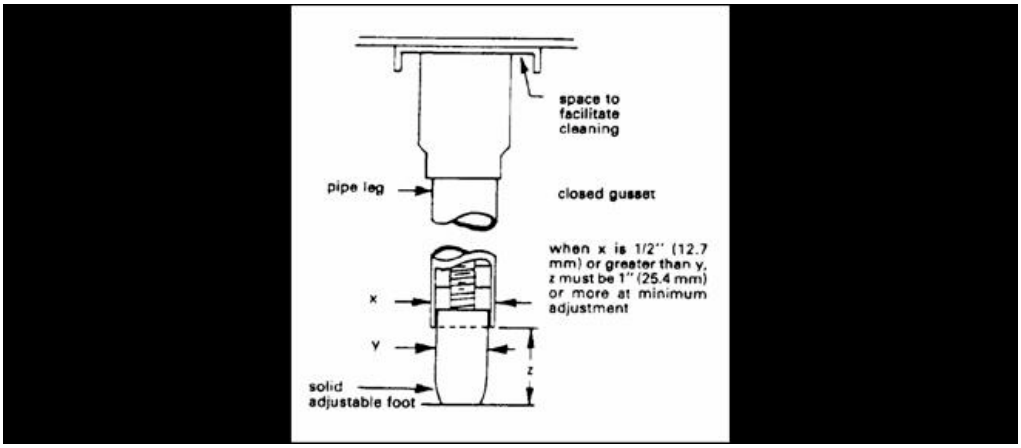


Figure 20 – Legs and gussets

(16) Reinforcing and framing members not totally enclosed are to be placed in such a manner as to be easy to clean. ***(Figure 21)***

(a) All framing and reinforcing members shall be so placed as to eliminate harborage for vermin.

(b) The ends of all hollow sections of reinforcing and framing members shall be sealed.

(c) Horizontal angle reinforcing and gussets shall not be placed where food or garbage may accumulate thereon.

(d) Where angles are used horizontally, they shall have one leg turned down wherever the nature of the equipment permits, or shall be integral with the sides.

(e) All vertical sections shall be either completely closed or open to the floor.

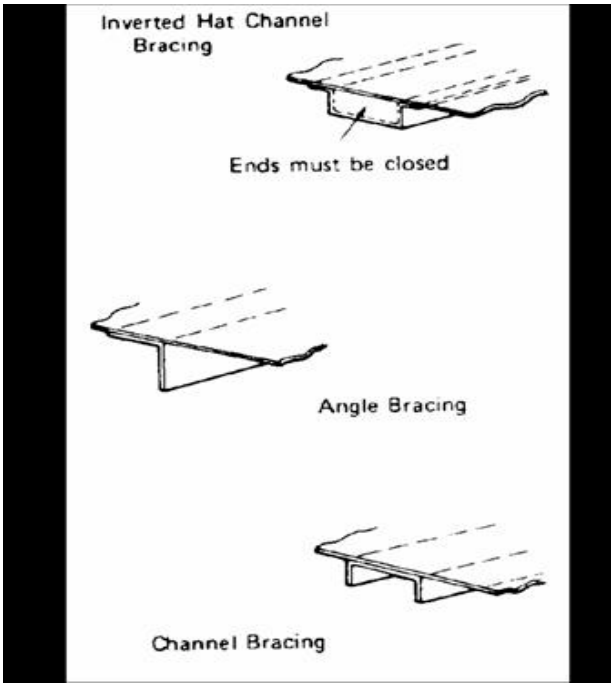


Figure* 21 – *Reinforcing and framing

VI. CONVEYORS

A. Materials

(1) Only those corrosion resistant materials capable of maintaining original surface characteristics under the prolonged influence of the use environment, including the expected food contact and normal use of cleaning compounds and sanitizing solutions.

(2) Belt materials shall be nontoxic, oil proof and of such construction that raw edges and sides will be sealed. The belt shall be relatively nonabsorbent. Belt lacings or fastenings shall meet the applicable clean ability requirements for food, splash and nonfood zones.

(3) Whenever alternate materials are used, the use of such materials proven to be equally satisfactory from the standpoint of sanitation and protection of food is acceptable.

B. Fabrication

(1) Conveyor belt, belt support pan, rollers, driving mechanism and pulleys shall be readily accessible for cleaning.

(2) The base of conveyor units shall have readily removable access panels to permit cleaning.

(3) Readily removable catch pans of proper design and adequate capacity shall be provided wherever spillage, splash and similar debris may accumulate. Food waste collection and disposal stations shall be designed, constructed and equipped to facilitate the collection and/or disposal of shell waste in an acceptable manner and to be easily cleaned.

(4) Drains, when provided in connection with conveyors shall be equipped with readily removable strainer baskets or similar device.

(5) Motors shall be so located as to be protected against splash, spillage and the like, or to be otherwise protected.

(6) In the non-food zone, exposed threads and projecting screws and studs should be used only when it has been demonstrated that other fastening methods are impractical and they shall be eliminated from the splash contact surfaces.
(a) Exposed rivet, screw, or bolt in the splash zone shall be of low profile type such as brazier, or modified brazier rivets or pan and oval screw and bolt heads. ***(Figure 22)***

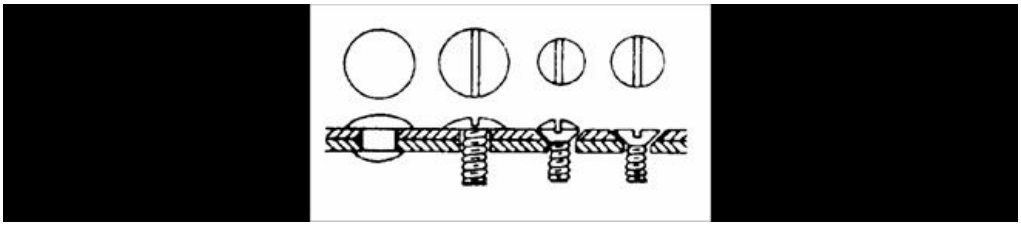


Figure 22 – Low profile fasteners for nonfood contact surfaces

VII. Oyster Shucking Grinders

A. Materials

(1) Only those corrosion resistant materials capable of maintaining original surface characteristics under the prolonged influence of the use environment, including the expected food contact and normal use of cleaning compounds and sanitizing solutions. The machine is designed to operate in a wet spray environment.

(2) Food contact surfaces shall be effectively washed to remove or completely loosen soils by manual or mechanical means such as the application of detergents; hot water; brushes; or high pressure sprays.

(3) Parts of a shellstock grinder which are considered food contact surfaces include; the blade, the area behind the blade including the motor shaft from the blade to the motor housing, and the inside surface of the housing or cover surrounding the blade. These food contact parts shall be manufactured from high impact materials that are easily cleanable and non-corrosive. The grinder must be constructed to be easily disassembled and assembled to facilitate inspection, maintenance, cleaning, and sanitizing. ***(Figure 23)***

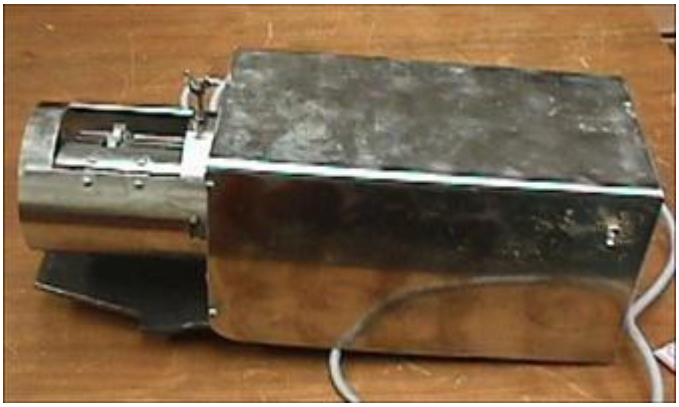


Figure 23 – Mechanical stainless steel oyster grinder

B. Fabrication

(1) The motor shaft should be of corrosion resistant material.

(2) Juncture point where the motor shaft enters the blade chamber must be sealed to reduce dirt and detritus deposition around the shaft.

(3) The blade must be made from a single piece of high impact non-corrosive material. Blade teeth must be an integral part of the blade, or if grinding surfaces are used instead of teeth, they must be welded to the face of the blade with all welds ground smooth.

(4) The housing around the blade assembly must be constructed of material that is corrosion resistant.

(5) Bolts or screws must be constructed of corrosion resistant material to prevent rust and corrosion.

(6) The inside surface of the blade housing must be smooth, and if welded ground smooth for easy cleaning.

(7) The blade housing must be designed with an easily removable cover that will open up the entire blade assembly area to facilitate inspection, cleaning, sanitizing, and maintenance.

Notes:

1. Proceedings, 1958 Shellfish Sanitation Workshop, U.S. Public Health Service, Washington DC.
2. American Iron and Steel Institute. Copy of the AISI Steel Products Manual, Stainless & Heat Resisting Steels can be obtained from the Iron and Steel Society, 410 Commonwealth Drive, Warrendale, PA 15086, Telephone 412-776-9460.
3. Plastic, rubber, and rubber-like materials used for equipment may be subject to the Food Additives Amendment to the Federal Food, Drug, and Cosmetic Act. The acceptability of such materials under Food Additive Amendment shall be obtained from equipment manufactures.
4. Sanitary standards describing the construction of valves, fittings, and pumps may be obtained from

International Association of Milk and Environmental Sanitarians, Inc., 200 W Merle Hay Centre, Suite 404, Cedar Rapids, IA, 52402, Telephone 319-395-9151, FAX 319-393-1102.

5. Skimmer size: The Food and Drug Administration definition and standard of identity for raw oysters states in part: "The oysters are drained on a strainer or skimmer which has an area of at least 300 square inches per gallon of oysters drained, and has perforations of at least 1/4 of an inch in diameter and not more than 1 1/4 inches apart, or perforations of equivalent areas and distribution. (Definitions and Standards under the Federal Food, Drug, and Cosmetic Act, Title 21, Part 36, F

References:

1. 3-A Sanitary Standard Committee, 3-A Sanitary Standards for Sanitary Fitting for Milk and Milk Products Number 63-00 (08-17 Amended), 6245 Executive Boulevard, Rockville, MD 29852.
2. 3-A Sanitary Standard Committee, 3-A Sanitary Accepted Practices for Supplying Air Under Pressure in Contact with Milk, Milk Products and Food Contact Surfaces Serial #60403, 6245 Executive Boulevard, Rockville, MD 29852.
3. 3-A Sanitary Standard Committee, 3-A Sanitary Standards for Mechanical Conveyors For Dry Milk and Milk Products #41-00, 6245 Executive Boulevard, Rockville, MD 29852.
4. 3-A Sanitary Standard Committee, 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, No. 20-17, 6245 Executive Boulevard, Rockville, MD 29852.
5. 3-A Sanitary Standard Committee, 3-A Sanitary Standards for Uninsulated Tanks for Milk and Milk Products, No. 32-01, 6245 Executive Boulevard, Rockville, MD 29852.
6. Building Officials & Code Administrators, The BOCA National Plumbing Code, 1987: Model plumbing regulations for the protection of public health, safety and welfare, 4051 W. Flossmoor Rd. Country Club Hills, IL 60477, 1988.
7. C.D.B. Company, Equipment for the Shellfish Industry, 335 Hill-N-Date Drive, York, PA 17403.
8. Lunsford, L.R., Shellfish Industry: Equipment Construction Guides, U.S. Department of Health, Education and Welfare, Public Health Service, Division of Environmental Engineering and Food Protection, Washington 25, D.C., Public Health Service Publication No. 943, Adopted by the 1961 National Shellfish Sanitation Workshop (April 1962).
9. National Sanitation Foundation, Food Service Equipment Standards, 3475 Plymouth Road, Ann Arbor, Michigan, 48106, September 1978.
10. Office of the Federal Register, 21 Code of Federal Regulations, Parts 170-199, U.S. Government Printing Office, Washington, DC, 1992.
11. Stainless Steel Information Center, Specialty Steel Industry of North America, STAINLESS STEEL: An introduction to a versatile, aesthetically pleasing and "full life cycle" material, 3050 K Street, N.W. Washington, DC 20007. Website http://www.ssina.com
12. U.S. Food and Drug Administration, Milk and Milk Product Equipment: A Guide for Evaluating Sanitary Construction, Developed by the Milk Safety Branch, Division of Cooperative Programs, 200 "C" Street, SW, Washington, DC 20204.
13. U.S. Food and Drug Administration, Grade "A" Pasteurized Milk Ordinance, Developed by the Milk Safety Branch, Division of Cooperative Programs, 200 "C" Street, SW, Washington, DC 20204, 1991 Revision.
14. U.S. Food and Drug Administration, Standards for the Fabrication of Single Service Containers and Closures for Milk and Milk Products, Developed by the Milk Safety Branch, Division of Cooperative Programs, 200 "C" Street, SW, Washington, DC 20204, 1991 Revision.
15. U.S. Food and Drug Administration, Food Service Sanitation Manual: A Model Food Service Sanitation Ordinance, H.E.W. Publication No. (FDA) 78-2081, Developed by the Division of

Retail Food Protection, Division of Cooperative Programs, 200 "C" Street, SW, Washington, DC 20204, 1978.

.02 Shellfish Plant Inspection Standardization Procedures NSSP Standardized Shellfish Processing Plant Inspection Form

Chapter I Introduction to Plant Standardization

PURPOSE:
In 1988, the Interstate Shellfish Sanitation Conference (ISSC) adopted, as a primary goal, an initiative to standardize FDA Shellfish Specialists and State Standardization Officers. The Conference affirmed that standardization of shellfish regulators will result in uniform plant inspections and strengthen consumer confidence in shellfish products. In 1991, the Conference adopted issue 91-222 requiring the certification of the shellfish plant inspections before listing in the Interstate Certified Shellfish Shipper's List (ICSSL), effective January 1, 1994. As a result of that issue, FDA developed procedures to standardize Shellfish Specialists and State Standardization Officers. The requirements and criteria described in this Standardization procedures document apply only to standardization of the Shellfish Specialists and State Standardization Officers.

OBJECTIVE:
The standardization process provides regulatory personnel the opportunity to standardized their knowledge and skills related to the NSSP Model Ordinance with the knowledge and skills of FDA's National Plant *Standard*(s) and/or Shellfish Specialists. The process and criteria for demonstrating uniformity in the required performance areas are described in Chapter IV.

Through the application of this procedure, the *Candidate* should demonstrate uniformity with "the *Standard*" or “State Standardization Officer” through his/her knowledge and expertise in the application and interpretation of the Model Ordinance requirements for HACCP principles, sanitation, and the use of the NSSP
STANDARDIZATION SHELLFISH PROCESSING PLANT INSPECTION FORM. The application of this procedure is not intended to provide basic shellfish plant sanitation training to individual *Candidates*.

DEFINITIONS:

The following definitions apply in the interpretation and application of this procedure.

(1) CANDIDATE means an individual applying for initial Standardization who has completed the prerequisite requirements or/and an applicant who is applying for re-standardization.

(2) MODEL ORDINANCE, also known as "Guide for the Control of Molluscan Shellfish," provides readily adoptable standards and administrative practices necessary for the sanitary control of molluscan shellfish.

(3) NATIONAL STANDARDIZATION OFFICER, also known as "FDA's National Plant *Standard*," means an FDA individual(s) at the national level responsible for interpreting NSSP Model Ordinance requirements for shellfish plant operations. The *Standard* represents the FDA position on all Standardization issues. The *Standard* is also responsible for standardizing FDA

Shellfish Specialists.

(4) NOMINEE means the applicant designated for standardization based on the procedures contained in this document.

(5) STANDARDIZATION means the process whereby a *Candidate* demonstrates the knowledge and skills necessary to be considered uniform with the *Standard* as defined in the NSSP, Plant Standardization Procedures.

(6) STANDARDIZED INSPECTOR means a State/Federal shellfish plant inspector who has been authorized to certify shellfish shippers as demonstrated by successfully passing a standardized test.

(7) STATE STANDARDIZATION OFFICER means a State shellfish program employee who has met the qualification requirements in the NSSP Plant Standardization Procedures and successfully completed field standardization inspections with a Standardized FDA Shellfish Specialist.

Chapter II Standardization Participants

FDA

The FDA National Plant *Standard*(s) will be responsible for standardizing all Shellfish Specialists. Standardized FDA Shellfish Specialists will standardize the State's "Standardization Officer" *Candidate(s)*. The FDA National *Standard* will conduct standardization inspections to evaluate and assure the proficiency of the FDA Shellfish Specialists. The Standardization inspection process will consist of three (3) practice inspections and five (5) formal standardization inspections.

STATE

Each participating State will sponsor an adequate number of individuals for positions as State Standardization Officers and inspectors to guarantee that each certified shellfish dealer is routinely inspected for compliance with the Model Ordinance plant processing requirements. The State should select no more than two (2) individuals as Shellfish Standardization Officers. The FDA Shellfish Specialists will conduct standardization inspections to evaluate and assure the proficiency of the State Standardization Officer(s). The Standardization inspection process will consist of three (3) practice inspections and five (5) standardization inspections.

State Standardized Inspectors are standardized by State Standardization Officers. Each State shall provide the necessary resources to support the training of State shellfish inspectors by the State Standardization Officer(s) to ensure that each shellfish firm receives uniform routine inspections. The State Standardization Officer also has the option of sanctioning the participation of local, city, and/or county shellfish plant inspectors. It is recommended that the State Standardization Officer standardize State Standardized Inspector *Candidates* utilizing the same standardization procedures identified for State Standardization Officers.

Chapter III Qualifications For Standardization

This chapter defines those requirements that the *Candidate* must complete prior to standardization. In order for a *Candidate* to engage in the process of initial field standardization, they will qualify by completing the prerequisite and experience requirements specified in this chapter. Those requirements only apply to first time applicants applying for standardization.

QUALIFICATIONS FOR STATE PERSONNEL:

When nominating a *Candidate*, the supervisor making the nomination should provide the required *Candidate* background information on the STANDARDIZATION NOMINATION FORM (Attachment 1). This information will be maintained in a file at the appropriate FDA Office.

- **NOMINATION** - To be eligible for standardization, the *Candidate* should be a senior inspector with experience and responsibility in the shellfish program.
- **JOB EXPERIENCE** - The *Candidate* should be responsible for conducting molluscan shellfish plant inspections and providing training in shellfish inspection procedures. It is a requirement that the *Candidate* has at least one (1) year of full time experience performing shellfish plant inspections within the past three (3) years.
- **CLASSROOM TRAINING** - Prior to field standardization, the *Candidate* must successfully complete the following courses:
    - A two (2) or three (3) day Seafood Alliance HACCP (Basic Seafood HACCP)
    - ***FD*** 245 Shellfish Plant Standardization Course
- **EDUCATION** - It is recommended that the *Candidate* have at least twenty (20) hours of training in the application of Food Science and related studies in Microbiology and/or Epidemiology, HACCP principles/Plan Review, and State regulations.

QUALIFICATIONS FOR FDA PERSONNEL:

When nominating a *Candidate*, the supervisor making the nomination should provide the required *Candidate* background information on the STANDARDIZATION NOMINATION FORM (Attachment 1). This information will be maintained in the office of the appropriate FDA Shellfish Specialist and / or with the FDA National Plant Standard, Center for food safety and Applied Nutrition (CFSAN), Office of Food Safety, College Park, Maryland.

- **NOMINATION** - To be eligible for standardization, the *Candidate* must be a FDA Shellfish Specialist.
- **JOB EXPERIENCE** - Experience will be in accordance with FDA's defined position description including job responsibilities.
- **CLASSROOM TRAINING** - Prior to field standardization, the *Candidate* must successfully complete the following courses:
    - A Two (2) or three (3) day Seafood Alliance HACCP (Basic Seafood HACCP)
    - ***FD 245*** Shellfish Plant Standardization Course
- **EDUCATION** - Education will be in accordance with FDA's defined position description.

Chapter IV Performance Criteria For Field Standardization

All Standardization *Candidates* shall meet the following performance criteria:

(a.) **HACCP:** The *Candidate* shall demonstrate the ability to verify that HACCP Plan exists and is being adequately implemented by the dealer.

(b.) **SANITATION ITEMS:** The *Candidate* shall demonstrate the ability to recognize, through records review, that the "8" NSSP, Model Ordinance , “02 Sanitation Items" are being adequately monitored and that those records are accurate and complete.

(c.) **ADDITIONAL MO REQUIREMENTS:** The *Candidate* shall demonstrate knowledge of the NSSP Model Ordinance, “03 Other Model Ordinance Requirements" by correctly identifying deficiencies relating to those items during the field evaluation process.

(d.) **INSPECTION EQUIPMENT:** The *Candidate* shall be equipped and familiar with the equipment necessary to conduct a Shellfish plant inspection. The *Candidate shall* be evaluated on the proper use of inspection equipment during the standardization process.

The following is a ***MINIMUM*** list of required forms and equipment for use during shellfish plant inspections:

- Current Edition of the NSSP Standardized Shellfish Processing Plant Inspection Form)
- Administrative materials (Model Ordinance, Field Guide, etc.)
- Head cover: baseball cap, hair net, lab coat or equivalent protection, etc.
- Calibrated stem or digital thermometer with not >2 °F increments.
- Chemical test kit or strips for Chlorine, Quaternary, or Iodine sanitizers.
- Flashlight(important item - must be adequate for the job and in working condition.); and
- A 70% solution of Isopropyl alcohol or equivalent "wipes".
- A camera (Optional)

(e.) **COMMUNICATION:** The *Candidate* shall demonstrate the ability to effectively communicate with plant management about deficiencies noted during the evaluation. Many different types of communication skills and approaches are necessary and valuable during the inspection process.

The *Candidate* shall be required to take the lead in communicating with industry personnel during all inspections and the *Standard* shall evaluate the *Candidate*’s communication skills.

INTRODUCTION:
The *Candidate* shall be required to make all introductions. A complete introduction consists of:

(a.) Identifying yourself and then introducing all persons participating in the inspection;

(b.) Describing to the PERSON IN CHARGE the purpose and flow of the inspection - for training only, NOT a regulatory inspection so no written report will be left with the firm.

(c.) Identifying and explaining to the PERSON IN CHARGE, that it will be necessary to ask questions, during the inspection; and

(d.) Although there will be no written report left, with the firm, if there are significant findings they will be brought to the attention of the PERSON IN CHARGE during the Exit Interview.

In addition to verbal and written communication, the *Candidate* shall also use the inspection process to communicate and demonstrate FOOD SAFETY concepts by example. Activities such as proper hand washing, and sanitizing, insuring the thermometer is cleaned and sanitized before every use and wearing proper clean outer garments and a heave cover will reinforce your spoken and written communications.

INTERVIEW WITH THE PERSON IN CHARGE:

The *Candidate* shall conduct a discussion with the PERSON IN CHARGE to determine:

1. (a.) If a HACCP PLAN exists, and if so, whether the PERSON IN CHARGE understands the principles of HACCP, and is ensuring that the employees are effectively adhering to the plan.

EXIT INTERVIEW:

The Candidate, at the exit interview shall thank the PERSON IN CHARGE for allowing the use of his/her facility for training. Next he or she must clearly convey and discuss in detail with that person any significant finding, as stated during the introduction phase at the start of the training.

If significant findings were identified the Candidate shall discuss with the PERSON IN CHARGE:

(a.) What was observed and how it can be corrected;

(b.) The firm's plan for correction and how long it will take, and

(c.) If any Corrective actions were observed during the inspection (where, when, how and by whom the correction occurred), insure the PERSON IN CHARGE is advised and emphasize the commendable nature of all such action.

Explain the public health significance of any significant findings and demonstrate the ability to discuss and resolve in a courteous and professional manner, issues that the PERSON IN CHARGE might not agree with or clearly understand.

Table 1: Summary of evaluation methods for initial STANDARDIZATION.

PERFORMANCE AREA	FIELD STANDARDIZATION
HACCP (Items 1 - 7)	Evaluation of existing HACCP Plan
Sanitation (Items 8 - 16)	Evaluation/inspection
Additional MO Requirements (Items 17 -27)	Evaluation/inspection
Inspection Equipment	Observation
Communication	Observation

Chapter V Pre-Standardization Field Procedure

Pre-standardization - This phase consists of three (3) joint "practice" field inspections by the *Candidate* and the *Standard*. During these “practice” inspections there will be open discussion between the *Candidate* and the *Standard* on all matters relating to the standardization process including: the NSSP Model Ordinance interpretations, inspection form debiting requirements (where is "it" marked on the form); questions and discussions relating to the firm's HACCP plan; related Sanitation and Monitoring records and Corrective Action. The current edition of the NSSP Standardized Shellfish Processing Plant Inspection Form (Attachment 4) will be used during all aspects of the standardization procedure.

During pre-standardization inspections, the *Standard* and *Candidate* shall conduct the inspection together and discuss each noted deficiency. They shall agree on the number of times and locations where deficiencies were observed in the plant.

Following pre-standardization, the *Standard* may decide that the *Candidate* is unprepared to proceed to the formal field standardization process. If the *Standard* determines the *Candidate* needs additional field training, after discussion with the *Candidate*, they may decide to complete additional "practice" inspections. If the *Standard* determines that more "practice" inspections will not help in the *Candidate's* understanding of the process and/ or procedure then the *Candidate* and *Candidate's* supervisor will be informed.

Chapter VI Field Standardization Procedure

The Field Standardization Process consists of the *Standard* and the *Candidate* jointly conducting five (5) formal shellfish plant evaluations. Always select five (5) formal Shucker/packer (SP) plants if they are available. If a State has less than five (5) Shucker/packer's (SP), then the remaining plants will be selected according to the following priority:

1) Repackers (RP)
2) Shellstock Shippers (SS)
3) Reshippers (RS)

During all joint field inspections, the *Candidate* will be the lead person. He or she will be responsible for the following: Introduction (determining who is the "most responsible" person), requesting the firm's HACCP Plan and its related documents, and sanitation monitoring records. The minimum number of records required for review will be at least three (3) months. The *Candidate* shall also conduct the "exit" interview and discuss all significant findings with management.

Chapter VII Standardization Scoring

COMPARISON OF FINDINGS:

Following each inspection, the *Standard* shall compare his/her findings with the *Candidate*. At the conclusion of the field standardization, the *Standard* shall tabulate and compare the *Candidate's* inspection findings to determine if the *Candidate* has successfully completed the requirements for Standardization. The *Standard* shall discuss any differences, results and other observations with the *Candidate*.

The *Standard* will evaluate each inspection report to determine the number of disagreements ***(using Standardization Requirements below)*** between the *Standard* and the *Candidate.* Disagreements shall be recorded on the Comparative Results form provided as Attachment 2.

CANDIDATE SCORING: The *Standard* shall grade each inspection report by circling each incorrectly marked item. The *Standard* shall determine the number of disagreements on items and record that number in the form provided in ATTACHMENT 3. For inspectional equipment and communication scoring is not used but impacts the outcome of the *Candidate*'s performance.

The *Candidate*s shall meet the following level of agreement to achieve Standardization after completing five (5) formal field evaluations.

(a.) HACCP: (item 1-7)

The *Candidate*s **SHALL NOT DISAGREE** with the *Standard* more than an average of three (3) times in five (5) evaluations.**

(b.) Sanitation Items: (item 8- 16)

The *Candidate*s **SHALL NOT DISAGREE** with the *Standard* more than an average of three (3) times in five (5) evaluations. **

(c.) Other Model Ordinance Requirements: (item 17 –27)

The *Candidate*s **SHALL NOT DISAGREE** with the *Standard* more than an average of four (4) times in five (5) evaluations. **

(d.) Inspection Equipment:

The *Candidates* **SHALL** have all essential equipment, listed in Chapter IV "Performance Criteria for Field Standardization" available for use during each inspection. This section shall rate as **SATISFACTORY or NEEDS IMPROVEMENT.**

(e.) Communications:

The *Candidates* **SHALL** communicate per the requirements in Chapter IV "Performance Criteria for Field Standardization." This section shall rate as **SATISFACTORY or NEEDS IMPROVEMENT.**

****NOTE: With the exception of *Candidates* deficiencies that were not observed by the *Standard***

CRITERIA FOR SUCCESS STANDARDIZATION:

To achieve standardization, the *Candidates* shall meet requirements for the Performance criteria (a-c) described in Chapter IV. The *Candidates* may receive “Needs Improvement” classification in the section inspectional equipment and communications and still be standardized.

When either inspection equipment or communication performance area are classified as needing improvement, the *Candidates* and the *Candidate's* supervisor shall be notified that the “Needs

Improvement" area(s) must be satisfactorily addressed before restandardization is granted. Prior to restandardization, the *Candidate's* supervisor must notify the *Standard* that the area(s) or concern has been addressed.

Chapter VIII Standardization Results

REPORTING

The *Standard* and *Candidate* shall describe on the narrative section on the NSSP SHELLFISH PROCESSING PLANT FORM each specific deficiency and location within the firm where the deficiency was observed. The *Candidate* shall not fail to recognize any critical items. After each inspection has been completed, the *Standard* shall compare the number and description of the deficiencies found in the plant for each item on the narrative section of the NSSP Standardized Shellfish Processing Plant Inspection Form. The *Standard* shall determine if both observed the same specific deficiencies throughout the plant.

The *Standard* will use the Comparative Results Form (Attachment 2) to determine the level of agreement between the *Standard* and *Candidate*. At the conclusion of the formal Field Standardization exercise, the *Standard* will complete a Composite Results Report (Attachment 3).

After successfully completing the Field Standardization Exercise, the *Candidate* will be granted the TITLE of *STANDARDIZATION OFFICER OR STANDARDIZED INSPECTOR.* A certificate recognizing that accomplishment will be forwarded to the *Candidate*, along with formal notification to the *Candidate's* supervisor, within thirty (30) days.

Chapter IX ReStandardization

STANDARDIZATION EXPIRATION:

The *Candidate's* STANDARDIZATION is valid for a period of five (5) years. Expiration dates will appear on the certificate issued by the *Standard*.

STANDARDIZATION MAINTENANCE:

The maintenance process consists of joint inspections conducted during evaluation activities. Maintenance will also be provided in the form of updated FD 2041 Shellfish State Standardization Officer courses, ORA University web based course, updated field standardization guides, and other guidance/technical assistance activities on an as needed basis.

Chapter X Termination, Suspension, or Revocation of Standardization

TERMINATION OF FIELD STANDARDIZATION:

(a.) The *Standard* has the option to terminate the field exercise at any time during the procedure if the *Candidate*, in the opinion of the *Standard*, is not achieving the required level of agreement for standardization.

(b.) The *Standard* shall notify the *Candidate* and the *Candidate's* supervisor in writing of the reasons for failure.

(c.) The *Standard* will document the reason(s) for termination of the field. This information shall be forwarded to the *Candidate's* supervisor and a copy shall be placed in the FDA file. All evidence and conclusions reached by the FDA shall be documented in writing by the *Standard* and shall be kept for three (3) years in accordance with the Freedom of Information Act.

SUSPENSION/REVOCATIONOFSTANDARDIZATIONCERTIFICATION

(a.) Fails to utilize and/or properly complete the current NSSP Standardized Shellfish Processing Plant Inspection Form.

(b.) Fails to properly code (critically code) deficiencies (critical, key, and other) on the NSSP STANDARDIZATION SHELLFISH PROCESSING PLANT INSPECTION FORM.

(c.) Fails to fulfill the required maintenance activities described in *CHAPTER IX*.

(d.) Before suspension or revocation, the *Standard* will consult with appropriate personnel in the FDA and/or the *State's* agency to reach a decision on whether:

i. The standardization shall be suspended temporarily with notice regarding conditions required for reinstatement; or

ii. The standardization shall be revoked.

(e.) When a STANDARDIZATION certificate is revoked or suspended, the *Standard shall* notify the supervisor in writing, of his/her decision.

(f.) The *Standard* will document the reason(s) for suspension or revocation of the standardization certification. This information shall be forwarded to the *Candidate's* supervisor and a copy shall be placed in the FDA file. All evidence and conclusions reached by the FDA shall be documented in writing by the *Standard* and shall be kept for three (3) years in accordance with the Freedom of Information Act.

RE-STANDARDIZATION AFTER SUSPENSION OR REVOCATION.

The *Candidate* may apply for restandardization, within thirty (30) days, after suspension or revocation. He or she must contact and work with the appropriate FDA or *State Standardization Officer to correct all prior deficiencies before the restandardization process begins.

