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# Targeted Data Collection Efforts for the 2012 ARMS III

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## **EXECUTIVE SUMMARY**

USDA's National Agricultural Statistics Service (NASS) conducts the annual Agricultural Resource Management Survey (ARMS). ARMS is conducted in three phases and ARMS III, the economic portion that takes an average of 90 minutes to complete with an enumerator, suffers from much lower response rates than other phases of ARMS, as well as other NASS surveys. In order to focus data collection efforts and resources on those operations that are unlikely to respond, NASS began to use data mining approaches to target those operations.

In 2011, likely nonrespondents to ARMS III were flagged using nonresponse propensities. The flagging procedure in 2011 was helpful in targeting these nonrespondents, but improvements were made for the 2012 data collection. This report covers the 2012 data collection period but also highlights the changes from 2011 to 2012. The differences in the flagging procedures between the two years are summarized, along with results of the 2012 study. In addition to the new flagging procedure, in 2012, NASS introduced the addition of impact groups to identify those likely nonrespondents that have the most influence on survey estimates. In 2012, we found that providing a logo token item to highly likely nonrespondents was correlated with increased response rates. However, procedures in 2012 were not implemented consistently by all state offices, so we cannot determine if other experimental procedures may have been effective.



## RECOMMENDATIONS

1. Continue using the response propensity scores as a tool to identify the operations that are least likely to respond to ARMS III.
2. Conduct studies that can be monitored more rigorously to determine if targeted procedures are effective at increasing response rates.
3. Consider using response propensity scores that identify operators who are less likely to respond, but not the LEAST likely to respond. Maybe this group of respondents can be persuaded to respond using targeted methods.
4. Consider using token items as a routine component for the data collection strategy used for the ARMS III. Although NASS has not done a controlled experiment using token items, there are several studies in survey methods literature that show increases in response rates when they are used.

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# Targeted Data Collection Efforts for the 2012 ARMS III

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## Abstract

Low response rates for the Agricultural Resource Management Survey Phase III (ARMS III) are a growing concern. Beginning in 2011 and enhanced in 2012, data mining techniques were used to proactively identify operations that are likely to be nonrespondents to ARMS III. Once identified, a measure of the impact on the calibration targets of each likely nonrespondent was calculated. Likely nonrespondents were then divided into a treatment and control group to evaluate data collection methods. Likely nonrespondents in the treatment group were targeted with more intense data collection strategies in an effort to increase response rates. These strategies were evaluated to determine whether they could increase response to the survey but because these strategies were not uniformly applied, definitive conclusions about their effectiveness cannot be drawn.

**Key Words:** Nonresponse propensity scores, impact scores, data mining, targeted data collection, ARMS, calibration target

## 1. INTRODUCTION

### 1.1 Background

The Agricultural Resource Management Survey (ARMS) is an annual survey conducted by the National Agricultural Statistics Service (NASS) in partnership with the Economic Research Service (ERS). It is conducted in three phases over the course of the year. The first phase is the screening phase. The second phase focuses on production expenses, chemical use, and the targeted commodity (targeted commodities change annually). The third phase of ARMS (ARMS III) focuses on financial data such as expenses and income. The focus of this research is on low response rates to ARMS III and strategies to overcome them.

There are multiple versions of ARMS III– the Cost and Returns Report (CRR), Core, and commodity specific version(s) (i.e., Soybean in 2012). The CRR is a comprehensive survey of operational practices and economic well being conducted in the contiguous 48 states. The CRR and commodity specific versions have traditionally been personally enumerated, however,

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beginning in 2012, they were mailed out, with personal visit followup for nonrespondents. The Core is not as comprehensive as the CRR and is only administered in the 15 highest cash receipt states in order to produce estimates for those states. The Core has always been a mail-out/mail-back survey, with personal visit followup of nonrespondents. This research included all versions of the questionnaire. Calibration is used in ARMS III to create sample weights. By re-weighting records to known benchmark calibration targets, adjustments are made for nonresponse and coverage.

