United States ENVIRONMENTAL PROTECTION AGENCY Washington, DC 20460	AGENCY USE ONLY OMB Control No. 2060-0226 EPA Form No. 1264-14 (Rev. July 2020)
SNAP INFORMATION NOTICE	Expires:
When completed send CBI and public versions of this form and attachments electronically via CD or USB drive (preferred), or print to:	Date of Receipt: Case Number:

Via US Postal Service: SNAP Document Control Officer U.S. EPA Mail Code: 6205T 1200 Pennsylvania Ave, NW Washington DC 20460	Via Delivery Service: SNAP Document Control Officer U.S. EPA Stratospheric Protection Division 4th Floor, 4355FF (MC 6205T) 1201 Constitution Ave., NW Washington, DC 20004

Part I: INTRODUCTION AND CBI INFORMATION

Section A: Introduction

GENERAL INSTRUCTIONS

This form may be used to submit information under the Significant New Alternatives Policy (SNAP) program for the review of alternatives to Class I and Class II ozone-depleting substances (ODS) under Section 612 of the Clean Air Act. Submitters are required to provide this information on new substitutes or new end-uses of existing substitutes to assist the Agency in assessing the acceptability of chemicals or processes that are considered alternatives in sectors, end-uses, products, and/or equipment that use ODS. Additionally, submitters may voluntarily provide this information on new substitutes or new end-uses of existing substitutes to assist the Agency in assessing the acceptability of chemicals or processes that are considered alternatives in sectors that previously used ODS. A separate notice must be filed for each alternative you are submitting. You may submit a single notice for multiple uses of the same alternative. If the alternative is a new chemical substance, you must submit a Premanufacturing Notice (PMN) to EPA's New Chemicals Program and the TSCA/SNAP Addendum form to SNAP.

Please visit the SNAP website for instructions and frequently asked questions: https://www.epa.gov/snap/submit-snap-substitute.

This form contains a Response Checker that identifies questions that are missing responses. Please review the questions that are missing responses carefully to ensure that all required information is provided before submitting this form to EPA. Please note that this checker is not an indicator of whether EPA will consider the submission complete, but rather, this checker is an indicator of whether all questions have been answered prior to submission.

Select the appropriate box identifying the type of submission submitted (Select only one box):

New alternative (substance, formulation or technology) not previously listed as acceptable, acceptable subject to use conditions or unacceptable under SNAP.	
New end-use or application of substitute previously listed as acceptable, acceptable subject to use conditions or unacceptable under SNAP.	

Section B: Identification of Alternatives

1. Name of Alternative. *Note: Additional information about the proposed substitute must be provided in Part III, Section A.*	**CBI**

2. Indicate the sector and end-use for which you are submitting this SNAP Information Notice.

Sector(s)	End-use(s)	If you chose "Other" as an end-use, please specify here.	CBI

Please complete the following tabs of this submission form (click to go to each section):

Section C: Confidentiality Claims

Anyone submitting data which are to be treated as Clean Air Act Confidential Business Information (CBI), must assert and substantiate a claim of confidentiality at the time of the initial submission. All information claimed as CBI will be treated in a manner consistent with 40 CFR Part 2, Subpart B. Failure to assert and substantiate a claim of confidentiality at the time of submission may result in disclosure of information by the Agency without further notice.

To assert a claim on this form, [bracket] the information you claim as confidential and mark the confidential box in the column on the right-side of the corresponding row. **If any information is claimed as confidential, you must substantiate those claims below and provide both the confidential version and a "sanitized" version of this form, including attachments, to EPA at the time of the initial submission.**

Information submitted as CBI may be accessed by companies designated as Authorized Representatives of the United States Environmental Protection Agency (EPA) under an EPA contract for the purpose of assisting EPA in the development and implementation of national regulations for the protection of stratospheric ozone, including the evaluation of SNAP Information Notices. These Authorized Representatives may have access to any information received by the Stratospheric Protection Division within the EPA's Office of the Atmospheric Programs. Access to such information is necessary to ensure that these companies can complete the work required by the contract. Such Authorized Representatives of the Administrator are subject to the provisions of 42 U.S.C. 7414(c) respecting confidential business information as implemented by 40 CFR 2.301(h).

For any portion of a submission that you claim as confidential, please provide the following information as part of the Statement of Data Confidentiality Claims.

1. Please provide the reasons why the cited passages qualify for confidential treatment.

2. If you assert that disclosure of this information would be likely to result in substantial harmful effects to you, describe those harmful effects and explain why they should be viewed as substantial.

3. Indicate the length of time—until a specific date or event, or permanently—for which the information should be treated as confidential.

4. Identify the measures you have taken to guard against undesired disclosure of this information.

5. Describe the extent to which the information has been disclosed, and what precautions have been taken in connection with these disclosures.

6. Are copies of any determinations of confidentiality previously made by EPA, other Federal agencies, or courts concerning this information enclosed?

ADDITIONAL STATEMENT OF DATA CONFIDENTIALITY CLAIMS
Please provide any additional information on confidentiality claims below.

Paperwork Reduction Act Notice

OMB Control No. 2060-0226

Approval expires August 31, 2023

This collection of information is approved by OMB under the Paperwork Reduction Act, 44 U.S.C. 3501 et seq. (OMB Control No. 2060-0226). Responses to this collection of information are mandatory (40 CFR part 82, subpart G). An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The public reporting and recordkeeping burden for this collection of information is estimated to be 32 hours per response. Send comments on the Agency's need this formation, the accuracy of the provided burden estimates and any suggested methods for minimizing respondent burden including through the use of automated collection techniques to the Director, Regulatory Support Division, U.S. Environmental Protection Agency (2821T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

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Part II: CONTACT INFORMATION

Section A: Submitter Contact Information

1. Person Submitting Notice (in U.S.): Enter information for the official who signs the certification in **Part XV Certification**.

Name of Authorized Official	Title	CBI
Company/Organization		CBI
Mailing Address	Telephone Number	CBI
Email Address		CBI

2. Agent (if applicable): Complete only if you authorize an agent to assist you in preparing this notice. The agent must also sign the certification.

Name of Authorized Official	Title	CBI
Company/Organization		CBI
Mailing Address	Telephone Number	CBI
Email Address		CBI
Is this person granted full access to Confidential Business Information?		

3. Technical Contact (in U.S.): If applicable and if the technical contact is not the authorized agent, identify a person who can provide EPA with additional technical information on the substitute during the review period.

Name of Authorized Official	Title	CBI
Company/Organization		CBI
Mailing Address	Telephone Number	CBI
Email Address		CBI
Is this person granted full access to Confidential Business Information?		

4. Joint Submitter (if applicable): Identify the joint submitter, if any, who is authorized by the primary submitter to provide some of the information required in the notice.

Name of Authorized Official	Title	CBI
Company/Organization		CBI
Mailing Address	Telephone Number	CBI
Email Address		CBI
Is this person granted full access to Confidential Business Information?		

CONFIDENTIALITY CLAIMS: All contacts listed on this page will be granted access to CBI, unless otherwise noted.

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Part III: GENERAL INFORMATION

Section A - Alternative-Specific Information

1. Identify Proposed Substitute: If a blend, provide the percent composition of each constituent by weight.

(a) Chemical name (preferably IUPAC nomenclature)	**(b) Percent composition (by weight)**	**(c) Chemical Abstracts Service (CAS) registry number**	**(d) Molecular formula**	CBI

(e) For alternative processes and technologies (e.g., absorption chillers, stirling cycle), describe the technology and provide a technical drawing and a diagram of the system as an attachment. Also provide the location and identity of any chemical constituents.	CBI

(f) If you have applied for or hold a U.S. patent on the proposed substitute, provide the following:

Patent Name	**Patent Number (if available)**	**Topics Covered in Patent**	CBI

2. Commercial/trade name(s) of alternative:

	CBI

3. Generic name: Provide a generic name that is specific enough to identify the substance uniquely and could potentially be used for listing the substitute in the Federal Register.

4. Impurities: Identify any impurities that are reasonably anticipated to be present in the proposed substitute as manufactured for commercial purposes. If there are unidentified impurities, enter "unidentified" and estimate their total weight percentages. Do not include substances that are mixed with the proposed substitute after manufacture of the primary ingredients.

(a) Impurity Chemical Name	**(b) Percent Composition (by weight)**	**(c) CAS registry number**	**(d) Molecular Formula**	CBI

5. Byproducts: Describe any byproducts resulting from the manufacture or processing of the chemical alternative or chemicals used in the new alternative. If there are unidentified byproducts enter "unidentified." Indicate when the byproduct is formed (e.g., during manufacturing, during processing) and the amount formed.

(a) Byproduct Chemical Name	**(b) Percent Composition (by weight)**	**(c) CAS registry number**	**(d) When is product formed?**	**(e) Amount Formed (g)**	CBI

6. Degradation Products: Describe any degradation products resulting from the use or disposal of the chemical alternative or chemicals used in the new alternative. If there are unidentified degradation products enter "unidentified." Indicate when the degradation product is formed (e.g., during use, in contact with fire, following disposal) and the rate at which it is formed.

(a) Degradation Product Chemical Name	**(b) Percent Composition (by weight)**	**(c) CAS registry number**	**(d) When is product formed?**	**(e) Rate of Formation (g/s)**	CBI

7. Test Marketing: Has a test marketing notification been sent to EPA?

CBI

If yes, indicate the date		

8. Physical and Chemical Properties: Attach copies of all test reports and specify the protocol used. If submitting a blend substitute, physical and chemical properties are required for the blend.

			CBI
(a) Molecular weight		g/mol	
(b) Physical state		at 20°C	
(c) Melting point		°C at 1 atm. pressure	
(d) Boiling point		°C at 1 atm. pressure	
(e) Specific gravity (*Relative to water or air, specify*)		at 20 °C	
(f) Bubble point (for blends)		°C	
(g) Dew point (for blends)		°C	

Flammability-specific Physical and Chemical Properties:

(h) Is the proposed substitute flammable?	Yes		
(i) Lower Flammability Limit (LFL) (*Using ASTM E681*)		ppm or %	
(j) Upper Flammability Limit (UFL) (*Using ASTM E681*)		ppm or %	
(k) Flash point		°C	

(l) Other (specify)			
(m) If you are extracting this information from a public reference source (e.g., CRC Handbook of Chemistry and Physics, Merck Index), attach copies of the reference. Supporting documentation attached?	(n) If you have performed chemical analysis and testing on the substitute to derive the properties, attach copies of all test reports and specify the protocol used. Supporting documentation attached?		CBI

9. Ozone-depletion potential (ODP): Provide the 100-year ODP of the proposed substitute relative to CFC-11. If the substitute is a blend, provide the ODPs of the individual constituents. Reference the source for each ODP.