NOTE: State Standardization Officers can only standardize their inspectors. Only FDA National *Standards* or standardized FDA Specialists can standardize State standardization officers.

Chapter XI Appeals

FILING AN APPEAL.

Candidate after being notified of a failure to successfully achieve Standardization or restandardization may appeal the decision. Should the Candidate elect to appeal, this action must be initiated within thirty days (30) of the date of the written notification of the failure, suspension or revocation. The appeal's request shall be addressed to the National Shellfish Standard, FDA, Center for Food Safety and Applied

Nutrition (CFSAN), Office of Food Safety, 5001 Campus Drive, College Park, MD 20740.

APPEAL BOARD MEMBERS.

The National Shellfish Standard and representatives from the ISSC and FDA Shellfish Specialists will comprise the STANDARDIZATION Appeals Board. The ISSC will select States representatives to participate in the appeals process.

HEARINGS.
If the Appeal Board finds the appeal unjustified, the decision of the FDA *Standard* will stand.

If the Appeal Board determines that the State Standardization Officer's appeal is justified, the *State Standardization Officer* and the FDA *Standard* will be notified in writing that a hearing will be scheduled.

HEARING PROCEDURE.
At the hearing, the following procedure will be followed:

(1) The *State Standardization Officer* will present his/her argument for reversing the FDA *Standard's* decision;

(2) The Appeal Board will have the opportunity to question the action or conduct of the State Standardization Officer and the FDA *Standard*; and

(3) The Appeal Board will render a decision.

NOTE: Please click on the link below to view, print or download the NSSP Standardized Shellfish Processing Plant Inspection Form.

NSSP Standardized Shellfish Processing Plant Inspection Form

.03 Dealer Certification and the Interstate Certified Shellfish Shippers List (ICSSL)

A principal objective of the ICSSL is to provide a mechanism for State health officials and consumers to receive information as to whether lots of shellfish shipped in interstate commerce meet acceptable sanitation criteria. This is achieved through criteria and procedures to allow a producing or receiving State to "certify" that the product from a specific dealer has been grown, harvested, transported, processed, or shipped in compliance with the NSSP Model Ordinance. Dealer certification depends on maintaining acceptable operational and sanitary conditions. This determination is based on nationally uniform inspections by standardized inspectors.

State health officials who certify dealers must fully comply with the administrative requirements for certification for the process to remain viable. For the certification process to be effective, dealers must fully comply with the applicable NSSP Model Ordinance sanitation requirements pertaining to the type of operation involved.

The NSSP Model Ordinance requires that dealers obtain certification from the Authority prior to shipping shellfish in interstate commerce. Only those shellfish dealers who meet the NSSP Model Ordinance requirements are eligible to be listed in FDA's monthly publication of the ICSSL. A unique certification number that is used to mark his product identifies each dealer.

Use of the Interstate Shellfish Dealer's Certificate (FDA Form 3038)

The Interstate Shellfish Dealer's certificate, FDA Form 3038, is used by the Authority to place a dealer on the ICSSL, to report changes to a certificate, and to remove a dealer from the ICSSL. The certificate allows FDA to collect the necessary information to list certified dealers in the ICSSL. Dealers should be informed by the State officer of the probable date their names will appear on the ICSSL. Dealers should be advised against making interstate shipments prior to that date. If shipments need to be made before the appearance of the shipper's name on the ICSSL, the Authority in the dealer's State must notify the appropriate agency in each of the receiving States and the FDA regional and headquarters offices.

When the Authority cancels a dealer certification, the appropriate FDA Region or District Office must be notified and a completed Form FDA 3038 must be mailed to FDA. When a certificate is renewed, the certificate must be sent to FDA. A certificate will be withdrawn automatically from the ICSSL on the date of expiration unless FDA has received the new certificate.

Instructions for Completing the Interstate Shellfish Dealer's Certificate (FDA Form 3038)

The original copy, or Part 1, of the Shellfish Dealer's Certificate is mailed to FDA, Division of Cooperative Programs, Shellfish Safety Team, HFS-628, 5001 Campus Drive, College Park, Maryland 20740; Part 2 is mailed to FDA Shellfish Specialist; and, Part 3 is retained by the Authority. The original certificate with the appropriate signatures shall be mailed not later than the first of the month for publication in the ICSSL.

To input information check the applicable box.

Section I - Completed by State Shellfish Certification Agency

39. **Shellfish Dealer/Shipper:** Name, Address (including Street, Number, City or Town) ZIP,

Telephone

40. **Certification:**
    a) **Certificate Number** - Unique number assigned to each Certified Shellfish Dealer.
    b) **Date Certified** - Date the dealer was certified as meeting the NSSP criteria.
    c) **State** – Two (2) letter State code.
    d) **Expiration Date** - Date the certificate expires.
    e) **Category Symbol** – Two (2) letter code designating dealer process (*i.e. DP, SP, RP, SS, RS*).
41. **Date of On-Site Inspection:** Date the plant was inspected for certification.
42. **Standardized State Shellfish Plant Inspector:** Print the name of the inspector who conducted the on-site inspection.
43. **Expiration Date of Inspector's Certificate of Standardization:** Print the expiration date that appears on the Inspector's certificate.
44. **Cancellation Date:** Date the firm has been either decertified or recommended for de-listing.
45. **Reason for Cancellation:** Check applicable box; Other denotes voluntary or seasonal suspension of activities.
46. a) **State Shellfish Certification Officer:** Printed name of official to authenticate information.
    b) **Signature:** Official's signature.
    In the case that a State has only one Standardized State Shellfish Plant Inspector, sign this block.
    c) **Date Certificate sent to FDA:** Self-explanatory.

Section II - Completed by Division of Cooperative Programs - FDA

47. **Date Certificate Received:** Date the signed original Form FDA 3038 is received by FDA.
48. **Date Certificate Published:** Date when the certified dealer's name is scheduled for publication on the ICSSL.

.04 Shellstock Tagging

Shellstock tagging has a very direct role in public health protection. In the event of a shellfish related illness, tags are a tool, which, used in concert with records, should provide for traceability of live shellstock from the final consumer back through every middle man, (retailer, wholesaler, carrier, and dealer) who handled the product, to a specific growing area, harvest date, and ultimately, if possible, the individual person who harvested the shellstock.

When an outbreak of disease attributable to shellfish occurs, health departments and other appropriate State and Federal agencies must be able to determine the source of shellfish contamination to prevent any further outbreaks from this source. This can be done most effectively by using the records kept by the shellfish harvesters and dealers to trace a shellfish shipment, through all the various dealers who have handled it, back to its point of origin. Shellstock tags are the first important records concerning the origin of shellfish.

Harvesters must provide information necessary to create a record of the origin, quantity, and date of harvest, which can be used to trace a lot of questionable shellstock back to its source or sources. Investigation of disease outbreaks can be severely hindered if the source of the shellfish cannot be readily identified. Inability to identify the source can result in shellstock from the unacceptable source continuing to be used and continuing to cause illness. Health authorities may be forced to close a safe growing area, to ban a safe shellstock shipment or to seize a safe lot of shellstock as a public health precaution if the source of contaminated shellfish cannot be accurately and rapidly determined.

Maintaining adequate records is considered by some industry members to be a burden. This has resulted in various unacceptable practices being encountered by health officials, including no written records of purchase, undated shellstock shippers tags maintained in an unordered manner, new shipping tags being placed on a lot of shellstock without records to correlate the original identity of the lot with the new identity, and shellfish on the premises with no tags. Although these dealers often have "records" in the most general sense, these records are not in the form that meets the intent of the NSSP certification requirement to provide traceability on a lot-by-lot basis. As a result, follow-up investigations of disease outbreaks have been stymied, identification of the cause of the outbreak has been delayed, and outbreaks have continued. For more information concerning dealer certification, see the NSSP Guidance Document: *Chapter III. 03: Dealer Certification and the Interstate Certified Shellfish Shippers List*.

An example where the failure to maintain adequate records was identified as one of the principal contributing factors to a series of continuing shellfish associated disease outbreaks occurred in 1981 and 1982. The outbreaks continued for several months and affected thousands of people. An investigation by the States involved and FDA revealed that some States were unable to enforce the record keeping and tagging requirements of the NSSP. FDA found in one State that approximately one-third of the certified dealers inspected failed to maintain adequate records. State officials realized that an improved tagging, labeling or manifest system was needed to track shellfish in the marketplace back to the distributor and to the harvester.

When a lot of shellstock is sold in bulk (e.g. by the truckload without being placed in containers), the harvester or dealer must provide a transaction record prior to shipment. If the transaction record is generated by the harvester, the record must contain information identical to that required on the harvester’s tags and must also include the name of the consignee. If the transaction record is generated by the dealer, the record must contain information identical to that required on dealer’s tags and must include the name of the consignee.

The NSSP recognizes two (2) types of shellstock tags: harvester tags and dealer tags. Many of the requirements are the same for both tag types. There are some additional requirements for dealer tags when the product has been wet stored or depurated. Transaction records which provide the same information as the harvester’s or dealer’s tag may be used in lieu of tags for lot of shellstock sale and lot of shellstock shipment.

Shellstock harvest location needs to be consistently defined on all tags. The tags should provide the most precise identification of the harvest location or aquaculture site as is practicable; this identification must include at least the State (initials) in which the shellstock were harvested in the designated growing area within the State as assigned by the Authority of the producing State. If harvest areas have not been indexed by the Authority, then an appropriate geographical or administrative designation must be used (e.g. Long Bay, Decadent County, lease number, bed or lot number).

Each harvester or aquaculturist and each dealer must affix an approved, durable, waterproof tag, containing all the information required by the NSSP Model Ordinance, to each container of shellstock. Minimal required tag size is 13.8 square inches (89.03 cm^2). Example tags are provided in Attachment 1. The harvester's tags must be in place while the shellstock is being transported to the dealer unless the harvest has occurred at more than one harvest location or aquaculture site; then each container must be tagged at the harvest location or aquaculture site. In certain situations, the truck may be considered the container for transport of bulk loads of shellstock from the growing area to the dealer. For dealers, tagging must be done prior to shipment. When the dealer is also the harvester, the dealer's tag may also be used as the harvester's tag.

Harvester Tag Requirements

Information on the harvester's tags must be legible, indelible and arranged in the following specific order:

- A place may be provided where the dealer's name, address and certification number as assigned by the Authority may be added;
- The harvester's identification number as assigned by the Authority;
- The date of harvesting;
- The most precise identification of the harvest location or aquaculture site as is practicable; this identification must include at least the State (initials) in which the shellfish were harvested and the designated growing area with that State as assigned by the Authority of the producing State. If growing areas have not been indexed by the Authority, then an appropriate geographical or administrative designation must be used (e.g. Long Bay, Decadent County, lease number, bed or lot number);
- Type and quantity of shellfish;
- The following statement, in bold capitalized type on each bag: **"THIS TAG IS REQUIRED TO BE ATTACHED UNTIL CONTAINER IS EMPTY OR RETAGGED AND THEREAFTER KEPT ON FILE FOR 90 DAYS."** and
- All shellstock intended for raw consumption shall include a consumer advisory and follow the Time-Temperature Matrix Control. The following statement, from section 3-603.11 of the 2001 Food Code, or an equivalent statement shall be included on all shellstock: “RETAILERS, INFORM YOUR CUSTOMERS” “Consuming raw or undercooked meats, poultry, seafood, shellfish or eggs may increase your risk of food borne illness, especially if you have certain medical conditions”

Dealer Tag Requirements

Dealer tagging is required upon harvest or receipt from a harvester, processing and packaging of shellstock by the dealer, or sale and shipment of shellstock by the dealer to other dealers for subsequent sale, processing or additional packaging. The information on the dealer’s tags must be legible, indelible and arranged in the following specific order:

- The dealer's name, address, and certification number as assigned by the Authority;
- The original shellstock shipper's certification number;
- The date of harvesting;
- The most precise identification of the harvest location or aquaculture site as is practicable; this identification must include at least the State (initials) in which the shellfish were harvested and the designated growing area with that State as assigned by the Authority of the producing State. If growing areas have not been indexed by the Authority, then an appropriate geographical or administrative designation must be used (e.g. Long Bay, Decadent County, lease number, bed or lot number);
- Type and quantity of shellstock;
- The following statement, in bold capitalized type, that **“THIS TAG IS REQUIRED TO BE ATTACHED UNTIL CONTAINER IS EMPTY AND THEREAFTER KEPT ON FILE FOR 90 DAYS."** and

- All shellstock intended for raw consumption shall include a consumer advisory and follow the Time-Temperature Matrix Control. The following statement, from section 3-603.11 of the 2001 Food Code, or an equivalent statement shall be included on all shellstock: "RETAILERS, INFORM YOUR CUSTOMERS" "Consuming raw or undercooked meats, poultry, seafood, shellfish or eggs may increase your risk of food borne illness, especially if you have certain medical conditions."

When both the dealer and harvester tags appear on the container, the dealer tag is not required to list the date of harvesting, and the harvest location or the aquaculture site. A harvester's tag must be in place while the shellstock is being transported to a dealer. The dealer must keep the harvester's tag in place until the container of shellstock is shipped or until it is broken open for washing, grading and packing. Once the container is broken open, the dealer must:

- Keep the harvester tag for ninety (90) days;
- Keep track of the growing area and date of harvest of all shellstock; and
- Maintain the lot identity of all shellstock in an intermediate stage.

Except for shellstock that originated from a depuration-processor, shellstock transported across State lines and placed in wet storage must include the following information on its shipping tag after removal from wet storage:

- All information required on a dealer's tag as specified above; and
- The statement that "THIS PRODUCT IS A PRODUCT OF (NAME OF STATE) AND WAS WET STORED AT (FACILITY CERTIFICATION NUMBER) FROM (DATE) TO (DATE)"

Lot of shellstock tagging in the washing, packing and staging of shellstock is permissible only when the lot container (i.e., the pallet) is tagged as required in a protocol approved by the Authority. The protocol shall provide for lots of shellstock to be separated and identified to prevent commingling or misidentification. The tag on each lot of shellstock shall contain the following minimum information:

ALL SHELLFISH CONTAINERS IN THIS LOT HAVE THE SAME DATE AND AREA OF HARVEST.

Harvest Date_____

Harvest Area_____

Original Dealer/Shipper #_____

# of units in this lot container_____

The dealer's tag must be put on all containers of shellstock before they are shipped to another dealer or retailer. Prior to shipment, all containers of shellstock must remain easily identified and continue to be separated to prevent commingling or misidentification. The protocol approved by the Authority shall provide for lots of shellstock to be separated and identified so as to prevent commingling or misidentification. The allowable means of identification are:

- A harvester's tag containing the information required above on harvester's tags;
- A dealer's tag containing the information required above on dealers tags; and
- A lot of shellstock tag designed in the manner required above for lot tags.

Tag Requirements for Relaying

In relay operations, the method of shellstock identification (tagging, bulk load records, etc.) is left to the discretion of the Authority. When the relay process is conducted using containers, a need exists to develop a container identification system to locate and avoid removal of containers before the natural cleansing process is complete. Once the relay operation is complete, the shellstock is subject to the tagging requirements for harvesters and dealers.

Depuration Tag Requirements

Shellstock that has been subjected to depuration requires an increased level of control because of the increased potential for contamination. These controls must include packaging and tagging that will serve to help identify the depuration cycle of each harvest lot and to deter illegal commingling of shellstock which has not been depurated with depurated shellstock. The Authority may require the harvester to use special tags or to provide additional information on the tags. At a minimum, the harvester's tags (or transaction records used for bulk shipments) must identify the growing area, provide the harvester's special license number, and specify the harvest date and the quantity of shellstock.

The dealer's (i.e. the depuration processor) tags must, at a minimum, include the following information in a legible and indelible form:

- The dealer's name and address;
- The dealer's certification number as assigned by the Authority;
- The date of depuration processing;
- The depuration cycle number or lot number;
- The most precise identification of the harvest location as is practicable including the initials of the State of harvest, and the Authority's designation of the growing area by indexing, administrative or geographic designation. If growing areas have not been indexed by the Authority, then an appropriate geographical or administrative designation must be used (e.g. Long Bay, Decadent County, lease number, bed or lot number);
- The type and quantity of shellstock;
- The statement, in bold capitalized type, that "**THIS TAG IS REQUIRED TO BE ATTACHED UNTIL CONTAINER IS EMPTY AND THEREAFTER KEPT ON FILE FOR 90 DAYS.**"; and
- All shellstock intended for raw consumption shall include a consumer advisory and follow the Time-Temperature Matrix Control. The following statement, from section 3-603.11 of the 2001 Food Code, or an equivalent statement shall be included on all shellstock: "RETAILERS, INFORM YOUR CUSTOMERS" "Consuming raw or undercooked meats, poultry, seafood, shellfish or eggs may increase your risk of food borne illness, especially if you have certain medical conditions."

Attachment 1

In the event of a shellfish related illness, tags are a tool, which, used in concert with records, should provide for traceability of live shellstock from the final consumer back through every middle man, (retailer, wholesaler, carrier, and dealer) who handled the product, to a specific growing area, harvest date, and ultimately, if possible, the individual person who harvested the shellstock.

The following options are recommended for inclusion on tags to improve the effectiveness of the NSSP

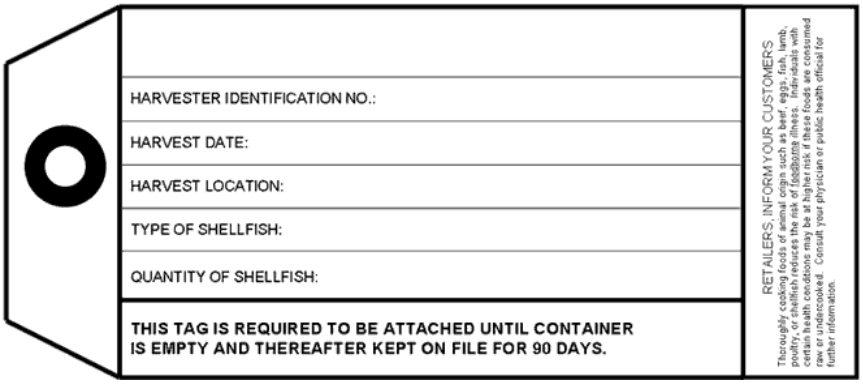
tagging program.

- Include the statement "**Perishable; keep refrigerated**" on the tag in bold print.
- Include the "Date Shipped" on the tag.
- Maintain flexibility in the tagging program to take advantage of evolving materials and technology (e.g. UPC coding)

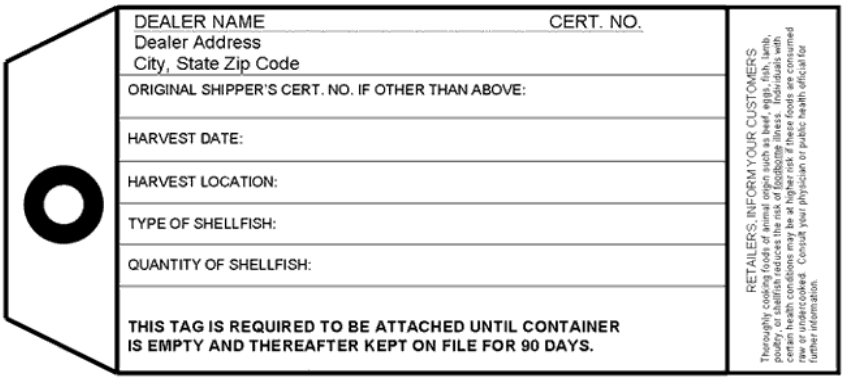
Tag Construction: Durable, waterproof and a minimum size of 13.8 square inches (89.03 ^{cm2}).

Examples of Shellstock Tags

This tag is an example of a harvester's tag with the minimum NSSP required information in the required order.

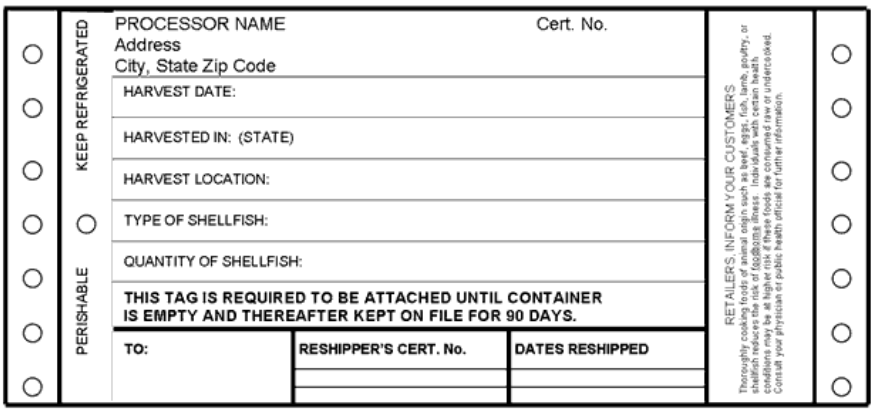


This tag is an example of a dealer's tag with the minimum NSSP required information in the required order.

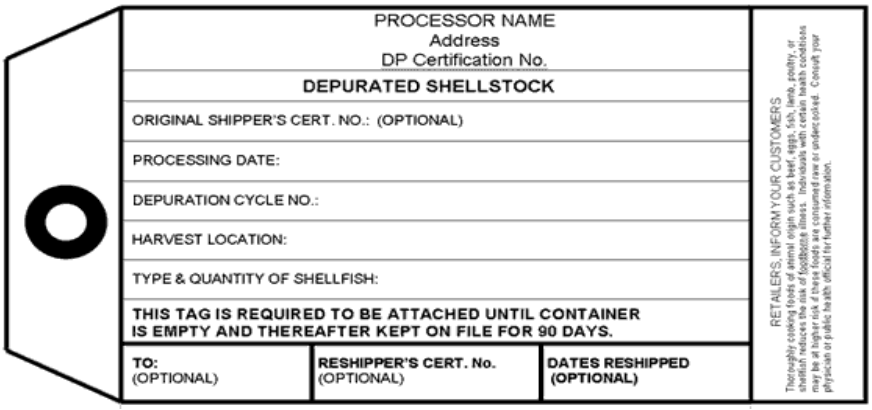


While both of the previous examples contain the minimum required information in the required order, many firms also customize the tags with additional information. Such information might include space for the consignee's address, date shipped, reshipper certification number, date reshipped, and a "Perishable- Keep Refrigerated" statement. Some firms also opt to preprint the types of shellfish with a check-off space. When customizing the tag, the order of the minimum required information cannot be changed.

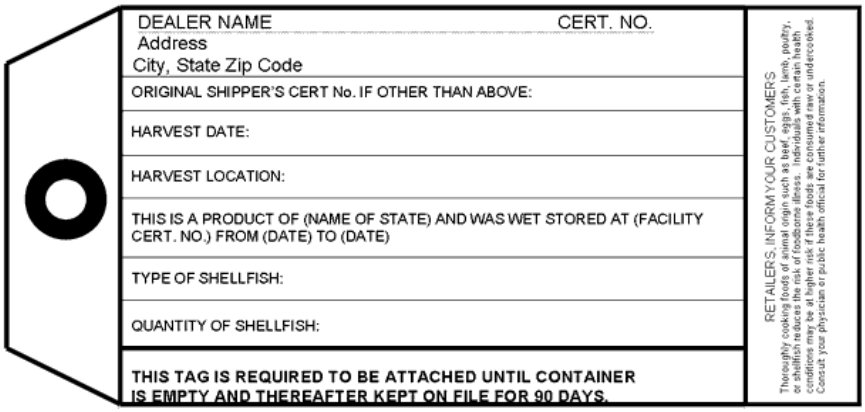
This tag is an example of a dealer tag which meets the NSSP requirements and has been modified to include additional information. It also has the pin feed feature to allow printing on the dot matrix printer.



This tag is an example of a tag for depurated shellstock with the minimum NSSP required information in the required order.



When shellstock is transported interstate and placed in wet storage, special tagging requirements must be met. See the NSSP Model Ordinance for details. This tag is an example of a dealer tag modified for labeling product transported across State lines and subsequently wet stored.


DEALER NAME CERT. NO.
Address
City, State Zip Code
ORIGINAL SHIPPER'S CERT No. IF OTHER THAN ABOVE:
HARVEST DATE:
HARVEST LOCATION:
THIS IS A PRODUCT OF (NAME OF STATE) AND WAS WET STORED AT (FACILITY CERT. NO.) FROM (DATE) TO (DATE)
TYPE OF SHELLFISH:
QUANTITY OF SHELLFISH:
THIS TAG IS REQUIRED TO BE ATTACHED UNTIL CONTAINER IS EMPTY AND THEREAFTER KEPT ON FILE FOR 90 DAYS.
RETAILERS, INFORM YOUR CUSTOMERS:
Thoroughly cooking foods of animal origin such as beef, eggs, fish, lamb, poultry, or shellfish to an internal temperature of 145°F (63°C) will prevent most food borne illness. These foods may cause illness if consumed raw or undercooked. Consult your physician or public health official for further information.

Tags are available through various sources. In some States, the Authority sells the tags which are sequentially numbered for accountability. There are also grower's associations which bulk purchase tags for their members at considerable savings. Individual dealers can also have tags printed at local print shops.

Tyvek is one example of a durable waterproof material commonly used for shellstock tags.

Some States require additional information on tags which exceeds the NSSP requirements. A dealer should verify the receiving State's requirements prior to shipment to that State.

.05 Protocol for Addressing Positive Coliform Sample in an Artificial Wet Storage Water Body

NOTE: Please click on the link below to view, print or download the Protocol for Addressing Positive
Coliform Sample in an Artificial Wet Storage Water Body.

Protocol for Addressing Positive Coliform Sample in an Artificial Wet Storage Water Body- Decision Tree

Description: Flow chart showing the protocol for addressing positive coliform results in artificial wet storage water bodies.

Collect weekly water samples for recirculating systems and daily samples for continuous flow through systems not using an approved water source.

If the water sample is negative for coliforms in either system, no action is required.

If the water sample is positive for coliforms in the recirculating system, institute daily sampling.

The Authority should be notified of a failure in either system.

Troubleshoot the HACCP Plan and operations by (1) Verifying that shellstock is from an approved growing area, (2) Reviewing maintenance records, (3) Reviewing system operations, (4) Verifying employee health, (5) Reviewing the sampling protocol, (6) Looking for an obvious reason for in-plant re-growth, (7) Determining that UV lamps are operating properly, and (8) Confirming the quality of the source water.

If no likely public health concern is found after troubleshooting, the product may be shipped and the problem causing the positive coliform result shall be fixed. Once fixed, re-verify through sampling that the system's water quality is acceptable.

If a potential public health concern is found after troubleshooting, the product may be depurated, relayed, cooked, replanted for long-term relay, or discarded and the problem causing the positive coliform result shall be repaired. Once repaired, re-verify through sampling that the system's water quality is acceptable. If the system fails after re-verification, attempts to repair the system must be made until the re-verification demonstrates acceptable water quality.

.06 Guidance for Reinstating a Previously Infected Employee

The dealer and/or supervisor may reinstate an excluded employee under one (1) or more of the following conditions: **[K]**

A. The employee is recovered from Norovirus illness and more than twenty-four (24) hours have passed since the employee became completely asymptomatic, or the employee provides the dealer or supervisor with written medical documentation from a health practitioner stating that the employee is free of a Norovirus infection with one (1) of the following:
    1. Test results show two (2) consecutive negative stool samples taken at least twenty-four (24) hours apart; or
    2. Otherwise determined by the health practitioner to be free of a Norovirus infection.
B. The employee diagnosed with an infection from Norovirus is now completely asymptomatic, and the employee provides written medical documentation from a health practitioner stating that the employee is free from Norovirus infection with one (1) of the following:
    1. Test results show two (2) consecutive negative stool samples taken at least twenty-four (24) hours apart; or
    2. Otherwise determined by the health practitioner to be free of a Norovirus infection.
C. The employee diagnosed with an infection from Norovirus is completely asymptomatic and without medical documentation, and more than twenty-four (24) hours have passed since the employee became completely asymptomatic, or the employee never developed symptoms and more than twenty-four (24) hours have passed since the employee was diagnosed.
D. Except when diagnosed with an infection from Norovirus, hepatitis A virus, *Salmonella typhi*, *Shigella* spp., or Enterohemorrhagic or Shiga Toxin-producing *Escherichia coli*, and when the employee was excluded because of symptoms of vomiting and/or diarrhea, the employee is asymptomatic for at least twenty-four (24) hours or provides the dealer and/or supervisor with written medical documentation stating the symptom is from a noninfectious condition.
E. When the employee is symptomatic with jaundice or is diagnosed with an infection from hepatitis A virus, one (1) of the following conditions is met:
    1. The employee has been jaundiced for more than seven (7) calendar days;
    2. Documentation of test results from a medical practitioner is provided that show falling liver enzymes in at least two (2) consecutive blood tests; or employee to be free of a

hepatitis A virus infection.

3. Documentation is provided from a health practitioner otherwise determining the employee to be free of a hepatitis A virus infection.

F. When excluded because of a diagnosis or a previous reported infection of *Salmonella typhi*, the employee provides written medical documentation from a health practitioner stating that the employee is free from *S. typhi* infection;

G. When diagnosed with an infection from *Shigella* spp. and completely asymptomatic, and one (1) of the following conditions is met:

1. The employee provides to the dealer or supervisor written medical documentation from a health practitioner stating that the employee is free of a *Shigella* spp. infection based on test results from two (2) consecutive stool specimens taken at least 48 hours after discontinuance of antibiotics and taken at least twenty-four (24) hours apart report negative findings for *Shigella* spp.; or
2. Without medical documentation if all symptoms of vomiting and/or diarrhea have resolved and more than seven (7) calendar days have passed since the employee became completely asymptomatic, or if the employee never developed symptoms and more than seven (7) calendar days have passed since the diagnosis.

H. The employee of the dealer that was excluded because of a diagnosis of infection from Enterohemorrhagic or Shiga Toxin-producing Escherichia coli, the employee is completely asymptomatic and one (1) of the following conditions is met:

1. The employee provides written medical documentation from a health practitioner stating that the employee is free of an infection from Enterohemorrhagic or Shiga Toxin-producing *Escherichia coli* based on test results showing two (2) consecutive negative results for Enterohemorrhagic or Shiga Toxin-producing *Escherichia coli*, from stool specimens occurring at least twenty-four (24) hours apart, and not earlier than forty-eight (48) hours after discontinuance of antibiotics; or
2. Without medical documentation if the asymptomatic employee was excluded or restricted after symptoms of vomiting or diarrhea have resolved, and more than seven (7) calendar days have passed since the employee became asymptomatic, or the asymptomatic employee was excluded or restricted without ever developing symptoms, and more than seven (7) calendar days have passed since the employee was diagnosed.

I. For an employee of the dealer that was excluded because an illness exhibiting acute sore throat with fever symptoms, the employee provides written medical documentation from a health practitioner stating that the employee meets one (1) of the following conditions:

1. Employee has received antibiotic therapy for *Streptococcus pyogenes* infection, as determined by a health practitioner, for more than twenty-four (24) hours;
2. Employee has at least one (1) negative throat specimen culture to *Streptococcus pyogenes* infection; or
3. Employee is otherwise determined by a health practitioner to be free of a *Streptococcus pyogenes* infection;

J. For an employee of the dealer that was excluded because of an unprotected infected wound, cut, or pustular boil, restriction may be removed when the infected wound, cut, or pustular boil is properly covered with one (1) of the following:

1. A dry, durable, tight-fitting, impermeable bandage and a single-use glove is worn over the impermeable cover on the hand, finger or wrist;
2. A dry, durable, tight-fitting, impermeable bandage is worn over the wound on the arm; or
3. A dry, durable, tight-fitting, impermeable bandage is worn over the wound on other parts of the body.

K. For an employee of the dealer that was excluded because of exposure to a known foodborne pathogen, restriction may be removed as follows:

1. If exposed to Norovirus, one (1) of the following conditions is met:
    a. More than twenty-four (24) hours have passed since the last day the employee was potentially exposed, or
    b. More than twenty-four (24) hours have passed since the employee's household contact became asymptomatic.
2. If exposed to *Shigella* spp., or Enterohemorrhagic or Shiga Toxin-producing *Escherichia coli*, one (1) of the following conditions are met:
    a. More than three (3) calendar days have passed since the last day the employee was potentially exposed, or
    b. More than three (3) calendar days have passed since the employee's household contact became asymptomatic;
3. If exposed to *S. typhi*, one (1) of the following conditions are met:
    a. More than fourteen (14) calendar days have passed since the last day the employee was potentially exposed, or
    b. More than fourteen (14) calendar days have passed since the employee's household contact became asymptomatic;
4. If exposed to hepatitis A virus, one (1) of the following conditions are met:
    a. More than thirty (30) calendar days have passed since the last day the employee was potentially exposed, or
    b. More than thirty (30) calendar days have passed since the employee's household contact became jaundiced.

