

## Supporting Statement – Part B

### AGRICULTURAL RESOURCE MANAGEMENT, CHEMICAL USE, AND POST-HARVEST CHEMICAL USE SURVEYS

OMB No. 0535-0218

#### B. COLLECTION OF INFORMATION EMPLOYING STATISTICAL METHODS

1. Describe (including a numerical estimate) the potential respondent universe and any sampling or other respondent selection method to be used. Data on the number of entities (e.g., establishments, State and local government units, households, or persons) in the universe covered by the collection and in the corresponding sample are to be provided in tabular form for the universe as a whole and for each of the strata in the proposed sample. Indicate expected response rates for the collection as a whole. If the collection has been conducted previously, include the actual response rate achieved during the last collection.

Respondent Universe: ARMS and the Vegetable Chemical Use Surveys are screened together to identify records for sampling. The target population for ARMS is the official NASS farm population with the exclusion of institutional farms, approximately 2 million operations. The target populations for the ARMS Chemical Use (Phase II) and Fruit and Vegetable Chemical Use Surveys are operations that produce the commodity of interest. The respondent universes for the Post-harvest Chemical Use Surveys are operations that store or handle the target commodities. The respondent universe for the Contractor Expense Surveys comes from known contractors on our list frame. No screening to identify these operations is necessary.

Sampling: The ARMS is a multiple frame survey using a list frame of small to large farms identified on the NASS list frame and a complementary area frame. Sample list strata are developed using major categories, a combination of targeted crops, livestock, fruit, vegetables, and horticulture. Strata are developed by grouping operators by the total value of sales followed by the presence of the targeted commodity. The list is an efficient sampling frame because it contains most of the farms with the largest production and economic activity. The area frame, stratified by land use, provides the completeness missing from the list. The multiple frame expansions are unbiased and more precise than expansions which could be obtained using one frame alone. For sampling organic producers, the NASS list frame will be supplemented with lists of certified organic producers originating from USDA-Agricultural Marketing Service (AMS) and lists of producers changing to organic which are supplied by industry contacts to ERS. These lists will be screened to verify that the operation is still in business and to determine presence of targeted commodity.

The list classification process is very extensive, examining many crop and livestock control data values. After classification is completed, list records are partitioned into size groups based on qualifying control data for the current year commodities, type of farm, and estimated size. The size groups are then collapsed into two sets of strata. One set consists of farms believed to have one of the targeted commodities for the current year. The other set contains all other identified medium to large farms, stratified by size and type of operation.

Operations will always belong to one of the standard expenditure strata and are eligible to also belong to a targeted commodity stratum. Targeted commodity strata take precedence over the expenditure strata in most instances but for some rarer commodities it is possible that the more rare strata can take precedence over the more common target commodity strata. Since targeted commodities have the potential to change each year, the classification and stratification may change as well.

The area frame sample consists of a subset of respondents from the June Agricultural Survey (JAS), included in OMB No. 0535-0213. During the JAS, farm operators associated with the land area segments are classified according to whether they are overlap with the list frame. Those farm operators not eligible for selection on the list are eligible for selection in the ARMS area sample.

Beginning in 2007, Sequential Interval Poisson (SIP) sampling was used for some of the PPCR surveys in ARMS. Beginning in 2008, all surveys (PPCR surveys and the CRR and CORE surveys) were selected using SIP methodology. In SIP, the sampling probabilities were defined to insure that each operation was in one and only one sample. The probabilities of selection can be based on any type of probability scheme. The SIP procedure was used to minimize overlap with the previous year's ARMS survey as well as the Crops/Stocks Surveys. Other surveys like Hogs and Cattle were not included in the SIP sampling procedure. Perry-Burt was discontinued for all parts of ARMS in 2008.