ARMS III suffers from low response rates (with higher response rates in the years ending in two or seven when the ARMS is combined with the mandatory Census of Agriculture). Response rates typically fall well below the Office of Management and Budget (OMB) target of 80% (see Table 1). There have been many attempts to increase response rates and reduce bias such as offering incentives and calibrating to known targets (McCarthy, Beckler, & Ott, 2006; Earp, McCarthy, Schauer, & Kott, 2008; Earp, McCarthy, Schauer, & Kott, 2009; Earp, McCarthy, Porter, & Kott, 2010). Recently, work has focused on proactively identifying nonrespondents (Earp & McCarthy, 2011; McCarthy, Jacob, & McCracken, 2010; McCarthy & Jacob, 2009). By identifying the highly likely nonrespondents, NASS can use targeted data collection methods for those cases. Targeted data collection methods for this project included having State Statisticians make the initial contact with operations, using in-person visits as the first contact with potential respondents, using token items, and offering enumerator incentives for completed cases.

Table 1: ARMS III Response Rates 2000-2011

ARMS III Sample Year	ARMS III Sample Size ( <i>n</i> )	ARMS III Respondents ( <i>n<sub>r</sub></i> )	ARMS III Nonrespondents ( <i>n<sub>n</sub></i> )	ARMS III response rates
2000	17,903	11,295	6,608	63.1%
2001	13,313	8,500	4,813	63.8%
2002	18,219	13,484	4,735	74.0%
2003	33,861	21,278	12,583	62.8%
2004	33,908	22,966	10,942	67.7%
2005	34,937	24,704	10,233	70.7%
2006	34,203	23,237	10,966	67.9%
2007	31,924	22,304	9,620	69.9%
2008	36,388	24,066	12,322	66.1%
2009	33,348	22,753	10,595	68.2%
2010	35,431	23,285	12,146	65.7%
2011	34,070	22,130	11,940	65.0%
Total	357,505	240,002	117,503	67.1%

Since response rates fall below eighty percent, nonresponse bias analyses were conducted in the past to assess how nonresponse impacts ARMS III survey estimates. This analysis showed that although calibration does a good job of correcting for bias, some key estimates had significant bias after calibration (Earp et al, 2008; Earp et al, 2009; Earp et al, 2010). Calibration is a

retroactive approach to correct for bias after survey data collection is complete. Ideally, we would like to prevent nonresponse bias as much as possible by obtaining better response during data collection. Proactively identifying likely nonrespondents prior to data collection and tailoring our data collection efforts for those operations is one way to possibly increase response, thereby likely decreasing nonresponse bias.

## 1.2 Classification Tree Models

In 2010, NASS developed a procedure to flag likely nonrespondents for ARMS III using a data mining technique called classification trees. Classification (or decision) trees are used to predict the outcome of a binary variable, such as survey response/nonresponse, from auxiliary data. The primary objective of classification trees is classification of groups (in our case respondent/nonrespondent operations). For the classification trees developed for predicting ARMS nonresponse, the auxiliary data used (which is available for both ARMS respondents and nonrespondents) were variables from the 2002 and 2007 Census of Agriculture.

The classification trees are created by segmenting a dataset by a set of simple rules. The rules assign an observation to a segment based on the input variable that maximizes the difference between two groups based on the target (in this case survey nonresponse). The dataset is sequentially split into subsets by these rules until no more splits can be created. No more splits can be created when the sample size per segment is too small, no more significant splits can be created, or the maximum depth of the tree is too large.

Classification trees create a hierarchy (tree) where the segments are called nodes. The first node, known as the root node, contains the entire dataset. From the root node, there are branches or paths to and from nodes within a tree. Terminal nodes are nodes that have no branches coming from them and are known as leaves. Each record will appear in only one of the leaves and the leaves will collectively contain all the records in the dataset. The leaves of interest are those that have the highest proportion of records with the target (in this case, refusal/non-contact).

When using classification trees, usually a single tree is created with the best initial split. However, an ensemble of trees was created for ARMS III, for a variety of reasons. In the single tree framework, the tree is created with the best initial split based on a portion of the data (training data), but there is no guarantee that is the best split based on the entire dataset. Also, the initial split directly affects the subsequent splits, so although it may be a good initial split, it may not identify the greatest number of operations in the target. It is possible that a split that is not initially the most optimal will provide better subsequent splits. By growing multiple trees (an ensemble), we have a richer understanding of likely nonrespondents that could possibly bias our key estimates, and more stable nonresponse propensity scores.