.07 Time and Temperature Controls

Introduction

NSSP Guide for the Control of Molluscan Shellfish Guidance Documents provide the public health principles supporting major components of the NSSP, its Model Ordinance, and summaries of the requirements for that component. NSSP Model Ordinance requirements apply only to interstate commerce although most States apply the requirements intrastate. All requirements of the Program can be found in the current edition of the NSSP Model Ordinance.

A goal of the NSSP is to control the safety of molluscan shellfish for human consumption by preventing unnecessary growth of bacterial pathogens resulting from improper or ineffective cooling or from time to temperature abuse.

Chapter II Risk Assessment and Risk Management

Authorities must conduct Risk Assessments to determine the appropriateness of developing *V.v)* or *Vibrio parahaemolyticus (V.p.)* Control Plans.

The Authority in conjunction with the FDA will determine whether the State will implement a *V.v.* plan, a *V.p.* plan, or the control option for all other harvested shellstock (see Table 1). In developing *V.v.* and *V.p.* Control Plans the Authority must conduct *V.v.* and *V.p.* risk evaluations. The specific requirements of these evaluations are detailed in Chapter II. @.06 and Chapter II. @.07.

Chapter VIII Harvesters Time to Temperature Control

There are several pathogens that can cause illness from consumption of molluscan shellfish. Not all known pathogens associated with shellfish reproduce in the shellfish. However there are several pathogens that multiply in shellfish and present a health concern. Most *Vibrio* spp. grow in shellfish and the rate of growth is dependent upon temperature. To minimize illness, the NSSP includes controls to limit exposure to warm temperatures. The controls begin at harvest and are applied at every level of processing and handling. This guidance document provides an explanation of those controls.

A. Authority Responsibilities.

Authorities must establish time to temperature controls for harvesters. The Authority in conjunction with the FDA will determine whether the State will implement a *V.v.* Plan (Chapter II. @.06), a *V.p.* Plan (Chapter II. @.07), or the control option of Chapter VIII. @.02 A. (3). In developing *V.v.* and *V.p.* Control Plans the Authority must conduct *V.v.* and *V.p.* risk evaluations. The specific requirements of these evaluations are detailed in Chapter II. @.06 and Chapter II. @.07. The Authority will advise the industry of the applicable harvest controls. The water and air temperatures used to establish these controls shall be representative of the temperatures of growing areas of the State from which harvesting is occurring.

B. Harvesters.

Harvesters must be aware of the applicable time to temperature requirements. Harvesters can obtain this information by contacting the Authority responsible for regulating shellfish harvesting. Harvesters must adhere to the time to temperature requirements of the individual State Vibrio Plans or follow the matrix below.

Action Level	**Average Monthly Maximum Air Temperature**	**Maximum Hours from Exposure to Receipt at the**
Level 1	<50 °F (10 °C)	36 hours
Level 2	50 - 60 °F (10 - 15 °C)	24 hours
Level 3 **Level 4**	>60 - 80 °F (15 - 27 °C) >80 °F (>27 °C)	18 hours 12 hours

The harvest controls and *V.v.* and *V.p.* State Control Plans and the matrix above apply only to the harvester or harvester/dealer of shellstock for the purposes of handling and delivery of shellstock to the original dealer.

The harvester must provide harvest records to the original shellfish dealer demonstrating compliance with the applicable time and temperature requirements. This record may be in the form of a harvester tag, trip record, or other record deemed appropriate by the Authority. The record must include the date and time harvest begins for each lot of shellfish harvested. For States that establish and limit harvest times the recording of the time harvest begins may not be necessary. The time harvest begins is the time when the first shellstock in a lot is taken from the water or, in the case of intertidal harvest, the time of first exposure. Should the harvesting technique used involve re-submerging, the Authority must approve the harvesting technique to assure that the harvest method does not promote post-harvest growth of pathogens associated with shellfish. The Authority shall not allow re-submerging techniques that promote Vibrio growth. It is expected that some harvest vessels will be equipped with refrigeration capabilities to accommodate large volume harvesting. Where

cooling occurs on a harvest vessel, or prior to delivery to the original dealer, the harvester must provide documentation to the original dealer that the time and temperature requirements established by the Authority have been met.

To comply with the time to temperature requirements for harvested shellstock (Chapter VIII. @.02 A (1), (2), and (3)), the type of cooling must be capable of achieving the required internal temperature within the time frames required in the State Vibrio Control Plans or 50 °F (10 °C) prior to shipment (see shellstock storage critical control point Chapter XIII. .01 B. (3) and (4)). The use of temporary or inadequate cooling is not acceptable. Cooling that occurs prior to receipt by the original dealer does not alleviate the dealer requirement to document the time to internal temperature requirements.

To comply with the time to temperature requirements for shellstock intended for Wet Storage, Depuration, PHP, or "For Shucking Only by a Certified Dealer", the dealer must comply with one (1) of the options below:

Option 1
The dealer must shuck or introduce into Wet Storage or Depuration, within the applicable time to temperature controls of Chapter VIII. @.02 A. (3) and Chapter XIII. .03; or

Option 2
The dealer must place the shellstock in temperature control within the applicable time to temperature controls of Chapter VIII. @.02 A. (3) and Chapter XIII. .03.

Ocean Quahogs (*Arctica islandia*) and Surf Clams (*Spisula solidissima*) are excluded from the time to temperature controls of State Vibrio Control Plans or the matrix outlined in Chapter VIII. @.02 A. (1) (2) and (3). This exclusion applies only when these products are intended for thermal processing. Authorities may exclude other species when intended for thermal processing.

In harvesting situations which expose shellstock to direct sunlight that increases product temperature, the Authority must consider the appropriateness of shading in the development of *V.v.* and *V.p.* Control Plans and may require shading when implementing controls for all other shellstock harvesting.

Chapter IX

Conveyances Used to Transport Shellstock to the Original Dealer.

Conveyances used to transport shellstock from the harvest area to the original dealer shall be constructed to prevent contamination, deterioration, or decomposition of the shellstock during transport.

For shellstock being delivered within the time to temperature controls of Chapter VIII. @.02 A. (1) (2) and (3), refrigeration of the conveyance is not required. However, shellstock transport must comply with Chapter IX. .01 C. and may not be shipped in a manner which would cause the temperature of the shellstock to increase. Persons responsible for transporting shellstock must take reasonable steps to assure that the shellstock temperature is not increased unnecessarily as a result of the method of transport. An example would be a closed-in truck with a high internal temperature

caused by very warm ambient temperature or exposed to direct sunlight for a long period of time while closed. The Authority shall monitor this activity to assure compliance. When temperature control is necessary during transport to the original dealer to comply with the Authority established time to temperature controls, the shellstock must be cooled with ice or mechanical refrigeration. This cooling must be capable of achieving the required internal temperature of 55 °F (12.7 °C) for shellstock harvested under State *V.v.* Plans or 50 °F (10 °C) for all other shellstock.

Should compliance with internal temperatures involve refrigeration on board the vehicle or in the transportation conveyance prior to reaching the original dealer, shellstock must be cooled as necessary to comply with the internal temperature of 55 °F (12.7 °C) for shellstock harvested under State *V.v.* Plans or 50 °F (10 °C) for all other shellstock. Refrigeration units must be pre-chilled to 45 °F (7.2 °C) and the refrigeration unit must be maintained at a temperature to ensure that the shellstock temperature is not allowed to increase. Ice can also be used to cool shellstock. Any ice on-site at a certified dealer shall be from potable water in a commercial ice machine or come from a source certified by the Authority or the appropriate regulatory Authority. Once cooling of the shellstock begins, that cooling must be continued using an acceptable cooling method.

Conveyances Used to Transport Shellstock from Dealer to Dealer (Common Carriers or Shipping Dealers Conveyance).

Shellstock being transported from dealer to dealer must be shipped in containers which can be easily cleaned and maintained to prevent contamination. Shellstock must be shipped on pallets when shipped in bulk. Pallets are not necessary if the conveyance has channeled flooring.

If shellstock is shipped with other cargo, the shellstock must be protected from contamination by the other cargo. Shellstock must be refrigerated or cooled at all times when shipping from dealer to dealer. Conveyances must be pre-chilled to 45 °F (7.2 °C) or below prior to loading. It is acceptable to use ice as a means of cooling. The dealer shall keep a record of compliance with the pre-chilling requirement; this record is not intended to be a HACCP record for the shipping dealer.

All shipments of shellstock shall be accompanied with a documentation record indicating the time of shipment and that all shipping containers were pre-chilled. The documentation required in Chapter IX. .05 must include the time of shipment, the means of cooling, and indicate the temperature to which the conveyance was pre-chilled if mechanical refrigeration was the means of cooling (This documentation is not intended to be a HACCP record for the shipping dealer). In situations when the dealer chooses to ship product not harvested under a State Vibrio Plan that has not achieved the internal temperature of 50 °F (10 °C), the shipping documentation must provide notice to the receiving dealer that the product was shipped prior to achieving an internal temperature of 50 °F (10 °C). Additionally, the shipment shall be accompanied with a time/temperature recording device indicating continuing cooling. Shipments of four (4) hours or less will not be required to have a time/temperature recording device. The documentation stating the time of shipment will accompany the bill of lading and will be used by the receiving dealer to determine the length of shipment.

This control will allow product to be shipped while cooling is occurring. Should the receiving dealer choose not to further ship the shellstock with a time/temperature recording device, the dealer must cool and document that the product has reached an internal temperature of 50 °F (10 °C) prior to reshipping.

Conveyances Used to Transport Shellstock that are Owned by the Receiving Dealer.

Shellstock being picked up by the receiving dealer's truck and delivered directly to the receiving dealer's facility must be shipped in containers which can be easily cleaned and maintained to prevent contamination. Shellstock must be shipped on pallets when shipped in bulk. Pallets are not necessary if the conveyance has channeled flooring.

If shellstock is shipped with other cargo, the shellstock must be protected from contamination by the other cargo. Shellstock must be refrigerated or cooled at all times when shipping from dealer to dealer. Conveyances must be pre-chilled to 45 °F (7.2 °C) or below prior to loading. It is acceptable to use ice as a means of cooling.

The dealer shall keep a record of compliance with the pre-chilling requirement (see dealer to dealer shipping section above) or document the time the shipment was received from the selling dealers facility and the ambient air temperature of the shipping container; this record is not intended to be a HACCP record for the shipping dealer. The ambient air temperature of the conveyance must be to 45 °F (7.2 °C) or below prior to loading and time of receipt is a receiving HACCP record for the receiving dealer.

Additionally, the shipment shall be accompanied with a time/temperature recording device indicating continuing cooling. Shipments of four (4) hours or less will not be required to have a time/temperature recording device. The documentation stating the time of shipment will accompany the bill of lading and will be used by the receiving dealer to determine the length of shipment.

This control will allow product to be shipped while cooling is occurring. Should the receiving dealer choose not to further ship the shellstock with a time/temperature recording device, the dealer must cool and document that the product has reached an internal temperature of 50 °F (10 °C) prior to reshipping.

Conveyances Used to Transport Shellstock Directly to Retail.

Dealers shipping shellstock directly to retail should comply with State laws governing retail foods. In many cases these laws require the shellstock to be at an internal temperature of 45 °F (7.2 °C) or less at receipt. A dealer could be in compliance with the shipping and documentation requirements of Chapter IX. .04 and .05 and the shellstock fail to meet retail food requirements.

The documentation requirements of Chapter IX. .05 are to provide receiving dealers with information necessary to meet the receiving critical limit requirements included in Chapters XI., XII., XIII., XIV., and XV. Receiving requirements for retailer and food service operators are outlined in the USFDA Food Code and State Retail Food regulations and the information included in the documentation required in Chapter IX. .05 is not necessary for retailers and food services operators to comply with the receiving requirements for retail food. Therefore, the documentation requirement in Chapter IX. .05 does not apply for shipments to retailers and food service operators.

Chapter XI Shucking and Packing Dealer Requirements

Shellstock Received from Harvesters

Dealers receiving shellstock from a harvester must only accept shellstock that is accompanied by documentation from the harvester indicating the time of harvest. The original dealer must document and maintain a record that cooling of the shellstock began at a time that was compliant with the time to temperature requirements of Chapter VIII. @.02 A. (1), (2), or (3). Shellstock intended for shucking must include the same harvester documentation as shellstock intended for raw consumption. The documentation may be in the form of a harvester tag which includes date and time of harvest or a trip record, or other form that meets the requirements of the Authority.

Although a record is not required of the shipment temperature from the harvester, dealers should make sure that the means of transport to the dealer does not allow unreasonable temperature increases.

The dealer must document and maintain a HACCP record that the shellstock received from harvesters are either shucked or placed in a refrigeration unit at or below 45 °F (7.2 °C) within the time to temperature requirements of Chapter VIII. @.02 A. (1), (2), and (3) and Chapter XIII .03.

Storage Requirements

All shellstock obtained from a licensed harvester shall be placed in a storage area maintained at 45 °F (7.2 °C) or less within two (2) hours of receipt. This two (2) hour requirement does not allow the dealer to exceed the time to temperature requirements of Chapter VIII. @.02 A. (1) or (2) as outlined in State Vibrio Control Plans.

In cases when shellstock that is harvested in compliance with State *V.v.* or *V.p.* Plans does not reach the dealer within the time periods outlined in the State Vibrio Plans, the dealer may elect as a corrective action to convert the shellstock to a restricted use such as PHP or "For Shucking Only by a Certified Dealer". Should the dealer choose this option the dealer must adhere to the time to temperature requirements of Chapter VIII. @ .02 A. (3).

<u>Shellstock Received from Another Certified Dealer</u>

Dealers receiving shellstock from another certified dealer for shucking and packing must document and maintain a record that the shellstock was received iced; in a conveyance at or below 45 °F (7.2
°C); or at an internal temperature of 50 °F (10 °C) or less. Dealers receiving shellstock from another certified dealer must also document and maintain a record that the shipment was accompanied by documentation indicating (1) time of shipment; (2) that conveyance was pre-chilled; and (3) notice of shellstock that was shipped prior to meeting required internal temperature and notice of a time/temperature device indicating that continuous cooling has occurred.

When a dealer receives shellstock that was harvested in compliance with Chapter VIII. @ .02 A. (3) not cooled to an internal temperature of 50 °F (10 °C) prior to shipment the receiving dealer must review the data of the time/temperature recording device and document in a record that continuing cooling has occurred since the time of shipment, as required in Chapter XI. .05 (Indicate in a record the presence of a time/temperature recording device). For shipments that have multiple deliveries, it is acceptable for each delivery to have an individual time/temperature recording

device or be shipped with a single time/temperature recording device that each receiving dealer can use for documentation. Note that allowances for routine refrigeration defrost cycles and other short duration temperature fluctuations may be necessary. If the shipment is less than four (4) hours, a time temperature recording device is not required.

Storage Requirements

Shellstock that has been refrigerated must not be allowed to remain without ice, mechanical refrigeration or other approved methods of refrigeration, as required in Model Ordinance Chapter XI. .01 B. (1) or B. (2) for more than two (2) hours at points of processing or transfer such as loading docks.

Once shellstock has been shucked by the dealer, the dealer shall comply with the processing and storage Critical Control Points of Chapter XI. .01 D. and E.

All shucked shellfish shall be maintained and shipped at or below 45 °F (7.2 °C).

Chapter XIII Shellstock Shipping Dealer Requirements

Shellstock Received from Harvesters

Dealers receiving shellstock from a harvester must only accept shellstock that is accompanied by documentation from the harvester indicating the time of harvest. The original dealer must document and maintain a record that cooling of the shellstock began at a time compliant with the time to temperature requirements of Chapter VIII. @.02 A. (1), (2), and (3). Shellstock intended for further processing must include the same harvester documentation as shellstock intended for raw consumption. The documentation may be in the form of a harvester tag which includes date and time of harvest or a trip record or other form that meets the requirements of the Authority.

Although a record is not required of the shipment temperature from the harvester, dealers should make sure that the means of transport to the dealer does not allow unreasonable temperature increases.

The dealer must document and maintain a HACCP record that the shellstock was shucked, iced, or placed in a refrigeration unit at or below 45 °F (7.2 °C) within the time to temperature requirements of Chapter VIII. @.02 A. (1), (2), and (3).

Storage Requirements

All shellstock obtained from a licensed harvester shall be placed in a storage area maintained at 45 °F (7.2 °C) or less within two (2) hours of receipt. This two (2) hour requirement does not allow the dealer to exceed the time to temperature requirements of Chapter VIII. @.02 A. (1) or (2) as outlined in State Vibrio Control Plans.

Shellstock received from harvesters that harvested shellstock in compliance with the State *V.v.* Control Plan as outlined in Chapter VIII. @.02 A. (1) must be placed in refrigeration within the times outlined in the State *V.v.* Control Plan and cooled by the original shipper to 55 °F (12.7 °C) within the time period outlined in the State *V.v.* Control Plan (see Chapter XIII. .01 B. (3)), unless the shellstock is labeled for a restricted use. The original dealer must document that the internal temperatures listed above were achieved within the time frame outlined in the State *V.v.*

Control Plan.

Shellstock received from harvesters that harvested shellstock in compliance with the State *V.p.* Control Plan as outlined in Chapter VIII. @.02 A. (2) must be cooled by the original shipper to 50 °F (10 °C) (see Chapter XIII. .01 B. (3)), unless the shellstock is labeled for a restricted use. The original dealer must document that the internal temperatures listed above were achieved within the time frame outlined in the State *V.v.* Control Plan. Shellstock cooled to an internal temperature of 55 °F (12.7 °C) to comply with a *V.v.* Control Plan is considered in compliance with this requirement. It is assumed that refrigeration capable of achieving an internal temperature of 55 °F (12.7 °C) within six (6) hours would also achieve an internal temperature of 50 °F (10 °C) within ten (10) hours.

Shellstock received from harvesters that harvested shellstock in compliance with the time to temperature control matrix outlined in Chapter VIII. @.02 A. (3) and restricted use shellstock must be cooled to an internal temperature of 50 °F (10 °C) prior to shipment (see Chapter XIII. .01 B. (4)). (Product intended for relay, wet storage, depuration, or *Mercenaria* spp. which is being cooled utilizing an Authority approved tempering plan are exempt from the requirement listed in Chapter XIII. .01 B. (4).) The original dealer must document that the internal temperatures listed above have been achieved prior to shipment.

In cases when shellstock that is harvested in compliance with State *V.v.* or *V.p.* Plans does not reach the dealer within the time periods outlined in the State Vibrio Plans, the dealer may elect as a corrective action to convert the shellstock to a restricted use such as PHP or "For Shucking Only by a Certified Dealer". Should the dealer choose this option the dealer must adhere to internal temperature requirements of Chapter XIII .01 B. (4).

Where cooling occurs on a harvest vessel, or prior to delivery to the original dealer, the harvester must provide documentation to the original dealer that the time and temperature requirements the Authority and outlined in the State Vibrio Control Plan have been met. The information must be included in the dealer's HACCP records.

Shipping Requirements

All shipments of shellstock must be accompanied by documentation that indicates (1) time of shipment; (2) that conveyance was pre-chilled; and (3) notice of any shellstock that was shipped prior to meeting required internal temperature and notice of a time/temperature recording device indicating that continuing cooling has occurred.

Prior to shipping shellstock received from harvesters the dealer must comply with the internal temperature requirements of Chapter XIII. .01 B. (3) and (4).

Should the original dealer choose to ship shellstock which was harvested in compliance with the time to temperature control matrix outlined in Chapter VIII. @.02 A. (3) but has not been cooled to an internal temperature of 50 °F (10 °C), the dealer shall include a time/temperature recording device indicating that continuing cooling has occurred. Shipments of four (4) hours or less will not be required to have a time/temperature device or comply with Chapter XIII. .01 A. (2) (c) (d) or (e). Shipments of four (4) hours or less must have documentation as required in Chapter XIII. .01 A. (2) (b). **[C]**

Note that allowances for routine refrigeration defrost cycles and other short duration temperature

fluctuations may be necessary.

Shellstock Received from Another Certified Dealer

Dealers receiving shellstock from another certified dealer for shipping and repacking must document and maintain a record that the shellstock was received iced; in a conveyance at or below 45 °F (7.2 °C); or at an internal temperature of 50 °F (10 °C) or less. Dealers receiving shellstock from another certified dealer must also document and maintain a record that the shipment was accompanied by documentation indicating (1) time of shipment; (2) that conveyance was pre-chilled; and (3) notice of any shellstock that was shipped prior to meeting required internal temperature and notice of a time/temperature device indicating that continuous cooling has occurred.

When a dealer receives shellstock that was not cooled to an internal temperature of 50 °F (10 °C) prior to shipment the receiving dealer must review the data of the time/temperature recording device and document in a record that continuing cooling has occurred since the time of shipment, as required in Chapter XI. .05. Additionally the dealer must indicate in a record the presence of a time/temperature recording device. For shipments that have multiple deliveries, it is acceptable for each delivery to have an individual time/temperature recording device or be shipped with a single time/temperature recording device that each receiving dealer can use for documentation. Note that allowances for routine refrigeration defrost cycles and other short duration temperature fluctuations may be necessary. If the shipment is less than four (4) hours, a time temperature recording device is not required.

Shellstock acceptability (receiving Critical Control Points) can be determined as follows:

1. The presence of enough ice on the shellfish to provide cooling to achieve required internal temperatures; or
2. An ambient temperature of 45 °F (7.2 °C) or less in the conveyance as measured by a thermometer; or
3. An internal temperature of 50 °F (10 °C) which can be measured by opening the shellstock and measuring the meat or using a temperature indicating gun which measures product temperature; or
4. The shipment of shellfish is accompanied by documentation that indicates (1) time of shipment; (2) that conveyance was pre-chilled; and (3) notice of any shellstock that was shipped prior to meeting internal temperature required and notice of the presence of a time/temperature device indicating that continuous cooling has occurred.
5. For shellstock which was shipped prior to achieving an internal temperature of 50 °F (10 °C) the dealer must review the data of the time/temperature recording device and document in a record that continuing cooling has occurred since the time of shipment, as required in Chapter XI. .05. The dealer must indicate in a record the presence of a time/temperature recording device. For shipments that have multiple deliveries, it is acceptable for each delivery to have an individual time/temperature recording device or be shipped with a single time/temperature recording device that each receiving dealer can use for documentation.

Storage Requirements for Dealers Receiving Shellstock from another Certified Dealer

All shellstock that has been refrigerated must not be allowed to remain without ice, mechanical refrigeration, or other approved methods of refrigeration, as required in Model Ordinance Chapter XI. .01 B. (1) or B. (2) for more than two (2) hours at points of processing or transfer such as

loading docks. All shucked shellfish shall be maintained and shipped at or below 45 °F (7.2 °C).

Shipping Requirements for Dealers Receiving Shellstock from another Certified Dealer

All shipments of shellstock must be accompanied by documentation that indicates (1) time of shipment; (2) that conveyance was pre-chilled; and (3) notice of shellstock that was shipped prior to meeting required internal temperature and notice of a time/temperature device indicating that continuous cooling has occurred.

Should the original dealer choose to ship shellstock which was received with documentation indicating that the product was not cooled to an internal temperature of 50 °F (10 °C) prior to shipment, the dealer must adhere to one (1) of the following:

1. Include documentation indicating that the shellstock that was shipped prior to meeting required internal temperature and notice of a time/temperature device indicating that continuing cooling has occurred. The shipment must be accompanied with a time/temperature recording device indicating continuing cooling. Shipments of four (4) hours or less will not be required to have a time/temperature device or comply with Chapter XIII. .01 A. (2) (c), (d), or (e). Shipments of four (4) hours or less must have documentation as required in Chapter XIII. .01 A. (2) (b). **[C]**
2. Should a dealer receive shellstock from a dealer who has elected to ship the shellstock prior to achieving required internal temperatures the dealer may choose to cool the product to an internal temperature of 50 °F (10 °C) or less prior to shipment. In this case a time temperature device will not be required. The dealer must document in a HACCP record that the internal temperature of 50 °F (10 °C) was met prior to shipment.

Chapter XIV Reshipping

Shellstock Received from Another Certified Dealer

Dealers receiving shellstock from another certified dealer for reshipping must document and maintain a record that the shellstock was received iced; in a conveyance at or below 45 °F (7.2°C); or at an internal temperature of 50 °F (10 °C) or less. Dealers receiving shellstock from another certified dealer must also document and maintain a record that the shipment was accompanied by documentation indicating (1) time of shipment; (2) that conveyance was pre-chilled; and (3) notice of shellstock that was shipped prior to meeting required internal temperature and notice of a time/temperature device indicating that continuous cooling has occurred.

Should the shipping dealer have chosen to ship product harvested under the time temperature requirements of Chapter VIII. @.02 A. (3) or restricted use shellstock prior to achieving required internal temperatures, the shellstock must be accompanied by a time/temperature recording device which indicates that continuing cooling has occurred. The shipment must also be accompanied by a shipping document indicating the time of shipment and that all shipping containers were prechilled. Shellstock acceptability (receiving Critical Control Points) can be determined as follows:

1. The presence of enough ice to contact the shellfish and provide cooling to achieve required internal temperatures; or
2. An ambient temperature of 45 °F (7.2 °C) or less in the conveyance as measured by a thermometer; or
3. An internal temperature of 50 °F (10 °C) which can be measured by opening the shellstock and measuring the meat or using a temperature indicating gun which measures product

temperature; or

4. The shipment of shellfish is accompanied by documentation that indicates (1) time of shipment; (2) that conveyance was pre-chilled; and (3) notice of shellstock that was shipped prior to meeting internal temperature required and notice of the presence of a time/temperature device indicating that continuous cooling has occurred.
5. For shellstock which was shipped prior to achieving an internal temperature of 50 °F (10 °C) the dealer must review the data of the time/temperature recording device and document in a record that continuing cooling has occurred since the time of shipment, as required in Chapter
   XI. .05. The dealer must indicate in a record the presence of a time/temperature recording device. For shipments that have multiple deliveries, it is acceptable for each delivery to have an individual time/temperature recording device or be shipped with a single time/temperature recording device that each receiving dealer can use for documentation.

Storage Requirements for Dealers Receiving Shellstock from another Certified Dealer

All shellstock that has been refrigerated must not be allowed to remain without ice, mechanical refrigeration or other approved methods of refrigeration, as required in Model Ordinance Chapter XI. .01 B (1) or B (2) for more than two (2) hours at points of processing or transfer such as loading docks. All shucked shellfish shall be maintained and shipped at or below 45 °F (7.2 °C).

Shipping Requirements for Dealers Receiving Shellstock from another Certified Dealer

All shipments of shellstock must be accompanied by documentation that indicates (1) time of shipment; (2) that conveyance was pre-chilled; and (3) notice of shellstock that was shipped prior to meeting required internal temperature and notice of a time/temperature device indicating that continuous cooling has occurred.

Should the original dealer choose to ship shellstock which was received with documentation indicating that the product was not cooled to an internal temperature of 50 °F (10 °C) prior to shipment, the dealer must adhere to one (1) of the following:

1. Include documentation indicating that the shellstock that was shipped prior to meeting required internal temperature and notice of a time/temperature device indicating that continuing cooling has occurred. The shipment must be accompanied with a time/temperature recording device indicating continuing cooling. Shipments of four (4) hours or less will not be required to have a time/temperature device or comply with Chapter XIII. .01 A. (2) (c), (d), or (e). Shipments of four (4) hours or less must have documentation as required in Chapter XIII. .01 A. (2) (b). **[C]**
2. Should a dealer receive shellstock from a dealer who has elected to ship the shellstock prior to achieving required internal temperatures the dealer may choose to cool the product to an internal temperature of 50 °F (10 °C) or less prior to shipment. In this case a time temperature device will not be required. The dealer must document in a HACCP record that the internal temperature of 50 °F (10 °C) was met prior to shipment.

Internal Temperature Measurements.

When monitoring the internal temperature of shellstock, it is acceptable to open the shellstock and measure the temperature of the shellfish directly using a thermometer or use a temperature detector device which provides the external temperature of the product. Where possible, but especially in cases in which product appears to be packaged for final sale, methods for determining the internal temperature of the shellstock should not compromise the integrity of the container. Should

circumstances dictate that the measurement of the internal temperature of individual shellfish is necessary then particular care should be taken so as to avoid transferring heat from the equipment used by, and from the hands of the inspector to the shellfish. Individual oysters are typically no more than 0.2 kg in mass and can be warmed relatively quickly through handling by bare hands and when exposed to equipment or environments which are at a higher temperature than the original internal temperature of the animal.

Prying open the shells of shellfish is a time consuming and inherently destructive process (those animals measured must be discarded). The internal temperature of shellstock is, under most circumstances, reflected by the external temperature of the space surrounding the shellfish, or the external temperature of the shell of the animal, at the center of a packaged mass of shellstock (box, sack, bag, etc.). This temperature may be measured by inserting a standard analog or digital thermometer probe into the package to an appropriate depth or by exposing the shellfish at the center of the package for rapid measurement of the external shell temperature such as is made possible with laser guided infrared temperature measurement devices.

Time/Temperature Recording Devices – The time/temperature recording device must allow the receiving dealer to document that continuing cooling has occurred during transport.

Cooler Process Study Guidance

An alternative to monitoring product temperatures would be properly designed cooling process studies that demonstrate that cooling critical limits will be met. The cooling process studies must evaluate cooling times under worst case conditions found in the facility.

Factors including ambient air temperatures, product temperatures at arrival, amount of product to be cooled, arrangement of product in the cooler, and opening of the cooler door must be considered in the study. In conducting the studies, confirmatory product temperatures should be taken at the area of the cooler that is likely to have the least cooling ability. For instance, product temperature should be taken in the middle of a pallet in the most difficult cooling portion of the cooler.

Once a study is completed, the study should detail requirements needed to achieve compliance with the critical limits. Requirements could include such items as cooler capacity or arrangement of product in the cooler. Once identified, the monitoring of the critical limits would include records to document that the requirements identified in the study to meet the critical limit are in place. The written study remains with the HACCP records.

This guidance can be utilized as a guide by the Authority when a certified dealer chooses not to physically monitor the initial temperature storage Critical Control Point (CCP) for each incoming lot of shellstock under the NSSP Model Ordinance as required by State *V.v.* or *V.p.* Control Plans.

The dealer can demonstrate the ability of the cooler to achieve required internal shellstock temperatures through a study that demonstrates that their mechanical refrigeration unit is able to cool shellstock to 50 °F for *V.p.* or 55 °F for *V.v.* within the required maximum time frame. This would enable the firm to monitor the ambient temperature of the refrigeration unit without requiring the firm to take the internal shellstock temperatures at the exact time of ten (10) hours (*V.p.*) or six (6) hours (*V.v.*) for each lot of shellfish on each day of the *V.v.* or *V.p.* Control Plan season. This guidance assumes that the refrigeration unit has a continuous temperature recording device (TRD) or the dealer manually monitors the cooler ambient temperature each day.

1. Determine the parameters of the cooler process study based on expected maximum load during implementation of a *V.v.* or *V.p.* Control Plan. This study can be used to satisfy internal temperature requirements for A. (3) shellstock.
2. Over three (3) days of refrigerated storage, starting with the first day of the *V.v.* or *V.p.* season, record the "internal" shellstock temperature at the time of loading into the cooler.
3. Record the days' maximum air and water temperature in the vicinity of the harvest area.
4. Record the internal shellstock temperatures after six (6) hours of refrigerated storage for *V.v.* and at ten (10) hours of refrigerated storage for *V.p.* and record the results.
5. If the internal shellstock temperatures meet the Model Ordinance requirements for cooling, continue to only monitor the cooler ambient temperatures as you normally would under your HACCP Plan.
6. When the air or water temperatures in the vicinity of the harvest area have increased by 10°F since the initial process study date repeat process study as described in No. 1 through No. 4 above.
7. If results meet the Model Ordinance requirements for cooling continue to only monitor the cooler ambient temperatures as you normally would under your HACCP Plan.
8. When the air or water temperatures in the vicinity of the harvest area have increased by another 10 °F since the initial process study date repeat process study as described in No.1 through No. 4 above.
9. If results meet the Model Ordinance requirements for cooling continue to only monitor the cooler ambient temperatures as you normally would under your HACCP Plan.
10. If following the process studies the cooler has been shown to achieve the required internal shellstock temperature, including at least one (1) three (3)-day period of maximum loading under elevated air and water temperatures, then the study is considered successful and the certified dealer needs only to continue to monitor the routine cooler ambient temps as per their HACCP Plan.