The sampling population for the Fruit and Vegetable Chemical Use surveys will be obtained from the ARMS classify code as well. All records on each State's list frame having target vegetables or a vegetable indicator will have a positive probability of selection. The purpose for using the ARMS classify for creating the Chemical Use sampling population is to more effectively control overlap between the ARMS and the Chemical Use surveys. The Vegetable Chemical Use Survey is screened in the spring with the ARMS screening to identify operations with targeted crops. The sample design for the Fruit and Vegetable Chemical Use surveys is a multi-variate probability proportional to size (MPPS) design. Acreage of all targeted crops that the grower reported in the screening phase or on the list frame are included when determining a grower's probability of selection.

The populations for Post-harvest Chemical Use surveys are facilities that store the commodity of interest. Sampling is based on information maintained on the NASS list for volume stored or capacity. Sampling will vary significantly based on the commodity targeted for the survey; corn and soybeans, for example, were surveyed in 2003 and the population included warehouses and elevators where corn and soybeans were stored.

The sampling population for the Contractor Expense Surveys consists of all large contractors in each State for the five commodity groups (broilers/starter pullets, layers, turkeys, hogs, and processed vegetables).

**Response Rates:** Following are average response rates for all survey phases based on the last three survey cycles.

Annual Average Response Rates					
Survey	Survey Year	Sample Size	Percent Response	Percent Refusal	Percent Inaccessible
ARMS Screening (Phase 1)	2011	73,026	70.5%	13.3%	16.2%
	2010	79,120	73.6%	10.5%	15.9%
	2009	60,429	74.3%	11.7%	14.0%
	<b>Average</b>				
ARMS Production Practices (Phase 2)	2010	6,213	80.5%	15.1%	4.4%
	2009	3,653	73.2%	19.9%	6.9%
	2008*	--	--	--	--
	<b>Average</b>	4,933	76.9%	17.5%	5.7%
ARMS Phase 2 - Organic Component **	2010	382	87.9%	9.4%	2.7%
	2009	304	85.3%	9.8%	4.9%
	2008 *	--	--	--	--
	<b>Average</b>	343	86.6%	9.6%	3.8%
ARMS Cost and Returns (Phase 3)	2010	34,947	67.1%	27.7%	5.2%
	2009	32,771	70.0%	25.3%	4.7%
	2008	35,559	68.4%	27.3%	4.3%
	<b>Average</b>	34,426	68.5%	26.8%	4.7%
Fruit and Vegetable Chemical Use Survey	2010 Veg. *	--	--	--	--
	2009 Fruit	6,740	77.2%	14.9%	7.9%
	2008 Veg. *	--	--	--	--
	<b>Average</b>	6,740	77.2%	14.9%	7.9%
Post Harvest Chemical Use Survey	2010	2,237	89.4%	9.6%	1.0%
	2009 *	--	--	--	--
	2008 *	--	--	--	--
	<b>Average</b>	2,237	89.4%	9.6%	1.0%

\* Survey not conducted this year due to budget constraints.

*(Overall average for the last three years was 73.4%)*

The Public Affairs Section (PAS) promotes NASS survey efforts and educates respondents about the need and use for the data they are asked to provide. This group has developed survey-specific materials enumerating the benefits and uses of the data gathered from the economic surveys as well as the chemical use efforts. PAS works with data users and industry leaders to provide concrete examples of instances where the data that respondents provide are used to service the respondents. They are also actively publicizing survey activities by generating and distributing news reports and drop-ins for industry publications and news outlets.

Several studies and projects are underway in the NASS Research and Development Division that relate to ways to increase response rates and reduce respondent burden. One project is the development of a mail version of the core set of questions that are critical to producing data for the income accounts and will be repeated annually. Preliminary research shows that the core version reduces respondent burden by approximately one-third. Another effort that is underway is research into identifying the validity of using previously reported data for the completion of certain sections of the ARMS Phase III.

2. **Describe the procedures for the collection of information including:**
- **statistical methodology for stratification and sample selection,**
  - **estimation procedure,**
  - **degree of accuracy needed for the purpose described in the justification,**
  - **unusual problems requiring specialized sampling procedures**

**Agricultural Resource Management Survey** - The annual ARMS collects production practices and cost of production data on selected commodities and also detailed whole farm financial information from a representative sample of farms and ranches across the country. To accomplish this, the ARMS are conducted in three data collection phases. In many ways, the three phases can be viewed operationally as independent surveys. However, the power of the ARMS design is that data across phases are related and can be combined and analyzed. Estimated sample sizes are shown in the table for Item A.12.