Therefore, every variable was forced to be used as an initial split in one tree for this study. There were 71 variables in the dataset that could serve as the initial split and 70 of those splits were statistically significant at  $p < 0.20$  level (see Appendix B for a list of the variables). These 70

initial splits were used separately in the model to grow 70 different trees. Therefore, each variable was considered when assessing characteristics of nonrespondents. All variables were considered for subsequent splits in the tree and those splits were determined by the splitting algorithm used by SAS Enterprise Miner (SAS, 2009). A total of 140 trees were created using the 70 variables from the Census of Agriculture (COA), 70 trees from the 2002 COA and 70 trees from the 2007 COA.

## 2. METHODS

In 2011, a threshold of 0.70 was chosen to act as a cut-off to distinguish between likely nonrespondents and all other operators. Therefore, all leaves (also called terminal nodes) with seventy percent nonresponse rate or higher were selected from each tree. This identified 543 likely nonrespondent subgroups with over 6,878 likely nonrespondent records. If an operation had a score of 0.70 or higher in any of the trees, the operation was flagged as a likely nonrespondent.

This 2012 study builds off the 2011 ARMS III study (Earp, Mitchell, McCarthy, & Kreuter, 2012; Earp, Mitchell, McCarthy, & Kreuter, 2014). The procedure used for identifying nonrespondents in 2011 worked well, but there were some improvements made to the method for 2012. While flagged records all had a nonresponse propensity of 70% or higher in at least one tree, the *average* nonresponse propensity across all trees ranged from 12% to 90%. Therefore, some of the records flagged based on a high nonresponse propensity in only some trees may, in fact, have a low nonresponse propensity when their scores are considered across all trees. As shown in Figure one, there are two distinct subgroups of flagged records with nonresponse propensities, those above .7 and those below. Based on this, in 2012 we only flagged operations whose average nonresponse propensity across *all* trees was greater than or equal to .70. This allowed us to target the operations that are the most highly likely nonrespondents.

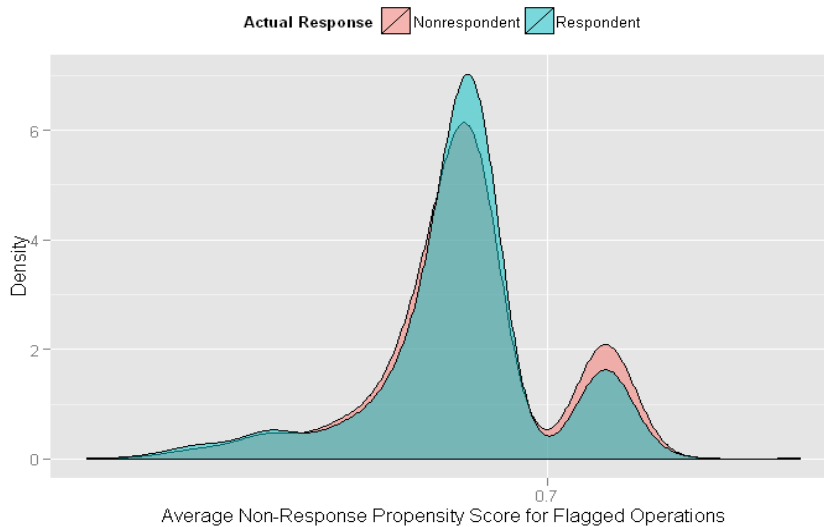


Figure One: Average Non-Response Propensity Scores for Flagged Operations in 2011

The flagging procedure in 2011 flagged a total of 6,878 records as likely nonrespondents across all questionnaire versions. This large number of operations was too high for our targeted data collection techniques because of the high cost of some of the data collection techniques and limited staff resources. Because of this large number, only the records flagged from the CRR version were targeted for changes in data collection in 2011. Using the new procedure in 2012, 887 operations were flagged from all questionnaire versions. These 887 flagged operations were randomly split into a treatment group ( $n=441$ ) and comparison group ( $n=446$ ) after stratifying by state and farm type.

In 2011, NASS began to use these classification trees to identify likely ARMS III nonrespondent operations (Earp, Mitchell, McCarthy, & Kreuter, 2012; Earp, Mitchell, McCarthy, & Kreuter, 2014). In addition to using the classification trees, in 2012 we incorporated impact groups, a measure combining the likelihood of response with a measure of how important an operation is to meeting the calibration target for particular data items. We assigned highly likely nonrespondent operations to one of three impact groups. Impact group 3 included highly likely nonrespondents that are the most important to the calibration targets. Impact group 2 included highly likely nonrespondents that are of mid-importance to calibration targets. Impact group 1 included highly likely nonrespondents that are least important to calibration targets. The assignment of impact groups was based on a point system using list frame data. High impact records were defined using the following criteria: whether the record is in the top 10% of production or inventory for a calibration target within their state, if a record is in the top 10% of sales within their state, and if a record has a positive value for each calibration target. See Appendix A for the official 2012 data collection memorandum and procedures for details regarding the creation of impact groups.