Note: Changes to maximum shellfish loading or cooler capacity or changes to cooler compressor would require additional Re-Validation Process Studies.

NOTE: Please click on the link below to view, print or download the Time/Temperature Decision Trees.

Time/Temperature Decision Trees

.08 Icing, Cold Water Dips and Ice Slurries for Cooling Shellstock

For States implementing a *V.v.* or *V.p.* Control Plan, there exist several options for temperature control to limit post-harvest Vibrio growth. NSSP recognized methods of temperature control include ice, mechanical refrigeration, or other approved means capable of lowering and maintaining the temperature of shellstock at 50 °F (10 °C) or less. The Authority is responsible for approving measures used by industry to control shellstock temperature for the purpose of complying with the State's Vibrio Control Plan. The desired outcome of temperature control is to inhibit bacterial growth after harvest.

In the past, questions have arisen regarding the efficacy and safety of icing as a means of controlling the post-harvest growth of Vibrio species. Icing has long been recognized in the NSSP as an acceptable and effective means of temperature control. The use of ice for temperature control is found throughout the NSSP Model Ordinance (MO). MO Chapter VIII defines temperature control as "*the management of temperature of shellstock by means of* ***ice****, mechanical refrigeration or other approved means necessary to lower and maintain the temperature of the shellstock to comply with Chapters XI, XIII, or XIV*." The use of ice is not a new or novel control measure and has been applied effectively by the industry for many years. Several States have established icing shellstock onboard harvest vessels and at landing as a temperature control measure with documented success. Icing shellstock for the purpose of temperature control under a State's Vibrio Control Plan should be considered an acceptable practice.

In the past, questions have also arisen concerning the safety of chilled water and ice slurry dips as a means for controlling post-harvest growth of Vibrio bacteria. Specifically questioned has been the potential for microbial contamination when oysters are submerged in cold water or ice slurries whereby repeated use of the same cold water or ice slurry could produce a microbial rich environment, consisting not just of Vibrio species but of fecal coliforms and other bacteria as well. Properly maintained, the water temperature of the dip should be sufficiently cold to retard the growth and proliferation of most microorganisms. Maintaining the dip at or below 50 °F (10 °C) will inhibit growth and proliferation of bacteria. To help ensure that cold water and ice slurry dips do not become overloaded with mud, sediment, and debris, in accordance with MO requirements, shellstock are to be washed making them reasonably free of mud, bottom sediments, and other material. Once removed from warm harvest waters and washed, shellstock placed in cold water or ice slurries close their bivalve shells, cease filtering activity, and can remain closed for extended periods. They generally remain closed and inactive throughout the time needed to cool while held in cold water dips and ice slurries, thereby minimizing the potential for the introduction of Vibrio species or other microorganisms during these cooling processes. Additionally, except for naturally occurring bacteria such as Vibrio species, oysters harvested from approved areas should not carry with them, or their sediments, pathogens of public health concern. Furthermore, the use of warm water dips for heat shock, which is typically followed by a cold water dip to rapidly bring shellstock temperature back down, has been a long recognized and accepted NSSP process. The proper use of dips for rapidly cooling shellstock at harvest can be an effective measure to controlling post-harvest growth of Vibrio species and should not introduce other public health risks when practiced safely under the approval of the Authority. For these reasons, the use of cold water baths and ice slurries should be considered acceptable for controlling the post-harvest growth of Vibrio species.

Studies conducted by Texas A&M and the University of Florida Oyster Industry Laboratory have demonstrated that rapid cooling using ice and ice slurries not only prevents the growth of Vibrio bacteria, but can reduce Vibrio levels in Gulf oysters with no significant increase in oyster mortality. Methods varied from ice slurry dips to ice packing followed by cold storage, using both shucked and live product. The study data clearly suggests that icing and ice slurry dips are effective in maintaining and even reducing *V.v.* and *V.p.* levels after harvest. Additional preliminary studies performed by FDA at the Gulf

Coast Research Laboratory in Dauphin Island, Alabama demonstrated no evidence of significant increases in levels of Vibrio species, fecal coliforms and other bacterial indicators resulting from ice slurry use.

To help ensure the safe use of ice and rapid cooling dips, the following should be considered:

(1) Water used to wash shellstock free from mud, sediment and other material should be from a potable water source or from a growing area classified as Approved and open to harvest.
(2) Ice should be made from a potable water source and properly protected from contamination prior to use.
(3) Water used in cold water or ice slurry dips should be from a potable water source or from a growing area classified as Approved and open to harvest.
(4) When icing shellstock, proper drainage should be provided to allow gravimetric removal of melting ice.
(5) When recirculated cold water is used to cool shellstock, water temperature should be monitored to ensure proper cooling and water quality should be monitored to ensure against impairment from sediment and particulate buildup due to extended use, which could result in a microbial or filth hazard.
(6) When cooling shellstock in cold water dips, water should be monitored to ensure proper cooling temperatures are maintained and to ensure against impairment from sediment and particulate buildup due to extended use.
(7) When ice slurries are used to rapidly cool shellstock, water quality should be monitored to ensure against impairment from sediment and particulate buildup due to extended use.

As with all control measures, the State must approve prescribed applications for use. It remains the State's responsibility to ensure the safety and efficacy of approved procedures for temperature control. It follows that before approving any system for temperature control, whether onboard harvest vessels, at landing sites, or in processing plants, prospective systems for cooling should be evaluated by the State. Existing guidelines on the safety and quality of ice and water used for cooling shellstock should suffice to address recent questions. Additionally, consultation with FDA Shellfish Specialists or CFSAN is always available to States needing further guidance.

.09 Irradiation Pre-labeling Guidance

This document provides guidance to primary certified shellfish processors involved in transferring pre-labeled shellfish to be processed at irradiation PHP facilities.

Vibrio spp. are highly sensitive to ionizing radiation. The NSSP recognizes Vibrio reduction processes such as irradiation and provides general requirements for dealers using them. For irradiation the following guidelines provide additional detail:

49. All shellfish irradiation facilities and shellfish processors using an irradiation facility to PHP shellfish must be recognized by their Authority as a certified PHP facility and comply with NSSP Model Ordinance Chapter XVI.

50. Irradiation facilities must utilize a process that has been validated in accordance with the NSSP to achieve a reduction of *V.v.* and/or *V.p.* to less than 30 MPN/g. The process shall not irradiate shellfish to an absorbed dose of greater than 5.5 kGy, as provided by 21 CFR § 179.26. While the size of the container of shellfish does not affect the ability of the process to provide the proper

dose of irradiation to all shellfish in a process batch, once a process has been validated it is essential that all containers be of uniform size with the same number of containers on each pallet. This is also important for purposes of product tracking and control. Each processor wishing to use an irradiation facility that has already been recognized and validated in accordance with the NSSP does not have to revalidate the irradiation process being used. Further, if a NSSP recognized irradiation facility conducts verification sample testing, processors using that facility to PHP shellfish may use those verification sample results to fulfill their NSSP verification requirements.

51. The shellfish processor and the irradiation facility must have implemented a Hazard Analysis Critical Control Point (HACCP) plan approved by the respective Authorities for the PHP process that ensures the target pathogen(s) in shellfish are consistently reduced to levels recognized as safe in the NSSP Model Ordinance.

52. Once the irradiation process is completed containers of irradiated shellfish should be segregated from other shellfish or seafood products.

53. Under 21 CFR § 179.26(c), molluscan shellfish that are irradiated must bear a specific logo and a statement specifying that the shellfish have been treated by irradiation or treated with radiation. However, PHP irradiation facilities that irradiate shellfish may not have the capability to also label the shellfish as irradiated; such facilities can only irradiate the shellfish, not label them. As such, the primary processor may pre-label the pallets of shellfish as irradiated and may also provide a statement detailing Vibrio reduction.

54. For dealers who ship shellfish to an irradiation facility in containers that have been pre-labeled as irradiated with Vibrio reduction information the following guidelines provide additional detail:

    a. A signed agreement should be in place between the irradiation facility and the primary certified shellfish dealer specifying the post office addresses of each party and outlining the specifications needed to ensure that the pre-labeled containers of shellfish do, in fact, undergo the validated irradiation process set forth within the agreement.
    b. Both the primary shellfish dealer and the irradiation facility must each have an implemented HACCP plan to ensure that shellfish pre-labeled as irradiated undergo the validated irradiation process set forth in the agreement.
    c. The agreement should provide for transport of the shellfish in sealed trucks and the transport should be secured with a tamperproof seal at the primary certified dealer and a record should be made of the seal number.
    d. The agreement should also establish that the oyster shellstock is washed, sorted, and placed into pre-labeled containers by the primary certified shellfish dealer.
    e. The agreement should specify how to palletize pre-packaged and pre-labeled oyster containers.
    f. Pallets of oyster containers shall be clearly labeled with the words “TO BE IRRADIATED.”

55. The number of pre-labeled containers should be documented in a HACCP record and in an additional record to be provided to the operator at the irradiation facility. This transport should be limited to pallets of shellfish to be irradiated and no other seafood or shellfish products.

56. When the transport arrives, the irradiation facility operator may remove the seal, record the number of containers, verify the number of containers in the transport matches the record provided by the primary certified dealer and then record the number of containers in the

irradiation facility's HACCP record.

57. The irradiation facility operator shall record all other required HACCP receiving critical limit information in HACCP records.

58. Irradiated shellfish shall be placed in cooler storage or on transports maintained at the appropriate temperature (cooler maintained at 45 degrees and transport pre-chilled to 45 degrees).

59. Irradiated shellfish shall be segregated from other seafood or shellfish products.

60. The irradiation facility shall also have implemented a HACCP plan that includes the critical control points for receiving, the irradiation process, and refrigerated storage.

Chapter IV. Naturally Occurring Pathogens

.01 Vibrio parahaemolyticus (V.p.) Control Plan Guidance

A. Risk Evaluation

The determination of Reasonably Likely to Occur should be conducted as follows:

1. A risk evaluation as described in Proposal 07-202 (with the understanding that ISSC has not adopted nor endorsed the FDA *V.p.* Risk Assessment); or
2. The risk factor decision tree under development by the Vibrio Management Committee (VMC) using the risk factors included in Proposal 07-202; or
3. Other approaches approved by the State Authority that provide at least an equivalent level of protection and reduce the risk so that it no longer constitutes an annual occurrence.

B. *V.p.* Control Plan

1. Triggers

   A plan for an area(s) or a State must include control measures for the month(s) in which:

   a. The total number of *V.p.* illnesses is two (2) or more in a three (3) year period; or
   b. The area was epidemiologically linked to an outbreak within the prior five (5) years and the plan must also apply to the period thirty (30) days prior to the first day of harvest of the outbreak and thirty (30) days after the last day of harvest associated with the outbreak; or
   c. The average water temperatures representative of harvesting conditions exceed 60 °F for States bordering the Pacific Ocean and 81 °F for States bordering the Gulf of Mexico and Atlantic Ocean (New Jersey and south). See exemption in the SSP Model Ordinance Chapter II. @.07 B. 2.; or
   d. The regulatory authority to administer this plan is [To be filled in by the Authority].

2. Control Measures

   a. Post-Harvest Processing (PHP).
   b. Closing the area to oyster harvest.
   c. Restrict oyster harvest to product labeled for shucking by a certified dealer, or other means to allow the hazard to be addressed by further processing. The authority must notify harvesters and dealers of those areas restricted to harvest for shucking by a certified dealer, or other means to allow the hazard to be addressed by further processing or "For PHP Only." Harvesters must include on the tag of all product harvested in these areas the statement for shucking by a certified dealer, or other means to allow the hazard to be addressed by further processing or "For PHP Only." Harvesting controls must be provided by the Authority to ensure that restricted use shellstock is not diverted to retail or food service. Dealers must establish a for shucking by a certified dealer, or other means to allow the hazard to be addressed by further processing or "For PHP Only" labeling Critical Limit as part of their HACCP plan for receiving. A shipping Critical Control Point must include a for shucking by a certified dealer, or other means to allow the hazard to be addressed by further processing or "For PHP Only" labeling requirement. Restricted Use Shellstock is not intended for retail or food service.
   d. Limit time from harvest to refrigeration to no more than five (5) hours or other times based on modeling and sampling in consultation with FDA.

      e. Limit time from harvest to refrigeration such that levels of total *V.p.* after completion of cooling to 60 °F do not increase more than 0.75 log from levels at harvest. Calculations for 0.75 log increase can be based on the table as shown below or based on validation studies. The Authority may use the FDA Risk Assessment to determine the

initial "at harvest" levels.

f. The term refrigeration is storage in a container that is capable of dropping and maintaining ambient air temperature of 45 °F (7.5 °C).

g. Other control measures based on appropriate scientific studies

3. Plan Effectiveness as Demonstrated by:

a. Post-Harvest Processing.
Conduct end product testing consistent with PHP verification protocol as provided in the NSSP Guide for the Control of Molluscan Shellfish. Test results shall demonstrate the level of total *V.p.*in the final product does not exceed the average levels found in the area at times of the year the State had determined *V.p.* illness is not reasonably likely to occur. Data may be shared between States or other entities as may be appropriate considering the characteristics of the harvest area(s), such as temperature, hydrological patterns, etc. In the absence of such State data, use 100/g for the Pacific and 1000/g for the Atlantic/Gulf as provided in the FDA Risk Assessment.
Note: These levels are significantly higher than those allowed in validation/verification to non-detectable. Labeling "for added safety" would not be permitted unless the lower levels were reached.

b. Closing the area to oyster harvest.
Issue a legally binding closure order(s). Conduct Patrol and maintain Patrol records for the area(s) in accordance with the NSSP Model Ordinance requirements.

c. Restrict oyster harvest to product labeled for shucking by a certified dealer, or other means to allow the hazard to be addressed by further processing or "For PHP Only. "The Authority must notify harvesters and dealers of those areas restricted to harvest for shucking by a certified dealer, or other means to allow the hazard to be addressed by further processing or “For PHP Only.” Harvesters must include on the tag of all product harvested in these areas the statement “for shucking by a certified dealer, or other means to allow the hazard to be addressed by further processing” or “For PHP Only”. Harvesting controls must be provided by the Authority to ensure that restricted use shellstock is not diverted to retail or food service. Dealers must establish a for shucking by a certified dealer, or other means to allow the harvest to be addressed by further processing or “For PHP Only” labeling Critical Limit as part of their HACCP Plan for receiving. A shipping Critical Control Point must include for shucking by a certified dealer, or other means to allow the hazard to be addressed by further processing or “For PHP Only” labeling requirement. Restricted Use Shellstock is not intended for retail or food service.

d. Limit time from harvest to refrigeration to no more than five (5) hours or other times based on modeling and sampling in consultation with FDA. Compliance may be documented by State restriction orders, harvester records, dealer records, field records, storage records, harvester education/inspections, records of capable and operating refrigeration.

e. Limit time from harvest to refrigeration such that levels of total *V.p.* after completion of cooling to 60 °F do not increase more than 0.75 log from levels at harvest. Calculations for 0.75 log increase can be based on the table as shown below or based on validation studies. The authority may use the FDA Risk Assessment to determine the initial "at harvest" levels.

f. The term refrigeration is storage in a container that is capable of dropping and maintaining ambient air temperature of 45 °F (7.5 °C).

g. Other control measures based on appropriate scientific studies

4. Plan Modification

5. Cost Benefit Analysis (Optional)

Temperature Specific *Vibrio parahaemolyticus* Growth Rates and Doubling Times for Calculating Cumulative Growth Based on Hourly Temperature Observations

Oyster Temperature (degree F)	Growth Rate (logs/hr)	Doubling Time (hrs)	Oyster Temperature (degree F)	Growth Rate (logs/hr)	Doubling Time (hrs)
50	0.008	35.8			
51	0.011	28.4	76	0.147	2.05
52	0.013	23.1	77	0.156	1.93
53	0.016	19.2	78	0.165	1.83
54	0.019	16.1	79	0.174	1.73
55	0.022	13.8	80	0.183	1.64
56	0.025	11.9	81	0.193	1.56
57	0.029	10.4	82	0.203	1.48
58	0.033	9.14	83	0.213	1.41
59	0.037	8.11	84	0.224	1.34
60	0.042	7.24	85	0.235	1.28
61	0.046	6.50	86	0.246	1.23
62	0.051	5.87	87	0.257	1.17
63	0.056	5.33	88	0.268	1.12
64	0.062	4.86	89	0.280	1.07
65	0.068	4.45	90	0.292	1.03
66	0.074	4.09	91	0.304	0.99
67	0.080	3.77	92	0.317	0.95
68	0.086	3.49	93	0.330	0.91
69	0.093	3.24	94	0.343	0.88
70	0.100	3.01	95	0.356	0.85
71	0.107	2.81	96	0.370	0.81
72	0.115	2.63	97	0.383	0.79
73	0.122	2.46	98	0.397	0.76
74	0.130	2.31	99	0.412	0.73
75	0.139	2.17	100	0.426	0.71

Note: Growth rate (in logs/hr) = (0.01122*Temp – 0.4689)^2

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.02 Post- Harvest Processing (PHP) Validation/Verification Guidance for *Vibrio vulnificus (V.v.)* and *Vibrio parahaemolyticus (V.p.)*

A. Process Validation

Used for the initial validation of a process or when there has been a change to a previous validation process.

1. Data on ten (10) processed samples obtained on each of three (3) processing days (total of thirty (30) samples) are required.

2. All samples used on a processing day must come from the same lot of shellfish and be determined to have an adjusted geometric mean (AGM) MPN of 10,000 per gram or greater as described below for initial load testing.
3. Samples should be distributed throughout the processing day. A sample will consist of a composite of ten (10) to twelve (12) oysters processed at one (1) time.
4. The zero hour level may be achieved through naturally occurring Vibrio levels in shellfish and, where not practical, by time/temperature abuse. (Inoculated pack samples may be used as appropriate.)
5. Analytical methodology to determine Vibrio levels should be the official methods previously endorsed by the ISSC as indicated in Model Ordinance Chapter XVI. Post-Harvest Processing.
6. Microbiological testing for initial levels will be by a 3-tube MPN using appropriate dilutions (10^{-1} to 10^{-6}).
7. Microbiological testing for processed samples will be by a single dilution five-tube MPN, inoculating with either 0.01 g or 0.1 g of shellfish per tube based upon the table below.
8. The numerical value of the endpoint criteria should be less than 30 per gram and achieves a minimum 3.52 log reduction.
9. For the process to be validated, no more than three (3) samples out of thirty (30) may fail. Depending upon the initial load, failure of a single sample is determined according to the table below.

AGM Interval	Grams Per Tube	Positive Tubes Allowed
59,995 or Greater	.01	2
37,174 – 59,994	.01	1
23,449 – 37,173	.1	4
12,785 – 23,448	.1	3
10,000 – 12,784	.1	2

For example, if the AGM equals 50,000, then use the second row because 37,174 ≤50,000 < 59,994. The second row tells to inoculate with .01 grams of the original oyster homogenate in each tube and the test fails if more than one (1) of the five (5) tubes is positive.

B. Equipment Validation

Used to ensure that each new or modified unit of equipment will deliver the validated process. May be accomplished using the following:

1. A physical test of the equipment (e.g., thermal distribution study) that is designed to ensure that, when properly operated, it will consistently deliver the validated process.
2. The process needs to be verified according to section D. before labeling claims can be made.

C. Initial Load Testing

Initial level of Vibrio in shellfish for each lot of shellfish used in validation shall be 10,000 MPN per gram or greater based on the adjusted geometric mean (AGM) of the MPNs/g of four (4) samples where the AGM is given by:

AGM = the geometric mean of the four (4) MPNs/g multiplied by an adjustment factor of 1.3
Note: If four (4) samples from a lot of shellfish with a true density of 100,000 cells per gram are examined by the MPN procedure, the probability of the geometric mean of the MPNs showing 100,000 or greater is about 50%. In an attempt to improve the probability of samples being accepted when the true density is 100,000/g an adjustment factor of 1.3 was selected based upon statistical analysis.

D. Verification

Used to verify that a previously validated process is working properly.

1. Process verification by microbiological testing should be done monthly
2. The monthly sampling shall consist of thirty (30) tubes from a minimum of three (3) samples of ten (10) tubes each with an inoculum of 0.01 grams. Ideally, this would be done on three (3) separate days of production, spread throughout the month, using a ten (10) tube MPN each day. If this is not feasible, the thirty (30) tubes can consist of three (3) samples from three (3) consecutive days or three (3) samples from a given day (from three (3) separate lots if possible)
3. Each sample will consist of ten – twelve (10-12) oysters
4. If more than eleven (11) tubes of the thirty (30) most recent three – ten (3-10) tube samples within any calendar month are positive, then the process fails for that month. In this case, corrective actions as outlined in the Verification Sampling Plan Decision Tree must be taken and verification must be repeated within one (1) week of the analysis indicating verification failure. Labeling claims may not be used during this time.
5. If all ten (10) tubes are positive for any given sample, this is considered a verification failure and corrective actions must be taken immediately regardless of the result of the other samples for that month.
6. If verification fails twice during a twelve (12) month period, revalidation is required and product should not be labeled until revalidation occurs.
7. The dealer in conjunction with the Authority shall annually evaluate the previous twelve (12) months of data and the HACCP plan.
8. The dealer may elect, with Authority concurrence, to conduct quarterly sampling if the previous twelve (12) verification samples pass.

NOTE: Please click on the link below to view, print or download the Verification Sampling Protocol Decision Tree.

Verification Sampling Protocol Decision Tree

.03 Guidance for Demonstrating the Effectiveness of Time to Temperature Reduction Criteria for *Vibrio vulnificus* and *Vibrio parahaemolyticus*

A. Time-to-Temperature Protocol

1. Identify the target time/temperature requirements for the specific cooling system/unit.
2. Demonstrate that each cooling method and unit is capable of meeting the target time/temperature by conducting a process study under worst case conditions for that unit. The following parameters should be considered and utilized in conducting the process study:
    a. maximum load for the cooling unit
    b. initial product temperature (studies have demonstrated that measurement of the external temperature and the internal meat temperatures are comparable and either can be used)
    c. location of hot spot(s)
    d. thermostat setting(s)
    e. cooling methods(s) used
    f. method of loading the cooling unit
3. Include a description of the process; a record of the process study conducted; and monitoring records in a HACCP Plan.

4. The protocol should be applied at the first point of refrigeration.

.04 Method for Validation and Verification of a Two (2) or Three (3) Log Reduction of *Vibrio parahaemolyticus* (*V.p.)* in Oysters

A. VALIDATION

1. Introduction:
   Rapid refrigeration can slow the growth of *V.p.* in recently harvested oysters. An alternative to rapid refrigeration requirements under NSSP is a PHP which requires at least a two (2) log reduction in *V.p.* levels for the Gulf and a three (3) log reduction for the Pacific. This document provides guidance for the validation of a PHP to achieve either the two (2) or three (3) log reduction of *V.p.* density as appropriate.

2. Overview:
   Validation of the PHP to achieve a two (2) or three (3) log reduction in *V.p.* levels is conducted on three (3) harvest lots, with one (1) initial measurement prior to PHP, or "pre- process", and ten (10) measurements after the PHP or "post-process". This process is divided into three (3) basic parts: 1) the pre-process *V.p.* density determination of the lot, 2) determination of tube number and concentration of oyster homogenate aliquoted (inoculum) to obtain post-process *V.p.* density 3) validation and/or verification of the two (2) or three (3) log reduction as prescribed. Samples must be taken from three (3) independent harvest lots to test the efficacy of the PHP process with confidence.

   Although the pre-process sampling protocol requires three (3) dilutions from one (1) sample, post-process sampling protocol requires only a single dilution as indicated for each of the ten (10) samples. These ten (10) samples for each of three (3) lots make a total of thirty (30) samples. The number of positive tubes in each post-processed sample determines whether the sample passes or fails. The PHP is validated if no more than five (5) of the thirty (30) samples collected after processing fail. The PHP must be verified in each month it is performed.

   The method of analysis will be the same MPN method as is utilized in Chapter 9 of the FDA Bacteriological Analytical Manual, 7th Edition, May 2004 revision, used for the regulatory analyses for *V.p.* in shellfish as approved under the NSSP and cited in the NSSP Guide for the Control of Molluscan Shellfish 2009 Section IV. Guidance Document Chapter II. Growing Areas.11 Approved NSSP Laboratory Tests. *Although a* Most Probable Number (MPN) *series will be performed, an MPN/g value will not be attained or used throughout the validation process. Instead, the information used to validate and verify, and the data generated, is based on the statistical analysis of probability.*

3. Initial *V.p.* Density Determination:
   For each pre-process lot, a ten-tube decimal dilution MPN is performed. The tube code obtained establishes initial *V.p.* density on the pre-processed lot to determine how to perform the post-process lot measurements. For confidence in the initial measurement at least three (3) dilutions are necessary. (The amount of the original sample in each dilution is one tenth as much as in the previous dilution. For example, if the lowest dilution has x grams, the next dilution has x/10, then x/100, etc.)

   For a lot to be included in the validation the dilutions selected for the analysis must not result in

all positive or all negative tubes. *It should be noted that in the unlikely event that the pre-processed sample tube code is not listed in the attached table, a problem in the determination of the initial V.p. level likely occurred and that the initial V.p. density of the lot will have to be retested before continuing the validation study.* If unsure of the initial *V.p.* density it may be necessary to use more than three (3) dilutions in the initial analysis. When more than three (3) dilutions are used, the results from only three (3) contiguous dilutions are significant in determination of the outcome. To select the three (3) dilutions to be used, the following guidance is provided. In each example the selected dilutions are underlined in bold.

(a) When more than one (1) of the dilutions used has all ten (10) tubes positive, select the highest dilution (most dilute sample portion) having all ten (10) tubes positive and the two (2) following dilutions (i.e. 10,10,6,0).

(b) When only one (1) of the dilutions used has all ten (10) tubes positive, select that dilution and the two (2) following dilutions (i.e. 10,8,4,0)

(c) When a positive tube or tubes occur in dilutions higher than the three (3) dilutions chosen, add the number of positive tubes in the higher dilutions to the third dilution chosen (i.e. 10,9,3,1 becomes 10,9,4).

(d) When the sum of the tubes in the third dilution would exceed ten (10), select the three (3) highest consecutive dilutions having at least one (1) positive tube among them (i.e. 10,9,9,2).

4. Post PHP Process *V.p.* density determination (see attached table):
The three (3) dilutions so determined form a tube code for the initial density of *V.p.* in the pre-processed samples. This tube code, listed in column one (1) of the attached table in Appendix A. (see *Appendix A: Tube Code Table for Validation and Verification*), determines both the number of tubes used and the amount of inoculum in each of the post- processed samples. Once the tube code from the initial pre-process *V.p.* density measurement is obtained from the first column of the attached table, the number of tubes to be used in each of the ten (10) post-processed samples can be obtained from the same row in the third column. Directly adjacent to column three (3) in this same row, column four (4), indicates the maximum number of tubes allowed to be positive for that sample to pass.

   Column two (2) of the table shows three (3) possible dilutions of the original sample that could have been used in the initial *V.p.* density determination. If these dilutions were used to generate the tube codes in column one (1) of the attached table, then the volume of sample to be inoculated into each of the post-process single dilution MPN tubes for the sample lot is given directly adjacent. Hence the amount to inoculate for *V.p.* density determination of post-process samples is in column five (5) for the Gulf (two (2) log) and column six (6) for the Pacific (three (3) log).

   Since the initial density of *V.p.* may vary considerably, dilutions other than the dilutions given in column two (2) of the table may be used. When this occurs an adjustment must be made in the volume of post-process sample inoculated into each of the single dilution MPN tubes used.

   For example, the dilutions prescribed in column two (2) for tube code 10, 1, 0 are 0.001, 0.0001, 0.00001. If the dilutions used were actually 0.01, 0.001, 0.0001, the amount in column five (5) or six (6) would be multiplied by ten (10). Thus, the nine (9) tube post- process single dilution MPN would have an adjusted sample inoculum of 0.1 gram/mL (0.01 x 10) and must be used for each sample from the lot rather than the 0.01 gram/mL sample inoculum specified in column five (5) of the table to validate the two (2) log reduction. In the same example, to validate the three (3) log reduction, the adjusted sample inoculum of 1.0 gram/mL (0.1 x 10) must be used

for each post-process sample from the lot instead of the 0.1 gram/mL specified in column six (6) of the table.

5. Determining validation of two (2) or three (3) log reduction post PHP process:
Individual post-process samples pass or fail based on the number of positive tubes which result from the single dilution MPN, as found in column four (4) of the table. In the example above for a pre-process sample tube code of 10,1,0 using a nine (9) tube, single dilution MPN for the analysis, column four (4) directly across from the tube code indicates that no more than four (4) of the nine (9) tubes per sample may be positive for the sample to pass. For the three (3) lots to pass and the PHP to be validated for a two (2) or three (3) log reduction in *V. parahaemolyticus* density, no more than five (5) of the thirty (30) individual samples from the three (3) lots tested post-process can fail.

B. VERIFICATION

1. Initial *V.p.* density determination:
In each month that oysters are post-harvest processed, the first lot for processing is selected for testing. The method of testing the lot is similar to the testing for validation. An initial measurement uses ten (10) tubes at three (3) dilution levels. This initial measurement determines the number of tubes, mass of homogenate, and number of allowed turbid growth (positive) tubes used to test the oysters after PHP processing. The table used for validation is also used for the verification process.

   If the initial measurement has all negative (non-turbid)tubes and the mass of inoculum in the least dilute tube contains at least one (1) gram of the oyster homogenate, then the process is considered verified for that month. If the least dilute tube contains less than one (1) gram of homogenate the process should be repeated with one (1) gram of sample. If an all negative result is again obtained the process is considered verified for that month. If growth is observed post-process verification testing must be performed.

2. Post PHP Process *V.p.* density verification:
Post processed verification testing uses the first lot of the month. Three (3) outcomes are possible;
   (a) The process is verified for the month, or
   (b) The process fails verification and the process must be revalidated, or
   (c) Additional testing using a subsequent lot is needed.

   Four (4) parameters determine the verification test and they are outlined in the following table. The first parameter is the number of samples taken from a lot. When the process is validated ten (10) samples are selected from each lot; however, for verification seven (7) samples are to be taken from the lot. The second parameter is the maximum number of growth tubes for the process to be verified with the first lot. The maximum number of samples allowed to be positive for the process to verify is one (1). The third parameter is the minimum number of positive tubes that causes the process to require revalidation, which is three (3).

Table 1. Positive Sample Maximum and Minimum

Number of Samples	First Lot Maximum Positive for Pass	First Lot Minimum Positive for Fail	Second Lot Maximum Positive	Probability of Passing for Non-degenerate Process
7	1	3	1	96%

If the number of positive tubes in the testing of the first lot is two (2), then a second lot is selected. The fourth parameter is the maximum number of positive tubes allowed for verification when the second lot is used. The following table outlines this scenario.

Table 2. Pass/Fail Schematic

Monthly Verification First Lot	Monthly Verification Second Lot
7	7
6	6
5	5
Fail 4	4
3	Fail 3
Second Lot Needed 2	2
1	1
Pass 0	Pass 0

The process has a 96% probability of passing verification as long as it is working optimally; should the process degenerate in efficacy, the probability of passing significantly decreases.

NOTE: Please click on the link below to view, print or download the Tube Code Table for Validation and Verification.

Tube Code Table for Validation and Verification-Appendix A

.05 Template for Submission of Post-Harvest Process Validation Studies

In the NSSP Model Ordinance Chapter XVI. Post-Harvest Processing (PHP) it states that if a dealer elects to utilize a PHP for the purpose of making safety added labeling claims they must conduct a validation study to demonstrate the ability of the PHP to reduce the target pathogen(s) to acceptable levels. Specifics on target levels and approved methods of detection for pathogens are found in the Model Ordinance. All laboratory analysis must be performed by a laboratory that has been evaluated by FDA or an FDA certified LEO and found to "conform" or "provisionally conform" with the requirements of the NSSP Model Ordinance Chapter III. And supporting Guidance Documents. Results of the validation study should be submitted in the following format for review and consideration by State and Federal Shellfish Control Authorities. For validation of *V.v.* or *Vibrio parahaemolyticus* methods, checklist may be used as a guide.