Proposed Substitute (*If blend, include ODP of each constituent*)	**(a) ODP relative to CFC-11**	**Information Sources**	CBI

(b) Provide any additional data on the ODP of the proposed substitute (e.g. chlorine or bromine loading potentials).	**(c) Reference the source of this information and attach any supporting documentation.**	**Supporting Documentation Attached?**	CBI

10. Global Warming Characteristics: Provide the alternative's global warming potential relative to carbon dioxide over a 100-year time horizon and atmospheric lifetime, if known. Reference the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC AR4). Alternate sources may include the 2010 World Meteorological Organization (WMO) Scientific Assessment of Ozone Depletion or the peer-reviewed literature. If the substitute is a blend, provide the GWPs of the individual constituents and an estimate of the GWP of the blend at its nominal composition.

Proposed Substitute (If blend, include GWP of each constituent)	**(a) 100-year GWP (Relative to carbon dioxide)**	**(b) Atmospheric Lifetime (AL)**	**Information Sources**	CBI

(c) If the proposed substitute or any components of a blend is captured as a byproduct of another manufacturing or industrial process, indicate the source of the alternative.	**Supporting Documentation Attached?**	CBI

11. VOC Status Information: CBI

(a) Is the substitute exempt from the definition of volatile organic compound (VOC) under CAA regulations (see 40 CFR 51.100(s)) addressing the development of State Implementation Plans (SIPs) to attain and maintain the national ambient air quality standards?		
(b) For blends, which components, if any, are exempt from the definition of VOC at 40 CFR 51.100(s)?		CBI
(c) Has a petition for VOC exemption been submitted? If so, provide details below (e.g., date of submission).		CBI

(d) For compounds that are not VOC exempt, provide information on the reactivity of the compound(s) in the atmosphere, such as the maximum incremental reactivity in grams of O_3 per gram of VOC and/or the kOH (298 K) value. CBI

Proposed Substitute/Component	**MIR (g O_3/g VOC)**	**kOH (298 K) value**	**Other**	**Reference**

12. Cost of Proposed Substitute (chemical or blend): Provide an estimated cost of the substitute in US$/kg, US$/lb, or other.	CBI

13. Toxicity Limits. For the proposed substitute, impurities and/or byproducts, provide short and long term exposure limits set for use in the workplace, if available. *If the submission includes one or more chemicals that the SNAP program has not listed, please reference Part XII Recommended Toxicity Studies in this SNAP Information Notice to see a list of toxicological studies, for each sector, that are recommended for a critical toxicity review of chemicals submitted to the SNAP program as proposed substitutes.*

Proposed Substitute (If blend, include all constituents in addition to the blend as a whole), Impurity, and/or Byproduct	**(a) Short Term Exposure Limit (ppm)**	**(b) Type of Short Term Exposure Limit (e.g., STEL, AEGL)**	**(c) Long Term Exposure Limit (ppm)**	**(d) Type of Long Term Exposure Limit (e.g., PEL, OEL, AEL, WEEL, TLV)**	**Sources**	CBI

(e) If available, summarize the acute and chronic toxicity of the proposed substitute and of its constituent chemicals on any organism (e.g. human and/or other mammals, fish, wildlife, and plants). Attach all complete test reports that are reasonably available to you.	**Supporting Documentation Attached?**	CBI
(f) If the proposed substitute is a blend, has the acute and chronic toxicity of the proposed substitute been evaluated on a blend basis?	**Supporting Documentation Attached?**	CBI
(g) If the proposed substitute is a blend and the acute and chronic toxicity of the proposed substitute has not been evaluated on a blend basis (and therefore, only on a component basis), please explain why and provide supporting documentation as applicable.	**Supporting Documentation Attached?**	CBI

14. Safety Documents. Please attach a copy of any documents that will be provided to any person who is reasonably likely to be exposed, such as:

Safety Document	**Supporting Documentation Attached?**	CBI
Safety Data Sheet (SDS)		
Hazard Warning Statement		
Warning Labels		
Other (provide name)		

15. Environmental Regulations.		CBI
(a) Is the substitute, or a component of the substitute, a hazardous air pollutant?		
(b) Is the substitute, or a component of the substitute, a hazardous waste under RCRA regulations?		
(c) Provide information on any environmental regulatory statute (such as those listed below) applicable to the manufacture, use, and disposal of the proposed substitute.		CBI
Statute	**Statute Citation & Explanation of Requirements**	
Titles of the Clean Air Act (CAA) other than Title VI		
Clean Water Act (CWA)		
Safe Drinking Water Act (SDWA)		
Resource Conservation and Recovery Act (RCRA)		
Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)		
Toxic Substances Control Act (TSCA)		
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)		
Emergency Planning and Community Right to Know Act (EPCRA or SARA Title III)		
State and local laws		
Other applicable environmental federal, state, and local laws not mentioned above		

16. Health and Safety Regulations: If applicable, describe how occupational, consumer, or general population exposure to the alternative is regulated under health and safety related statutory authorities.

Statutory Authority	**(a) How does regulation apply? Provide citation (e.g., CFR if applicable).**	CBI
Department of Transportation (DOT) (e.g., Vapor UN1013, Class 2.2)		
Occupational Safety and Health Administration (OSHA) (e.g., TLV-TWA, Personal Protective Equipment [29 CFR 1910.132])		
State and local laws		
Other (e.g., Food and Drug Administration Threshold of Regulation [TOR] Exemptions)		

Note: Information claimed as confidential should be placed in [brackets] and marked as CBI. If information is claimed as CBI, then a public version of the submission must be submitted with the bracketed information redacted or removed.

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Part IV: REFRIGERATION AND AIR CONDITIONING-SPECIFIC INFORMATION

Section A: Refrigeration and Air-Conditioning Use Profile

1. Specific End-Use: For every end-use and/or application for which you are applying, fill out the following table by identifying whether it uses new and/or retrofit equipment, the ODS (and/or other alternatives) used in the end-u

End-Use	Application	(a) Mark all that apply	(b) New (N) equipment, retrofit (R) equipment, or both (N,R)?	(c) ODS (and/or other substances) being replaced	(d) Replacement ratio (lb: lb)	CBI
Chillers (Commercial Comfort AC)	Centrifugal					
	Positive Displacement Chillers (includes Reciprocating, Screw, Scroll, Rotary Compressors)					
Industrial Process Refrigeration (IPR)						
Industrial Process Air Conditioning						
Ice Skating Rinks						
Cold Storage Warehouses	Food Refrigeration					
	Non-Food Refrigeration					
Refrigerated Transport	Refrigerated Trailers (Reefers)					
	Refrigerated Shipping Containers					
	Refrigeration Equipment within Ship holds					
	Refrigeration Equipment within Light-Duty Vehicle (e.g., food delivery, ice cream truck)					
Retail Food Refrigeration	Supermarket System, Direct					
	Supermarket System, Indirect					
	Low Temperature Stand-alone Units (< 0 ℃) (e.g., self-contained equipment such as individual reach-in coolers, glass door merchandisers)					
	Medium Temperature Stand-alone Units (>0 ℃) (e.g., self-contained equipment such as individual reach-in coolers, glass door merchandisers)					
	Remote Condensing Units for Walk-in Coolers or Multiple Reach-in Coolers					
	Refrigerated Food Processing and Dispensing Equipment (e.g., ice cream makers, chilled beverage dispensers, frozen beverage dispensers)					
Vending Machines						
Drinking Water Coolers	Water Fountain affixed to wall or ground					
	Stand-alone Water Coolers					
Commercial Ice Machines	Self-contained Ice Machines					
	Ice Machines with remote condenser					
Household Refrigerators and Freezers	Household Refrigerator and Freezers					
	Small Refrigerators (e.g., chilled kitchen drawers, wine coolers, home beverage centers, and mini-fridges)					
Residential and Light Commercial Air Conditioning and Heat Pumps	Room Air Conditioners (such as window units, packaged terminal air conditioners (PTAC) and heat pumps (PTHP), and portable self-contained air conditioners)					
	Mini-Splits, Non-Ducted					
	Multi-Splits, Non-Ducted					
	Split-Systems, Ducted, Household (Central A/C)					
	Split-Systems, Ducted, Light Commercial (Central A/C)					
	Packaged Rooftop Units					
	Water-Source Air Conditioning and Heat Pumps					
	Ground-Source Air Conditioning and Heat Pumps					
Residential Dehumidifiers						

Motor Vehicle Air Conditioning	Light-duty Vehicles (e.g., passenger cars)					
	Light-duty Trucks (e.g., minivans, full size pick-up trucks, and full-size SUVs)					
	Heavy-duty Vehicles (e.g., heavy-duty pickup trucks and vans, and commercial medium and heavy-duty on-highway vehicles)					
	Off-road Vehicles (e.g., farm and construction equipment)					
	Buses and Passenger Rail					
Non-mechanical Heat Transfer	Thermosiphon					
	Recirculating Coolers					
Mechanical Heat Transfer	Organic Rankine Cycle (ORC)					
Very Low Temperature Refrigeration	Refrigeration systems that maintain temperatures at -80°F (-62 °C) or lower (e.g., medical freezers, freeze dryers).					
Other (specify)	Uranium Isotope Separation Processing					
	Medical and Laboratory Refrigeration Equipment (low/medium temperature that maintain temperatures above -80 °F (-62 °C))					

2. Additional End-Use Description: Please describe the specific uses for which you are applying. For example, what is the equipment layout and where is the refrigerant located? Is it a direct expansion unit and/or does it use a secondary loop? In what types of locations will the equipment be used (e.g., for refrigeration this could include supermarkets, convenience stores, and/or restaurants)? Is the equipment for low, medium, or high temperature refrigeration or air conditioning? Is air conditioning for the purpose of human comfort cooling or another application?	CBI

3. Technology Changes and Costs: Describe any new equipment technology changes and associated costs that will be necessary in order to use the proposed substitute. Provide information on materials compatibility (e.g., piping, refrigerant oil) and attach any available test results. Provide specific information on each different end-use and application and their associated costs, including design changes to equipment (e.g., component changes larger compressor, special safety features), changes in labor, and changes in energy costs, and ongoing operational costs.

