Supporting Statement – Part B

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

OMB No. 0535-0218

The information that is provided in this supporting statement serves as an overview of the sampling, statistical methodology, weighting of data for non-response, methods for increasing response rates, measurements for accuracy, testing of instruments, etc. The more detailed information for the ARMS and Chemical Use surveys can be found in the attachments to this submission.

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 the Vegetable Chemical Use Surveys are operations that produce the commodity of interest. 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 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 Vegetable Chemical Use survey 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 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 four survey cycles.

Annual Average Response Rates					
Survey	**Survey Year**	**Sample Size**	**Percent Response**	**Percent Refusal**	**Percent Inaccessible**
ARMS Screening (Phase 1)	2012	63,576	3/	3/	3/
	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%
	Average	69,038	72.8%	11.8%	15.4%
ARMS Production Practices (Phase 2)	2011	2,949	79.8%	15.8%	4.4%
	2010	6,305	80.5%	15.1%	4.4%
	2009	3,699	73.2%	19.9%	6.9%
	2008*	--	--	--	--
	Average	5,002	76.9%	17.5%	5.7%
ARMS Phase 2 - Organic Component 2/	2011 1/				
	2010	382	87.9%	9.4%	2.7%
	2009	304	85.3%	9.8%	4.9%
	2008 1/	--	--	--	--
	Average	343	86.6%	9.6%	3.8%
ARMS Cost and Returns (Phase 3)	2011	34,070	65.8%	28.6%	5.5%
	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%
	Average	34,426	67.8%	27.2%	4.9%
Fruit and Vegetable Chemical Use Survey	2011 Fruit 1/	--	--	--	--
	2010 Veg. 1/	--	--	--	--
	2009 Fruit	6,740	77.2%	14.9%	7.9%
	2008 Veg. 1/	--	--	--	--
	Average	6,740	77.2%	14.9%	7.9%

1/ Survey not conducted this year due to budget constraints.
2/ The Organic counts are also included in the Production Practices - Phase 2 totals.
3/ Survey is still being conducted so results are not available.

(Overall completion average for the last four years was 71.2%)

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 (ARMS) - 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 Supporting Statement A, item 12, table.

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 sample 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 sheets are attached to this renewal submission.

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 letters, respondent booklets, sample questionnaires, and the telephone quality control sheets, 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. The 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.

Vegetable Chemical Use Survey - The vegetable survey targets operators with selected commodities. Vegetable operations are screened as described above. Only active operations with the crops of interest become part of the population for the fall survey.

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 vegetable chemical use data begins in early October. Samples of the questionnaire versions, along with advance letters, respondent booklets, and a telephone quality control sheets 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.

In the ARMS Progress Report you will find a Research Plan to test the recommendations of the NAS. The timeline can be found in Appendix A.

http://www.nass.usda.gov/Surveys/ARMS_Progress_Report.pdf.

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 non-response in the Vegetable Chemical Use Survey 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 Vegetable Chemical Use Survey 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.

Item non-response in ARMS II and the Vegetable 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 non-response in the ARMS III weights, for all versions, is adjusted by 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.

Item non-response in 1ARMS III is dealt with by 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.

Contractor expenses are imputed from the data collected with the Contractor Expense Survey.

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

NASS uses an OMB-approved generic clearance docket (OMB Control # 0535-0248), to conduct testing and evaluation of NASS questionnaires. A variety of testing methods, including cognitive testing, focus groups, split sample field tests, etc., are used to test ARMS and other NASS surveys. NASS does not plan to create a cognitive laboratory facility due to the geographic dispersion of farm operators needed for testing. As is typical in establishment surveys, most testing is conducted with onsite visits. NASS is using the OMB-approved generic clearance docket to evaluate current instruments and practices and to test revised instruments before they are put into production.

NASS conducted an extensive analysis of imputation for the 2007 Census of Agriculture and then used the analysis to inform questionnaire design for the 2012 Census of Agriculture and the 2012 ARMS, which have many of the same questions.

NASS currently uses an experimental control group to evaluate differences between data reported on ARMS mail and field versions to determine whether less detailed information obtained on mail surveys can be substituted for the disaggregated, detailed data on the field version of the questionnaires. NASS will

continue to use the experimental design approach to assess questionnaire differences.

NASS has hired an individual with prior experience with agricultural data, to lead a project on designing data collection methods for large and complex operations across its surveys, including ARMS. This could involve the use of respondent record-keeping practices, but past research in this area was not productive. A subsample of ARMS for research and testing purposes will be considered when there are sufficient new ARMS initiatives to justify this mode of testing.

Web-based data collection is available to about one half of the ARMS sample nationally. NASS utilized Morae usability testing software to test computer based instruments. Implementation and testing of computer-assisted personal interviewing (CAPI) began in fall 2009 with the assignment of a CAPI project manager. Due to the complex nature of ARMS, with numerous tables and interrelated instrument designs, CAPI implementation will be incremental over the next few years.

Several tests will be conducted 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.

In the ARMS Progress Report you will find a listing of tests NASS plans to conduct from 2012 through 2016. The timeline can be found in Appendix A.

http://www.nass.usda.gov/Surveys/ARMS_Progress_Report.pdf.

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.

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. Data from the Contractor Expense Survey that is included in this approval request is used to impute data for operations that could not or would not provide expenses that were conducted under a contract agreement.

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.

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 State Statistical Offices; Norman Bennett, Eastern Field Operations Director, (202)720-3638 and Kevin Barnes, Western Field Operations Director (202)720-8220.

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 Christine 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 Troy Joshua, (202) 720-6146, Section Heads are Dale Hawks (202)720-0684 and Tony Dorn (202) 690-3223.

Survey	**Survey Statisticians** Census and Survey Division, Program Administration Branch, Environmental and Economic Surveys Section	**Commodity Statisticians** Statistics Division, Environmental, Economics and Demographics Branch, Economic, and Environmental and Demographics Sections
ARMS I Screening	Curt Stock (202)720-3598	Vacant
ARMS II	Esmerelda Dickson (202)720-6170	Erik Gerlach (202) 720-5581
ARMS III	Curt Stock (202) 720-3598	Bryan Combs (202) 720-9168
Fruit Chemical Use	Jean N. Porter (202) 720-6564	Erik Gerlach (202) 720-5581
Vegetable Chemical Use		
Contractor Expense Survey	Curt Stock (202) 720-3598	Bryan Combs (202) 720-9168

June, 2012