The ARMS Phase I is conducted from May through July, and it collects general farm data such as crops grown, livestock inventory, and value of sales. The Integrated Screening Form is used in years that we will be conducting the Vegetable Chemical Use Survey. The integrated form will be used for both the ARMS II and III surveys and the Vegetable Chemical Use Survey. These data are used to qualify or screen farms for these surveys to make sure the samples are as accurate as possible. The mail and telephone forms of the questionnaires are attached.

The ARMS Phase II is conducted from September through December. This phase collects data associated with agricultural production practices (field operations, pest management practices, etc.), resource use (pesticide applications, fertilizer and nutrient application, types of equipment used, etc.), and variable costs of production for specific commodities. The respondent is given an information booklet for each crop with code definitions and conversion tables to help complete the questionnaire. Samples of the Phase II advance letter and flyer, respondent booklets, questionnaires, and telephone quality control sheet are attached.

The ARMS Phase III is conducted from December through April following the survey reference year to enable collection of full year financial data. This phase collects whole farm finance and operator characteristics information. Samples of the Phase III advance letter, respondent booklet, sample questionnaires, and the telephone quality control sheet, are attached. Some of these respondents will be asked to complete a commodity-specific report to obtain financial, resource use, and cost of production data for the selected commodity and the entire farming operation. It is vital that operators who are selected for both the second and final phase complete both phases, so that we can collect data for the entire crop production process (physical activities and financial costs). Data from both phases provide the link between agricultural resource use and farm financial conditions; this is a cornerstone of the ARMS design. These commodity-specific versions consist of the Core questionnaire with appropriate customization of questions with a general scope as shown in example crop and livestock questionnaires.

As these questionnaires are updated each year to accommodate changes in the farming conditions for that year or for a particular commodity, the final versions will be submitted to OMB as they become available.

**Fruit and Vegetable Chemical Use Surveys** - The fruit and vegetable surveys target operators with selected commodities. Vegetable operations are screened as described above while fruit operations are selected from the NASS list frame. Only active operations with the crops of interest become part of the population for the fall survey.

Fruit and Vegetable producers selected for the survey are asked to complete an interview with questions pertaining to whole farm acreage and production, chemical products used and application rates, pest management practices, organic practices, and operator characteristics. Collection of fruit or vegetable chemical use data begins in early October. Samples of the two questionnaire versions, along with advance letters, respondent booklets, and a telephone quality control sheet are attached.

**Post-harvest Chemical Use Surveys** - Data collection for this survey is conducted by personal interview after the target commodity has been harvested. Sample sizes and commodities for the next 3 years are shown in the table for Item A-12. An introductory letter from the State Field Offices about the survey is mailed to the selected operations prior to the survey. When possible, an endorsement letter from representatives of the commodity industry requesting their membership to cooperate on the survey is also mailed to the respondents prior to data collection. Samples of the advance letter, questionnaire, respondent booklet, and telephone quality control sheet are attached.

**Contractor Expense Surveys** - These surveys are used to collect average contractor expenses for the five commodity groups (layers, turkeys, hogs & pigs, broilers & starter pullets, and processed vegetables) . The sample size will vary from State to State, dependent upon the number of contractors and the amount of influence they each have on the market in their respective States.

NASS Field Office staff will receive a Survey Administration Manual which provides detailed aspects of the survey data collection and editing process. Field enumerators in each State will be given an Interviewer's Manual.