Once likely respondents and nonrespondents were identified and cost was considered, the data collection methodology for each group was targeted using different methods for different groups. Initial data collection techniques were the same for flagged operations in the treatment and control groups. All operations in both groups were mailed a questionnaire as the first survey contact. All mail nonrespondent records from both groups were sent to the state offices to be enumerated using a follow-up, in-person contact. As part of the in-person contact for all operations, the staff member explained the importance of the individual operation and provided a data product, NASS logo token item, or report, if available.

Enumerator incentives were offered to enumerators who completed records in the treatment sample in any of the three impact groups. Enumerators were allocated a bonus of twenty dollars for every flagged operation in the treatment group for which they obtained a response.

In addition to the enumerator incentives which were offered for all treatment sample records, specific follow-up contact techniques were used for records in the treatment group based on the impact group assignment. For records in impact group 3 (those highly likely nonrespondent records most important to calibration targets), records were not allowed to be held out of data collection (unless there was a dangerous situation), and the first non-mail follow-up contact was

an in-person visit done by the director, deputy, or office staff (a supervisory enumerator could be assigned if no office staff were available) to set the stage for a supervisory enumerator to collect the survey data. For records in impact group 2, the first non-mail follow-up contact was made in person by a supervisory enumerator to collect the data or set the stage for an experienced enumerator to collect the data. For records in impact group 1, usual ARMS procedures were followed (i.e., an enumerator was assigned to collect the data from the operations). See Appendix A for the official memorandum and procedures on the follow up data collection procedures.

Field office personnel completed a scoring supplement sheet for each case in the treatment group. The scoring supplement contained questions about the data collection techniques that were used for each operation and was used to assess the effectiveness of the treatment options. See Appendix C for the Scoring Supplement Sheet that was used in 2012.

### 3. RESULTS

The Fischer Exact Test was used to determine if the proportion of nonresponse was different for the records flagged as likely nonrespondents compared to those that were not flagged. Response rates were significantly different for these two groups ( $\chi^2(3, N=32,096) = 54.10, p < 0.01$ ) (see Table 2). This shows that the flagging operation does indeed identify those records that are likely nonrespondents. Even with the extra emphasis put on these records, the response rates were still significantly lower.

Table 2: Response Rates for the ARMS flagged records and other (non-flagged) records

	Likely nonrespondents (flagged records)	Other records (non-flagged records)
Completed	55.6%	73.1%
Refusal	36.9%	21.8%
Inaccessible	4.9%	4.2%
Office Hold	2.9%	0.9%
N*	861	32,096

\*The number of sample operations is not equal to the number of flagged operations (861 versus 887) due to processing inconsistencies for a small number of cases. Also, note that the sample size of likely nonrespondents (887) is approximately 20 times greater than the sample size of likely nonrespondents 32,096).

The Fischer Exact Test was also used to determine if the proportion of nonresponse was different for the treatment group compared to the comparison group. We found no difference in response rates between the treatment and comparison group ( $\chi^2(1, N=861) = 0.0031, p = 0.96$ ). In fact, the response rate was 0.1% lower in the treatment group (see Table 3).

Table 3: Response Rates for the comparison group and treatment group

	Comparison Group	Treatment Group
Completed	55.3% (n=242)	55.2% (n=234)
Refusal	36.2% (n=158)	37.5% (n=159)
Inaccessible	4.8% (n=21)	5.2% (n=22)
Office Hold	3.7% (n=16)	2.1% (n=9)
N*	437	424

\*The number of sample operations is not equal to the number of flagged operations (861 versus 887) due to processing inconsistencies for a small number of cases.