1. Title of PHP Method Validated

2. Summary

3. Objectives (Study Purpose)
    a. Detailed description of the PHP method validated.
    b. Target pathogen(s) and prescribed reduction.

4. Method of Analysis
    a. Post-Harvest Process description.

i. Identify temperatures, weights, or other pertinent information for the PHP method. Methods of mollusk preparation, for example acclimation to temperature or salinity, include all details. All variables that could affect the outcome of the PHP must be detailed.
ii. Identify number of animals used in study and number of trials performed.

b. Laboratory (Pre and post processing pathogen measurement and description of analytical procedure)
   i. Initial pathogen levels and pathogen detection model: microbiological or chemical analysis.
      1. How was initial pathogen load achieved, i.e. naturally occurring population, inoculation or thermal abuse.
      2. Provide adjusted Geometric Mean (AGM) calculations and unit of measure appropriate for target (i.e. MPN/g for Vibrio or coliforms, CFU/100g for ETCP fecals.
      3. Analytical methodology used for pathogen quantification and confirmation. This method must be recognized in the NSSP Guide for the Control of Molluscan Shellfish (Accepted methods listed in Section IV. Guidance Documents Chapter II. 14. Approved NSSP Laboratory Tests: Microbiological and Biotoxin Analytical Methods.)
   ii. Post Process Product Analysis: microbiological or chemical analysis
      1. Quantify pathogen Level(s) in processed product utilizing the same analytical method used to attain initial load.

c. Validation Outcome
   i. Provide specific information regarding outcome measurements. Metric used to validate method (these will vary depending on targeted pathogen and are located in the Model Ordinance). Documentation that process achieved target reduction.

5. Results
   a. Graphs, tables, and charts outlining the validation study results.
      i. Data from validation demonstration; levels achieved in post-process.
      ii. Pathogen measurements (for example: AGM interval, grams per tube and the number of positive tubes as per the Guidance Document for verification/validation).

6. Conclusions
   a. Demonstrate reduction of the target pathogen to NSSP established standards.

7. Appendix
   a. Tables or graphical interpretations of data.

8. Optional Information
   a. If appropriate, include optional items such as interpretation of confounding factors or applicable industry limitations.
   b. Acknowledgements, for example funding sources, technical help, or bibliography.

Checklist for Submission of Post-Harvest Process Validation Studies for *Vibrio vulnificus* and *Vibrio parahaemolyticus*

	Explanation of PHP Method Validated
	1. Method name
	2. Specific information about machinery, equipment, or supplies necessary to perform the method of PHP is provided
	3. Standard operating procedures: Detailed description of the PHP method validated is provided.
	4. What are the specific issues that must be accounted for during processing? For example, is there a limit to number of shellfish, spacing, hold times that are considered part of the process?
	5. Internal quality control measures for equipment calibration, maintenance, repair and for performance checks are explained.
	Objectives to be Accomplished
	1. Does the process reduce the level of *Vibrio vulnificus* and/or *Vibrio parahaemolyticus* in the process to non-detectable (<30MPN/gram) and achieve a minimum 3.52 log reduction?
	2. Was the process validated by demonstrating that the process will reliably achieve the appropriate reduction in the target pathogen(s) in a study as outlined in Guidance Documents Chapter IV, Naturally Occurring Pathogens.
	Method of Analysis
	1. Was laboratory analysis performed by a laboratory that has been evaluated by FDA or an FDA certified LEO and found to "conform" or "provisionally conform" with the requirements of the NSSP Model Ordinance Chapter III and supporting Guidance Documents?
	2. Are all variables that could affect the outcome of the PHP identified: temperatures, weights or other pertinent information?
	Pre Processed Samples to Attain Initial Levels
	1. Microbiological testing for initial levels was done by a 3-tube MPN using appropriate dilutions (10-1 to 10-6).
	2. Was the initial level of Vibrios for each lot of shellfish used in the validation 10,000 MPN per gram or greater based on the adjusted geometric mean (AGM) of the MPNs/g of four (4)
	3. How were the zero hour levels achieved: through naturally occurring Vibrio levels in shellfish, time/temperature abuse, inoculation? (Inoculation is not preferred)
	Enumeration of or Processed Samples
	1. Does a sample consist of a composite of 10 to 12 oysters processed at one time from one day?
	2. Is there data on ten (10) processed samples obtained on each of three (3) processing days (total of 30 samples)?
	3. Microbiological testing for processed samples was done with a single dilution five-tube MPN, inoculating with either 0.01 g or 0.1 g of shellfish.
	4. Are only analytical methods to determine Vibrio levels previously endorsed by the ISSC as indicated in Model Ordinance Chapter XVI. Post-Harvest Processing?
	5. Was microbiological testing for processed samples done with a single dilution five-tube MPN, inoculating with either 0.01 g or 0.1 g of shellfish per tube?
	6. **For the process to be validated, no more than three (3) samples out of 30 may fail**. Failure is based on the Guide for the Control of Molluscan Shellfish 2009 Section IV. Guidance Documents Chapter IV. Naturally Occurring Pathogens .04 Post-Harvest Processing (PHP) Validation/Verification Guidance for *Vibrio vulnificus* and *Vibrio parahaemolyticus.*

.06 Vibrio cholera

Toxigenic non O1/O139 serotypes of *Vibrio cholera* strains including O75 are naturally occurring pathogens and are capable of causing severe cholera-like diarrhea. Typically, these pathogens cause sporadic illnesses or small outbreaks. However, infected individuals shed large numbers of infections cells that can be introduced into a growing area via a pollution event and further elevate risk. Toxigenic *V. cholera* strains are rarely isolated in the environment or shellfish in the United States. *V. cholera* O75 and other toxigenic strains should be considered naturally occurring pathogens unless, during investigation of an illness or illness outbreak, the Shellfish Authority determines evidence of its association with a pollution event or condition.

.07 Production Reporting Guidance

Introduction

The NSSP Model Ordinance Chapter II @.03 B. includes a requirement for the Authority to report production data to the ISSC.

The primary purpose of the requirement is to ensure that the data necessary to conduct *V.v* and *V.p.* risk evaluations is collected by the Authority. Additionally, production trend data would be used by the ISSC in evaluating illness trends. To utilize the data for both of these intended purposes, it is important that the production data be collected and reported timely at appropriate intervals and in metrics that allow the development of national production trends.

Timely Reporting

The Authority should annually report monthly production data no later than March 1 of the subsequent year. The ISSC will compile State information which will be shared with the ISSC Executive Board at the Spring ISSC Executive Board Meeting. The information will also be provided to the ISSC Vibrio Management Committee for use in evaluating illness trends.

Reporting Intervals

The annually reported data will include production totals for each month of the preceding year. The monthly reporting will allow shellfish authorities to conduct risk analysis for the time periods that coincide with the higher risk periods.

Reporting Metrics

The State may use the reporting metric that is most appropriate for conducting the risk analysis that are required in Chapter II @.06 and @.07 and are optional in Chapter II@.02. It is expected that all States will not choose the same metric. Should the Authority choose a metric other than pounds of shellfish meat, the Authority should provide a conversion factor that allows the ISSC to convert the metric into pounds of Shellfish meat. Chapter II @.03 B includes the reporting of utilization type (raw, shucked, PHP, etc.) when available. Authorities are encouraged to provide utilization type. The current risk models assume that at all times of the year, 50% of harvested shellfish are consumed raw. The reporting of utilization type could provide valuable insight into that assumption and could result in more precise Vibrio calculators.

Chapter V. Illness Outbreaks and Recall Guidance

.01 Guidance for Investigating an Illness Outbreak and Conducting Recall

A. Requirements for the Authority.

Shellfish are filter feeders and therefore have the ability to concentrate microorganisms, including human pathogens and toxigenic micro-algae, from the water column if these organisms are present in the growing area. Concentrations in the shellfish may be as much as 100 times that found in the water column. If the microorganisms concentrated are harmful to humans, and if, in the case of human pathogens, the shellfish are consumed raw or partially cooked, human disease can result. Shellfish can also be contaminated during transport and post- harvest processing; i.e. wet storage, etc. Shellfish can be mishandled during processing which can contribute to the growth of existing microorganisms to the point where consumption can cause illness.

Documentation of the information supporting growing area classification, proper tagging and record keeping, expeditious follow-up on reported illnesses, effective recall of implicated product and public warning announcements are all requisite to protecting public health. Shellfish growing areas implicated through epidemiological association between illness and shellfish consumption must be closed immediately to prevent additional implicated product from reaching the consumer. In addition, shellfish product from the implicated growing areas may be detained and an effective recall of product initiated if the investigation determines that it is necessary to protect public health.

When an illness outbreak investigation indicates that there is an epidemiological association between shellfish consumption and the illnesses, the investigating Authority shall immediately inform the producing Authority of the illnesses, the stage of the investigation, and epidemiological link to consumption of molluscan shellfish. Prompt reporting, even in the initial stages of an investigation, will allow the producing Authority to conduct its investigation (in accordance with Chapter II. @.01 B.) and determine whether harvest area closure, notification, and recall are required.

When an illness outbreak has occurred, immediate closure of the implicated growing area(s) will significantly reduce the chance of additional illnesses during the investigatory process. Immediate closure for the purposes of this Guidance Document means within twenty-four (24) hours of notification of the illness (NSSP Model Ordinance Chapter IV. @.03 A. (1)). If a preliminary investigation reveals that the growing area is not implicated, an immediate closure is not necessary. Additional information concerning investigation of an outbreak of shellfish related illness believed to be associated with a naturally occurring pathogen can be found in the NSSP Guidance Documents: *Guidance for a Time-Temperature Evaluation of a Shellfish Implicated Outbreak* (ISSC/FDA, 2017). Additional information concerning the disease causing potential of shellfish can be found in the NSSP Guidance Documents: *Sanitary Survey and the Classification of Growing Waters, Guidance for Developing Marine Biotoxin Contingency Plans*, and *Shellstock Relay* (ISSC/FDA, 2017).

The Authority should assign an Illness Investigation/Recall Coordination Lead (the Lead) for the agency to be listed on the ISSC website as the agency contact person. The Lead will be the agency contact for the duration of the event.

During and after the immediate closure, the Authority must be in the process of investigating, evaluating and conducting increased surveillance. Immediate closures will not always result in an immediate recall

of product. It is imperative that the Authority communicate with State Epidemiologists, local health officials, pertinent State agencies, industry and others as necessary to complete a thorough investigation.

Additionally, immediate closures may not be necessary if the investigation reveals that the illness outbreak was caused by a specific activity by a single entity which can be controlled through a product recall and an immediate corrective action in the processing or transport of product.

An illness outbreak investigation must include an evaluation of the health hazard presented and consideration of the following factors, including but not limited to:

1. Immediately send staff members out to perform growing area reconnaissance.
2. Review documentation of the information supporting growing area classification, review environmental sample trends, secure additional shellstock and/or water samples if necessary.
3. Review toxin sample trends, sampling protocol and supporting information for biotoxin closures, secure additional shellstock and/or water samples if necessary.
4. Interview local sources regarding any anecdotal or factual information on the origin of contaminants (large passenger vessels, point and non-point sources).
5. Immediately send staff members out to interview certified dealer(s), restaurant staff members or retail establishment staff members to secure additional details regarding tagging, record keeping, refrigeration temperatures, handling practices, shipping and receiving information and where and from whom the shellfish products were purchased, name and telephone number of contact person.
6. When possible, interview harvesters in the area of concern to determine handling practices and specific harvest area(s).
7. Determine the identity of the product involved, the extent of distribution of implicated product, total amount of the suspected product, total amount in distribution chain, distribution information and proposed recall strategy.

A product recall may not be appropriate when an illness outbreak investigation reveals the following, including but not limited to:

1. When the etiological and epidemiological evidence confirms that shellfish from a specific growing area or lease area are the cause of the illnesses.
2. When it has been determined that a specific process conducted by a dealer is the cause of the illnesses.

A product recall may not be appropriate when an illness outbreak investigation reveals, but is not limited to, the implicated product is no longer available in the market.

When the source of the illness is found to be the distribution and processing system, shellfish product should be also detained and an effective recall of product initiated, and the problem immediately corrected. Under these circumstances no closure of the growing waters is warranted in accordance with NSSP Model Ordinance, Chapter II. @.01 D.

An area which was closed due to an illness outbreak can be reopened using the criteria outlined in the NSSP Model Ordinance, Chapter IV. @.03 A. (5) (c):

Reopened Status. A growing area temporarily placed in the closed status (as provided in (b) above), shall be returned to the open status only when:

1. The emergency situation or condition has returned to normal and sufficient time has elapsed to allow the shellstock to reduce pathogens or poisonous or deleterious substances that may be present in the shellstock to acceptable levels. Studies establishing sufficient elapsed time shall document the interval necessary for reduction of contaminant levels in the shellstock to pre-closure levels. In addressing pathogen concerns, the study may establish criteria for reopening based on coliform levels in the water; or
2. The requirements for biotoxins or conditional area management plans as established in Section .04 and Section .03, respectively, are met; and
3. Supporting information is documented by a written record in the central file.

Whenever an Authority initiates a recall of shellfish products because of public health concerns, the Authority will monitor the progress and success of the recall. The Authority will immediately notify the FDA, Authorities in other States/countries, ISSC, and industry involved in the recall. Each Authority involved in a recall will implement actions to ensure removal of recalled product from the market and issue public warnings if necessary to protect public health.

Pursuant to the NSSP Model Ordinance Chapter II. @.01 C. (4) and D. (2) an Authority initiated recall shall include procedures consistent with The Recall Strategy as provided in 21 CFR Part 7.41, 7.42 and 7.50 as listed below: [for purposes of this guidance "the Authority" will be substituted for "the agency for a Food and Drug Administration"]

FDA will decide whether to audit or issue public warnings after consultation with the Authority(ies), and after taking into account the scope of the product distribution and other related factors. After consultation with the Authority(ies) and after taking into account the scope of the product distribution and other related factors, FDA may audit and/or issue public warnings. If the FDA determines that any Authority involved in the recall fails to implement effective actions to protect public health, the FDA may audit, classify the severity of, and publish the recall, including the issuance of public warnings when appropriate.

21 CFR Part 7.41:

Health hazard evaluation and recall classification.

(a) An evaluation of the health hazard presented by a product being recalled or considered for recall will be conducted by an ad hoc committee of Food and Drug Administration scientists and will take into account, but need not be limited to, the following factors:
   (1) Whether any disease or injuries have already occurred from the use of the product.
   (2) Whether any existing conditions could contribute to a clinical situation that could expose humans or animals to a health hazard. Any conclusion shall be supported as completely as possible by scientific documentation and/or statements that the conclusion is the opinion of the individual(s) making the health hazard determination.
   (3) Assessment of hazard to various segments of the population, e.g., children, surgical patients, pets, livestock, etc., who are expected to be exposed to the product being considered, with particular attention paid to the hazard to those individuals who may be at greatest risk.
   (4) Assessment of the degree of seriousness of the health hazard to which the populations at risk would be exposed.
   (5) Assessment of the likelihood of occurrence of the hazard.

(6) Assessment of the consequences (immediate or long-range) of occurrence of the hazard.

(b) On the basis of this determination, the Food and Drug Administration will assign the recall a classification, i.e., Class I, Class II, or Class III, to indicate the relative degree of health hazard of the product being recalled or considered for recall.

Section 7.42 Recall strategy.

(a) General.

(1) A recall strategy that takes into account the following factors will be developed by the agency for a Food and Drug Administration-requested recall and by the recalling firm for a firm-initiated recall to suit the individual circumstances of the particular recall:

(i) Results of health hazard evaluation.
(ii) Ease in identifying the product.
(iii) Degree to which the product's deficiency is obvious to the consumer or user.
(iv) Degree to which the product remains unused in the market place.
(v) Continued availability of essential products.

(b) Elements of a recall strategy. A recall strategy will address the following elements regarding the conduct of the recall:

(1) Depth of recall. Depending on the product's degree of hazard and extent of distribution, the recall strategy will specify the level in the distribution chain to which the recall is to extend, as follows:

(i) Consumer or user level, which may vary with product, including any intermediate wholesale or retail level; or
(ii) Retail level, including any intermediate wholesale level; or
(iii) Wholesale level.

Means of notification, methods of collecting related information, and summary of findings. Recall notification procedures should be standardized to assure compliance with Title 21 CFR, Section7.42:

(2) Public warning. The purpose of a public warning is to alert the public that a product being recalled presents a serious hazard to health. It is reserved for urgent situations where other means for preventing use of the recalled product appear inadequate. The Food and Drug Administration in consultation with the recalling firm will ordinarily issue such publicity. The recalling firm that decides to issue its own public warning is requested to submit its proposed public warning and plan for distribution of the

warning for review and comment by the Food and Drug Administration. The recall strategy will specify whether a public warning is needed and whether it will issue as:

(i) General public warning through the general news media, either national or local as appropriate, or
(ii) Public warning through specialized news media, e.g., professional or trade press, or to specific segments of the population such as physicians, hospitals, etc.

Section 7.50 Public Notification of Recall.

The Food and Drug Administration will promptly make available to the public in the weekly

FDA Enforcement Report a descriptive listing of each new recall according to its classification, whether it was Food and Drug Administration-requested or firm-initiated, and the specific action being taken by the recalling firm.

Organization of the recall procedures must take into consideration the need for work week, weekend, and holiday notifications. Various recall notification strategies may be used depending on the nature of the illness outbreak and recall. (See attached Appendices and supporting forms for example of a Recall Standard Operating Procedure). Complete removal of shellfish from interstate and intrastate commerce is vital for effective recall reaction. Timely notification and reaction by public health officials utilizing the Title 21 CFR, Part 7 requirements and associated State procedures must provide a safeguard against contaminated shellfish reaching the market. In some cases, duplication of the Federal requirements by States may be the method selected to assure standardization of necessary steps to ensure effective recalls.

Educational programs should be developed for both industry and the public describing the public health necessity for effective recall notifications and eliminating potentially unsafe shellfish products from the market place. Programs developed specifically for participation of key industry people may be especially helpful in eliciting cooperative efforts of the entire industry. Such programs should focus on incentives to standardize the procedures for effective and timely recall activities.

The adequacy of State procedures as a basis for assuring rapid and thorough reaction to illness outbreaks and product recall efforts is an important component of this activity. Shellfish recall will be ineffective and/or compromised if State procedures are so written or interpreted that effective reaction cannot be successfully initiated. It is important that consistent recall expectations and notification procedures be standardized by participating public health Authorities in order to effectively safeguard the general public from potentially hazardous food.

When a recall of shellfish products is initiated, the Authority shall:

1. Immediately notify the appropriate FDA Shellfish Specialist of the recall and provide a recall status report every five (5) working days after the initiation of the recall. Subsequent recall monitoring reports should be provided as information is acquired. The recall monitoring report, which may be verbal or written notification, will include the following information:
    a. The name and address of the recalling dealer(s), plus certification numbers;
    b. The identity of the affected product;
    c. The reason for the recall;
    d. Any other actions deemed appropriate to address the recall such as closing the growing area, conducting surveys, conducting monitoring and contacting other agencies, tribes and stakeholders, in regard to possible growing area closures and investigation of the situation requiring the recall including but not limited to sanitary or shoreline survey activities, water quality factors, and other environmental factors under consideration;
    e. All relevant product identification (harvest date, harvest location, date shucked, lot code, quantity etc.); and
    f. Distribution and redistribution of all shipments of the suspected lots.
2. Establish procedures that ensure support staff members who are conducting investigation efforts will report provide results of the investigation activities to the Lead to be added to the progress updates and final recall summary report. Activities include:
    a. Review illness investigation reports.
    b. Review facility inspection reports.

c. Review harvest site applications/information.
d. Review Survey of pollution sources.
e. Review marine water quality test results.
f. Review biotoxin test results.
g. Draft a summary of growing area findings for pollution, biotoxins, etc. as needed.

3. Prepare a complete recall summary that determines the effectiveness of the recall. The Authority will forward the recall summary documents to the appropriate FDA Shellfish Specialist within five (5) working days of the completion of the recall. The recall summary will include:
    a. The quantity, type, and status of recalled products returned to or recovered by the recalling dealer(s);
    b. The quantity, type and status (if known) of recalled products not returned to or not recovered by the recalling dealer;
    c. The reason for initiating the recall;
    d. The date the recall was initiated;
    e. The date the recall was completed;
    f. Dealer inspection results or other evidence where appropriate; and
    g. A listing, in chronological order, of any complaints or injuries associated with the product.
    h. Final disposition of all recalled product.
    i. All other actions taken to address the recall such as closing the growing area, conducting surveys, conducting monitoring, contacting other agencies, tribes and stakeholders, etc. relating to possible growing area closures and investigation of the situation requiring the recall, such as sanitary or shoreline survey activities, water quality factors, and other environmental factors for consideration.
4. Provide a summary of the details involving the recall to the appropriate Authorities upon conclusion of the recall. Each respective element of the recall activities will be described in sufficient detail to provide adequate trace back information and/or account for providing public health protection as a result of the recall. Upon approval of the report, copies will be provided via email and or hard copy to the FDA Shellfish Specialist and other agencies needing the information.

B. Requirements for Dealers

When an illness has occurred or has been reported to a certified dealer or harvester, they shall immediately notify the Authority. Immediate notification to the appropriate agency will significantly reduce the chance of additional illnesses and will limit the duration and extent of any precautionary growing area closures and product recalls.

The Authority will provide the contact information for the Illness Investigation/Recall Coordination Lead (the Lead) for the agency. The Lead will be the contact for the duration of the event.

The affected industry must cooperate with the Authority during the investigation and evaluation. It is imperative that the industry and the Lead communicate as necessary to complete a thorough investigation.

If the investigation reveals that the source of the illness is found to be the distribution and processing system, shellfish product should be detained and an effective recall of product initiated. The investigation may reveal a problem with the processing of product, if that is the case, the Authority should work with the processor to immediately correct the problem.

Whenever a certified dealer conducts a recall of shellfish products, the dealer shall:

1. Follow the written recall procedures adopted in accordance with NSSP Model Ordinance Chapter X. 03 B. (1) and (2);
2. Immediately notify the Authority which is responsible for the enforcement of shellfish sanitation, unless directed initially by the Authority, that a product recall has been initiated; and
3. Immediately notify the receiving shipper(s) or other receiver/user that a product recall has been initiated;
4. Provide the Authority and the receiver of the product with:
    a. The type and quantity of shellfish being recalled;
    b. The name and license or permit number of each harvester or shipper certification number, as necessary;
    c. The harvest area; and
    d. The date(s) of harvest and shipment as they appear on the shipping tag or invoice.
5. Direct each receiver of the recalled product to examine their receiving records and invoices and report:
    a. The quantity of product received;
    b. The quantity remaining;
    c. The quantity shipped and to whom, including name, address, phone number and date of reshipment; and
    d. All product being held and considered embargoed.
6. Advise the receiver that:
    a. The product is not to be sold or shipped;
    b. Unless advised otherwise by the Authority, the product is to remain on the premises until the Authority representative or other designee arrives;
    c. When appropriate, they should notify their customers who received the product about the recall; and
    d. All receiving and shipping records and invoices for implicated products are to be available for inspection by the Authority's officials.
7. Provide a recall status report to the Lead every five (5) working days after the initiation of the recall. Subsequent recall monitoring report, which may be verbal or written notification. Unless otherwise specified or inappropriate in a given recall case, the recall progress update should contain the following information:
    a. Number of consignees notified of the recall and the date and method of notification;
    b. Number of consignees responding to the recall communication and quantity of products on hand at the time it was received;
    c. Number of consignees that did not respond (if needed, the identity of non-responding consignees may be requested by the Authority and the Food and Drug Administration);
    d. Number of products returned or corrected by each consignee contacted and the quantity of products accounted for;
    e. Number and results of effectiveness checks that were made; and
    f. Estimated time frames for completion of the recall.

The dealer must fulfill any additional reporting requirements in accordance with the Food Drug and Cosmetic Act (21 CFR Parts 7.40-7.59 and 207 FDA Section 1005). The recalling dealer has the initial responsibility for determining if the recall is progressing satisfactorily. It is also the obligation of all recalling dealers to determine the effectiveness of their recall. Effectiveness checks aid in verifying that all known, affected consignees received notification about the recall and have taken appropriate action.

C. Requirements for FDA

Whenever a certified dealer conducts a recall of shellfish products, the FDA Shellfish Specialist shall:

1. Monitor the Authority and FDA actions ensure that the product recall is consistent with the requirements of the NSSP Model Ordinance;
2. Inform other FDA offices as appropriate as new or pertinent recall information from the Authority becomes available; and
3. Coordinate all FDA and other Federal assistance provided, as necessary, to affected States.

D. Dispute Resolution.

The ISSC recognizes that States should be allowed to appropriately respond to public health emergencies that could restrict interstate shipment of shellfish. In instances where prudent action is not taken by a State during recall or illness outbreak situations, an Authority or FDA must notify the Executive Board regarding the State's decision and rationale for taking an action or failure to take an action. The Authority should provide the rationale for the proposed action by describing, at a minimum:

1. The potential effect on the public health within that State;
2. The potential effect on the public health in other States;
3. The potential economic impact on States;
4. The necessity for the action within the proposed timeframe

The ISSC will consider the rationale of the Authority and the Executive Board may decide to contact the appropriate agency head or Governor in order to secure prudent public health protection. In the event that action is not taken after deliberation between the Conference and the State, the ISSC may recommend the State as an unresolved issue under the ISSC Constitution, By-Laws and Procedures, Procedure IX. Section 3.

.02 Guidance for a Time-Temperature Evaluation of a Shellfish Implicated Outbreak

Because shellfish are filter feeders, they can concentrate microorganisms, marine biotoxins and poisonous or deleterious substances from the water column when these substances are present in the growing area. In addition, shellfish, like any other food product, can become unfit for human consumption through the introduction of contaminants during handling, storage, transport, distribution, and processing. Furthermore, improper handling and storage can contribute to the increase of naturally occurring pathogens to hazardous levels in shellfish meats. The intrinsic risk from illness induced by microorganisms associated with consumption of raw or partially cooked shellfish products compels the shellfish control authority to act quickly and effectively when shellfish are implicated in a food-borne outbreak. When illness has occurred, the Authority needs to immediately begin an investigation before critical evidence is inadvertently lost or destroyed.

Currently, the NSSP Model Ordinance does not call for any action if illness is limited to only one person. This is appropriate for molluscan shellfish borne illness caused by microorganisms associated with pollution events. However, when naturally occurring marine bacteria such as *V.v.* or *Vibrio parahaemolyticus* are suspected to cause the illness an evaluation of the possibility of time-temperature abuse of the product is critical to understanding how the illness may have been prevented. A time-temperature audit provides information regarding the time-temperature experience of the product implicated as well as the health conditions of any ill persons which may have contributed to their susceptibility to the disease. Although the gathering of this data has been a public health focus for several

years, there has been no effort to standardize how or what data are gathered during an illness investigation. When naturally occurring marine bacteria are believed to be the source of the shellfish implicated illness or outbreak, the time-temperature history of the product and the health of the persons may be more relevant than the traditional investigatory focus on tracing the origin of the product back to the shellfish growing area.

For additional information concerning the Vibrio organisms, see Watkins and McCarthy (1994) and the NSSP Guidance Documents contained within Chapter IV. Naturally Occurring Pathogens.

Time-Temperature Evaluation of a Shellfish Implicated Outbreak

The Authority should promptly conduct an audit of the time-temperature history of the implicated product in a shellfish disease outbreak to the extent practicable. The Authority should use all records from any measuring devices in conveyances or coolers used to transport the product, or any records of conditions associated with the implicated product as it moved from harvest to consumption. Where necessary, the Authority in the State of shellfish product origin should be contacted to provide assistance in gathering information. The audit must include the retail market or restaurant where the victim bought the shellfish product, the facility of the person who sold the product that the retail market or restaurant, the facilities of all dealers and common carriers who handled the product following its harvest, and the practices and facilities of the person who harvested the shellfish. The audit should include, but should not be limited to, the following points.

In the retail market or restaurant implicated in the shellfish illness outbreak, the Authority should, at a minimum:

1. Record the ambient temperature in the establishment; observe the time-temperature control in the establishment, i.e. how the product was handled.
2. Examine the establishment's records for the temperature of the storage device or facility used for the implicated product while at the establishment, or observe and record the temperature of the storage device or facility during the investigation; observe and record the temperature and age of the remaining product at the establishment. The age of the product must be cross checked with transaction records;
3. Observe the controls to prevent cross contamination of the implicated product; and provide for the immediate sampling and testing for the suspect organism(s) of any remaining product from the retail or food service location implicated in the outbreak.

The Authority should determine if the dealer or person who sold the product to the retail market or the restaurant is on the ICSSL. If the person is not on the ICSSL, the Authority should gather any pertinent information regarding the status of time-temperature controls practiced by this person such as:

1. Inspection reports for the person's facility;
2. Observed temperature of the person's conveyance used to transport shellfish product; and
3. Presence or absence of adequate refrigeration capability in the person's conveyance.

If the dealer is on the ICSSL, the Authority should conduct an inspection of the dealer's facility and records for purposes of gathering data from time-temperature control procedures and practices at that facility including:

1. The presence or absence of adequate refrigeration capability of the dealer's conveyance;

2. The presence or absence of temperature records for the delivery conveyance;
3. The observed temperature and time-temperature control practices on the dealer's loading dock;
4. The transaction records demonstrating the product's age from the date of harvest of the implicated product; and
5. The dealer's observed product rotation practice (i.e., the existence of product of widely differing ages).

For additional information concerning the ICSSL, see the NSSP Guidance Documents Chapter III. .03 *Dealer Certification and the Interstate Certified Shellfish Shippers List*.

The Authority should gather data similar to that above from all dealers or common carriers (certified or uncertified) between the point of first receipt from the harvester and the retail market or restaurant.

The Authority should inspect the original dealer's facility (i.e. the point of first receipt from the harvester). If the original dealer's facility is in another State, the Authority should request the appropriate Authority in that State to perform an audit and to share the results of the audit. This audit should, at a minimum:

1. Determine if there are adequate provisions for product refrigeration;
2. Observe temperature and/or records of temperature for the dealer's refrigeration facility;
3. Observe general time-temperature control procedures and practices; and
4. Observe the temperature and age of shellfish product on-site under receipt from harvesters or under storage.

To the extent practicable, the Authority should gather information concerning the time-temperature control capability of the harvester of record for the implicated product. If the product was harvested in another State, the Authority should request the appropriate Authority in that State to perform an audit and to share the results of the audit. This audit should, at a minimum, determine:

1. If adequate shading was provided for harvested shellfish product;
2. The existence of mechanical refrigeration for storage of harvested product; and
3. If records of prior enforcement actions against the harvester exist.

In cases where Vibrio species are the suspected organisms causing the illness or outbreak, the Authority should investigate the health status of the victim(s) to determine:

1. If there were underlying health problems which may have contributed to the occurrence of the illness(es);
2. If the victim(s) was aware of his underlying condition;
3. If the victim(s) was aware of his high-risk status;
4. If the victim(s) had been advised not to consume raw shellfish; and
5. If the establishment had posted point-of-sale information for high-risk consumers.

References

- Watkins, W. and S. McCarthy. 1994. *Proceedings of the 1994 Vibrio vulnificus Workshop*. U.S. Department of Health and Human Services, Public Health Service, Office of Seafood (HFS-400), Shellfish Sanitation Branch, 200 C Street, SW, Washington, D.C. 175 pages.

Appendices

- Appendix A
- Appendix B
- Appendix C
- Appendix D
- Appendix E
- Appendix F
- Appendix G

NOTE: To view, print, or download Appendix A, B, C, D, E, F, or G click on the link below.