- 3. Describe methods to maximize response rates and to deal with issues of non-response. The accuracy and reliability of information collected must be shown to be adequate for intended uses. For collections based on sampling a special justification must be provided for any collection that will not yield "reliable" data that can be generalized to the universe studied.**

In previous years, NASS conducted several studies using various incentives or gifts being given to the respondents in an attempt to increase response rates. The increase in response rates were minimal compared to the amount of money that was spent. Thus far, it seems that the best tool for increasing response rates is improving the training of our Field Enumerators. Enumerators who are better prepared to answer questions raised by the respondents and to inform respondents of how this data will be used and why it is so very important for them to respond have had the best success rates. This data is very important to both the farming community as well as external data users (politicians, educators, banking industry, farm supply companies, etc.).

**RESEARCH:** The findings from 2007 NASS research report on: *Assessing the Effect of Calibration on Non-response Bias in the 2005 ARMS Phase III Sample Using Census 2002 Data* are summarized in the next two paragraphs.

Records sampled for the 2005 ARMS Phase III were matched with those from the 2002 Census of Agriculture, and means of census data were calculated for matching records which had also provided 2002 expenditure data for the census. Nonresponse bias in ARMS data was assessed, using census data as a proxy, in terms of the degree to which the mean based on all sample cases versus

respondent cases differed. Three means were computed and compared across 20 regions in order to assess relative bias: 1) the mean of all matching cases using base sampling weights, 2) the mean for only matching ARMS respondents using the same base sampling weights, and 3) the mean for matching ARMS respondents using the sampling weights as adjusted through calibration.

Using 17 “study variables,” relative bias of the mean was assessed using a variation of the formula provided by OMB in Guideline 3.2.9. Although significant biases were exhibited in 9 of 17 variables using the 2005 ARMS III base sampling weights, the 2005 ARMS III calibration weights were able to reduce the bias so that it was no longer significantly different from zero ( $p < .05$ ) in almost 90% (8/9) of the study variables. For this analysis the calibration process varied slightly from that of the 2005 ARMS III, in that egg and milk production were not included, since they were not accounted for by the 2002 Census; this may in part account for the one variable, fertilizer expenses, still demonstrating a significant level of bias after the use of calibrated weights. This study suggests that the process of calibration is an effective tool in reducing nonresponse bias levels, so they are no longer significantly different from zero.

Research is underway to see if sample size reductions can be gained using more advanced calibration techniques during ARMS phase III summarization processes.

Several research projects will be launched based on recommendations of the National Academies of Sciences, Committee on National Statistics (NAS-CNSTAT) comprehensive review of the ARMS. Copies of the November 2007 report are available via the web at:

[http://books.nap.edu/openbook.php?record\\_id=11990&page=R1](http://books.nap.edu/openbook.php?record_id=11990&page=R1).

The high priority areas focus on: respondent burden reduction strategies, response rate improvement, and improvement of data quality. Recommended action items may impact other NASS surveys as well as the next Census of Agriculture.

**The following are the non-response adjustments for ARMS II and Chemical Use.**

Unit nonresponse in the Fruit, Vegetable, and Post-Harvest Chemical Use Surveys as well as ARMS II is accounted for using reweighting. The records are stratified by State and size group, and a non-response adjustment is calculated as the sample size divided by the number of completed reports. This process redistributes the survey weights for the non-respondents to the usable records. For ARMS II, the weights are then scaled so that the expanded total of the target commodity’s planted acres is equal to the planted acreage number set by the

ASB (Agricultural Statistics Board). For the Fruit and Vegetable Chemical Use Surveys, a calibration program adjusts the weights so that the expanded planted acreage totals for each target crop matches the planted acreage set by the ASB. Scaling only occurs in the Post-Harvest Chemical Use survey if appropriate data from the ASB is available.

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Item non-response in ARMS II and Fruit, Vegetable, and Post-Harvest Chemical Use Surveys is handled with mean imputation. Missing fertilizer and pesticide rates are replaced with average rates by State, commodity and product code (or nutrient for fertilizer rates). If no records exist in that category, then the groups are collapsed. No other items in these surveys are imputed.

#### **The following are non-response adjustment for ARMS III.**

Non-response is taken into account in the ARMS III sample allocations by State. ARMS III sets a target for positive usable responses by State and ARMS Region; the sample size is adjusted based on a 5-year historical response rate to achieve the targeted usable rates.