The major change in data collection was for the operations that were identified as highly likely nonrespondents who would have the most impact on calibration targets. Instructions for these cases involved having the state director or other office staff or supervisory enumerator contact the operation in person and providing an enumerator incentive if the supervisory enumerator was able to get a response. The response rates for this subgroup of operations are shown in Table 4. The Fischer Exact Test was also used to determine if the proportion of nonresponse was different for the treatment group compared to the comparison group for the highly likely nonrespondent impact operations. We found no statistical difference in response rates between the treatment and comparison group ( $\chi^2(1, N=172) = 0.878647, p = 0.35$ ), but we do see that for this subgroup, response rates are slightly higher (2.2% higher) in the treatment group. This will be discussed more in the next section.

Table 4: Response Rates for the highly likely nonrespondent impact operations - comparison group and treatment group

	Comparison Group	Treatment Group
Completed	48.4% (n=44)	50.6% (n=41)
Refusal	37.4% (n=34)	43.2% (n=35)
Inaccessible	7.7% (n=7)	3.7% (n=3)
Office Hold	6.6% (n=6)	2.5% (n=2)
N	91	81

Within the treatment group, we examined the specialized data collection techniques recorded on the Supplemental Scoring Sheet to see if any of the specific techniques improved response rates. Similar to 2011, within the treatment group, the use of a logo token item was the only strategy that was significantly related to response rates ( $\chi^2(1, N=424) = 5.07, p < 0.05$ ). Approximately 74 percent of operations that received a logo token item responded to ARMS. No other strategy is associated with a significant difference in response rates.

### 3.1 Field office adherence with interviewing instructions

After data collection, we analyzed the data from the Supplemental Scoring Sheet and followed up with each field office to discuss their experience with the procedures. We found out that the procedures were not followed for many cases in the treatment group. For operations in Impact

Group 3, procedures called for the follow up contact to be made by a state director/deputy director or supervisory enumerator, then assigned to an experienced or supervisory enumerator. From responses on the Scoring Supplement Sheet, 12% of these cases were sent to directors/deputies/state statisticians for the first contact and 15% used supervisory enumerators for the first contact, so 27% of these cases were initially handled as the procedures indicated. Enumerators assigned to these operations were often standard enumerators (not supervisory or refusal conversion). As noted above, the treatment group response rate for this subgroup of operations was 2.2% higher than the control group. Had more of the operations been handled by the directors and state statisticians, the response rate may have been even better for the treatment group, but given the results, there is no way to evaluate that in this study.

For those operations in Impact Group 2, procedures called for the follow up contact to be made in person by a supervisory enumerator. These cases could be handled completely by that enumerator or assigned to a different enumerator with the best refusal conversion techniques. We found that 11% of these cases were contacted by a supervisory enumerator and only one refusal conversion enumerator was used (out of 160 cases). Although procedures called for these operations to be targeted by a supervisory or refusal conversion enumerator, most of these operations were contacted by standard enumerators.

For those operations in Impact Group 1, we asked enumerators to make their first contact in person and either collect the data or set up an appointment. Enumerators could be assigned to these cases as they normally would, and they were to do the follow-up in person. In 96% of these cases, enumerators visited in person (mostly standard enumerators but 11 supervisory enumerators and 3 refusal conversion enumerators). This group had the most buy-in for our instructions, most likely because it reflects the normal way data collection is handled for ARMS.

Overall, the proposed experimental procedures were likely not fully implemented for a variety of reasons. During the time of the study, NASS was undergoing a field office reorganization with many employees transitioning from state offices to regional offices. Therefore, staff were not available to work on ARMS III in general, and to make additional survey contacts specifically. Also, field offices were reluctant to change their data collection strategies during the production survey, particularly for operations they have worked with in the past. In addition, although RDD staff worked extensively with the headquarters survey team, they had much less communication with the field staff who ultimately was tasked with carrying out the procedures.

For operations in Impact Groups 2 and 3, the operations that are more important to calibration targets, procedures were implemented as planned only part of the time. This makes our results difficult to analyze because we cannot compare the treatment and control groups if they essentially used the same procedures for both groups. It also demonstrates the difficulty of implementing an experiment in a production setting. As researchers, we need to recognize the importance of working more closely with the FO staff and field enumerators who are ultimately responsible for carrying out the procedures in any study.

### 3.2 Enumerator Incentives

During the ARMS 2012 data collection period, field offices were asked to offer incentives to enumerators for each record they completed from any of the impact groups in the treatment sample. Enumerators were to be told of this incentive before the data collection period. Only those states that had records in the treatment group were given the money to provide the incentives.