End-Use	Application	(a) Technology changes, including material compatibility issues when retrofitting	(b) Capital costs associated with proposed substitute, alternative process, new equipment, and/or new materials	(c) Changes in labor and energy costs	(d) Ongoing operational costs of equipment	CBI

4. Production: Provide estimated information on production of the proposed substitute or equipment using the proposed substitute by end-use and/or application.

End-Use	Application	(a) Year proposed substitute or technology will be commercially available (or note if currently available)	(b) Anticipated annual production for the end-use in the first year (kg)	CBI

5. Market Share: Estimate the timing for market penetration and percentage of the market that is anticipated to be captured by this proposed substitute.

End-Use	Application	(a) Years until maximum market penetration	(b) Maximum annual production at market penetration	(c) Anticipated market share at maximum market penetration (%)	CBI

6. Application of Proposed Substitute. Please provide information on the equipment lifetime, charge size, associated room size, and associated equipment size anticipated for the proposed substitute in the end-use(s) and application(s) for the proposed substitute.

End-Use	Application	(a) Equipment Lifetime (years)	(b) Typical charge size (kg)	(c) Maximum charge size (kg)	(d) Equipment capacity (kWh, tons)	CBI
1)						
2)						
3)						
4)						
5)						
End-Use	**Application**	**(e) Typical room size (m^3)**	**(f) Minimum room size (m^3)**	**(g) Typical anticipated room air exchange rate (ACH)**	**(h) Minimum anticipated room air exchange rate (ACH)**	CBI
1), cont'd						
2), cont'd						
3), cont'd						
4), cont'd						
5), cont'd						

7. Energy Efficiency: Provide the alternative's impact on energy efficiency relative to the substance it is replacing in similar equipment. Attach documentation, if available.

End-Use	Application	Energy Efficiency (+/- X%) relative to substance(s) being replaced	Supporting Documentation Attached?	CBI

8. Refrigerant Oil: Provide information on the chemical class of refrigerant oil you anticipate will be used (e.g., polyalkylene glycol, polyolester, mineral oil, etc.) and information on refrigerant/oil solubility.

	CBI

9. End-Use Specific Standards: List any standard-setting organizations (U.S. or ANSI/ISO) that have or will evaluate the proposed substitute and/or equipment in the proposed end-use(s) and identify the associated standard.

Standard-Setting Organization	(a) Standard Number and Title	(b) Status (e.g., under development, final)	CBI
American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) (e.g., ASHRAE 15)			
Underwriters Laboratories (UL) (e.g., UL 484, UL 60335-2-24)			
Society of Automotive Engineers (SAE) International			
Other (e.g., International Electrochemical Commission (IEC), International Organization for Standardization (ISO))			

Section B: Refrigeration and Air Conditioning Physical and Chemical Properties

1. Physical and Chemical Properties: Provide information on the physical and chemical properties relevant to evaluating the proposed substitute in refrigeration and air conditioning end-uses.

			CBI
(a) Vapor pressure @ 20 °C		atm	
Please also provide vapor pressure-temperature curve:	**Attached?**		
(b) Heat of combustion		kJ/mol	
(c) Critical temperature		°C	
(d) Critical Pressure		atm	

2. ASHRAE Designation: If applicable, indicate the status of submission to or publication by the ASHRAE Standing Standard Project Committee 34 (SSPC 34).

		CBI
Submitted to ASHRAE SSPC 34, not yet published. If proposed designation and classification are available, provide below.		
Published by ASHRAE SSPC 34. If so, provide the following information:		
ASHRAE Designation		CBI
ASHRAE Safety Classification		

Section C: Flammability

1. Flammability-Related Physical and Chemical Properties. Provide information on the physical and chemical properties relevant to evaluating the flammability of the proposed substitute in refrigeration and air-conditioning end-uses.

			CBI
(a) Maximum pressure of combustion		atm	
(b) Maximum rate of pressure increase during combustion (*Required for refrigerants designated as ASHRAE flammability class 2, 2L, or 3*)			
(c) Minimum ignition energy (MIE)		Joules	

2. Flammability Assessments and Test Data.

Type of Assessment	Summary of Results	Supporting Documentation Attached?	CBI
(a) Fault Tree Analysis or Failure Mode and Effects Analysis *(Required for each end-use if flammable)*			
(b) Risk assessment for all end-uses, consumer and occupational (technician) exposure *(Required if flammable)*			
(c) Results of ASTM E681 Flammability Limits in Air (include temperature at which test was conducted in summary of results)			
(d) Fractionation during Leakage *(Required if proposed substitute is a blend with flammable components)*			

3. Flammability Concerns and Mitigation: Provide any information on flammability concerns and mitigation measures.		Supporting Documentation Attached?	CBI
(a) Detail any abatement techniques that are used to minimize the risks associated with flammable substances or mixtures:			
(b) Additional information on flammability concerns and mitigation measures:			

Section D: Exposure

1. Exposure Media and Release Information

(a) Identify the media(s) to which the proposed substitute is released (e.g., indoor air, outdoor air, water, land).	(b) Indicate the physical form of chemicals at the time of handling/exposure (e.g., solid, liquid, gas).	(c) If releases occur outdoors (e.g., outdoor air, water, land), provide information or estimates of the magnitude of release (ppm or percent of charge).	CBI
(d) Identify engineering controls used to reduce or prevent releases to the environment (e.g., safety valves, gas scrubbers).	(e) Identify the contact pathway (e.g., ingestion, inhalation, dermal).	(f) Describe any protective equipment and engineering controls used to protect workers (e.g., goggles, gloves, chemical hoods).	CBI

2. Identify and explain the activities, duration of activities, and typical and maximum exposure concentrations in which worker exposure to the proposed substitute is expected to be the highest for each scenario in (a) through (c).

Scenario	Identify activities with typical and maximum potential for exposure	Duration of Activity				Exposure Concentration				CBI
		Typical		Maximum		Typical		Maximum		
(a) Manufacture and charging of equipment (e.g., filling)			hours/day		hours/day		ppm		ppm	
			day/year		day/year		%		%	
(b) Installation and servicing (e.g., connecting and disconnecting refrigerant lines)			hours/day		hours/day		ppm		ppm	
			day/year		day/year		%		%	
(c) Disposal (e.g., connecting and disconnecting refrigerant lines)			hours/day		hours/day		ppm		ppm	
			day/year		day/year		%		%	
(d) Are exposure concentrations based on a proxy compound or blend?		(e) If yes, what is the proxy compound or blend?			(f) Explain why the proxy compound or blend is appropriate for estimating exposures to the proposed substitute?					
Is supporting documentation (e.g., personal monitoring data) attached?										

3. Estimate typical and maximum number of pieces of equipment a worker would (a) manufacture and/or charge, (b) install and/or service, and (c) dispose per day.

Scenario	Typical Number of Pieces	Maximum Number of Pieces	CBI
(a) Manufacture and charging of equipment			
(b) Installation and servicing			
(c) Disposal			

4. Provide information on training materials related to manufacture, installation and servicing, and disposal. If the proposed substitute is flammable, describe how these guidelines differ from training for non-flammable refrigerants.	Are any training materials attached?	CBI

5. Exposure during Use of Equipment

(a) Identify and explain the activity during which end-user exposure to the proposed substitute is expected to be the highest (e.g., operational leaks).			CBI
(b) Identify who is most likely to be exposed to the substitute at the end-use (e.g., consumers, workers)?	(c) Estimate the typical and maximum annual leak rates from the equipment, in terms of (1) ppm and/or (2) percent of charge.		CBI
	Typical	**Maximum**	

		ppm		ppm	
		%		%	
Is supporting documentation (e.g., personal monitoring data) attached?					

6. Information on Recovery Practices: Section 608 of the Clean Air Act prohibits the intentional release (venting) of ozone-depleting and substitute refrigerants , while maintaining, servicing, repairing, or disposing of air conditioning or refrigeration equipment unless exempted by EPA. Please provide information below on how the substitute will be recovered.

(a) How will the refrigerant be recovered? Please provide standards, reports, or analyses from ETL, UL, AHRI, or equivalent on refrigerant-specific servicing equipment or the feasibility of using existing refrigerant recovery/recycling equipment.	**Supporting Documentation Attached?**	CBI
(b) Please provide a description of recovery procedures (e.g., recover and recharge or recover and send to reclaimer).	**Supporting Documentation Attached?**	CBI
(c) Indicate the anticipated recovery efficiency of the refrigerant (percent of charge).	**Supporting Documentation Attached?**	CBI

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Part V: FOAM BLOWING-SPECIFIC INFORMATION

Section A: Foam Blowing Use Profile

1. Specific End-Use: Identify each end-use that may be reasonably anticipated for the alternative. Identify the ODS (and/or other alternatives) used in the end-use and/or application and the quantity of proposed substitute needed to re

End-Use	(a) Mark all that apply	(b) ODS (and/or other substances) being replaced	(c) Replacement ratio (lb: lb)	CBI
Rigid Polyurethane: Appliance				
Rigid Polyurethane: Spray *(High-pressure, Two component)*				
Rigid Polyurethane: Spray *(Low-pressure, Two component)*				
Rigid Polyurethane: Spray *(One-component Foam Sealants)*				
Rigid Polyurethane: Commercial Refrigeration				
Rigid Polyurethane: Sandwich Panels				
Rigid Polyurethane: Slabstock and Other				
Rigid Polyurethane & Polyisocyanurate Laminated Boardstock				
Flexible Polyurethane				
Integral Skin Polyurethane				
Polystyrene: Extruded Sheet				
Polystyrene: Extruded Boardstock & Billet				
Polyolefin				
Phenolic Insulation Board & Bunstock				
Other (specify)				

2. Additional End-Use Description: Please describe the specific uses for which you are applying. For example, what type of material will be blown? What method or type of equipment is used for foam blowing? Who will be using the foam blowing agent/equipment? Will the foam blowing agent be used by consumers or restricted to commercial use? For spray foams, how many components are used? Will the alternative be used in high or low pressure spray foam?	CBI

3. Technology Changes and Costs: Describe any new equipment technology changes and associated costs that will be necessary in order to use the proposed substitute.