Unit nonresponse in the ARMS III all version weights are adjusted for using calibration. The calibration process modifies the survey weights so that certain targets are met. NASS uses official estimates of farm numbers, corn, soybean, wheat, cotton, fruit and vegetable acres as well as cattle, milk production, hogs, broilers, eggs and turkeys as calibration targets. For example, after calibration the weighted sum of the survey data will equal the NASS estimate for corn acres. The weights for the ARMS III commodity specific versions (Versions 2, 3, and 4) are scaled so that the targeted commodities' expansion is equal to the number set by the ASB.

Item nonresponse in ARMS III is dealt with using machine imputation. About 150 survey variables that are critical to NASS analysis and/or ERS work are imputed using positive data from current survey respondents. Imputation is based on groups of operations by region, State, economic sales class, and type of farm. Further, groups are collapsed when not enough observations are present for a particular item.

#### **4. Describe any tests of procedures or methods to be undertaken.**

NASS has experience from previous chemical use and economic surveys that have been beneficial in designing the surveys explained in this docket. Pre-testing of restructured or rotated in sections of questionnaires will be done annually for each survey, refining the data collection instruments each year. The results of these tests and subsequent methods will be incorporated into the operational design.



Additional questionnaire modifications may be tested in the process of assessing and incorporating suggestions from a review of the ARMS by the National Academies of Science. Results of this review are available via the web at:

[http://books.nap.edu/openbook.php?record\\_id=11990&page=R1](http://books.nap.edu/openbook.php?record_id=11990&page=R1).

NASS has been researching the use of data from other surveys to use in the imputation process for item or section non-responses. Data that will be collected as a part of the 2012 Census of Agriculture is a potential source of data for the ARMS surveys to be conducted in the near future.

Response improvement techniques will continue to be researched and tested to improve response rates in the area of questionnaire improvement, respondent relationship building, and soft refusal conversion techniques.

For 2012, we will be researching how the mail version (Version 5 – Core) is picking up data compared to our main personal interview version (Version 1 – CRR). From the research, we will be able to tell if we are giving up data quality issues by collecting more samples by mail than by personal interview. Also for 2012, NASS implemented our propensity scoring or target follow-up for the ARMS Phase III survey. Implementation of both of these was discussed with our steering committee. The committee hopes that the targeted follow-up leads to increased response rates and the mail research shows no data quality issues. These issues will also be considered in line with the NAS Report recommendations.

**5. Provide the name and telephone number of individuals consulted on statistical aspects of the design and the name of the agency unit, contractor(s), or other person(s) who will actually collect and/or analyze the information for the agency.**

The sampling plans are developed by NASS. Questionnaire design, data edit, and initial summarization will also be completed by NASS, and for ARMS, in consultation with ERS. Washington State University provided design expertise for the development of the Web-based version of the Core Phase III questionnaire.

The sample size for each State is determined by the Sampling Branch, Census and Survey Division; Branch Chief is William Iwig, (202) 720-3895.

Data collection is carried out by NASS Field Offices; Deputy Administrator for Field Operations is Norman Bennett (202) 720-0507.

The NASS survey statisticians in Headquarters listed below are responsible for coordination of sampling, questionnaires, data collection, and other Field Office

support. Branch Chief is Chris Messer, (202) 690-8747; Section Head is Shiela Corley (202) 720-5921.

The NASS commodity statisticians in Headquarters listed below are responsible for national summaries, analysis, and publication. Branch Chief is Kevin Barnes, (202) 720-6146, Section Heads are Dale Hawks (202)720-0684 and Kevin Hintzman (202) 690-3223.

<b>Survey</b>	<b>Survey Statisticians</b> Census and Survey Division, Program Administration Branch, Environmental and Economic Surveys Section	<b>Commodity Statisticians</b> Statistics Division, Environmental, Economics and Demographics Branch, Economic, and Environmental and Demographics Sections
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