Checklists for Recalls, Closures and Special Events

Section V. Suggested Forms

Shellfish Harvest Record

Company Name: _____

Certificate Number: _____

Harvest Area	Harvest Date	Species	Quantity

Page _____

Shellfish Harvest/Purchase Record

Certificate Number	Quantity	Species	Harvest Area	Harvest Date	Purchase Date	Harvester Certificate Number

Page_____

Shellfish Harvest/Purchase Record

Restricted Use Shellstock (Shucking or PHP)

Certified Dealer Number: _____

Lot #	Quantity	Species	Harvest Area	Harvest Date	Purchase Date	Received from (Harvester or Certified Dealer

Page_____

Shellfish Sales Record

Date Sold	Sold To	Quantity	Species	Harvest Date	Harvest Area	Harvester Certificate Number

Page _____

Sales Disposition Record

Restricted Use Shellstock (Shucking or PHP)

Certified Dealer Number: _____

Sales/Disposition Record

Lot #	Date Sold or Processed	Sold To Dealer Certificate Number (N/A if Processed)	Quantity Sold Unprocessed	Quantity Processed

Page_____

Export Health Certificate

State of _____

Address _____

Statement of Licensure and Certification

Exported By: Certificate Number_____**Consigned To:** _____

License (*Check one*): Shellstock Shipper ☐ Shucker-Packer ☐

Shipped Via: Port of Embarkation: Port of Debarkation:

Identifying Marks: Total # of Containers: Total Marked Weight:

Product: Class, Type, Style: Count: Lot Weight: Labels/Brand:

The above-named exporter hereby certifies through its authorized agent that this product was harvested from the following harvest area or areas:

Agent's Signature:_____Date: _____

The_____State Department of Health routinely inspects shellfish operations and shellfish harvest areas to determine their compliance with State shellfish sanitation laws and the requirements of the National Shellfish Sanitation Program. The above named exporter is currently licensed and certified by the Department as indicated above. The above named harvest area is currently certified by the Department of Health as approved for harvest.

By:_____Date:_____

(Appropriate State Official/Title)

Section VI. NSSP Policy Setting Documents

Department of Health and Human Services - Food and Drug Administration Policy Statement

Consumption of Raw Molluscan Shellfish

Molluscan shellfish are animal-derived protein foods that are widely consumed and play an important role in the diets of some consumers. Most animal-derived protein foods are cooked prior to consumption. Cooking can reduce a number of potentially pathogenic organisms and the risk of illness. However, molluscan shellfish are often consumed raw or partially cooked. Therefore, some cases of illness are inevitable from consuming them in this way.

The majority of illnesses that occur from the consumption of raw molluscan shellfish are the result of pollution. They are not life threatening to the general population and commonly range from mild intestinal disorders of short duration to acute gastroenteritis. More serious illnesses can occur, but are rare.

Certain medically compromised individuals are at increased risk from common marine Vibrio bacteria that are unrelated to pollution. Therefore, it may not be possible to address this risk through environmental controls. Although the reported number of illnesses and fatalities from these bacteria in the United States each year is small in comparison with other food borne illnesses, the best advice for medically compromised individuals is not to eat raw molluscan shellfish. At most risk are those affected by: AIDS; chronic alcohol abuse; liver, stomach or blood disorders; cancer; diabetes; and kidney disease. Those uncertain of their health should seek the advice of their physician.

To reduce the risk of illnesses associated with raw shellfish consumption, the Food and Drug Administration (FDA) administers the NSSP. The NSSP is a tripartite cooperative program of Federal and State public health officials and the shellfish industry working together to improve shellfish safety. FDA is committed to the NSSP partnership as providing the best means of making molluscan shellfish as safe as possible. States annually spend millions of dollars to monitor waters to assure that they are safe before harvesting is permitted. FDA routinely audits the States' classification of shellfish harvesting areas to verify that none pose a threat to public health. FDA has also increased its cooperative efforts with State and Federal law enforcement officers to prevent illegal harvesting from closed waters, a practice that probably leads to most shellfish illnesses. Adhering to NSSP controls will help to keep risks to a minimum.

Interstate Shellfish Sanitation Conference Policy Statement

Consumption of Raw Molluscan Shellfish

Introduction

The Interstate Shellfish Sanitation Conference (ISSC) was organized in 1982 to address the safety and sanitation of molluscan shellfish (oysters, mussels, clams, and whole and roe-on scallops). The ISSC has a formal Memorandum of Understanding with the U.S. Food and Drug Administration (FDA) to promote shellfish sanitation through the NSSP, a tripartite cooperative program of Federal and State public health officials and the shellfish industry working together to improve shellfish safety. The ISSC recognizes the success of this Program, which is founded on the premise that, through appropriate controls, molluscan shellfish can be consumed raw by most people with reasonable risk. The ISSC remains committed to that premise.

Policy Statement

Molluscan shellfish are animal-derived protein foods that are widely consumed and play an important role in the diets of some consumers. Most animal-derived protein foods are cooked prior to consumption. Cooking can reduce a number of potentially pathogenic organisms and the risk of illness. Consumption of raw shellfish, as with consumption of other types of raw animal-derived protein foods, increases the risk of illness. The majority of illnesses related to the consumption of raw molluscan shellfish are a result of pollution. These illnesses are not life threatening to the general population and commonly range from mild intestinal disorders of short duration to acute gastroenteritis. More serious illnesses can occur, but are rare.

To reduce the potential risk associated with consumption of raw molluscan shellfish, the FDA in cooperation with the States administers the NSSP. States monitor shellfish growing waters to determine that they are safe before harvesting is permitted. The FDA routinely audits the States' classification of shellfish harvesting areas to verify that none pose a threat to public health. The FDA has also increased its cooperative efforts with State and Federal law enforcement officers to prevent illegal harvesting from closed waters and ensures that all shellfish in interstate commerce are properly labeled or has a tag identifying the harvest area and shipper. The tagging and labeling requirement of the NSSP is designed to ensure that only shellfish from approved growing waters reach interstate commerce. Adherence to NSSP controls minimizes risks. Recognizing the NSSP partnership provides the best possible means of ensuring that molluscan shellfish are safe, the FDA, the States, and the ISSC are committed to continued support of the Program.

Certain medically compromised individuals are at increased risk from common marine bacteria that are unrelated to pollution. Therefore, it may not be possible to address this risk through environmental controls. Although the reported number of illnesses and fatalities from these bacteria in the United States each year is small in comparison with other food borne illnesses, total abstinence from raw molluscan shellfish is the best advice for medically compromised individuals. Those at greatest risk include, but are not restricted to those affected by: AIDS; chronic alcohol abuse; liver, stomach or blood disorders; cancer, diabetes and kidney disease. Those uncertain of their health status should seek the advice of their physician.

Interstate Shellfish Sanitation Conference Resolution 97 - 01

SUBJECT: Post-Harvest Treatment Processing

TEXT OF RESOLUTION:

WHEREAS, the effect of naturally occurring *Vibrio vulnificus* in raw shellstock oysters has been a problem that has caused considerable concern for the Interstate Shellfish Sanitation Conference (ISSC), the FDA, State public health regulators, the molluscan shellfish industry and the general public; and

WHEREAS, the ISSC had previously adopted a position (stated in a resolution by the 1991 Conference) that "in absence of definitive information regarding *Vibrio vulnificus*, the only realistic approach is education of the high risk groups"; and

WHEREAS, the ISSC also had recommended that "States and industry take immediate steps to institute harvesting, processing and handling procedures which will eliminate illnesses attributable to *Vibrio vulnificus*"; and

WHEREAS, the State public health regulators and Authorities are awaiting guidance from the ISSC and FDA regarding Post-Harvest Treatment (PHT) processes; therefore

BE IT RESOLVED, that the ISSC encourages the development and Authority approval of Post-Harvest Treatment (PHT) processes which are able to consistently and reliably reduce *Vibrio vulnificus* to non-detectable levels in raw molluscan shellfish.

Interstate Shellfish Sanitation Conference Resolution 09-001

SUBJECT: Educational Outreach Common Carrier Associations

TEXT OF RESOLUTION:

WHEREAS, the National Shellfish Sanitation Program, (NSSP), was developed in 1925 when the U. S. Public Health Service responded to a request for assistance from local and State public health officials in controlling disease associated with the consumption of raw shellfish, and

WHEREAS, each shellfish shipping State has adopted adequate laws and regulations for sanitary control of the shellfish industry, completed sanitary surveys of harvest areas, delineated and patrolled restricted areas, inspected shellfish plants, and conducted such additional inspections, laboratory investigations, and control measures as were necessary to ensure that the shellfish reaching the consumer had been grown, harvested and processed in a sanitary manner, and

WHEREAS, the shellfish industry has cooperated by obtaining shellfish from safe sources, by providing plants which met the agreed upon sanitary standards, by maintaining sanitary operating conditions, by placing the proper certificate number on each package of shellfish, and by keeping and making available to the control authorities records which showed the origin and disposition of all shellfish, and

WHEREAS, in 1982, a delegation of State officials met in Annapolis, Maryland and formed the Interstate Shellfish Sanitation Conference (ISSC), that is composed of State shellfish regulatory officials, industry officials, FDA, and other Federal agencies, and

WHEREAS, the ISSC has provided a forum for State shellfish regulatory officials, industry officials, FDA, and other Federal agencies, to establish uniform national guidelines and to exchange information regarding sources of safe shellfish, and

WHEREAS, under the guidance of the ISSC, the NSSP has led the United States in the prevention of food-borne illnesses by requiring the States, to monitor bacteriological water quality of shellfish growing areas, to label shellfish with exact growing area information for trace-back purposes, to inspect and certify shellfish processing facilities, to require refrigeration of shellfish to reduce the growth of food-borne pathogens, and

WHEREAS, shellfish dealers are required by the NSSP to ensure that shellfish is shipped under proper temperature control to prevent possible pathogen growth, especially natural marine pathogens such as *Vibrio vulnificus* and *Vibrio parahaemolyticus* that have substantial growth based on temperature, and

WHEREAS, common carriers are exempt from the time-temperature control requirements of the Model Ordinance, causing most dealers to be concerned if the shellfish products shipped via these carriers are maintained at proper temperatures and

BE IT RESOLVED, that the ISSC acknowledge that managing pathogen growth comes from proper temperature control and maintaining this proper temperature control is of concern for dealers who ship shellfish including shipping via common carriers,

BE IT FURTHER RESOLVED, that the ISSC will extend an educational outreach to Common Carrier Associations to express these concerns in a letter to Common Carrier Associations detailing the need for proper temperature control for shipping shellfish,

BE IT FURTHER RESOLVED, that the ISSC will extend an educational outreach to Common Carrier Associations to express these concerns by promoting the attendance of an Executive Board member to attend Common Carrier Association Conferences as they may occur and as Executive Board budget allows.

Interstate Shellfish Sanitation Conference Resolution 11-003

SUBJECT: Guidance on Equivalence Criteria for Food

TEXT OF RESOLUTION:

WHEREAS, the Interstate Shellfish Sanitation Conference, (ISSC), and the Food and Drug Administration, (FDA), agreed to a Memorandum of Understanding, (MOU), on March 14, 1984, which continues to present; and

WHEREAS, The National Shellfish Sanitation Program (NSSP) and its associated documents, including the FDA/ISSC MOU, do not make provisions for equivalency determinations or recognition of other programs; and

WHEREAS, under Article 4 of the World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (SPS), as a participating member, the U.S. is obligated to consider equivalent food safety measures of a participating country if those measures provide a level of public health protection equal to that provided by the U.S. system - the NSSP; and

WHEREAS, FDA must address the concept of equivalence and related criteria afforded by non-NSSP shellfish regulatory systems; therefore

BE IT RESOLVED, that the ISSC recognizes that FDA, as a U.S. regulatory agency, is bound by the WTO to consider equivalency if requested by other countries and that the ISSC recognizes and accepts equivalency determinations by FDA; and

BE IT FURTHER RESOLVED, that upon request from FDA, the ISSC will provide input on the criteria and evaluation processes that may be applied by FDA for such determinations.

Section VII. Shellfish Federal Regulations

TITLE 21--FOOD AND DRUGS
CHAPTER I--FOOD AND DRUG ADMINISTRATION
DEPARTMENT OF HEALTH AND HUMAN SERVICES
SUBCHAPTER A--GENERAL

PART 7 ENFORCEMENT POLICY[8]

Subpart A--General Provisions
§ 7.1 - Scope.
§ 7.3 - Definitions.
§ 7.12 - Guaranty.
§ 7.13 - Suggested forms of guaranty.

Subpart B [Reserved]

Subpart C--Recalls (Including Product Corrections)--Guidance on Policy, Procedures, and Industry Responsibilities
§ 7.40 - Recall policy.
§ 7.41 - Health hazard evaluation and recall classification.
§ 7.42 - Recall strategy.
§ 7.45 - Food and Drug Administration-requested recall.
§ 7.46 - Firm-initiated recall.
§ 7.49 - Recall communications.
§ 7.50 - Public notification of recall.
§ 7.53 - Recall status reports.
§ 7.55 - Termination of a recall.
§ 7.59 - General industry guidance.

Subpart D [Reserved]

Subpart E--Criminal Violations
§ 7.84 - Opportunity for presentation of views before report of criminal violation.
§ 7.85 - Conduct of a presentation of views before report of criminal violation.
§ 7.87 - Records related to opportunities for presentation of views conducted before report of criminal violation.

Authority: 21 U.S.C. 321-393; 42 U.S.C. 241, 262, 263b-263n, 264.
Source: 42 FR 15567, Mar. 22, 1977, unless otherwise noted.

TITLE 21--FOOD AND DRUGS
CHAPTER I--FOOD AND DRUG ADMINISTRATION
DEPARTMENT OF HEALTH AND HUMAN SERVICES
SUBCHAPTER B--FOOD FOR HUMAN CONSUMPTION

PART 101 FOOD LABELING[8]

Subpart A--General Provisions
§ 101.1 - Principal display panel of package form food.
§ 101.2 - Information panel of package form food.
§ 101.3 - Identity labeling of food in packaged form.
§ 101.4 - Food; designation of ingredients.
§ 101.5 - Food; name and place of business of manufacturer, packer, or distributor.
§ 101.9 - Nutrition labeling of food.
§ 101.10 - Nutrition labeling of restaurant foods.
§ 101.12 - Reference amounts customarily consumed per eating occasion.
§ 101.13 - Nutrient content claims--general principles.
§ 101.14 - Health claims: general requirements.
§ 101.15 - Food; prominence of required statements.
§ 101.17 - Food labeling warning, notice, and safe handling statements.
§ 101.18 - Misbranding of food.

Subpart B--Specific Food Labeling Requirements
§ 101.22 - Foods; labeling of spices, flavorings, colorings and chemical preservatives.
§ 101.30 - Percentage juice declaration for foods purporting to be beverages that contain fruit or vegetable juice.

Subpart C--Specific Nutrition Labeling Requirements and Guidelines
§ 101.36 - Nutrition labeling of dietary supplements.
§ 101.42 - Nutrition labeling of raw fruit, vegetables, and fish.
§ 101.43 - Substantial compliance of food retailers with the guidelines for the voluntary nutrition labeling of raw fruit, vegetables, and fish.
§ 101.44 - What are the 20 most frequently consumed raw fruits, vegetables, and fish in the United States?
§ 101.45 - Guidelines for the voluntary nutrition labeling of raw fruits, vegetables, and fish.

Subpart D--Specific Requirements for Nutrient Content Claims
§ 101.54 - Nutrient content claims for "good source," "high," "more," and "high potency."
§ 101.56 - Nutrient content claims for "light" or "lite."
§ 101.60 - Nutrient content claims for the calorie content of foods.
§ 101.61 - Nutrient content claims for the sodium content of foods.
§ 101.62 - Nutrient content claims for fat, fatty acid, and cholesterol content of foods.
§ 101.65 - Implied nutrient content claims and related label statements.
§ 101.67 - Use of nutrient content claims for butter.
§ 101.69 - Petitions for nutrient content claims.

Subpart E--Specific Requirements for Health Claims
§ 101.70 - Petitions for health claims.
§ 101.71 - Health claims: claims not authorized.
§ 101.72 - Health claims: calcium, vitamin D, and osteoporosis.
§ 101.73 - Health claims: dietary lipids and cancer.
§ 101.74 - Health claims: sodium and hypertension.
§ 101.75 - Health claims: dietary saturated fat and cholesterol and risk of coronary heart disease.
§ 101.76 - Health claims: fiber-containing grain products, fruits, and vegetables and cancer.
§ 101.77 - Health claims: fruits, vegetables, and grain products that contain fiber, particularly soluble fiber, and risk of coronary heart disease.
§ 101.78 - Health claims: fruits and vegetables and cancer.
§ 101.79 - Health claims: Folate and neural tube defects.
§ 101.80 - Health claims: dietary noncariogenic carbohydrate sweeteners and dental caries.
§ 101.81 - Health claims: Soluble fiber from certain foods and risk of coronary heart disease (CHD).
§ 101.82 - Health claims: Soy protein and risk of coronary heart disease (CHD).
§ 101.83 - Health claims: plant sterol/stanol esters and risk of coronary heart disease (CHD).

Subpart F--Specific Requirements for Descriptive Claims That Are Neither Nutrient Content Claims nor Health Claims
§ 101.93 - Certain types of statements for dietary supplements.
§ 101.95 - "Fresh," "freshly frozen," "fresh frozen," "frozen fresh."

Subpart G--Exemptions From Food Labeling Requirements
§ 101.100 - Food; exemptions from labeling.
§ 101.105 - Declaration of net quantity of contents when exempt.
§ 101.108 - Temporary exemptions for purposes of conducting authorized food labeling experiments.

Appendix A to Part 101--Monier-Williams Procedure (With Modifications) for Sulfites in Food, Center for Food Safety and Applied Nutrition, Food and Drug Administration (November 1985)
Appendix B to Part 101--Graphic Enhancements Used by the FDA
Appendix C to Part 101--Nutrition Facts for Raw Fruits and Vegetables
Appendix D to Part 101--Nutrition Facts for Cooked Fish

Authority: 15 U.S.C. 1453, 1454, 1455; 21 U.S.C. 321, 331, 342, 343, 348, 371; 42 U.S.C. 243, 264, 271.
Source: 42 FR 14308, Mar. 15, 1977, unless otherwise noted.

TITLE 21--FOOD AND DRUGS
CHAPTER I--FOOD AND DRUG ADMINISTRATION
DEPARTMENT OF HEALTH AND HUMAN SERVICES
SUBCHAPTER B--FOOD FOR HUMAN CONSUMPTION

PART 109 UNAVOIDABLE CONTAMINANTS IN FOOD FOR HUMAN CONSUMPTION AND FOOD-PACKAGING MATERIAL[8]

Subpart A--General Provisions
§ 109.3 - Definitions and interpretations.
§ 109.4 - Establishment of tolerances, regulatory limits, and action levels.
§ 109.6 - Added poisonous or deleterious substances.
§ 109.7 - Unavoidability.
§ 109.15 - Use of polychlorinated biphenyls (PCB's) in establishments manufacturing food-packaging materials.
§ 109.16 - Ornamental and decorative ceramic ware.

Subpart B--Tolerances for Unavoidable Poisonous or Deleterious Substances
§ 109.30 - Tolerances for polychlorinated biphenyls (PCB's).

Subpart C--Regulatory Limits for Added Poisonous or Deleterious Substances [Reserved]

Subpart D--Naturally Occurring Poisonous or Deleterious Substances [Reserved]

Authority: 21 U.S.C. 321, 336, 342, 346, 346a, 348, 371.
Source: 42 FR 52819, Sept. 30, 1977, unless otherwise noted.

TITLE 21--FOOD AND DRUGS
CHAPTER I--FOOD AND DRUG ADMINISTRATION
DEPARTMENT OF HEALTH AND HUMAN SERVICES
SUBCHAPTER B--FOOD FOR HUMAN CONSUMPTION

PART 110 CURRENT GOOD MANUFACTURING PRACTICE IN MANUFACTURING, PACKING, OR HOLDING HUMAN FOOD[8]

Subpart A--General Provisions
§ 110.3 - Definitions.
§ 110.5 - Current good manufacturing practice.
§ 110.10 - Personnel.
§ 110.19 - Exclusions.

Subpart B--Buildings and Facilities
§ 110.20 - Plant and grounds.
§ 110.35 - Sanitary operations.
§ 110.37 - Sanitary facilities and controls.

Subpart C--Equipment
§ 110.40 - Equipment and utensils.

Subpart D [Reserved]

Subpart E--Production and Process Controls
§ 110.80 - Processes and controls.
§ 110.93 - Warehousing and distribution.

Subpart F [Reserved]

Subpart G--Defect Action Levels
§ 110.110 - Natural or unavoidable defects in food for human use that present no health hazard.

TITLE 21--FOOD AND DRUGS
CHAPTER I--FOOD AND DRUG ADMINISTRATION
DEPARTMENT OF HEALTH AND HUMAN SERVICES
SUBCHAPTER B--FOOD FOR HUMAN CONSUMPTION

PART 123 FISH AND FISHERY PRODUCTS[8]

Subpart A--General Provisions
§ 123.3 - Definitions.
§ 123.5 - Current good manufacturing practice.
§ 123.6 - Hazard analysis and Hazard Analysis Critical Control Point (HACCP) plan.
§ 123.7 - Corrective actions.
§ 123.8 - Verification.
§ 123.9 - Records.
§ 123.10 - Training.
§ 123.11 - Sanitation control procedures.
§ 123.12 - Special requirements for imported products.

Subpart B--Smoked and Smoke-Flavored Fishery Products
§ 123.15 - General.
§ 123.16 - Process controls.

Subpart C--Raw Molluscan Shellfish
§ 123.20 - General.
§ 123.28 - Source controls.

Authority: 21 U.S.C. 321, 342, 343, 346, 348, 371, 374, 379e, 381, 393; 42 U.S.C. 241, 241l, 264.
Source: 60 FR 65197, Dec. 18, 1995, unless otherwise noted.

TITLE 21--FOOD AND DRUGS
CHAPTER I--FOOD AND DRUG ADMINISTRATION
DEPARTMENT OF HEALTH AND HUMAN SERVICES
SUBCHAPTER B--FOOD FOR HUMAN CONSUMPTION

PART 161 FISH AND SHELLFISH[8]

Subpart A--General Provisions
§ 161.30 - Declaration of quantity of contents on labels for canned oysters.

Subpart B--Requirements for Specific Standardized Fish and Shellfish
§ 161.130 - Oysters.
§ 161.136 - Olympia oysters.
§ 161.145 - Canned oysters.
§ 161.170 - Canned Pacific salmon.
§ 161.173 - Canned wet pack shrimp in transparent or nontransparent containers.
§ 161.175 - Frozen raw breaded shrimp.
§ 161.176 - Frozen raw lightly breaded shrimp.
§ 161.190 - Canned tuna.

Authority: 21 U.S.C. 321, 341, 343, 348, 371, 379e.
Source: 42 FR 14464, Mar. 15, 1977, unless otherwise noted.

TITLE 21--FOOD AND DRUGS
CHAPTER I--FOOD AND DRUG ADMINISTRATION
DEPARTMENT OF HEALTH AND HUMAN SERVICES
SUBCHAPTER E--ANIMAL DRUGS, FEEDS, AND RELATED PRODUCTS

PART 509 UNAVOIDABLE CONTAMINANTS IN ANIMAL FOOD AND FOOD-PACKAGING MATERIAL[8]

Subpart A--General Provisions
§ 509.3 - Definitions and interpretations.
§ 509.4 - Establishment of tolerances, regulatory limits, and action levels.
§ 509.5 - Petitions.
§ 509.6 - Added poisonous or deleterious substances.
§ 509.7 - Unavoidability.
§ 509.15 - Use of polychlorinated biphenyls (PCBs) in establishments manufacturing food-packaging materials.

Subpart B--Tolerances for Unavoidable Poisonous or Deleterious Substances
§ 509.30 - Temporary tolerances for polychlorinated biphenyls (PCBs).

Subpart C--Regulatory Limits for Added Poisonous or Deleterious Substances [Reserved]

Subpart D--Naturally Occurring Poisonous or Deleterious Substances [Reserved]

Authority: 21 U.S.C. 336, 342, 346, 346a, 348, 371.
Source: 42 FR 52821, Sept. 30, 1977, unless otherwise noted.

Section VIII. FDA Manual of Interpretations

Manual of Interpretations Codification System

Date: December 8, 2002

The Manual of Interpretations Codification System consists of nine (9) subject areas. The nine (9) areas are Interpretation Number, Date, and National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish, reference hereon known as "Model Ordinance Reference," Key Words, Question, Interpretation Rationale, Other References, and Contact.

Interpretation Number: The interpretation number consists of four (4) fields:

(1) Primary
(2) Secondary
(3) Tertiary and
(4) Quaternary.

Each identified field is related to a particular section of the Model Ordinance and a chronological number is assigned for the interpretation. The following is an example:

For example: Interpretation Number: 15-III-@.02-100 - 15 - The primary field corresponds to the last published Guide for the Control of Molluscan Shellfish revision date; in this case it is "2017."

III- The secondary field corresponds to a chapter in the Guide; in this case it is "Chapter III - Laboratory."
@.02- The tertiary field corresponds to the chronological numerical sequence for a subparagraph under a particular section in a chapter.

100 - The quaternary field is a chronological number for each interpretation issued under a particular section. Note: All interpretations issued for the first time for each Guide section will start with the number 100.

Date:	This is the actual date when the interpretation was issued.
Model Ordinance Reference:	This refers to the particular chapters, paragraphs and subparagraphs in the guide. For example "Chapter III, Section @.02A"
Keywords:	These are words that serve to provide significant or memorable statements for systematic index entry.
Question:	This is the particular question of concern that needs to be interpreted.
Interpretation:	The FDA written response to clarify the particular area of concern in a specific chapter or section of the NSSP Guide for the Control of Molluscan Shellfish**.**
Rationale:	This explains the reason for the interpretation. This area will cover existing policy, regulations, laws, and public health reasons.
Other References:	This includes other documents used to issue the interpretation such as laws, regulations, model codes, scientific literature, etc.
Contact:	This is the office responsible for issuing the interpretation. Any questions or comments should be in writing and addressed to: U.S. Food and Drug Administration Center for Food Safety and Applied Nutrition Shellfish and Aquaculture Policy Branch, 5001 Campus Drive (HFS- 325),College Park, MD 20740

Interpretation Number: 15-I-@.02-100

Date: July 15, 1994

Revised: December 8, 2002

Model Ordinance Reference:
Chapter I @.02 A. (1)
NSSP Guidance Document –
Shellfish Plant Inspection Standardization Procedures

Key Words:
Standardization, Limited, Officers

Question:
What procedures are to be used to standardize a State Shellfish Standardization Officer in jurisdictions which have less than five (5) dealers to certify for the ICSSL?

Interpretation:
Options For Standardizing State Shellfish Standardization Officers Within Jurisdictions With Fewer Than five (5) Certified Dealers

1. Determine the number of intrastate shellfish dealers not listed on the ICSSL and include as many as necessary to obtain the minimum five (5) inspections. All certified dealers must be included in the sample.

2. Arrange to conduct standardization inspections in another jurisdiction, using as many certified dealers as necessary to complete the exercise. All certified dealers within the candidate's home state must be included in the sample. This exercise must be conducted with an FDA Standardization Officer.

3. If options 1 or 2 are possible, they must be selected before pursuing option 3. When the Shellfish Specialist agrees that option 1 or 2 cannot be utilized, the FDA Standardization Officer and the State Candidate will inspect all interstate and intrastate dealers within the State. If this number of dealers equals less than five (5), the standardization exercise will be based upon the inspection of the number of available plants. However, the Candidate must achieve 80% agreement on EACH inspection. The FDA Standardization Officer shall review annually the number of dealers available within the jurisdiction and standardize the State Shellfish Officer using five (5) dealers whenever they become available. The State Shellfish Officer shall make every effort to achieve standardization using five (5) dealers. If a State Shellfish Standardization Officer standardized under this option relocates to another State with five (5) or more dealers, that Officer must be restandardized by the FDA Shellfish Specialist through field standardization using five (5) dealers.

In all of the above option cases, the state shellfish standardization officer candidate must successfully complete the FDA classroom training portion of the standardization process.

4. A State may choose to contract with another State which has a recognized State Standardization Officer to conduct routine and pre-certification inspections.

Rationale:
NSSP Guidance Document - Shellfish Plant Inspection Standardization Procedures, in the Guide for the Control of Molluscan Shellfish, establishes the procedures for measuring the training and performance of an applicant to become a standardized State Shellfish Officer or Plant Inspector. NSSP Guidance Document - Shellfish Plant Inspection Standardization Procedures requires that, during the plant inspection phase of standardization, a minimum of eight (8) plants be jointly inspected by the FDA Standardization Officer and the candidate for State Shellfish Officer. Three (3) of the eight (8) plant inspections are considered to be a review or warm-up inspections, and five (5) inspections are counted as the official number of inspections for the standardization process.

However, several States and foreign countries that participate in the ISSC and want to list firms on the ICSSL have fewer than five (5) plants within their jurisdiction. Therefore, they are unable to follow the procedures set forth in NSSP Guidance Document - Shellfish Plant Inspection Standardization Procedures to standardize a State official. NSSP Guidance Document - Shellfish Plant Inspection Standardization Procedures addresses this issue vaguely, stating that, "For States that do not have eight (8) plants, all of the available plants must be inspected with the Standard determining the appropriate review number." To clarify this issue, FDA offers the above options. Election of any option will:

- Meet the intent of the standardization procedures;
- Maintain uniform requirements for Standardized State Officers; and
- Uphold the criteria for listing dealers on the ICSSL.

Contact:
U.S. Food and Drug Administration
Center for Food Safety and Applied
Nutrition, Shellfish and Aquaculture Policy
Branch, 5001 Campus Drive (HFS-325),
College Park, MD 20740

Distribution:
Shellfish Specialists
Regional Federal State Program Managers
Division of Federal State Relations
Shellfish Sanitation Branch
Interstate Shellfish Sanitation Conference

Interpretation Number: 15-I-@.02-101

Date: November 5, 2004

Final: March 25, 2005

Interpretation Number: 15-I-@.02-101

Model Ordinance Reference:
Chapter I@ 02.F (1)

Key Words:
Inspections, unannounced, announced

Question:
The USFDA did not concur with ISSC adoption of Proposal 03-200. The FDA indicated that States presently have the discretion to schedule inspections when unannounced visits are not successful. The ISSC Executive Board and FDA agreed that resolution of the issue of unannounced inspections could be accomplished by the development of an NSSP interpretation acknowledging State discretion.

Interpretation:
The Authority shall make unannounced inspections of the dealer's facilities unless extenuating circumstances exist that would preclude this. Such extenuating circumstances are to be determined by the Authority, at their discretion, as long as documentation detailing the extenuating circumstances is maintained and the minimum inspection frequencies stipulated in Section (1) (b) are met.

Rationale:
Unannounced inspections for HACCP and/or sanitation based food processing inspection programs always offer the best evaluation of a firm's compliance with the rules and regulations that apply to a process. For dealers regulated by the NSSP, the same reason for unannounced inspections applies to shellfish facilities. The Authority should make every effort to conduct unannounced inspections at shellfish facilities. It is recognized, however, that there are times when unannounced inspections may not be feasible, or may create undue hardship on the Authority's shellfish inspection program. In all cases, professional judgment should be used in determining when it is appropriate to announce an inspection, and announced inspections should only be conducted when other options have been exhausted.

Examples of instances where announced inspections should be considered include:

(A) When inspection staff members repeatedly have been unable to make contact with a facility operator in order to conduct an inspection during operating hours (such as may occur with small staffed operations that open intermittently, operations that open only seasonally, or facilities that are open only during certain occasions);

(B) A dealer's facility is located a considerable distance from the inspector's office, such that coordination is needed to ensure that the facility will be open and operating during an inspection visit, thereby ensuring that the inspector can manage his/her workload and travel funds without wasting the Authority's personnel time or budget.

Other References:
None

Contact:
U.S. Food and Drug Administration
Center for Food Safety and Applied
Nutrition, Shellfish and Aquaculture Policy
Branch, 5001 Campus Drive, HFS-325
College Park, Maryland 20740-3834

Distribution:
FDA Shellfish Specialists
FDA Federal State and Cooperative Programs Managers Division of
Federal State Relations
FDA Office of Food Safety Seafood, Division of Seafood Safety
Interstate Shellfish Sanitation Conference
Shellfish MOU Authorities in Canada, Chile, Mexico, New Zealand, Korea

Date of Re-Issue:
April 25, 2006

Contact:
U.S. Food and Drug Administration
Center for Food Safety and Applied
Nutrition, Shellfish and Aquaculture Policy
Branch, 5001 Campus Drive, (HFS-325)
College Park, MD 20740

Distribution:
Shellfish Specialists
Regional Federal State Program Managers
Division of Federal State Relations
Shellfish Sanitation Branch
Interstate Shellfish Sanitation Conference
Interpretation Number: 15-III-@.02-100

Interpretation Number: 15-III-@.02-100

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Revised: December 8, 2002

Revised: March 20, 2004

Reissued: September 1, 2004

Model Ordinance Reference:
Chapter III @.02 NSSP *Guide for the Control of Molluscan Shellfish*, Guidance Document - Approved NSSP Laboratory Tests and NSSP *Guide for the Control of Molluscan Shellfish* Guidance Document - Shellfish Laboratory Evaluation Checklist – Microbiology

Key Words:
Single Dilution, MPN, Adverse Pollution Condition Sampling, Seawater

Question:
What are the options for use of a 12-tube single dilution most probable number (MPN) test for growing area water samples?