End-Use	(a) Technology changes to use alternative	(b) Capital costs associated with proposed substitute, alternative process, new equipment, and/or new materials	(c) Changes in labor and energy costs	(d) Ongoing operational costs	CBI

4. Production and Market Share: Provide estimated information on production of the proposed substitute by end-use. If possible, estimate the percentage of the market held by the ODS being replaced that will be captured by this proposed substitute.

End-Use	(a) Year proposed substitute or technology will be available (or note if currently available)	(b) Anticipated first year annual production for end-use (kg)	(c) Years until maximum market penetration	(d) Maximum annual production at market penetration	(e) Anticipated market share at market penetration (%)	CBI

5. Application of Proposed Substitute. Please provide information on the amount of blowing agent, associated room size, and anticipated room air exchange rate for the proposed substitute in the proposed end-use(s).

End-Use	(a) Typical amount of blowing agent (kg)	(b) Maximum amount of blowing agent (kg)	(c) Typical room size (m^3)	(d) Minimum room size (m^3)	(e) Typical anticipated room air exchange rate (ACH)	(f) Minimum anticipated room air exchange rate (ACH)	CBI

6. Energy Efficiency: Provide the alternative's impact on energy efficiency relative to the substance it is replacing in similar products. Attach documentation, if available.

End-Use	Energy efficiency (+/- X%) relative to substance(s) being replaced	Supporting Documentation Attached?	CBI

Section B: Foam Blowing Agent Physical and Chemical Properties

1. Physical and Chemical Properties: Provide information on the physical and chemical properties relevant to evaluating the proposed substitute in foam blowing end-uses.			CBI
(a) Vapor pressure @ 20 °C		atm	
(b) Thermal conductivity		W/m·K	

2. Manufacture and Degradation Products. Provide information on the catalyst used in the manufacture of foam blowing agent and the degradation products under different external conditions (e.g., temperature) during use to assess potential hazards of breakdown/degradation products of foam during use. Attach supporting documentation.	**Supporting Documentation Attached?**	CBI

Section C: Flammability

1. Flammability-Related Physical and Chemical Properties. Provide information on the physical and chemical properties relevant to evaluating the flammability of the proposed substitute in foam blowing end-uses.			CBI
(a) Heat of combustion		kJ/mol	
(b) Auto ignition temperature		°C	
(c) For blowing agent blends containing flammable components, indicate the concentrations at which the blend is flammable.		ppm or %	

2. Flammability Assessments and Test Data.		CBI
(a) Results of ASTM E681 for Flammability Limits in Air (*Required if substitute is flammable)*		
(b) Additional Analyses (optional)		

3. Flammability Concerns and Mitigation: Provide any information on flammability concerns and mitigation measures.			CBI
(a) Detail any abatement techniques that are used to minimize the risks associated with flammable substances or mixtures:			
(b) For flammable foam blowing agents used in spray foam, provide a training program that addresses flammability concerns.	**Supporting Documentation Attached?**		
(c) Additional information on flammability concerns and mitigation measures:			

Section D: Exposure

1. Exposure Media and Release Information

Scenario	Identify activities with typical and maximum potential for exposure	Provide the estimated amount of each component in foam blowing agent released to the environment (e.g., as a solid waste or wastewater effluent) at the point of, or subsequent to, each scenario below.		Identify the media(s) to which the proposed substitute is released (e.g., indoor air, outdoor air, water, land) in each scenario below.	CBI
(a) Manufacture			ppm		
(b) End-Use (e.g., in products containing and processes using the proposed substitute)			ppm		
(c) Disposal			ppm		

(d) Identify engineering controls used to reduce or prevent releases to the environment (e.g., safety valves, gas scrubbers).	(e) If the proposed substitute is to be disposed of, indicate the method and location of disposal.	CBI

(f) Indicate the physical form of chemicals at the time of handling/exposure (e.g., solid, liquid, gas).	(g) Identify the contact pathway (e.g., ingestion, inhalation, dermal).	(h) Describe any protective equipment and engineering controls used to protect workers (e.g., goggles, gloves, chemical hoods).	CBI

2. Identify and explain the activities, duration of activities, and typical and maximum exposure concentrations in which worker exposure to the proposed substitute is expected to be the highest for each scenario in (a), (b), and (c). If monitoring data is available, please provide it as an attachment.

Scenario	Identify activities with typical and maximum potential for exposure	Duration of Activity				Exposure Concentration				CBI
		Typical		Maximum		Typical		Maximum		
(a) Manufacture and charging of equipment (e.g., preparation of foam formulations, injecting foam into appliances)			hours/day		hours/day		ppm		ppm	
			day/year		day/year		%		%	
(b) Manufacture of foam product/foam blowing			hours/day		hours/day		ppm		ppm	
			day/year		day/year		%		%	
(c) Disposal of foam blowing agent			hours/day		hours/day		ppm		ppm	

(c) Disposal of foam blowing agent			day/year		day/year		%		%	
(d) Are exposure concentrations based on a proxy compound or blend?		(e) If yes, what is the proxy compound or blend?			(f) Explain why the proxy compound or blend is appropriate for estimating exposures to the proposed substitute?					
Is supporting documentation (e.g., personal monitoring data) attached?										

3. Application of Spray Foam (If Applicable)

(a) Is the proposed substitute is expected to be used in the spray foam end-use?	(b) If your answer to (a) is yes, please identify and explain potential worker exposure to the proposed substitute during application of the blowing agent (e.g., onsite, field).	(c) Is consumer use of the spray foam (e.g., do-it-yourself spray foam cans) expected? If yes, please answer questions (d) and (e).	CBI

(d) Please describe the application system for the consumer (e.g., size of system/container and amount of foam blowing agent in system/container).	(e) Estimate the typical and maximum concentrations of consumer exposure (ppm). If monitoring data is available, please provide it as an attachment.				CBI
	Typical		**Maximum**		
		ppm		ppm	
Is supporting documentation (e.g., personal monitoring data) attached?					

4. Training Materials

(a) Provide information on training materials related to manufacture, installation and servicing, and disposal. If the proposed substitute is flammable, describe how these guidelines differ from training for non-flammable foam blowing agents.	Are any training materials attached?	CBI
(b) Provide information on training materials related to spray foam applications. If the proposed substitute is flammable, describe how these guidelines differ from training for non-flammable foam blowing agents.	Are any training materials attached?	CBI

5. Exposure during Use

(a) Identify and explain the activity during use of blowing agent in which end-user exposure to the proposed substitute is expected to be the highest (e.g., rigid cell foams used in residential construction or insulation).	CBI

(b) Identify who is anticipated to be exposed to the substitute at the end-use (e.g., consumers, workers)?	(c) Provide (1) typical and (2) maximum exposure concentration estimates (ppm). If monitoring data is available, please provide it as an attachment.					CBI
	Typical		**Maximum**		**Supporting Documentation Attached?**	
		ppm		ppm		

(d) Identify control measures used to reduce or prevent end-user exposures.	CBI

(e) For each end-use, provide maximum annual emission rates for blowing agent leaks from foam application during the foam's lifetime (i.e., after manufacturing and before disposal) as a percentage of the original total amount of blowing agent used to produce the foam. Please also specify the anticipated number of years for which the blowing agent would be leaking from the foam (i.e., the emissive lifetime). *For reference, please refer to EPA's standard annual emission rates listed in the Instructions.*			CBI
End-Use	**Annual Emission Rate**	**Emissive Lifetime of Foam (years)**	

Section E: Additional Information for Submission of Blends of Foam Blowing Agents

Blends of different foam blowing agents may also require additional information, depending on the end-use.

1. For the following end-uses, a submission is required for blends of blowing agents, including blends with blowing agents that are already listed as acceptable:

- Polyolefin
- Polystyrene: Extruded Boardstock and Billet
- Rigid Polyurethane and Polyisocyanurate Laminated Boardstock
- Rigid Polyurethane: Spray Foam*
- Phenolic Insulation Board and Bunstock

*For spray foam, if any components of the blend are flammable, then an additional submission is required for the blend.

2. For the following end-uses, it is permissible to blend blowing agents that are already listed as acceptable without an additional submission for the blend:

- Rigid Polyurethane: Appliance
- Rigid Polyurethane: Commercial Refrigeration
- Rigid Polyurethane: Sandwich Panels
- Rigid Polyurethane: Spray Foam*
- Rigid Polyurethane: Slabstock and Other
- Flexible Polyurethane
- Integral Skin Polyurethane
- Polystyrene: Extruded Sheet

*For spray foam, if all components of the blend are acceptable *and* non-flammable, then it is permissible to blend those blowing agents without an additional submission for the blend.

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Part VI: CLEANING SOLVENT-SPECIFIC INFORMATION

Section A: Cleaning Solvent Use Profile

1. Specific End-Use: Identify each end-use for which you are seeking review. Identify the ODS (and/or other alternatives) used in the end-use or application and the quantity of proposed substitute needed t

End-Use	(a) Mark all that apply	(b) ODS (and/or other substances) being replaced	(c) Replacement Ratio (lb: lb)	(d) Open or closed process?	CBI
Metal cleaning					
Electronics cleaning					
Precision cleaning					

2. Additional End-Use Description: Please describe the specific uses for which you are applying. For example, what type of work pieces will be cleaned? What type of equipment will be used to perform cleaning (e.g., open top vapor degreaser, vacuum sealed equipment, conveyorized equipment)? Where will the cleaning occur (e.g., commercial or industrial setting)? Please note that this end-use does not include manual cleaning or textile cleaning. | CBI

3. Technology Changes and Costs: Describe any new equipment or technology changes and associated costs that will be necessary in order to use the proposed substitute.

End-Use	(a) Technology Changes to Use Alternative	(b) Capital costs associated with proposed substitute, alternative process, new equipment, and/or new materials	(c) Changes in labor and energy costs	(d) Ongoing operational costs	CBI

4. Production and Market Share: Provide estimated information on production of the proposed substitute by end-use. If possible, estimate the percentage of the market held by the ODS being replaced that will be captured by this proposed substitute.