Only about half of the states used the incentives as planned; twelve offices used the incentives as planned while fourteen did not. In most of the states that did not use the incentive, office staff and supervisory enumerators said that they did not want to recognize individuals, but wanted to recognize the group effort of the survey data collection.

Since only half of all field offices used the enumerator incentives, we cannot statistically test the comparison of overall response rates for the treatment and control group across the whole experimental sample. However, we can provide some descriptive information that may inform NASS moving forward with the enumerator incentives. We can provide summary information about the response rates for the treatment and control groups, but we have to subdivide the sample by those offices that used the incentives and those that did not. In addition, because response rates differ by state, we cannot directly compare the actual response rates. Instead, we compare the *difference* between the response rates for the control and treatment groups for those states that used the incentives and those states that did not use them. Table 5 shows the differences in response rates for the treatment and control group for offices that used the incentives and those that did not. Since the sample was not selected in a way that differentiates field offices that use/do not use incentives, we cannot provide any statistical test. However, we can see that the difference in the response rates between the treatment and control groups for the states that used the incentive is higher than the difference between the treatment and control groups in the states that did not use the incentives. It could be that the use of the enumerator incentives did help achieve slightly higher response rates.

Table 5: Response rates for the states that used incentives and those that did not

	States that did use incentives			States that did not use incentives		
	Treatment group rate	Control group rate	Difference	Treatment group rate	Control group rate	difference
Complete	56.4%	55.8%	0.6%	53.4%	55.2%	-1.8%
Refusal	37.7%	38.3%	-0.6%	36.8%	31.8%	5.0%
Inaccessible	5.6%	4.8%	0.8%	4.8%	5.2%	-0.4%
Office hold	1.1%	1.1%	0%	4.1%	7.8%	-3.7%

The use of enumerator incentives may have been inconsistent because NASS has not typically used enumerator incentives in this way in the past. As with the data collection procedures, RDD staff worked with the headquarters survey team to develop the procedures for the enumerator incentives, but had less direct contact with the field office staff who administered the incentives.



Since we offered enumerators additional money to complete certain cases, we conducted a small quality control callback operation to confirm that these enumerators actually collected the survey data from respondents. We found no reason to expect falsification. The procedures used and results from the quality control callback operation are in Appendix D.

#### **4. CONCLUSION AND RECOMMENDATIONS**

This study illustrates that our nonresponse propensity models work well to identify likely nonrespondents for ARMS III. However, using the propensity scores to target data collection efforts to increase response has been challenging.

During the study, field offices and enumerators did not consistently implement the procedures that were being tested. Therefore, statistically valid analysis could not always be done to determine how effective the data collection strategies were in increasing response. Without standard implementation, we cannot conduct experiments that result in a clean comparison of the procedures. Moreover, we cannot use statistical evidence to improve or enhance our data collection process if we cannot test our strategies using clean comparisons.

This study reiterates that it is difficult to entice the likely nonrespondent operations to reply to our surveys. Without standard implementation of the procedures, results are difficult to interpret. We did see a 2.2% non-significant increase in response rates for the treatment group of highly likely nonrespondent impact operations, but no overall increase in response rates for the whole treatment group. We do not know if focusing on these highly likely nonrespondent operations would be beneficial, even if the procedures were always implemented. Instead of targeting these highly likely nonrespondent operations, perhaps RDD should focus on operations that are likely nonrespondents but have more of a 50/50 chance of responding to the survey.

The only data collection strategy associated with a significant difference in response rates in both 2011 and 2012 was providing a logo token item, although the relationship between the use of logo items and response may or may not be causal.

Implementing this experiment had unforeseen challenges in 2012, so the experiment will be conducted again in 2013 with a more limited number of field offices. This should allow us to work more closely with the offices, ensure they understand the objectives of the experiment, and have agreed to follow predefined procedures on using the scores and implementing the strategies to the best of their ability and providing explanations when they have deviated from the instructions. When we have this clear buy in, we can hopefully make the clean comparisons we need to assess the effectiveness of our strategies to get reluctant operations to respond to ARMS.