Interpretation:
The 12-tube, single dilution MPN test may be used to survey shellfish growing waters in the Approved classification in accordance with the conditions specified in this Interpretation. Table 1 is a summary of the applicable criteria.

Table 1 – Applicable Criteria for use of the 12-Tube, Single Dilution MPN

Test 12-tube, Single Dilution MPN Test, Approved Areas

Use	**Total Coliforms For Routine Monitoring and Survey**	**Fecal Coliforms For Routine Monitoring and Survey**
Sample inocula	1 ml per tube	5 ml per tube
Count range	9 to 248 MPN	2 to 50 MPN
Standard	70 MPN/100 ml	14 MPN/100 ml
90^{th} percentile/upper 10%	140 MPN	28 MPN

Background:
The use of a single dilution MPN test for sampling shellfish growing waters emerged from the 8^{th} National Shellfish Sanitation Workshop in 1974. At that Workshop, it was recognized that the single dilution MPN test is a simpler approach than either the 5 or 3-tube, multiple dilution MPN test because it requires fewer tubes than the 5-tube, multiple dilution MPN test, media of one strength, no diluent, quicker inoculation, less incubator and/or water bath space, fewer pipets; and, generally yields better data.

The conventional MPN procedure simply uses multiple dilutions to expand the range of determinate counts that can be obtained by the single dilution test procedure.

In their deliberations, Workshop conferees agreed:

1. That the number of tubes in each dilution for the multiple tube test may vary from standard published tables to suit the purpose of a particular sampling program provided the confidence limits of the test shall not exceed the upper confidence limits of a 3-tube, decimal dilution MPN test.
2. That a 12-tube, single dilution series can be used to routinely monitor closure lines.
3. That the volume inoculated in the 12-tube, single dilution test should be such that when half the tubes are positive, the MPN value would correspond to the value of the microbiological standard.

Requirements for sample volumes inoculated and numbers of tubes

Although there is no limit to the number of tubes that could be used in a single dilution MPN test, Workshop conferees agreed to the use of the 12-tube, single dilution test as an alternative to the 3 and 5-tube, decimal dilution tests. Specific criteria for determining sample inoculum were developed to meet the requirement to maintain the value for the microbiological standard at seventy (70) MPN/100 ml for total coliform organisms and fourteen (14) MPN/100 ml for fecal coliform organisms when six (6) of the twelve (12) tubes in the single dilution series are positive. The inoculum volumes required for the 12-tube, single dilution test have been calculated as 1 ml per tube and 5 ml per tube for total and fecal coliform organisms respectively. The range of determinate values for each sample volume is shown in Table 2.

Table 2 – MPN Table 12-tube, single dilution

1 ml Sample Inoculum	**1 ml Sample Inoculum**	**5 ml Sample Inoculum**	**5 ml Sample Inoculum**
Number of Positive Tubes	**MPN/100 ml**	**Number of Positive Tubes**	**MPN /100 ml**
0	<9	0	<2
1	9	1	2
2	18	2	4
3	29	3	6
4	41	4	8
5	54	5	11
6	70	6	14
7	88	7	18
8	110	8	22
9	139	9	28
10	179	10	36
11	248	11	50
12	>248	12	>50
	Range 9 to 248		Range 2 to 50

Similar calculations for the use of the 12-tube, single dilution MPN test to meet the Restricted area classification result in sample inocula of 0.1 ml per tube for the total coliforms and 0.8 ml per tube for fecal coliforms. The range of determinate values for each sample volume is shown in Table 3.

Table 3 – MPN Table 12-tube, single dilution

0.1 ml Sample Inoculum	0.1 ml Sample Inoculum	0.8 ml Sample Inoculum	0.8 ml Sample Inoculum
Number of Positive	MPN/100 ml	Number of Positive Tubes	MPN/100 ml
0	<87	0	<11
1	87	1	11
2	182	2	23
3	288	3	36
4	406	4	51
5	539	5	67
6	700	6	88
7	875	7	109
8	1099	8	137
9	1386	9	173
10	1792	10	224
11	2485	11	311
12	>2485	12	>311
	Range 87 to 2485		Range 11 to 311

Potential classification impact – NSSP variability criteria
The water quality criteria of the National Shellfish Sanitation Program (NSSP) consist of two (2) parts: the measure of central tendency (geometric mean) and a measure of variability (the ninetieth (90^{th}) percentile or upper 10%). In using a single dilution, the geometric mean value for the classification standard was required to remain at the level of both the 3 and 5-tube tests (70 MPN/100 ml for total coliforms and 14 MPN/100 ml for fecal coliform organisms in the Approved classification). The variability of the water quality data, however, depends on the sampling variability of the test itself and other factors related to changing conditions in the water being sampled. The NSSP has addressed this by using the upper two-sided 95% confidence limit for the value of the microbiological standard and designating it as the ninetieth (90^{th}) percentile/upper 10%.

For a 3-tube, decimal dilution MPN test, the upper two-sided 95% confidence limit for a value of seventy (70) MPN/100ml is 330 MPN/100 ml; for a 5-tube, decimal dilution MPN test, the upper two-sided 95% confidence limit for a value of seventy (70) is 230 MPN/100 ml. For a 12-tube, single dilution test, the upper two-sided 95% confidence limit for a value of 70 MPN/100 ml is 140 MPN/100 ml. For a value of 14 MPN/100 ml, the upper two-sided 95% confidence limits for 3 and 5-tube, decimal dilution tests are 49 MPN/100 ml and 43 MPN/100 ml respectively. For the 12-tube, single dilution test, the upper two-sided 95% confidence limit for a value of fourteen (14) MPN/100 ml is 28 MPN/100 ml. Hence, the water quality criteria for the 12-tube, single dilution MPN test for total coliforms in the Approved classification is a geometric mean value of seventy (70) MPN/100 ml and a ninetieth (90^{th}) percentile/upper 10% of 140 MPN/100 ml; for fecal coliforms, the NSSP water quality criteria for the Approved classification is a geometric mean value of fourteen (14) MPN/100 ml and a ninetieth (90^{th}) percentile/upper 10% of 28 MPN/100 ml.

The 5-tube, decimal dilution MPN test is more precise than the 3-tube, decimal dilution test and the greater precision is reflected in the reduced value of the ninetieth (90^{th}) percentile/upper 10%. Notwithstanding the difference in numerical values, each of these water quality criteria represents an equal probability that the waters being sampled are of the same sanitary quality. Since the 12-tube, single dilution MPN test has been found to be more precise than the 5-tube, decimal dilution test over

two-thirds of its range (from 3 to 11 tubes positive), the difference in the magnitude of the ninetieth (90^{th}) percentile/upper 10% values (28 versus 43) between the 12-tube and 5-tube tests is merely a function of the relative precision of the two tests and represents an equal probability that the waters being sampled are of the same sanitary quality. Thus, the impact on the water sampling program from the use of the 12- tube, single dilution test should be negligible if properly applied.

Restricted Areas
By extending the guidelines developed by Workshop conferees, the 12-tube, single dilution test MPN table (Table 3) could be used with geometric means of 700 MPN/100 ml for total coliforms and 88 MPN/100 ml for fecal coliforms. For these 12-tube, single dilution tests, the ninetieth (90^{th}) percentile/upper 10% would be an MPN of 1386/100 ml for total coliforms and an MPN of 173/100 ml for fecal coliforms.

Statistical Considerations
This method limits the range of determinate values obtainable and indeterminate values must be treated mathematically to ensure that they receive proper consideration. Thus, by convention, a total coliform MPN of <9 would be rendered as 8.9 MPN/100 ml; a fecal coliform MPN of <2 would be given as 1.9 MPN/100 ml. For the restricted classification, a total coliform MPN of <87 would become an MPN of 86 per 100 ml and the fecal coliform MPN of <11 would assume a value of 10 MPN/100 ml. High indeterminates would be treated in the same manner. A total coliform MPN of >248 would be rendered as 250 MPN/100 ml; the fecal coliform MPN of 50 would assume a value of 51 MPN/100 ml. In the restricted classification, the total coliform MPN of >2485 would become an MPN of 2500/100 ml; and, the fecal coliform MPN of >311 would assume a value of 320 MPN/100 ml.
Because of the limited count range of the single dilution MPN, the 12-tube, single dilution MPN test has been found to be inappropriate for use with the Systematic Random Sampling monitoring strategy. See Interpretation number 11-IV-02-102 for details.

Other References
U.S. DHEW/PHS/FDA Shellfish Sanitation Branch, *Proceedings Eighth National Shellfish Sanitation Workshop*, January 16-18, 1974, New Orleans, LA.

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Model Ordinance Reference:
Chapter IV @.02 D. (3) (a)
Chapter IV @.02 E. (3) (a)

Key Words:
Water Samples; Time Interval; Adverse Pollution Conditions; Remote Areas

Question:
What is the acceptable time interval between water quality samples collected from approved growing areas when using adverse pollution condition monitoring (IV @.02 E. (3) (a)), or an approved area designated as remote (IV @.02 D. (3) (a))?

Interpretation:
In accordance with Chapter IV @.02 E. (3) (a) and Chapter IV @.02 F. (6) (a), approved areas monitored under adverse pollution conditions shall have a minimum of five (5) samples collected annually from each station in the growing area. Samples shall be collected at intervals, which distribute them over a twelve (12) month period unless it can be demonstrated through data analysis that adverse pollution conditions are represented by a shorter time period. In this case, sampling may be limited to the reduced time period and shall include a minimum of five (5) samples representative of the adverse pollution condition. Sample collection shall be timed to distribute samples over the entire reduced monitoring period.

In accordance with Chapter IV @.02 D. (3) (a), approved areas designated as remote shall have a minimum of two (2) samples collected annually from each station in the area. Ideally, sample collection shall be timed to distribute samples over a twelve (12) month period. If the two-sample minimum is incorporated by the Authority, then sample collection shall occur at a frequency of one (1) sample every six (6) months.

It is always the option of the Authority to collect more than the minimum number of samples required by the Model Ordinance. When the Authority elects to collect more than the minimum requirement, it is recommended that additional samples be distributed over a twelve (12) month period. The Model Ordinance neither intends nor implies that sample collection be performed in a manner which results in multiple samples per sampling station visit or multiple samples over several consecutive days or weeks.

Rationale:
Although the Model Ordinance is not specific concerning the time interval between sample collections for adverse pollution condition monitoring in approved areas, or for approved areas designated as remote, it is a basic premise of the NSSP to coordinate sample collection to provide data representative of water quality over time. Collection of multiple samples on the same day or over brief time intervals negates the intent of the Model Ordinance and the Authority‘s ability to evaluate data associated with changing environmental conditions.

Supportive documentation is found in Chapter IV @.03 C. (3) (b) (ii), which states that for conditionally approved areas, "monthly water samples are required when the growing area is in the open status of its conditional classification." Here, emphasis is placed on the need to sample monthly, qualifying the Model Ordinance intent to sample at discrete time intervals necessary to provide representative temporal data. Chapter IV @.02 F. (6) (b) (iii), specifies the requirements for systematic random sampling, stating, "A minimum of six (6) random water samples shall be collected annually from each sample station in the growing area" and Chapter IV @.02 F. (6) (b) (ii) states that "Sample collection shall be scheduled sufficiently far in advance to support random collection with respect to environmental conditions." By design, this strategy provides for the sampling of an area over a twelve (12) month period to ensure collection under varying environmental conditions.

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Chapter IV @.02 D, E, F and G

Key Words:
Weighted ninetieth (90^{th}) Percentile, Adverse Pollution Condition, Systematic Random Sampling, Estimated ninetieth (90^{th}) Percentile

Question:
What is the procedure for determining the value of the ninetieth (90^{th}) percentile to be used in the analysis of sample data derived in the transition to a different MPN procedure?

Interpretation:
A weighted ninetieth (90^{th}) percentile value is calculated for each set of samples derived in the transition to a different MPN procedure.

Rationale: A number of States have availed themselves of the advantages afforded by the action of the 8^{th} National Shellfish Sanitation Workshop in allowing the use of a virtual limitless combination of tubes and dilutions in MPN procedures used in support of the National Shellfish Sanitation Program (NSSP). A change in the combination of tubes and/or dilutions from those traditionally used in the NSSP alters the precision or variability of the test and thus it's associated ninetieth (90^{th}) percentile. When a change in MPN procedures is instituted, new data with a different ninetieth (90^{th}) percentile must be phased into the existing sample database. During this phase-in period a "hybrid" ninetieth (90^{th}) percentile value must be calculated and used as the variability component of the bacteriological standard against which the variability of sample data is to be compared. This "hybrid" ninetieth (90^{th}) percentile value is calculated by weighting the relative contributions of each MPN method to the sample database. The resulting value is known as the weighted ninetieth (90^{th}) percentile. Weighted ninetieth (90^{th}) percentile values can be used equally effectively with either Adverse Pollution Condition (APC) or Systematic Random Sampling (SRS) regimes.

Calculations:

The value of the weighted ninetieth (90^{th}) percentile from a data set derived in the transition to a different MPN procedure is calculated in the following manner:

a. Convert the ninetieth (90^{th}) percentile values for both MPN procedures to their respective base 10 logarithmic values.
b. Multiply the logarithmic values for each MPN procedure by the number of samples in the database examined by that procedure.

c. Add these logarithmic values, then divide by the total number of samples examined.
d. Take the antilog of this value.
e. Round off conventionally to the nearest whole number.
f. This value is the weighted ninetieth (90^{th}) percentile against which sample data is compared.
g. Recalculate the weighted ninetieth (90^{th}) percentile when new data is added to the database.
h. Once all accumulated data is from the same MPN procedure and the transition in methodologies is complete, the corresponding ninetieth (90^{th}) percentile value for this MPN procedure is then used for comparing sample data.

Example 1

Data was gathered for a sampling station under the APC sampling regime. The growing area which encompasses this sampling station is in the approved classification. The first ten (10) samples in the database were examined by the traditional 5-tube, decimal dilution MPN test for fecal coliforms. The remaining five (5) samples required under APC sampling were analyzed by the 12-tube, single dilution MPN test for fecal coliforms. The ninetieth (90^{th}) percentile value for the 5-tube, decimal dilution MPN test for fecal coliforms is 43. The ninetieth (90^{th}) percentile value for the 12-tube, single dilution MPN test is 28. The weighted ninetieth (90^{th}) percentile value which results from this data will lie somewhere between the ninetieth (90^{th}) percentile values of the MPN procedures used. Its proximity to either method's ninetieth (90^{th}) percentile value will depend on the relative number of samples analyzed from each method. Since most of the samples in this example were derived from the 5-tube MPN test, the ninetieth (90^{th}) percentile value calculated will be weighted toward 43.

To calculate the weighted ninetieth (90^{th}) percentile for this data set:

a. The ninetieth (90^{th}) percentile values of 43 for the 5-tube, decimal dilution MPN test and 28 for the 12-tube, single dilution MPN test are converted to base 10 logarithms. This gives base 10 log values of 1.633 and 1.447 respectively.
b. The base 10 log values are then multiplied by the number of samples in the database examined by each MPN procedure used. Ten (10) of fifteen (15) samples were analyzed by the 5-tube, decimal dilution MPN test. The remaining five (5) of fifteen (15) were examined by the 12-tube, single dilution test. This gives 1.633 for the 5-tube test x ten (10) samples = 16.330 and 1.447 for the 12-tube, single dilution test x 5 samples = 7.235.
c. These values are added together and the resultant divided by the total number of samples in the database being used. Thus, 16.330 + 7.235 = 23.565, 23.565/15 =1.571.
d. The antilog of this value is taken. In this example, the antilog of 1.571 is 37.239.
e. The antilog value is rounded off to the nearest whole number which in this example is 37.
f. The weighted ninetieth (90^{th}) percentile for this data set is 37. Thirty-seven (37) is the ninetieth (90^{th}) percentile value which cannot be exceeded more than 10% of the time by the sample station data in this data set under the APC sampling regime for this station to remain in the approved classification status. When new data is added to the database of this sampling station, the value of the weighted ninetieth (90^{th}) percentile would have to be recalculated until the transition in methodologies is completed and all the data from this sampling station is derived from the same MPN procedure. At this time, the corresponding ninetieth (90^{th}) percentile value of 28 for the 12- tube, single dilution MPN procedure in use will be employed in comparisons with sample data.

Example 2

Data was derived from a sampling station under the SRS sampling regime. The growing area which encompasses this sampling station is also in the approved classification for **fecal coliforms**. The first eighteen (18) of thirty (30) samples were analyzed using the 5-tube, decimal dilution MPN test. The remaining twelve (12) of thirty (30) samples were examined using a 3-tube, decimal dilution MPN test. The ninetieth (90^{th}) percentile values for the 5-tube, decimal dilution test in the approved classification status is 43. That for the 3-tube, decimal dilution MPN test is 49. Again the value for the weighted ninetieth (90^{th}) percentile will be somewhere between the respective ninetieth (90^{th}) percentile values of both MPN methods. Its proximity to either is a function of the number of samples in the data set contributed by each MPN procedure. In this example, a somewhat greater number of samples were derived from use of the 5-tube, decimal dilution MPN test; so that, the value of the ninetieth (90^{th}) percentile will be weighted in that direction also.

To calculate the weighted ninetieth (90^{th}) percentile for this data set

a. The ninetieth (90^{th}) percentile values of 43 for the 5-tube, decimal dilution MPN test for **fecal coliforms** and 49 for the 3-tube, decimal dilution MPN test for **fecal coliforms** are converted to base 10 logs. This gives base 10 log values of 1.633 for the 5-tube, decimal dilution test and 1.690 for the 3-tube, decimal dilution MPN test.
b. These base 10 log values are then multiplied by the number of samples in the database analyzed by each MPN procedure. In this example, eighteen (18) of thirty (30) samples were examined by the 5-tube, decimal dilution MPN test: and, twelve (12) of thirty (30) samples were analyzed by the 3-tube, decimal dilution MPN test. This gives 1.633 for the 5-tube, decimal dilution MPN test x 18 samples = 29.394 and 1.690 for the 3-tube, decimal dilution MPN test x twelve (12) samples = 20.280.
c. These values are added together and the resultant divided by the total number of samples in the database being used. Thus, 29.394 + 20.280 =49.674, 49.674/30 = 1.656
d. The antilog of this value is determined. In this example, the antilog of 1.656 is 45.269.
e. This antilog value is rounded to the nearest whole number which in this example is 45.
f. The weighted ninetieth (90^{th}) percentile value for this data set is 45. Forty-five (45) is the value of the ninetieth (90^{th}) percentile which will be compared to the estimated ninetieth (90^{th}) percentile calculated from the data in the sample data set collected under the SRS sampling regime and examined using the two (2) different MPN methods. To remain in the approved status the estimated ninetieth (90^{th}) percentile calculated from this data set must be less than or equal to the value determined for the weighted ninetieth (90^{th}) percentile of the data set. Again the weighted ninetieth (90^{th}) percentile will have to be recalculated as new data becomes available. This recalculation must continue until the transition in methodologies is completed and all the data from this sampling station has been derived from the same MPN procedure. At this time, the corresponding ninetieth (90^{th}) percentile of 49 for the 3-tube, decimal dilution MPN procedure in use will be employed in comparisons to the estimated ninetieth (90^{th}) percentiles calculated directly from the sampling data.

Example 3

Data in this example was collected from a sampling station under the SRS sampling regime. This sampling station is in an area classified as restricted. The first twenty-four (24) of the thirty (30) samples collected were analyzed by the 5-tube, decimal dilution MPN test for **fecal coliforms**. The remaining six (6) samples of the thirty (30) collected were analyzed using a 5-tube, fivefold dilution MPN test for **fecal coliforms**. The ninetieth (90^{th}) percentile value for each of these MPN procedures is 260 and 190 respectively. The value of the weighted ninetieth (90^{th}) percentile for this data set will be somewhere between 190 and 260.

The proximity to either value will depend on the respective number of samples analyzed by each MPN method. In this example, most of the samples were derived from the 5-tube, decimal dilution MPN test. Consequently, the ninetieth (90^{th}) percentile value will be heavily weighted in that direction.

To calculate the weighted ninetieth (90^{th}) percentile for this data set:

a. The ninetieth (90^{th}) percentile values of 260 for the 5-tube, decimal dilution MPN test for **fecal coliforms** and 190 for the 5-tube, fivefold dilution MPN test for **fecal coliforms** are converted to base 10 logs. This gives a base 10 logarithmic value of 2.415 for the 5-tube, decimal dilution MPN test and 2.279 for the 5-tube, fivefold MPN test.
b. These base 10 log values are then multiplied by the number of samples in the database analyzed by each MPN procedure. In this example, the 5-tube, decimal dilution MPN was used in the analysis of twenty-four (24) of the thirty (30) samples while the 5-tube, fivefold dilution MPN was used to test the remaining six (6) samples. Hence, 2.415, the log ninetieth (90^{th}) percentile value for the 5-tube, decimal dilution MPN test is multiplied by twenty-four (24), the number of samples tested by this MPN procedure to give 57.960; and, 2.279, the log ninetieth (90^{th}) percentile value for the 5-tube, fivefold dilution MPN test is multiplied by six (6), the number of samples obtained using this MPN procedure to give 13.674.
c. These values are added together and subsequently divided by the total number of samples analyzed by both methods. In this example, 57.960 + 13.674 = 71.634, 71.634/30 = 2.388.
d. The antilog of this value is determined. In this example the antilog of 2.388 is 244.343.
e. This antilog is conventionally rounded to the nearest whole number which in this example is 244.
f. The weighted ninetieth (90^{th}) percentile value for the data set is 244. Two hundred forty-four (244) is the value of the ninetieth (90^{th}) percentile which will be compared to the estimated ninetieth (90^{th}) percentile calculated from the data in the sample data set collected under the SRS sampling regime and examined using the two (2) MPN methods. To remain in the restricted classification, the estimated ninetieth (90^{th}) percentile calculated from the data set will have to be less than or equal to the value of the weighted ninetieth (90^{th}) percentile obtained from the data set. This weighted ninetieth (90^{th}) percentile value will need to be recalculated as more data becomes available and until such time as the transition in methodologies is completed and all the samples have been derived from the same MPN procedure. When this occurs, the corresponding ninetieth (90^{th}) percentile of 190 for the 5-tube, fivefold dilution MPN procedure in use will be employed in comparisons to the estimated ninetieth (90^{th}) percentile calculated directly from the sampling data.

Example 4

Data in this example was collected from a sampling station under the APC sampling regime. This sampling station is in the approved classification and five (5) of fifteen (15) samples in the database were tested by the 5-tube, decimal dilution MPN test for total coliforms**.** The remaining ten (10) samples in the database were analyzed by the 3-tube, decimal dilution MPN test for total coliforms. The ninetieth (90^{th}) percentile value for each of these MPN tests were 230 and 330 respectively. The value of the weighted ninetieth (90^{th}) percentile will be somewhere between 230 and 330. Its proximity to either value depends on the respective number of samples analyzed by each MPN procedure. In this example, the preponderance of samples was tested by the 3-tube MPN procedure. As a result, the value of the ninetieth (90^{th}) percentile will be weighted more heavily toward 330.

To calculate the weighted ninetieth (90^{th}) percentile for this data:

a. The ninetieth (90^{th}) percentile values of 230 for the 5-tube, decimal dilution MPN test for total

coliforms and 330 for the 3-tube, decimal dilution MPN test for total coliforms are converted to base 10 logarithms. This gives base 10 log values of 2.362 and 2.519 respectively.

b. These base 10 log values are then multiplied by the number of samples in the database analyzed by each MPN procedure. In this example, five (5) of fifteen (15) samples in the database were analyzed by the 5-tube, decimal dilution MPN test. The remaining ten (10) of fifteen (15) samples were examined by the 3-tube, decimal dilution test. Thus, the base 10 log value of 2.362, the ninetieth (90^{th}) percentile of the 5-tube MPN procedure for total coliforms is multiplied by the five (5) samples tested by this MPN method to give 11.810. In addition, the base 10 log value of 2.519, the ninetieth (90^{th}) percentile of the 3-tube MPN test for total coliforms is multiplied by the ten (10) samples examined by this MPN procedure to give 25.190.
c. These values are added together and the resultant divided by the total number of samples in the database being analyzed. In this example, 11.810 + 25.190 = 37.000, 37.000/15 = 2.467.
d. The antilog of this value is determined. For this example, the antilog of 2.467 is 293.089
e. This antilog is rounded off to the nearest whole number which in this case is 293.
f. The weighted ninetieth (90^{th}) percentile for this data set is 293. Two hundred ninety three (293) is the value for the ninetieth (90^{th}) percentile that cannot be exceeded more than 10% of the time by this sampling station under APC for it to remain in approved classification status. The value for the weighted ninetieth (90^{th}) percentile must be recalculated as more data becomes available. This will continue until the transition in methodologies is completed and all samples in the database have been analyzed using the same MPN procedure. When this happens, the corresponding ninetieth (90^{th}) percentile of 330 for the 3-tube, decimal dilution MPN procedure in use will be employed in comparisons with the sample data.

Other References:

1. *Schaum's Outline Series Theory and Problems of Statistics*, Second Edition, 1994, McGraw Hill, Inc.
2. U.S. DHEW/PHS/FDA Shellfish Sanitation Branch, *Proceedings 8th National Shellfish Sanitation Workshop*, January 16-18, 1974, New Orleans, LA.

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Chapter IV @.02 F (5) Guidance Documents, Systematic Random Sampling Monitoring Strategy

Key Words:
Systematic Random Sampling, Estimated ninetieth (90^{th}) Percentile, Intermittent Nonpoint Pollution Events, 12-tube, single dilution MPN

Question:
Is it acceptable to apply the formula currently used in Systematic Random Sampling to calculate the estimated ninetieth (90^{th}) percentile of data derived from a 12-tube, single dilution MPN test?

Interpretation:
It is not acceptable to apply the formula currently used in Systematic Random Sampling to calculate the estimated ninetieth (90^{th}) percentile of data derived from a 12-tube, single dilution MPN test.

Rationale:
The purpose of the estimated ninetieth (90^{th}) percentile is to provide a tool to measure the impact of intermittent nonpoint pollution events on growing area water quality under the Systematic Random Sampling monitoring strategy. It does this by providing an estimate of the variability of the data. If water quality is affected by intermittent nonpoint pollution events, the effect of these events will be reflected in the variability of the data and through the use of suitable calculations this variability can be captured as the estimated ninetieth (90^{th}) percentile.

Currently the procedure for calculating the estimated ninetieth (90^{th}) percentile requires the use of at least thirty (30) samples. With a data set of this size, a significant impact on the variability of the data and as a consequence, its estimated ninetieth (90^{th}) percentile from the effects of intermittent nonpoint pollution events can only be detected by the occurrence of several high to very high bacterial counts in the data set. Therefore, in order to use the estimated ninetieth (90^{th}) percentile as intended, the method of bacterial enumeration must be capable of operating over a wide range in counts.

A 5-tube, decimal dilution MPN test operates over a count range of <2 to >1,600. The 3-tube, decimal dilution test operates over a count range of <3 to >1,100. Both of these MPN tests have a wide count range and are capable of measuring the higher count levels necessary for the estimated ninetieth (90^{th}) percentile to function. The 12-tube, single dilution MPN test on the other hand, operates over a count range of <9 to >248 for total coliforms and <2 to >50 for fecal coliforms. Both of these count ranges are quite limited and obviously are not capable of measuring the higher counts necessary for the estimated ninetieth (90^{th}) percentile to function in the same manner as the 5 and 3-tube, decimal dilution MPN tests.

The *Model Ordinance* requires the use of at least thirty (30) samples to calculate ninetieth (90^{th}) percentile values when using Systematic Random Sampling. With a data set of this size, it is impossible for the 12-tube, single dilution MPN test with its limited count range to measure bacterial densities when they occur at the levels necessary to demonstrate an impact from intermittent nonpoint pollution events. As a consequence, any significant effect on water quality that may occur as a result of these intermittent nonpoint pollution events is unlikely to be detected when using the 12-tube, single dilution MPN test for monitoring under Systematic Random Sampling. Therefore, the 12-tube, single dilution MPN test is inappropriate for

use with the Systematic Random Sampling monitoring strategy. Only test procedures which generate a broad range of counts should be used to monitor for the effects of intermittent nonpoint pollution events within the context of the Systematic Random Sampling strategy. Currently these testing procedures are limited to multiple dilution MPN tests and the mTEC membrane filter procedure when filtering multiple (half log) dilutions.

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Interpretation Number: 15-VIII-.03-100

Date: March 20, 1996

Revised: December 8, 2002

Model Ordinance Reference:
Chapter VIII. @.02

Key Words:
Vibrio vulnificus, matrix, AMMWT

Question:
What is the procedure for calculating the average monthly maximum water temperature (AMMWT) used in applying the *Vibrio vulnificus* control matrix?

Interpretation:
The authority shall determine, for each shellfish growing area, the AMMWT for each month using historical water temperature data for each of the previous five (5) years.
The procedure for calculating the AMMWT for each shellfish growing area is as follows:

1. List the maximum water temperature recorded for each day of the month.
2. Calculate the average maximum water temperature for the month using the daily water temperatures listed in step 1. **NOTE:** If water temperature data are not available for each day of the month, then use temperature data for those days it is available. These data shall be representative of water temperatures observed throughout the month.
3. Perform steps 1 and 2 for each month for each of the previous five (5) years.
4. Determine the AMMWT by calculating the mean of the five (5) average maximum water temperatures from step 3 for each month.

Rationale:
The procedure outlined above is consistent with the intent of the 1995 ISSC to calculate the AMMWT using maximum daily water temperatures, not the single warmest water temperature recorded during the month. This procedure is identical to that used to calculate average maximum monthly air temperatures (AMMAT) required under Chapter VIII. @.02.

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Interpretation Number: 15-XI-.01-100

Date: October 26, 1998

Revised: December 8, 2002

Model Ordinance Reference:
Chapter I @.02 H. (2) (c)-(e); Chapter XI 01.B. (2) and 01.C and 01.D; Chapter XII 01.B and 01.C; Chapter XIII 01.B. (2); Chapter XIV 01.B and 01.C

Key Words:
Time/Temperature abuse, Enforcement Follow-up, Microbiological testing

Question:
Is microbiological testing by the shellfish control authority a suitable means of determining whether a critical deficiency exists when a dealer fails to control shellstock or shucked product time/temperature exposure during storage or processing as specified in the above referenced sections of Chapters XI, XII, XIII, and XIV. If such a critical deficiency exists, is microbiological testing (i.e. where the product may be released if no microbiological contaminants are found at or above levels of concern) a suitable enforcement follow-up?

Interpretation:
Failure to comply with the time/temperature exposure conditions specified in the referenced sections of the Guide for the Control of Molluscan Shellfish Chapters XI, XII, XIII, and XIV constitutes a critical deficiency. Chapter X. 0l. C. (2) and (3) states that, even if processors choose to select critical limits other than those specified in these referenced sections, they must meet the conditions as components of good manufacturing practice. Violation of the temperature control requirements is a critical deficiency. When a critical deficiency is observed, product must be controlled to prevent contaminated or adulterated shellfish from reaching consumers. Microbiological testing is not a suitable means of determining whether the deficiency is a critical deficiency. There are no provisions in the NSSP for any rating other than critical for such deficiencies.

The referenced sections of Chapter I state that when a critical deficiency is detected during an inspection, the dealer must correct the deficiency during the inspection and must cease production affected by the deficiency until the deficiency is corrected. Failing that, the Shellfish Control Authority must immediately begin certification suspension or revocation proceedings. Additionally the Authority is required to ensure that contaminated or adulterated product does not reach the consumer.