End-Use	(a) Year proposed substitute or technology will be available (or note if currently available)	(b) Anticipated first year annual production for end-use (kg)	(c) Years until maximum market penetration	(d) Maximum annual production at market penetration	(e) Anticipated market share at market penetration (%)	CBI

5. Compatibility: Provide information on and address any issues with materials compatibility of the proposed substitute with metals and plastic with regards to its use as a cleaning solvent (e.g., is the solvent corrosive to some materials). | CBI

Section B: Cleaning Solvent-Specific Physical and Chemical Properties

1. Physical and Chemical Properties: Provide information on the physical and chemical properties relevant to evaluating the proposed substitute in solvent cleaning end-uses. | CBI

(a) Solubility		g/L	
(b) Dissociation Constant			
(c) Volatilization from soil			
(d) Volatilization from water			
(e) pH			
(f) Vapor pressure @ 20 °C		atm	
(g) Viscosity		Pa·s	
(h) Henry's Law constant		*specify units*	

Section C: Flammability

1. Flammability-Related Physical and Chemical Properties. Provide information on the physical and chemical properties relevant to evaluating the flammability of the proposed substitute in solvent cleaning end-uses. | CBI

(a) Heat of combustion		kJ/mol	

2. Flammability Concerns and Mitigation: Provide any information on flammability concerns and mitigation measures. | CBI

(a) Detail any abatement techniques that are used to minimize the risks associated with flammable substances or mixtures:		
(b) Additional information on flammability concerns and mitigation measures:		

Section D: Exposure

1. Exposure Media and Release Information

(a) Identify the media(s) to which the proposed substitute is released (e.g., indoor air, outdoor air, water, land).	(b) Indicate the physical form of chemicals at the time of handling/exposure (e.g., solid, liquid, gas).	(c) If releases occur outdoors (e.g., outdoor air, water, land), provide information or estimates of the magnitude of release (ppm).	CBI
(d) Identify engineering controls used to reduce or prevent releases to the environment (e.g., safety valves, gas scrubbers).	(e) Identify the contact pathway (e.g., ingestion, inhalation, dermal).	(f) Describe any protective equipment and engineering controls used to protect workers (e.g., goggles, gloves, chemical hoods).	CBI

2. Identify and explain the activities, duration of activities, and typical and maximum exposure concentrations in which worker exposure to the proposed substitute is expected to be the highest for each scenario in (a) through (b).

Scenario	Identify activities with typical and maximum potential for exposure	Duration of activity				Exposure Concentration				CBI
		Typical		Maximum		Typical		Maximum		
(a) End-Use (e.g., during removal of cleaned work pieces from an open-top degreasing unit)			hours/day		hours/day		ppm		ppm	
			day/year		day/year		%		%	
(b) Disposal (e.g., removing spent solvent from degreaser)			hours/day		hours/day		ppm		ppm	
			day/year		day/year		%		%	
(c) Provide the anticipated room air exchange rate (as air changes per hour [ACH]) during use and disposal of the substitute.										
(d) Are exposure concentrations based on a proxy compound or blend?		(e) If yes, what is the proxy compound or blend?								
(f) Explain why the proxy compound or blend is appropriate for estimating exposures to the proposed substitute?										
Is supporting documentation (e.g., personal monitoring data) attached?										

3. Describe disposal practices of used solvent (e.g., solvent collected and sent to a wastewater treatment facility, solvent collected and incinerated, recycling).	CBI

4. Provide information on training materials related to use and disposal.	**Are any training materials attached?**	CBI

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Part VII: FIRE SUPPRESSION AND EXPLOSION PROTECTION-SPECIFIC INFORMATION

Section A: Fire Suppression Use Profile

1. Specific End-Use: Identify each end-use and application (if applicable) for which you are seeking review and provide the requested information. For an explanation of each end-use and application visit the SNAP website: https://www.epa.gov/

End-Use	Application	(a) Mark all that apply	(b) ODS (and/or other substances) being replaced	(c) Weight and volume equivalence replacement ratio (lb: lb) *Note: Calculate using method described in Instruction Manual*	(d) Purpose of space in which the extinguisher will be used (e.g., engine room, machinery space, cargo room)	CBI
Total Flooding Agents	Normally Occupied Areas					
	Normally Unoccupied Areas					
Streaming Applications						

2. Additional End-Use Description: Please describe the specific uses for which you are applying. For example, what is the method of distribution (e.g., localized, sprinkler system, handheld, gaseous)? Is it a clean agent? Is the agent aerosolized? Where will the fire suppression system be installed (e.g., marine, aviation, data center)? Where will handheld extinguishers be intended for use (e.g., residential, commercial, aviation)?

	CBI

3. Technology Changes and Costs: Describe any new equipment and associated technology changes and costs that will be necessary in order to use the proposed substitute.

End-Use	Application	(a) Technology changes to use alternative and address material compatibility issues when retrofitting	(b) Capital costs associated with proposed substitute or alternative process	(c) Changes in labor and energy costs	(d) Ongoing operational costs	CBI

4. Production and Market Share: Provide estimated information on production of the proposed substitute by end-use. If possible, estimate the percentage of the market held by the ODS being replaced that will be captured by this proposed substitute.

End-Use	Application	(a) Year proposed substitute or technology will be available (or note if currently available)	(b) Anticipated first year annual production for end-use (kg)	(c) Years until maximum market penetration	(d) Maximum annual production at market penetration	(e) Anticipated market share at market penetration (%)	CBI

5. Application of Proposed Substitute. Please provide information on the charge size, associated room size, and anticipated room air exchange rate for the proposed substitute in the end-use(s) specified. *Note: If personal monitoring data is provided in Section D: Exposure, you are not required to respond to questions (c) through (e) below.*

End-Use	Application	(a) Typical charge size (kg)	(b) Maximum charge size (kg)	(c) Typical room size (m^3)	(d) Minimum room size (m^3)	(e) Typical anticipated room air exchange rate (ACH)	(f) Minimum anticipated room air exchange rate (ACH)	CBI

6. End-Use Specific Standards: Identify any standards set by standard-setting organizations (U.S. or ANSI/ISO) or requirements set by other organizations (e.g., IMO, FAA/ICAO) that will evaluate the proposed substitute and/or equipment in the proposed end-use(s).

Organization	(a) Standard Number and Title	(b) Status (e.g., under development, final)	CBI
Underwriters Laboratories (UL) (e.g., UL 711)			
National Fire Protection Association (NFPA) (e.g., NFPA 2010)			
Other (e.g., International Organization for Standardization (ISO))			
Other (e.g., International Maritime Organization (IMO), Federal Aviation Administration/International Civil Aviation Organization (FAA/ICAO))			

Section B: Fire Suppression Agent Physical and Chemical Properties

1. Physical and Chemical Properties: Provide information on the physical and chemical properties relevant to evaluating the proposed substitute in fire suppression end-uses.

			CBI
(a) Vapor pressure @ 20 °C		atm	
(b) Heat of vaporization		kJ/mol	
(c) Vapor Heat Capacity		J/K	
(d) Viscosity		Pa-s	

2. Degradation Products. Provide information on the degradation products of the alternative following discharge in a fire situation. Explain the conditions used in determining these products (e.g., flame temperature, time required to extinguish the fire, amount of O_2 present, combustible material).

	CBI

Section C: Fire Suppression Agent Toxicity and Hazard Information

1. Toxicity Studies for All Fire Suppression Submissions

a) Inhalation Toxicity Studies: Provide an inhalation toxicity study at least 28 days long if a) workers are exposed to the chemicals during manufacture or b) 8-hr TWA exposure levels have not been determined by OSHA, NIOSH, ACGIH, or AIHA. *For reference, please refer to the list of recommended toxicity tests for this sector in the Instructions.*

Inhalation Toxicity Study Name	Attached?	CBI

b) Genotoxicity Studies: Provide genotoxicity studies (e.g., Ames assays, forward mutation assays, cytogenetic assays) to determine the potential for the agent to induce DNA damage.

Genotoxicity Study Name	Attached?	CBI

2. In-kind Halon Alternatives (Gaseous Halocarbons). Provide the following additional information for halocarbon steaming agents or flooding agents used in occupied spaces.

			CBI
(a) Extinguishing Concentration (*Total flooding agents; use either a cup burner in heptane or full scale testing*)		g/m^3	
(b) Design Concentration *(As defined by NFPA and actual (if it is likely to be higher) based on manufacturer recommendations)*		g/m^3	

Additional Information	Attached?	CBI
Cardiac Sensitization Study		
Acute, sub-acute, and subchronic toxicity inhalation studies with rats in addition to those already listed in Section C, Number 1.		

3. In-kind Halon Alternatives (Non-Halocarbon Gaseous). Provide the following additional information for non-halocarbon gaseous steaming agents or flooding agents (e.g., inert gas, carbon dioxide) used in occupied spaces.

			CBI
(a) Extinguishing Concentration (*Total flooding agents; use either a cup burner in heptane or full scale testing*)		g/m^3	
(b) Design Concentration *(As defined by NFPA and actual (if it is likely to be higher) based on manufacturer recommendations)*		g/m^3	

4. Not-in-kind Halon Alternatives (Powdered Aerosols or Foam). Provide the following additional information for foam streaming agents or powdered aerosol flooding agent used in occupied spaces.

			CBI
(a) Extinguishing application density *(Per NFPA 2010, minimum mass of a specific aerosol-forming compound per m^3 of enclosure volume required to extinguish fire involving particular fuel under defined experimental conditions excluding any safety factor)*		g/m^3	
(b) Design application density (*Per NFPA 2010, extinguishing application density including a safety factor, required for system design purposes*)		g/m^3	

Additional Information	Attached?	CBI
Acute toxicity inhalation study with rats (*foam streaming agent*)		
Static Acute toxicity inhalation study with rats at design application density (*powdered aerosol flooding agent*)		
Ocular irritation studies (Draize test)		
Dermal irritation study (*powdered aerosols*)		

5. Powdered Aerosol Flooding Agents Used in Occupied Spaces. Provide the following additional information regarding the use of powdered aerosol flooding agents in occupied spaces which requires special considerations of the physical properties and toxicity of the agent and visibility in the protected space.