## 4.1 Recommendations

Based on the research done, the following are recommended:

1. Continue using the response propensity scores as a tool to identify the operations that are least likely to respond to ARMS III.
2. Conduct studies that can be monitored more rigorously to determine if targeted procedures are effective at increasing response rates.
3. Consider using response propensity scores that identify operators who are less likely to respond, but not the LEAST likely to response. Maybe this group of respondents can be persuaded to respond using targeted methods.
4. Consider using token items as a routine component for the data collection strategy used for the ARMS III. Although NASS has not done a controlled experiment using token items, there are several studies in survey methods literature that show increases in response rates when they are used.

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## APPENDIX A: IMPACT GROUP MEMO AND PROCEDURES

\*\*\*\*\* OFFICIAL MAIL \*\*\*\*\*

January 2, 2013

TO: State Directors  
Deputy Directors  
ARMS Phase III Statisticians  
NASS Field Offices, Except Alaska & Hawaii

THROUGH: Barbara Rater  
Chief  
Survey Administration Branch

FROM: Curt Stock  
Survey Administrator – ARMS Phase III  
Environmental and Economic Surveys Section

PROJECT CODE: 904

**SUBJECT: 2012 ARMS Phase III – RDD Scoring**

**Variable ACTION: 907 = NASDA Incentive Project Code**  
**38009904 = Field Office Accounting Code**

**DUE DATE: N / A**

The labels for the RDD variables “Scoring = 21” and “Scoring = 23” are reversed on the Sample Master compared to the documentation that has been previously released. Instead of updating the Marked Sample Table in ELMO and putting out new Sample Masters, all variable labels were updated in the documentation materials and records with “Scoring = 23” are now the “Most Important Group” instead of “Scoring = 21”. The information following this paragraph is from the memo on December 19, 2012. Updates to this memo and to the attached documentation materials are in red.

The Data Collection Plan for the RDD Non-Response Propensity Scoring Project can be found under “Impact Group Data Collection Procedures and Documentation” at the following link:  
[http://nassnet/csd\\_sab/docs/ARMS3/2012/2012\\_ARMS\\_III\\_RDD\\_index.html](http://nassnet/csd_sab/docs/ARMS3/2012/2012_ARMS_III_RDD_index.html)

The 441 records in this project were selected using an average non-response propensity score of 70% (to be a non-respondent on ARMS Phase III) across all 140 “non-response trees” in RDD’s model.

In short, there are 3 groups:

- Most important group for calibration targets (Scoring = 23, Records in group = 87)
- Mid importance group for calibration targets (Scoring = 22, Records in group = 185)
- Low importance group for calibration targets (Scoring = 21, Records in group = 169)

### Plans by Group:

- 1) Scoring = 23:**
  - Mail a questionnaire on December 27, 2012.
  - Initial in-person follow-up contact should be made by State Director, Deputy Director, experienced office staff, or supervisory enumerator.

- Field Office (FO) personnel can fill out a questionnaire or set stage for an enumerator to contact operation to collect data at a later day.
- FO personnel are sent to explain how important the respondent's operation is to the survey.
- Supervisor or experienced enumerator is sent out if need be.
- Fill out Scoring Supplement.

**2) Scoring = 22:**

- Mail a questionnaire on December 27, 2012.
- Initial in-person follow-up contact should be made by a Supervisory Enumerator or Experienced Enumerator.
- Fill out Scoring Supplement.

**3) Scoring = 21:**

- Mail a questionnaire on December 27, 2012.
- Initial in-person contact should be made by an enumerator like what is typically done.
- Fill out Scoring Supplement.

**Incentives:**

- **FO Personnel** – The funds in the attached spreadsheet under tab “FO - RDD Funds” should be used to focus on the 87 records in the high group (Scoring = 23). If FOs have money left over they should then focus on records in Scoring = 22 and then on to Scoring = 21.

**Use of Appropriate Accounting Code:** Travel should be charged to the CSD account under project code 9904. Travel arrangers should do a search for 9904 and select Accounting Code 38009904.

- **NASDA** – The funds in the attached spreadsheet under tab “NASDA - RDD Funds” should be used for enumerators only. Each enumerator would get \$20 per usable report, if the record is in Scoring Group 21, 22, or 23.

If a State does not use all their funds, the money will roll over to the general ARMS NASDA enumerator incentive fund. For example, Arizona has \$160 for 8 records with Scoring=21, 22, or 23. If enumerators complete 5 of these as usable reports and the remaining 3 records came in the mail or were non-response, AZ would use \$100 of their allocated \$160 for the RDD incentive. The remaining \$60 will be added to the general incentive fund. The attached spreadsheet under tab “Total NASDA Incentive Funds” shows the breakout by Field Office for both general and RDD funds. Please use project code 907 for both funds.