A suitable correction for a time/temperature abused product is destruction or processing the product in such a way that the microbiological hazard is eliminated (e.g. thermal processing) and modifying plant operations in such a way that a reoccurrence of the deficiency is not likely (e.g. pre-chilling product, reducing the size of the shucking or finished product containers, adding ice to the product during processing, making adjustments to or repairs to mechanical cooling systems). If these kinds of corrections are not enacted during the course of the inspection, the Shellfish Control Authority must immediately initiate certification revocation or suspension proceedings.

Microbiological testing (i.e. where the product may be released if microbiological contaminants are not found at or above levels of concern) is not a suitable means of ensuring that contaminated or adulterated product does not reach the consumer. The sample size necessary to ensure that any one microbiological

contaminant is not present is prohibitively large, especially considering the low levels of organisms of concern and the typically high variability of the lot. Additionally, microbiological analysis will only provide information on the pathogen for which analysis was performed and low levels of indicator organisms is not a reliable assurance that pathogens are not present in the product.

Where the dealer fails to take the appropriate corrective action as outlined above and required by I.@.02 H. (2) (c), the shellfish Control Authority must initiate decertification procedures, as required by I.@.02 H. (2) (d), and must ensure that the product is removed from commerce or is processed to eliminate the hazard, consistent with I.@.02 H. (2) (e).

Rationale:
Shellfish is a potentially hazardous food, particularly since it is frequently consumed raw. Consequently, controls must be in place to prevent the growth of naturally occurring pathogens as well as pathogens that may be introduced into the product during processing. Rapid chilling and holding the product at refrigeration temperature are two of the most practical and effective means of controlling the microbial hazards in raw molluscan shellfish.

Naturally occurring *Vibrio* spp., such as *Vibrio vulnificus* and *Vibrio parahaemolyticus,* are human pathogens found in shellfish. During periods of warm water temperature, the number of these organisms may increase to high levels and further bioaccumulate in the shellfish during processing and storage. These organisms grow rapidly at temperatures of 70 ° F or above (one log increase in 2 hrs.). Conversely, little or no growth occurs at temperatures at or below 45 ° F. Therefore, it is critical for shellfish products to be rapidly chilled to and held at 45 ° F or less. Further, enteric pathogens may be introduced into the shellfish through improper handling during post-harvest practices (e.g. use of contaminated water for shellstock washing or wet storage) or during shucking and repacking operations. Growth of these pathogenic organisms may also be prevented by rapidly chilling the product to 45 ° F or less.

Other References:
1. 21 Code of Federal Regulations, Part 123 - Fish and Fishery Products, Government Printing Office, Washington , DC
2. 21 Code of Federal Regulations, Part 110 - Current Good manufacturing Practice in Manufacturing, Packing, or Holding Human Food, Government Printing Office, Washington , DC

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Model Ordinance Reference:
Chapter I. @.02H. (2) (c)-(e); Chapter XI. 02. A. (2); Chapter XI. 02. E. (4)

Key Words:
Ice, sanitary quality, stored, protected, adulteration

Question:
What are the factors affecting the sanitary quality of ice and actions that should be taken when ice is improperly stored, protected or subject to adulteration?

Interpretation:
Ice is a regulated food which is used or intended for use on molluscan shellfish either in-shell or shucked for human consumption. Ice must be protected from adulteration as defined in the Food, Drug and Cosmetic Act Section 402.

In accordance with the Guide for the Control of Molluscan Shellfish any ice used in the processing, storage or transport of shellstock or shucked shellfish shall be made on-site from potable water in a commercial machine; or received from a facility sanctioned by the appropriate regulatory authority. Ice must be stored in a safe and sanitary manner to prevent its contamination.

The dealer shall use only equipment and utensils, including approved plastic ware which is: (1) constructed in a manner and with materials that can be cleaned, sanitized, maintained or replaced in a manner to prevent contamination of ice and shellfish products; and, (2) free from any exposed screws, bolts, or rivet heads on food contact surfaces. The dealer shall assure that all joints on food contact surfaces: (1) have smooth easily cleanable surfaces; and (2) for stainless steel, are welded. "Item 12 - Ice: approved source, sanitary, protected" is designated as a Swing item and identified as either a Key or Critical deficiency (NSSP Standardized Shellfish Processing Plant Inspection Form (ISSC Form 93-01(A).)

Key Deficiency:
Applies when conditions may lead to adulteration of ice.

Critical Deficiency:
Applies when the ice is visibly adulterated.

Key Conditions:
The following conditions are representative of Key deficiencies:

- Improperly constructed, maintained, cleaned, and sanitized walk-in coolers, insulated rooms, or other storage containers;
- Improperly constructed, cleaned, sanitized and stored totes, scoops, shovels, or other utensils used in handling ice;
- Ice making machines not maintained or protected (reservoir).

Corrective Actions:
Ice storage unit:
- Discontinue the use;
- Set a correction schedule for cleaning, repair, or

replacement Ice handling equipment:
- Discontinue use, clean and sanitize; or
- Replace with approved

equipment Ice machines:
- Shut down and initiate cleaning and/or repair.

Critical Conditions:
The following conditions are representative of Critical conditions:
- Dirt or other debris such as insulation, or paint chips observed in the ice;
- Ice is observed to be exposed to mold, slime, rust, condensate from cooler evaporator units, or other sources of adulteration.
- Ice exposed to foot traffic and observed to be used in direct contact with product;
- Stored food items in the ice.

Critical deficiency corrective action:
1. Discard ice;
2. Repair or replace ice storage units and equipment which caused the ice to be adulterated, or obtain ice from another source;
3. Destroy all product exposed to ice produced under conditions of adulteration

Where the dealer fails to take the appropriate corrective action as outlined above and required by Chapter I. @02. H. (2) (a), the shellfish Control Authority must initiate decertification procedures, as required by Chapter I. @02. H. (2) (b), and must ensure that the product is removed from commerce or is processed to eliminate the hazard, consistent with Chapter I. @02. H. (2) (c).

Rationale:
Ice is considered a food when used in direct contact with shellfish. As a food ice must be stored and handled in the same sanitary manner as any other food product. No food product shall enter into commerce that is either injurious to health or is otherwise adulterated. Contaminated ice used in direct contact with shellfish will cause the shellfish to be adulterated. Each shellfish dealer must protect molluscan bivalves and food contact surfaces from adulteration with lubricants, fuel, pesticides, cleaning compounds, sanitizing agents, condensate and other chemical, physical and biological contaminants.

All materials used in equipment, utensils, walk in coolers, or rooms used to make or store ice must meet food contact surface requirements. A preventive or corrective measure should be used to control an identified food safety hazard to ensure that no product shall enter into commerce that is either injurious to health or is otherwise adulterated.

Other References:
1. Food and Drug Administration, "Federal Food, Drug and Cosmetic Act", Government Printing Office, Washington, DC
2. Food and Drug Administration, "1997 Food Code", Washington, DC.
3. 21 Code of Federal Regulations, Part 123 - Fish and Fishery Products, Government Printing Office, Washington, DC
4. 21 Code of Federal Regulations, Part 110 - Current Good Manufacturing Practice in Manufacturing, Packing, or Holding Human Food, Government Printing Office, Washington,

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Interpretation Number: 15-XI-.02-101

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Revised: December 8, 2002

Model Ordinance Reference:
Chapter XI. 02. B. (1); Chapter XI. 02. B. (2)

Key Words:
Food contact surfaces, cleaning, sanitizing, equipment construction

Question:

1) What is a food contact surface**?**
2) What constitutes effective cleaning and sanitizing of a food contact surface?
3) What constitutes acceptable construction of shellstock grinders and parts thereof are considered food contact surfaces?

Interpretation:
1) A food contact surface means a surface of equipment or a utensil with which food normally comes into contact; or a surface of equipment or a utensil from which food or liquid may drain, drip, or splash into a food; or onto a surface normally in contact with food. Food contact surfaces include, but are not limited to, equipment and utensils such as; shucking knives and handles, shucking hammers and handles, shucking blocks, ice scoops and shovels, ice bins, skimmers, blower tanks, shucking pails, shellstock grinders.

2) Food-contact surface shall be clean to sight and touch. Cleaning and sanitizing shall occur prior to use each day and any time during use when contamination may have occurred. At a minimum, food contact surfaces shall be cleaned and sanitized every four (4) hours. More frequent cleaning may be necessary depending on the characteristics of the equipment and its use and the amount of food residue accumulation. At the end of each day, food contact equipment and utensils shall be washed and rinsed.

Food contact surfaces shall be effectively washed to remove or completely loosen soils by manual or mechanical means such as the application of detergents; hot water; brushes; or high pressure sprays. If washing in sink compartments is impractical such as when equipment is fixed or utensils are too large, washing shall be done using an alternative manual procedure. In such instances, washing shall be facilitated by 1) disassembling equipment as necessary to allow access of the detergent solution to all parts and equipment components and 2) utensils shall be scraped or rough cleaned to remove food particle accumulation.

The cleaning of food contact surfaces shall occur prior to sanitizing in order for the sanitizer to be effective in destroying vegetative bacteria. Sanitizers may be applied by immersion, spraying or brushing. Sanitizer concentration shall be in accordance with the manufacturer's directions on the label.

3) Parts of a shellstock grinder which are considered food contact surfaces include; the blade, the area behind the blade including the motor shaft from the blade to the motor housing, and the inside surface of the housing or cover surrounding the blade. These food contact parts shall be manufactured from high impact materials that are easily cleanable and non-corrosive. The grinder must be constructed to be easily disassembled and assembled to facilitate inspection, maintenance, cleaning, and sanitizing.

Guidelines for grinder construction:

1. The motor shaft should be of corrosion resistant material.
2. Juncture point where the motor shaft enters the blade chamber must be sealed to reduce dirt and detritus deposition around the shaft.
3. The blade must be made from a single piece of high impact non-corrosive material. Blade teeth must be an integral part of the blade, or if grinding surfaces are used instead of teeth, they must be welded to the face of the blade with all welds ground smooth.
4. The housing around the blade assembly must be constructed of material that is corrosion resistant.
5. Bolts or screws must be constructed of corrosion resistant material to prevent rust and corrosion.
6. The inside surface of the blade housing must be smooth, and if welded ground smooth for easy cleaning.
7. The blade housing must be designed with an easily removable cover that will open up the entire blade assembly area to facilitate inspection, cleaning, sanitizing, and maintenance.

Rationale:

Each shellfish dealer is responsible for assuring that all food contact equipment and utensils meet the design, construction, repair, and cleaning requirements of the NSSP, Guide for the Control of Molluscan Shellfish. Food contact surfaces must be cleaned and sanitized at a minimum frequency and in accordance with proper procedures to prevent contamination of shellfish by microbial pathogens and chemicals.

Consistent with the FDA Food Code, cleaning and sanitizing shall occur at least every four (4) hours and where necessary more often, depending on the accumulation of food debris or exposure to other contaminants. Under the NSSP Guide for the Control of Molluscan Shellfish and 21 CFR, Part 123, shellfish dealers are responsible for monitoring and maintaining records of the cleaning and sanitizing of food contact surfaces.

Other References:

1. 21 Code of Federal Regulations, Part 110 - Current Good Manufacturing Practice in Manufacturing, Packing, or Holding Human Food, U.S. Food and Drug Administration.
2. 21 Code of Federal Regulations, Part 123 - Fish and Fishery Products, U.S. Food and Drug Administration.
3. 1997 Food Code, U.S. Food and Drug Administration.
4. Food Equipment American National Standard NSF International Standard ANSI/NSF, NSF International, Ann Arbor, MI, 48113.

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Date: February 14, 2001

Revised: December 8, 2002

Model Ordinance Reference:
Chapter XV. 03. J

Key Words:
Sample Volume, Fecal Coliform Counts, MPN Table and Count Range

Question:
What sample volume is inoculated in the 12-tube, single dilution MPN test for end product depurated shellfish samples?

How are fecal coliform counts determined using the 12-tube, single dilution MPN test for end product depurated shellfish?

Interpretation:
Two (2) mls (1 gram) of a 1:1 dilution of shellfish homogenate is inoculated into each tube of single strength lauryl tryptose presumptive broth in the 12-tube, single dilution MPN test for end product depurated shellfish samples. Inoculated tubes are incubated in an air incubator at 35 °C for 24 hours. Any gas positive presumptive broth tubes are then subcultured to EC medium and incubated in a water bath at 44.5 °C for 24 hours. The presence of any amount of gas or effervescence in the EC tubes constitutes a positive test. Fecal coliform counts are read from the MPN Table below and reported as MPN/100 grams.

MPN Table for End-product Depurated Shellfish Samples

Number of Positive Tubes	MPN/100 grams
0	< 9.0
1	9.0
2	18
3	29
4	41
5	54
6	70
7	88
8	110
9	139
10	179
11	248
12	>248
	Count range 9 to 248

Rationale:
The use of the 12-tube, single dilution MPN test for end-product depurated shellfish was established as an acceptable method of analysis with the ISSC's adoption of the rewrite of Model Ordinance, Chapter XV, the Depuration Chapter in 1998. However, no specific guidance was provided on sample volumes to be examined or how fecal coliform counts were to be determined. Since the volume of sample inoculated in a single dilution MPN test controls the range of counts that can be determined, it is essential that an appropriate volume be inoculated to encompass the count range prescribed as the critical limits for depuration plant performance listed for all shellfish species encountered.

The inoculation of two (2) ml (yielding 1 gram) of sample from an initial 1:1 dilution of shellfish homogenate into each tube of the 12-tube, single dilution MPN produces a range of counts from 9 to 248. This range is sufficient to cover the critical limits of performance of all shellfish types listed in Chapter XV. 03. J.

Remarks:
Comments received from the review of the draft version of Interpretation Chapter XV. 03. J indicated that the content of the Interpretation was too broad to be dealt with effectively in a single Interpretation. For this reason, this second Interpretation was developed from information presented in the first concerning the correct application of the single dilution MPN test to end product depurated shellfish.

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Section IX. History of the National Shellfish Sanitation Program

Introduction

The NSSP was developed in 1925 when the U. S. Public Health Service responded to a request for assistance from local and State public health officials in controlling disease associated with the consumption of raw shellfish (oysters, clams, and mussels).

The public health control procedures established by the Public Health Service were dependent on the cooperative and voluntary efforts of State regulatory agencies. These efforts were augmented by the assistance and advice of the Public Health Service (now the Food and Drug Administration) and the voluntary participation of the shellfish industry. These three (3) parties combined to form a tripartite cooperative program. The guidelines of the program have evolved into the NSSP Guide for the Control of Molluscan Shellfish which is managed and updated by the Interstate Shellfish Sanitation Conference (ISSC).

Declaration of Principles

Oysters, clams, and mussels are unique foods which have been enjoyed by consumers for many years. The popularity of shellfish as a food can be traced through several centuries of American history. To early settlers, the food resources of the sea were one of the most valuable and readily usable of the natural resources, particularly from the estuaries. It is not surprising that shellfish were foremost among their staple food items.

The value of these renewable natural resources to the early settlers was reflected in colonial legislation designed to encourage their wise use. Over 300 years ago in 1658, the Dutch Council of New Amsterdam passed an ordinance regulating the taking of oysters from the East River. Other early legislation, including that of New York (1715), New Jersey (1730), and Rhode Island (1734), was designed to regulate harvesting, presumably as conservation measures to guarantee a continuing supply.

Public health controls of shellfish became a national concern in the U.S. in the late nineteenth and early twentieth century when public health authorities noted a large number of illnesses associated with consuming raw oysters, clams, and mussels. These shellfish-associated outbreaks were also medically recorded in other parts of the world, most notably in European countries. During the winter of 1924, there occurred a widespread typhoid fever outbreak, with cases in New York, Chicago, and Washington, D.C., which was finally traced to sewage polluted oysters. Local and State public health officials and the shellfish industry became sufficiently alarmed over this outbreak to request that the Surgeon General of the United States Public Health Service develop necessary control measures to ensure a safe shellfish supply to the consuming public.

In accordance with this request, the Surgeon General called a conference of representatives from State and municipal health authorities, State conservation commissions, the Public Health Service and its Bureau of Chemistry (later to become the Food and Drug Administration), the Bureau of Commercial Fisheries (now National Marine Fisheries Service) and the shellfish industry. This historic conference was held in Washington, D.C. on February 19, 1925.

The members of the conference recommended eight (8) resolutions for the sanitary control of the oyster industry. These included:

> "The beds on which shellfish are grown must be determined, inspected, and controlled by some official State agency and the U.S. Public Health Service."
>
> "The plants in which shellfish are shucked or otherwise prepared or packed by the shipper must be inspected and controlled by some official State agency and the U.S. Public Health Service."
>
> "There must be such governmental supervision and such trade organization as will make plain the source of shellfish and will prevent shellfish from one source being substituted for those from another source. This will be chiefly a problem of the individual State."
>
> "The methods of shipping must be supervised, inspected, controlled and approved by the proper official Federal and State agency."
>
> "The product must conform to an established bacterial standard and must meet Federal, State, and local laws and regulations relative to salinity, water content, and food proportion and conform to the Pure Food Laws standards."

The conference also established a committee to develop further necessary guidelines to recommend control practices for the sanitary control of the shellfish industry.

The basic concepts in formulating a program of national public health controls were reiterated by the Surgeon General in his letter of August 12, 1925, to State health officers and all others concerned. This letter set forth the following understandings:

1. The Public Health Service considers that the responsibility for the sanitary control of the shellfish industry rests chiefly upon the individual States; and that the requisite coordination and uniformity of control may best be achieved by mutual agreement among the States, with the assistance and cooperation of the Public Health Service..."
2. In accordance with this principle, it is considered that each producing State is directly responsible for the effective regulation of all production and handling of shellfish within its confines, not merely for the protection of its own citizens, but equally for safeguarding such of its product as goes to other States..."
3. In order that each State may have full information concerning the measures carried out in other States, the Public Health Service will undertake systematic surveys of the machinery and efficiency of sanitary control as actually established in each producing State, and will report thereon for the information of the authorities of other States. It is believed that, in addition to furnishing valuable information, these reports will have an important influence in stimulating the development of better sanitary control and in promoting substantial uniformity on a higher plane."
4. The officers of the Public Health Service assigned to this survey work will assist the State agencies in determining their sanitary problems, in formulating plans for adequate sanitary control, and in making actual sanitary surveys as far as practicable."
5. In addition to the above, the Public Health Service will continue to extend the services which it is already rendering, especially in conducting scientific investigations of fundamental importance to control, and in serving as a clearinghouse for the interchange of information and the discussion of policies between State authorities."

To implement this program, the members of the 1925 conference agreed that the producing States would issue "Certificates," i.e., a permit to operate, to shellfish shippers that meet agreed upon sanitary standards. The Public Health Service would serve as a clearinghouse for information on the effectiveness of the State control programs. This clearinghouse responsibility was met initially through issuance of a periodic "Progress Report on Shellfish Sanitation" describing the shellfish sanitation program in each State. This procedure was subsequently abandoned in favor of a "program endorsement" concept. Under this concept, the Public Health Service made a continuing appraisal of each State's shellfish sanitation program to determine if the control measures were in substantial accord with the provisions of the current "Manual of Recommended Practice for Sanitary Control of the Shellfish Industry." The Public Health Service also published a list of all shellfish shippers certified by those States that maintained "satisfactory" control programs.

The procedures used by the Public Health Service in fulfillment of its obligations under the Public Health Service Act resulted from an understanding that implementation and enforcement of the necessary public health controls could best be accomplished under State laws with Federal technical support and industry participation. The National Shellfish Sanitation Program is dependent entirely upon the States adopting the recommended requirements and the cooperative and voluntary efforts of State regulatory agencies and the shellfish industry.

National Shellfish Sanitation Program

The NSSP developed from public health principles and Program controls formulated at the original conference on shellfish sanitation called by the Surgeon General of the United States Public Health Service in 1925. These fundamental components were described in a supplement to *Public Health Reports, Report of Committee on Sanitary Control of the Shellfish Industry in the United States* (Frost, 1925)

The public health control procedures established by the Public Health Service were dependent on the cooperative and voluntary efforts of State regulatory agencies. These efforts were augmented by the assistance and advice of the Public Health Service (replaced by the Food and Drug Administration) and the voluntary participation of the shellfish industry. These three (3) parties combined to form a tripartite cooperative program.

To carry out this cooperative control program, each partner accepted responsibility for certain procedures.

Each shellfish shipping State adopted adequate laws and regulations for sanitary control of the shellfish industry, completed sanitary surveys of harvest areas, delineated and patrolled restricted areas, inspected shellfish plants, and conducted such additional inspections, laboratory investigations, and control measures as were necessary to ensure that the shellfish reaching the consumer had been grown, harvested and processed in a sanitary manner. The State annually issued numbered certificates to shellfish dealers who complied with the agreed-upon sanitary standards, and forwarded copies of the interstate certificates to the Food and Drug Administration (FDA).

The FDA made an annual review of each State Shellfish Control Program including the inspection of a representative number of shellfish processing plants. On the basis of the information thus obtained, the FDA determined the degree of conformity the State Control Program had with the NSSP. For the information of health authorities and others concerned, the FDA published a monthly list of valid interstate shellfish shipper certificates.

The shellfish industry cooperated by obtaining shellfish from safe sources, by providing plants which met the agreed upon sanitary standards, by maintaining sanitary operating conditions, by placing the proper certificate number on each package of shellfish, and by keeping and making available to the control authorities records which showed the origin and disposition of all shellfish.

Although the basic public health principles of the NSSP have remained unchanged, program procedures have been updated and improved upon at periodic intervals. The original 1925 "Report of Committee on Sanitary Control of the Shellfish Industry in the United States" was revised and reissued in 1937 and again in 1946. The document was then divided into two parts Part II entitled "Sanitation of Harvesting and Processing of Shellfish" was issued in 1957 and in 1959, Part I, "Sanitation of Shellfish Growing Areas." The need for a specialized program of this nature was reaffirmed by the cooperating members at the First National Shellfish Sanitation Workshop held in Washington, D.C., (Jensen, 1954) and at subsequent National Shellfish Sanitation Workshops (Jensen, 1956, 1958, 1961; Houser, 1964). A more complete summary of the history and evolution of the NSSP and its early approaches to resolution of shellfish sanitation issues can be found in David Clem's historical overview (Clem, 1994).

In the 1940's, the NSSP moved beyond its original 1925 objective of ensuring that shellfish shipped in interstate commerce were safe for human consumption. Paralytic Shellfish Poison (PSP) became a matter of public health concern and requirements were added to address this public health hazard. In 1957, when it was determined that shellfish could concentrate certain radionuclides, the procedures were revised to include public health controls for the pollutant. In the 1960's and 1970's, the program was again revised to address public health concern associated with heavy metals and pesticides.

Additional recommendations from the States and industry resulted in the 1965 revision of the Shellfish Sanitation Manual. This revision was prepared in cooperation with the Shellfish Control Authorities in all coastal States, food control authorities in the inland States, interested Federal agencies, Canadian Federal departments, the Oyster Institute of North America, the Pacific Coast Oyster Growers Association, and the Oyster Growers and Dealers Association of North America.

In 1968, the Sixth National Shellfish Sanitation Workshop was held (Morrison, 1969). Recommendations for further revisions to the 1965 Manual were made and accepted by Workshop participants. This Workshop was structured around twelve (12) task forces that were assigned specific topics to examine and develop recommendations for discussion by all workshop participants. This approach to examining and discussing large numbers of issues was proved successful and was recommended for use in future Workshops.

The shellfish sanitation program responsibilities assigned to the Assistant Secretary for Health, Department of Health, Education and Welfare were delegated to the Commissioner of Food and Drugs in late 1968. The FDA continued to sponsor the National Shellfish Sanitation Workshops (Ratcliffe, 1971; Wilt, 1974, 1975 and 1977). Proceedings from these Workshops contained additional recommendations for revisions to the 1965 Manual of Operations.

On June 19, 1975, the FDA proposed National Shellfish Safety Program Regulations in the *Federal Register* (FDA, 1975). There was considerable discussion at the 1975 and 1977 Workshops concerning these proposed regulations. After evaluation of the comments received as a result of the proposed rules, the FDA determined that promulgating Federal Regulations would not likely achieve NSSP goals. Subsequently, FDA decided revision of the 1965 Manual of Operations was the best approach for strengthening the NSSP. (See Federal Register of February 26, 1985, 50 F.R. 7797)

During this period, many Authorities began questioning the uniformity and effectiveness of shellfish programs in other States. These States and FDA began exploring methods for strengthening the NSSP that would not involve Federal regulations. In reviewing other approaches, it was noted that since 1950 the National Conference of Interstate Milk Shippers (NCIMS), a successful voluntary public health program, has been successful in assuring a nationwide safe and wholesome milk supply. The NCIMS was consulted for direction and advice.

The success of the NCIMS program prompted State shellfish control officials and FDA to select the NCIMS program as a model for developing a shellfish organization. In 1982, a delegation of State officials from 22 States met in Annapolis, Maryland and formed the Interstate Shellfish Sanitation Conference (ISSC). The ISSC is composed of State shellfish regulatory officials, industry officials, FDA, and other Federal agencies.

The ISSC organization provides the forum for State regulatory officials to establish uniform National guidelines and to exchange information regarding sources of safe shellfish. The first annual meeting was held in New Orleans, Louisiana in August 1983. At this conference, the ISSC adopted the 1965 NSSP Manuals of Operation, as well as formal procedures for adopting changes to the Manuals. These documents provided the basis for an Interstate Shellfish Sanitation Program (ISSP). In March 1984, FDA entered into a Memorandum of Understanding (MOU) with the ISSC. The MOU formalized the FDA's relationship with the ISSC and established the ISSC as a Federal-State-industry cooperative body. The ISSP, acknowledged in the 1984 MOU, is a set of guidelines for the sanitary control of shellfish, adequate to ensure that shellfish will be safe and sanitary.

At its second annual meeting in Orlando, Florida in August 1984, the ISSC accepted for review a revision of Part I of the 1965 NSSP Manual of Operations. At the third annual meeting in Cherry Hill, New Jersey, in August, 1985, the ISSC adopted an updated Part I of the NSSP Manual of Operations (published in 1986), and accepted for review a revision of Part II of the 1965 NSSP Manual. In preparing the draft revision of the 1965 NSSP Manual of Operations, FDA relied principally on the following sources:

1. The draft revision of the Proposed National Shellfish Safety Program Regulations, Part 951;
2. The 1965 NSSP *Manual of Operations, Part I, Sanitation of Growing Waters; Part II, Sanitation of the Harvesting and Processing of Shellfish*; and *Part III, Appraisal of State Shellfish Sanitation Programs*, U.S. Department of Health, Education, and Welfare, Public Health Service Publication No. 33;
3. The National Shellfish Sanitation Program Workshop Proceedings for 1968, 1971, 1973, 1974, and 1977;
4. The Environmental Protection Agency rules and regulations (40 CFR Parts 400, et seq.) concerning water pollution control and shellfish waters;
5. Other Federal laws and regulations concerning quality of shellfish and shellfish growing areas;
6. Existing State rules and regulations concerning shellfish growing area control and water quality criteria;
7. Analytical methods accepted by the American Public Health Association, Association of Official Analytical Chemists, American Society of Testing Materials, and other voluntary standard-setting organizations relating to shellfish and shellfish waters; and
8. Recommendations from the Interstate Shellfish Sanitation Conference.

Developing the updated Manual was a cooperative effort between FDA and the ISSC. Initial drafts were prepared by FDA and presented to the ISSC and other interested parties for review and comment.

Comments were incorporated into drafts after consultation with the ISSC, and the final revision was presented to the ISSC for formal endorsement in 1986. In updating the 1965 Manual, the harvesting and the processing of shellfish continued to be recognized as two (2) distinct phases of operation in the shellfish industry. Therefore, the updated Manual was published in two parts; Part I: *Sanitation of Shellfish Growing Areas* (1986); and Part II: *Sanitation of the Harvesting, Processing and Distribution of Shellfish* (1987). Part I of the Manual continued as a guide for preparing State shellfish laws and regulations pertaining to sanitary control of shellfish harvest area classification, laboratory procedures, relaying, patrol operations and marine biotoxin. Part II of the Manual continued as a guide for operating, inspecting and certifying shellfish shippers, processors and depuration facilities; and for controlling interstate shipments of shellfish. Part III: *Public Health Service Appraisal of State Shellfish Sanitation Programs* was discontinued by the FDA.

In addition to setting forth the principles and requirements for the sanitary control of shellfish produced and shipped in interstate commerce in the U.S., the updated Manual was intended to be used by the States to control the harvesting and handling of shellfish for recreational and intrastate commercial use. Most coastal States believe that consumers residing in their State should be provided equal public health protection, as are consumers in other States under the interstate certification program. To accomplish this, States may apply the same water quality and harvesting restrictions on non-interstate shellfish activities as on interstate activities. Having uniform intra and interstate programs also greatly facilitates the effective implementation and regulation of all shellfish harvesting activities, and results in the most efficient utilization of public health resources.

The updated Manual was also to be used by FDA as the basis for evaluating foreign shellfish sanitation programs. To accomplish this, FDA seeks to establish international MOUs with official agencies in those foreign countries that wish to export shellfish to the U.S. An MOU is established after the foreign government demonstrates to FDA that the government has laws or regulations equivalent to those published in the Manual, and that the foreign program was supported by trained personnel, laboratory facilities, and other resources as may be necessary to exercise control over the export shellfish industry. Once a country has an effective MOU, the Shellfish Control Authority submits certificates of their certified shellfish dealers to the FDA. The FDA publishes the names of these certified shellfish shippers in the Interstate Certified Shellfish Shippers List (ICSSL) as an approved source of shellfish.

In the years 1986 through 1995, under its 1984 MOU with the Interstate Shellfish Sanitation Conference (ISSC), the FDA published seven revisions of the Manual. Between 1995 and 2003, the ISSC/FDA has published two (2) revisions of the NSSP Guide for the Control of Molluscan Shellfish. The revisions were the result of the findings and recommendations from the annual meetings of the ISSC and reflected mutual FDA and ISSC concurrence. A full listing of all editions of the Manual of Operations for the NSSP can be found in the reference portion of this section.

The intent in establishing the ISSP Program was to modify the Manuals into a model ordinance format and include the ordinance with other shellfish related documents and procedures into an ISSP Handbook.

Interstate Shellfish Sanitation Program

During development of the ISSC, FDA, State regulatory officials, and the industry worked diligently to establish uniform guidelines and to exchange reliable information on sources of safe shellfish, and to provide revisions to the NSSP Manual as necessary through formal ISSC procedures. These efforts have been conducted under the umbrella of the March 1984 MOU) between the FDA and the ISSC. The

Memorandum formally established an FDA cooperative relationship with both the States and shellfish industry. The ISSC continues to play an important role in assuring that uniform shellfish control measures are adopted, and that those measures are enforced consistently by State regulatory authorities.

One of the foremost goals of the ISSC has been the adoption of a Model Ordinance which would embody the principles and requirements of the ISSP. Adoption of the Model Ordinance by each of the ISSC participating States implies commitment by each State to provide the necessary legal authority and resources to implement these regulatory requirements. Adoption also ensures uniformity across State boundaries and enhances public confidence in shellfish product.

Development of the Model Ordinance began in 1987 with the establishment of the ISSC Model Ordinance Committee, which included representatives of the FDA, the States and the industry. The Model Ordinance Committee worked to incorporate the NSSP Manual into the format of regulation and to resolve inconsistencies within the Manual. The initial draft Ordinance was presented to and adopted by the ISSC at its 1992 meeting. The FDA responded with comments and requested development of a strategy for the transition from the NSSP Manual to the Model Ordinance as the basis for the NSSP and for use by FDA in reviewing State Shellfish Sanitation Programs.

The ISSC recognized the importance of retaining many of the elements of the NSSP Manual that should not be incorporated into an ordinance. To accomplish this, the Model Ordinance Committee recommended development of the Interstate Shellfish Sanitation Program Handbook which would include, in addition to the Model Ordinance, guidance documents concerning important components of the NSSP, references, public health reasons for NSSP requirements, and procedures which support or are used in the NSSP. The ISSC Constitution, By-laws and Procedures were revised to recognize an Interstate Shellfish Sanitation Program (ISSP) and its Model Ordinance as replacing the NSSP on January 1, 1998, as the effective rules governing participation in the ISSC. However, further discussions by the ISSC Executive Board and FDA regarding recognition and identify of the Program have resulted in retention of the National Shellfish Sanitation Program title hereafter referred to as the NSSP.

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