(a) Identify the likelihood that the fire extinguisher will accidentally discharge (reported as the number of accidental discharges in 1 million).	(b) Identify the number of extinguishing devices (i.e., generators) installed in a room and the location of these devices within the space.	(c) Identify the discharge rate (g/s) of the fire extinguishing device.	(d) Identify the length of time it takes for the particles to become distributed throughout the space.	CBI

(e) Provide information on the complete extinguishant particle size distribution including the shape and aerodynamic profile of the individual particles (i.e., mass median aerodynamic diameter (MMAD), µm) and the geometric standard deviation of the particles during a typical commercial discharge.	(f) Identify the concentration (mg/m^3) of the effluent released from the nozzle.	(g) Identify the settling rate (g/s) of the particles.	(h) Identify the maximum egress time for personnel from the space and several approaches to facilitate safe egress (e.g., training, installation guidelines).	CBI

(i) Provide the composition of flooding agent ***before discharge***, including the weight percentages for each component:

Chemical name (preferably IUPAC nomenclature)	Percent composition (by weight)	Chemical Abstracts Service (CAS) registry number	Molecular formula	CBI

(j) Provide the composition of flooding agent ***after discharge***, including the weight percentages of all effluent gases and particulates that may not be filtered:

Chemical name (preferably IUPAC nomenclature)	State (e.g., gaseous, particulate, liquid)	Percent composition (by weight)	Chemical Abstracts Service (CAS) registry number	Molecular formula	CBI

Section D: Exposure

1. Exposure Media and Release Information

(a) Identify the media(s) to which the proposed substitute is released (e.g., indoor air, outdoor air, water, land).	(b) Indicate the physical form of pre- and post-activation products at the time of handling/exposure (e.g., solid, liquid, gas).	(c) If releases occur outdoors (e.g., outdoor air, water, land), provide information or estimates of the magnitude of release (ppm or percent of charge).	CBI

(d) Identify engineering controls used to reduce or prevent releases to the environment (e.g., safety valves, gas scrubbers).	(e) Identify the contact pathway (e.g., ingestion, inhalation, dermal).	(f) Describe any protective equipment and engineering controls used to protect workers (e.g., goggles, gloves, chemical hoods).	(g) Describe any protective measures taken to limit worker exposure (e.g., ventilation, detection system).	CBI

2. Identify and explain the activities, duration of activities, and typical and maximum exposure concentrations in which worker exposure to the proposed substitute and/or associated equipment is expected to be the highest for each scenario in (a) and (b).

Scenario	Identify activities with typical and maximum potential for exposure	Duration of Activity				Exposure Concentration				CBI
		Typical		Maximum		Typical		Maximum		
(a) Manufacture and charging of equipment (e.g., assembly of generators)			hours/day		hours/day		ppm		ppm	
			day/year		day/year		%		%	
(b) Installation and servicing (e.g., accidental discharge during servicing of fire suppression equipment)			hours/day		hours/day		ppm		ppm	
			day/year		day/year		%		%	
(c) Are exposure concentrations based on a proxy compound or blend?		(d) If yes, what is the proxy compound or blend?		(e) Explain why the proxy compound or blend is appropriate for estimating exposures to the proposed substitute?						
Is supporting documentation (e.g., personal monitoring data) attached?										

3. Provide information on training materials related to manufacture of the proposed substitute and/or fire suppression equipment and installation and servicing of fire suppression equipment.	**Are any training materials attached?**	CBI

4. Exposure during Use of Equipment

(a) Identify and explain the activity in which end-user exposure to the proposed substitute is expected to be the highest (e.g., discharge of fire suppression agent).				CBI
(b) Identify who is anticipated to be exposed to the substitute at the end-use (e.g., consumers, workers)?	(c) Provide (1) typical and (2) maximum exposure concentration estimates (ppm). If monitoring data is available, please provide it as an attachment.			CBI
	Typical		**Maximum**	
		ppm	ppm	
Is supporting documentation (e.g., personal monitoring data) attached?				

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Part VIII: AEROSOLS-SPECIFIC INFORMATION

Section A: Aerosol Use Profile

1. Specific End-Use: Identify each end-use and application that may be reasonably anticipated for the alternative. Identify the ODS (and/or other alternatives) used in the end-use or application and the quantity of propo

End-Use	Application	(a) Mark all that apply	(b) ODS (and/or other substances) being replaced	(c) Replacement Ratio (lb: lb)	CBI
Propellants	Consumer				
	Technical				
	Medical				
Solvents	Consumer				
	Technical				
	Medical				

2. Additional End-Use Description: Please describe the specific uses for which you are applying. For example, in what type of products will the substitute be used (e.g., personal care, automotive, electrical contact cleaner, degreaser, medical adhesive spray, MDI)?

	CBI

3. Technology Changes and Costs: Describe any new equipment technology changes and associated costs that will be necessary in order to use the proposed substitute.

End-Use	Application	(a) Technology changes, including material compatibility issues	(b) Capital costs associated with proposed substitute, alternative process, new equipment, and/or new materials	(c) Changes in labor and energy costs.	(d) Ongoing operational costs	CBI

4. Production: Provide estimated information on production of the proposed substitute or equipment using the proposed substitute by end-use.

End-Use	Application	(a) Year proposed substitute or technology will be available (or note if currently available)	(b) Anticipated first year annual production for end-use (kg)	CBI

5. Market Share: If possible, estimate the percentage of the market that is anticipated to be captured by this proposed substitute.

End-Use	Application	(a) Years until maximum market penetration	(b) Maximum annual production at market penetration	(c) Anticipated market share at market penetration (%)	CBI

6. Application of Proposed Substitute. Please provide information on the amount of the substitute to be used per can and associated aerosols can size anticipated for the proposed substitute in each proposed end-use.

End-Use	Application	(a) Typical amount of substitute per can (g)	(b) Maximum amount of substitute per can (g)	(c) Typical total weight of aerosol can (g)	(d) Maximum total weight of aerosol can (g)	CBI

7. Consumer Use: Please indicate whether the proposed substitute will be used for consumer use. If yes, describe the anticipated consumer applications.

	CBI

8. End-Use Specific Standards: List any standard-setting organizations (U.S. or ANSI/ISO) that have or will evaluate the proposed substitute and/or equipment in the proposed end-use(s) and identify the associated standard.

Standard-Setting Organization	(a) Standard Number and Title	(b) Status (e.g., under development, final)	CBI

Section B: Aerosol-Specific Physical and Chemical Properties

1. Physical and Chemical Properties: Provide information on the physical and chemical properties relevant to evaluating the proposed substitute in aerosol end-uses.

			CBI
(a) Solubility		g/L	
(b) Viscosity		Pa s	
(c) Vapor pressure @ 20 °C		atm	

Please also provide vapor pressure-temperature curve (*for aerosol propellants*):	Attached?		
(d) Dissociation Constant			
(e) Volatilization from soil			
(f) Volatilization from water			
(g) pH			
(h) Henry's Law constant		*specify units*	

Section C: Flammability

1. Flammability-Related Physical and Chemical Properties. Provide information on the physical and chemical properties relevant to evaluating the flammability of the proposed substitute in aerosol end-uses.

	Propellant		**Solvent**		CBI
(a) Heat of combustion		kJ/mol		kJ/mol	
(b) Critical temperature		°C		°C	
(c) Critical Pressure		atm		atm	
(d) Explosive Range (LEL/UEL)		ppm or %		ppm or %	

2. Flammability Concerns and Mitigation: Provide any information on flammability concerns and mitigation measures.

		CBI
(a) Detail any abatement techniques that are used to minimize the risks associated with flammable substances or mixtures:		
(b) Additional information on flammability concerns and mitigation measures:		

Section D: Exposure

1. Exposure Media and Release Information

			CBI
(a) Identify the media(s) to which the proposed substitute is released (e.g., indoor air, outdoor air, water, land).	(b) Indicate the physical form of chemicals at the time of handling/exposure (e.g., solid, liquid, gas).	(c) If releases occur outdoors (e.g., outdoor air, water, land), provide information or estimates of the magnitude of release (ppm).	
(d) Identify engineering controls used to reduce or prevent releases to the environment (e.g., safety valves, gas scrubbers).	(e) Identify the contact pathway (e.g., ingestion, inhalation, dermal).	(f) Describe any protective equipment and engineering controls used to protect workers (e.g., goggles, gloves, chemical hoods).	

2. Identify and explain the activities, duration of activities, and typical and maximum exposure concentrations in which worker exposure to the proposed substitute is expected to be the highest for each scenario in (a) through (c).

Scenario	**Identify activities with typical and maximum potential for exposure**	**Duration of Activity**				**Exposure Concentration**				CBI
		Typical		**Maximum**		**Typical**		**Maximum**		
(a) Manufacture and filling of aerosol cans (e.g., filling cans)			hours/day		hours/day		ppm		ppm	
			day/year		day/year		%		%	
(b) Use of aerosol product			hours/day		hours/day		ppm		ppm	
			day/year		day/year		%		%	
(c) Disposal (e.g., collection of spent aerosol solvent)			hours/day		hours/day		ppm		ppm	
			day/year		day/year		%		%	
(d) Are exposure concentrations based on a proxy compound or blend?		(e) If yes, what is the proxy compound or blend?			(f) Explain why the proxy compound or blend is appropriate for estimating exposures to the proposed substitute?					
Is supporting documentation (e.g., personal monitoring data) attached?										

3. Estimate typical and maximum number of aerosol cans a worker would (a) manufacture and/or fill, (b) use, and (c) dispose per day.

Scenario	**Typical number of cans per day**	**Maximum number of cans per day**	CBI
(a) Manufacture and filling of aerosol cans			
(b) Use of aerosol product			
(c) Disposal			

4. Estimate typical and maximum (a) delivery rate and (b) release rate for the aerosol can.

Scenario	**Typical**		**Maximum**		CBI
(a) Estimate the typical and maximum delivery rate for the aerosol product, in terms of grams/second		grams/sec		grams/sec	
(b) Estimate the typical and maximum release rates in terms of (1) ppm and/or (2) percent of aerosol can.		ppm		ppm	
		%		%	

5. For aerosol solvents (e.g., degreasers, flux removers), describe disposal practices of aerosol container and contents (e.g., collected and sent to incinerator, recycling).	CBI

6. Provide information on training materials related to manufacture and filling and disposal of aerosol cans. If the proposed substitute is flammable, describe how these guidelines differ from training for non-flammable aerosols.	Are any training materials attached?	CBI

Note: Information claimed as confidential should be placed in [brackets] and marked as CBI. If information is claimed as CBI, then a public version of the submission must be submitted with the bracketed information redacted or removed.

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Part IX: STERILANTS-SPECIFIC INFORMATION

Section A: Sterilants Use Profile

1. Specific End-Use: Identify the ODS (and/or other alternatives) used in the end-use or application and the quantity of proposed substitute needed to replace it for each end use (i.e., the replacement ratio). For an expl

End-Use	(a) ODS (and/or other substances) being replaced	(b) Replacement Ratio (lb: lb)	CBI
Sterilant			

2. Additional End-Use Description: Please describe the specific uses for which you are applying. For example, provide information on how the sterilant is applied (e.g., sterilization chambers)?	CBI

3. Technology Changes and Costs: Describe any new equipment and use profiles and associated costs that will be necessary in order to use the proposed substitute.

End-Use	(a) Technology changes to use alternative	(b) Capital costs associated with proposed substitute, alternative process, new equipment, and/or new materials	(c) Changes in labor and energy costs	(d) Ongoing operational costs	CBI

4. Production and Market Share: Provide estimated information on production of the proposed substitute by end-use. If possible, estimate the percentage of the market held by the ODS being replaced that will be captured by this proposed substitute.

End-Use	(a) Year proposed substitute or technology will be available (or note if currently available)	(b) Anticipated first year annual production for end-use (kg)	(c) Years until maximum market penetration	(d) Maximum annual production at market penetration	(e) Anticipated market share at market penetration (%)	CBI

5. Application of Proposed Substitute. Please provide information on the application of the substitute in the proposed end-use(s).

End-Use	(a) Provide information on the leak-tightness of the equipment (e.g., maximum and typical leak rate of equipment)	(b) Anticipated room air exchange rate (ACH)	CBI

6. Has the Proposed Substitute been submitted for registration under FIFRA.	CBI

Section B: Sterilant-Specific Physical and Chemical Properties

1. Physical and Chemical Properties: Provide information on the physical and chemical properties relevant to evaluating the proposed substitute in sterilization.			CBI
(a) Solubility		g/L	

Section C: Flammability

1. Flammability-Related Physical and Chemical Properties. Provide information on the physical and chemical properties relevant to evaluating the flammability of the proposed substitute when used in sterilization.			CBI
(a) Vapor pressure @ 20 °C		atm	
(b) Flashpoint		°C	
(c) Explosive range (LEL/UEL)		ppm or %	

2. Flammability Concerns and Mitigation: Provide any information on flammability concerns and mitigation measures.		CBI
(a) Detail any abatement techniques that are used to minimize the risks associated with flammable substances or mixtures:		
(b) Additional information on flammability concerns and mitigation measures:		

Section D: Exposure

1. Exposure Media and Release Information

(a) Identify the media(s) to which the proposed substitute is released (e.g., indoor air, outdoor air, water, land).	(b) Indicate the physical form of chemicals at the time of handling/exposure (e.g., solid, liquid, gas).	(c) If releases occur outdoors (e.g., outdoor air, water, land), provide information or estimates of the magnitude of release (ppm or percent of charge).	CBI
(d) Identify engineering controls used to reduce or prevent releases to the environment (e.g., safety valves, gas scrubbers).	(e) Identify the contact pathway (e.g., ingestion, inhalation, dermal).	(f) Describe any protective equipment and engineering controls used to protect workers (e.g., goggles, gloves, chemical hoods).	CBI
(g) Describe disposal practices of used sterilant (e.g., sterilant collected and sent to a wastewater treatment facility, recycling).			CBI

2. Identify and explain the activities, duration of activities, and typical and maximum exposure concentrations in which worker exposure to the proposed substitute is expected to be the highest for each scenario in (a) through (c).

Scenario	Identify activities with typical and maximum potential for exposure	Duration of Activity				Exposure Concentration				CBI
		Typical		Maximum		Typical		Maximum		
(a) Manufacture and charging of equipment (e.g., filling)			hours/day		hours/day		ppm		ppm	
			day/year		day/year		%		%	
(b) Use of sterilant or associated equipment containing sterilant			hours/day		hours/day		ppm		ppm	
			day/year		day/year		%		%	
(c) Disposal (e.g., of sterilant or associated equipment containing the sterilant)			hours/day		hours/day		ppm		ppm	
			day/year		day/year		%		%	
(d) Are exposure concentrations based on a proxy compound or blend?		(e) If yes, what is the proxy compound or blend?			(f) Explain why the proxy compound or blend is appropriate for estimating exposures to the proposed substitute?					
Is supporting documentation (e.g., personal monitoring data) attached?										

3. Training Materials

(a) Provide information on training materials related to manufacture and disposal. If the proposed substitute is flammable, describe how these guidelines differ from training for non-flammable sterliants.	Are any training materials attached?	CBI

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Part X: ADHESIVES, COATINGS, AND INKS-SPECIFIC INFORMATION

Section A: Adhesives, Coatings, and Inks Use Profile

1. Specific End-Use: Identify each end-use that may be reasonably anticipated for the alternative. Identify the ODS (and/or other alternatives) used in the end-use or application and the quantity of proposed substiti

End-Use	(a) ODS (and/or other substances) being replaced	(b) Replacement Ratio (lb: lb)	CBI
Adhesives			
Coatings			
Inks			

2. Additional End-Use Description: Please describe the specific use for which you are applying. For example, in what type of products will the substitute be used for adhesives (e.g., laminate, hardwood flooring, flexible foam, tire patch, metal to rubber, marine); coatings (e.g., metal coatings, wood stains, aerospace coating), or inks (e.g., flexographic printing, rotogravure printing)? What is the application method (e.g., spray gun, aerosol can, dip tank)?	CBI

3. Technology Changes and Costs: Describe any new equipment technology changes and associated costs that will be necessary in order to use the proposed substitute.

End-Use	(a) Technology Changes to Use Alternative and Address Material Compatibility Issues	(b) Capital costs associated with proposed substitute, alternative process, new equipment, and/or new materials	(c) Changes in labor and energy costs.	(d) Ongoing Operational costs	CBI

4. Production and Market Share: Provide estimated information on production of the proposed substitute by end-use. If possible, estimate the percentage of the market held by the ODS being replaced that will be captured by this proposed substitute.

End-Use	(a) Year proposed substitute or technology will be available (or note if currently available)	(b) Anticipated first year annual production for end-use (kg)	(c) Years until maximum market penetration	(d) Maximum annual production at market penetration	(e) Anticipated market share at market penetration (%)	CBI

5. Application of Proposed Substitute. Please provide information on the charge size and associated dispenser size (i.e., total weight of contents) anticipated for the proposed substitute in the proposed end-use(s).

End-Use	(a) Typical amount per dispenser (g or %)	(b) Maximum amount per dispenser (g or %)	(c) Typical total weight of dispenser (g)	(d) Maximum total weight of dispenser (g)	CBI

6. Consumer Use: Please indicate whether the proposed substitute will be used for consumer use. If yes, describe the anticipated consumer applications.	CBI

Section B: Adhesives, Coatings, and Inks-Specific Physical and Chemical Properties

1. Physical and Chemical Properties: Provide information on the physical and chemical properties relevant to evaluating the proposed substitute in adhesives, coatings, and inks end-uses.			CBI
(a) Solubility		g/L	
(b) Dissociation Constant			
(c) Volatilization from soil			
(d) Volatilization from water			
(e) pH			
(f) Vapor pressure @ 20 °C		atm	
(f) Viscosity		Pa·s	
(h) Henry's Law constant		*specify units*	

Section C: Flammability

1. Flammability-Related Physical and Chemical Properties. Provide information on the physical and chemical properties relevant to evaluating the flammability of the proposed substitute in adhesives, coatings, and inks end-uses.			CBI
(a) Heat of combustion		kJ/mol	
(b) Explosive Range (LEL/UEL)		% or ppm	

2. Flammability Concerns and Mitigation: Provide any information on flammability concerns and mitigation measures.		CBI
(a) Detail any abatement techniques that are used to minimize the risks associated with flammable substances or mixtures:		
(b) Additional information on flammability concerns and mitigation measures:		

Section D: Exposure

1. Exposure Media and Release Information

(a) Identify the media(s) to which the proposed substitute is released (e.g., indoor air, outdoor air, water, land).	(b) Indicate the physical form of chemicals at the time of handling/exposure (e.g., solid, liquid, gas).	(c) If releases occur outdoors (e.g., outdoor air, water, land), provide information or estimates of the magnitude of release (ppm or percent of dispenser).	CBI
(d) Identify engineering controls used to reduce or prevent releases to the environment (e.g., safety valves, gas scrubbers).	(e) Identify the contact pathway (e.g., ingestion, inhalation, dermal).	(f) Describe any protective equipment and engineering controls used to protect workers (e.g., goggles, gloves, chemical hoods).	CBI

2. Identify and explain the activities, duration of activities, and typical and maximum exposure concentrations in which exposure to the proposed substitute is expected to be the highest for each scenario in (a) through (c).

Scenario	Identify activities with typical and maximum potential for exposure	Duration of Activity				Exposure Concentration				CBI
		Typical		Maximum		Typical		Maximum		
(a) Manufacture and filling of dispensers (e.g., filling dispensers)			hours/day		hours/day		ppm		ppm	
			day/year		day/year		%		%	
(b) Use of adhesives, coatings, and inks product			hours/day		hours/day		ppm		ppm	
			day/year		day/year		%		%	
(c) Disposal (e.g., disposing of spent dispensers)			hours/day		hours/day		ppm		ppm	
			day/year		day/year		%		%	
(d) Are exposure concentrations based on a proxy compound or blend?		(e) If yes, what is the proxy compound or blend?			(f) Explain why the proxy compound or blend is appropriate for estimating exposures to the proposed substitute?					
Is supporting documentation (e.g., personal monitoring data) attached?										

3. Estimate typical and maximum number of adhesives, coatings, and inks dispensers a worker would (a) manufacture and/or fill, (b) use, and (c) dispose per day.

Scenario	Typical number of products per day	Maximum number of products per day	CBI
(a) Manufacture and filling			
(b) Use of adhesives, coatings, and inks product			
(c) Disposal			

4. Estimate typical and maximum (a) delivery rate and (b) release rate for the adhesives, coatings, and inks dispenser.

Scenario	Typical		Maximum		CBI
(a) Estimate the typical and maximum delivery rate for the dispenser product, in terms of grams/second		grams/sec		grams/sec	
(b) Estimate the typical and maximum release rates in terms of (1) ppm and/or (2) percent of dispenser.		ppm		ppm	
		%		%	

5. Provide information on training materials related to manufacture/filling and disposal of adhesives, coatings, and inks.	Are any training materials attached?	CBI

Note: Information claimed as confidential should be placed in [brackets] and marked as CBI. If information is claimed as CBI, then a public version of the submission must be submitted with the bracketed information redacted or removed.

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Part XI: TOBACCO EXPANSION-SPECIFIC INFORMATION

No additional information is needed for this sector.

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Part XII: RECOMMENDED TOXICOLOGY STUDIES

GENERAL INSTRUCTIONS

This Part of the form includes recommended toxicological studies for each sector:
-Refrigeration and Air Conditioning
-Foam Blowing; Aerosols; Solvents; Adhesives, Coatings, and Inks; Sterilants
-Fire Suppression

Please review and complete the appropriate table(s) given the sector(s) selected in Part I, Section B, Number 2.

Note: "Required" studies are required in order for your submission to be complete and in order for EPA to review your substitute. "Needed for complete database" are studies that provide EPA with information allowing them to use less conservative assumptions when assessing toxicity of the substitute. "Useful but not always required" studies will give EPA the most complete understanding of the substitute's toxicity; if you have this information available, please include it in your submission.

Refrigeration and Air Conditioning

Identify toxicology studies below.
The following toxicological studies are recommended for a critical toxicity review of chemicals submitted to the SNAP program as proposed substitutes in the **Refrigeration and Air Conditioning sector**. *The studies identified below are not necessary if a refrigerant is already listed under American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 34 and exposure limits have already been established.*

Required?	Study Category	Study Name	Attached?	CBI
Required	Critical Toxicology Studies	Acute inhalation study (4-hour study for LC50)		
		Subacute repeat-exposure inhalation study (28-day study)		
		Prenatal developmental inhalation study		
		Cardiac sensitization assay		
	Genetic Toxicity Assays	Bacterial reverse mutation assay (Ames test)		
		In vitro chromosome aberration study		
		In vivo micronucleus		
		Unscheduled DNA synthesis		
	Acute Irritation Assays	Dermal irritation study		
		Eye irritation study		
Needed for Complete Database		Subchronic inhalation study (90-day study)		
		Fish acute toxicity test		
		Daphnia acute immobilization test		
		Freshwater algae growth inhibition test		
		Bioconcentration test		
Useful (but not always required)		Acute oral dose study (LD50)		
		Subacute repeat-exposure oral study (28-day study)		
		Reproductive study		

Foam Blowing; Aerosols; Solvents; Adhesives, Coatings, and Inks; Sterilants

Identify toxicology studies below.
The following toxicological studies are recommended for a critical toxicity review of chemicals submitted to the SNAP program as proposed substitutes in the **Foam Blowing**; **Aerosols**; **Solvents**; and **Adhesives, Coatings, and Inks sectors**. *The studies identified below are not necessary if exposure limits have already been established.*

Required?	Study Category	Study Name	Attached?	CBI
Required	Critical Toxicology Studies	Acute inhalation study (4-hour study for LC50)		
		Subacute repeat-exposure inhalation study (28-day study)		
		Prenatal developmental inhalation study		
	Genetic Toxicity Assays	Bacterial reverse mutation assay (Ames test)		
		In vitro chromosome aberration study		
		In vivo micronucleus		
		Unscheduled DNA synthesis		
	Acute Irritation Assays	Dermal irritation study		
		Eye irritation study		
Needed for Complete Database		Subchronic inhalation study (90-day study)		
		Fish acute toxicity test		
		Daphnia acute immobilization test		
		Freshwater algae growth inhibition test		
		Bioconcentration test		
		Acute oral dose study (LD50)		

Useful (but not always required)		Subacute repeat-exposure oral study (28-day study)		
		Reproductive study		
		Cardiac sensitization assay		

Fire Suppression Sector

Identify toxicology studies below.
The following toxicological studies are recommended for a critical toxicity review of chemicals submitted to the SNAP program as proposed substitutes in the **Fire Suppression sector**.
The studies identified below are not necessary if exposure limits have already been established.

Additional information on EPA's methods for evaluating short-term exposures for each type of fire suppression agent is available at https://www.epa.gov/sites/production/files/2014-11/documents/riskscreenfire.pdf.

Alternative Type	**In-kind**		**Not-in-kind**		**Attached?**	**CBI**
Alternative	**Halocarbon Gaseous**	**Halocarbon Gaseous**	**Powdered Aerosols**	**Foam**		
End-Use	**Streaming**	**Flooding**	**Flooding**	**Streaming**		
Acute inhalation study (4-hour study for LC_{50})	✓	✓ [a]	✓ [a,b]	✓		
Subacute inhalation study (28-day study)	✓	✓	□	□		
Cardiac sensitization study	✓	✓ [a]	x	x		
Bacterial reverse mutation assay (Ames test)	✓	✓	✓	✓		
In vitro chromosome aberration study	✓	✓	✓	✓		
In vivo micronucleus study	✓	✓	✓	✓		
Unscheduled DNA synthesis	✓	✓	✓	✓		
Dermal irritation study	○	○	○	○		
Eye irritation study	○	○	✓ [a]	✓		
Subchronic inhalation study (90-day study)	✓	□	□	□		
Fish acute toxicity test	□	□	□	□		
Daphnia acute mobilization test	□	□	□	□		
Freshwater algae growth inhibition test	□	□	□	□		
Bioconcentration test	□	□	□	□		
Reproductive study	○	○	○	○		
Acute oral dose study (LD_{50})	x	x	○	○		
Subacute repeat-exposure oral study (28-day study)	○	○	○	○		

✓ *Required*

□ *Needed for Complete Database*

○ *Useful (but not always required)*

x *Not required*

[a] *Not required for unoccupied spaces.*

[b] *15-minute static inhalation assay with the compound at the design application density is preferred.*

Note: Information claimed as confidential should be placed in [brackets] and marked as CBI. If information is claimed as CBI, then a public version of the submission must be submitted with the bracketed information redacted or removed.

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Part XIII: ADDITIONAL INFORMATION

Please provide any additional information in this section.

Note: Information claimed as confidential should be placed in [brackets] and marked as CBI. If information is claimed as CBI, then a public version of the submission must be submitted with the bracketed information redacted or removed.

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Part XIV: ATTACHMENTS

Identify attachments below.
Select (X) in the CBI box next to any attachment that contains information you claim as confidential. The public version of the submission form must include the attachment name/citation at a minimum. All claims of confidentiality must be substantiated in Part I, Section C.

#	Attachment Name/Citation	Associated Section of Information Notice (Part/Section/Question)	Number of Pages	CBI

Note: Information claimed as confidential should be placed in [brackets] and marked as CBI. If information is claimed as CBI, then a public version of the submission must be submitted with the bracketed information redacted or removed.

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RESPONSE CHECKER

This checker identifies questions that are missing responses. Please review the questions that are missing responses carefully to ensure that all required information is provided before submitting this form to EPA. Please note that this checker is not an indicator of whether EPA will consider the submission complete, but rather, this checker is an indicator of whether all applicable questions have been answered prior to submission. You may determine that some questions are not applicable to your application, in which case it may be appropriate for the response checker to determine such questions to be incomplete.

Part IV: REFRIGERATION AND AIR CONDITIONING-SPECIFIC INFORMATION	
This sector was not selected for the proposed substitute in Part I, Section B, Number 2.	
Section A: Refrigeration and Air-Conditioning Use Profile	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.
Section B: Refrigeration and Air Conditioning Physical and Chemical Properties	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.
Section C: Flammability	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.
Section D: Exposure	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.

Part V: FOAM BLOWING-SPECIFIC INFORMATION	
This sector was not selected for the proposed substitute in Part I, Section B, Number 2.	
Section A: Foam Blowing Use Profile	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.
Section B: Foam Blowing Agent Physical and Chemical Properties	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.
Section C: Flammability	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.
Section D: Exposure	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.

Part VI: CLEANING SOLVENT-SPECIFIC INFORMATION	
This sector was not selected for the proposed substitute in Part I, Section B, Number 2.	
Section A: Cleaning Solvent Use Profile	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.
Section B: Cleaning Solvent-Specific Physical and Chemical Properties	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.
Section C: Flammability	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.
Section D: Exposure	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.

Part VII: FIRE SUPPRESSION AND EXPLOSION PROTECTION-SPECIFIC INFORMATION

This sector was not selected for the proposed substitute in Part I, Section B, Number 2.	
Section A: Fire Suppression Use Profile	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.
Section B: Fire Suppression Agent Physical and Chemical Properties	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.
Section C: Fire Suppression Agent Toxicity and Hazard Information	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.
Section D: Exposure	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.

Part VIII: AEROSOLS-SPECIFIC INFORMATION	
This sector was not selected for the proposed substitute in Part I, Section B, Number 2.	
Section A: Aerosol Use Profile	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.
Section B: Aerosol-Specific Physical and Chemical Properties	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.
Section C: Flammability	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.
Section D: Exposure	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.

Part IX: STERILANTS-SPECIFIC INFORMATION	
This sector was not selected for the proposed substitute in Part I, Section B, Number 2.	
Section A: Sterilants Use Profile	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.
Section B: Sterilant-Specific Physical and Chemical Properties	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.
Section C: Flammability	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.
Section D: Exposure	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.

Part X: ADHESIVES, COATINGS, AND INKS-SPECIFIC INFORMATION	
This sector was not selected for the proposed substitute in Part I, Section B, Number 2.	
Section A: Adhesives, Coatings, and Inks Use Profile	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.
Section B: Adhesives, Coatings, and Inks-Specific Physical and Chemical Properties	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.
Section C: Flammability	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.
Section D: Exposure	This sector was not selected for the proposed substitute in Part I, Section B, Number 2.