If you have any questions or concerns, please contact Curt Stock at (202) 720-3598.

\*\*\*\*\*

## 2012 ARMS Phase III Data Collection Procedures

Kathy Ott and Melissa Mitchell, October 10, 2012

### Assignment of Impact Group

During the ARMS III data collection, different procedures will be used for different operations based on their propensity to refuse and their importance to the calibration target for specific commodities. For this purpose, a sample of operations was selected for a treatment sample and a control sample, with an “Impact Group Code” assigned for each operation in those samples. Details on how the Impact Group Codes were assigned are in the Appendix.

Operations in the treatment sample in each of the impact groups will follow a specific follow up data collection methodology as outlined below. Field Offices can identify operations in the treatment group using the second digit of the Extract variable “x5” on the label. Operations in the control sample will not be marked for the field offices. Therefore, impact group assignment will not be used to determine data collection procedures for the control sample. Details on how the Impact Group Codes will be labeled for the field offices are in the Appendix.

### For operations in ALL impact groups:

- All cases selected for all ARMS versions will be initially mailed a questionnaire to fill out and mail back or fill out through EDR. The procedures below describe the followup contacts.
  - o Provide a data product, NASS logo item, ARMS report, or other item to the operator at the followup contact, if available in the office.
  - o Explain the importance of their particular farm on the estimates for their commodity/size.
  - o Fill out the “ARMS Phase III Scoring Supplement” documenting what strategies you used.

**Operations in Impact Group 3** – Most important for calibration targets (the variable “Scoring” =23; for information on the “Scoring” variable, see the Appendix)

In addition to items listed above,

- **Office Hold:** Do not assign these to Office Hold unless it is a dangerous situation.
- **Initial In-Person Followup contact:** The initial in-person followup contact should be made by the state director, deputy director, experienced office staff, or supervisory

enumerator. This contact should be made in person if possible, with a telephone contact only if absolutely necessary. The director/deputy/office staff should bring a questionnaire with them, but the intent of this contact is not to collect data, but to set the stage for an enumerator to contact the operation to collect data. The questionnaire can be filled out; however, if the respondent wishes to at this time. If the supervisory enumerator makes this contact, they may collect data at this time or set up an appointment for data collection. During this followup contact, the director/deputy/office staff/supervisory enumerator should provide a data product, NASS logo item, ARMS report, or other item to the operator, provide information about the survey and relevant ARMS data, describe that this operation in particular is important to the survey and that is why they have been visited in person, and give the operator the name of the enumerator who will contact them if possible. (Talking points for the initial contact are given at the end of this document).

- **Enumerator assignment:** Assign these cases to a supervisory or experienced enumerator. The enumerator should contact the operation after the followup contact by the director, deputy, experienced office staff, or supervisory enumerator. No enumerator assignment is necessary if the director/deputy/office staff/supervisory enumerator collected all data items at the initial in-person followup contact.
- **Data collection:**
  - o Followup contact made as specified above.
  - o Collect data (even partial data) if they will provide it.
  - o Provide detailed notes about the data collection experience.
  - o Review all known information about an operation (size, type, special instructions, ELMO comments, etc.) to tailor data collection if needed.
  - o Fill out the Scoring Supplement.

## **Operations in Impact Group 2** – Mid-importance for calibration targets (“Scoring” =22)

In addition to items listed above in the “For Operations in ALL Impact Groups” section,

- **Office Hold:** Assign Office Holds as you normally would, using guidance from SAB.
- **Respondent contact:** Followup contact should be made in person by a supervisory enumerator, with a telephone contact used only if absolutely necessary. The supervisory enumerator may collect data at this time, set up an appointment for data collection at a later time, or set the stage for a non-supervisory enumerator to come at a later time. (Talking points for the initial contact are given at the end of this document).
- **Enumerator assignment:** Assign these cases to a supervisory enumerator or a non-supervisory enumerator with the best refusal conversion techniques.



- **Data collection:**
  - Follow other procedures as usual.
  - Fill out the Scoring Supplement.

**Operations in Impact Group 1** – Not as important for calibration targets (“Scoring” =21)

In addition to items listed above in the “For Operations in ALL Impact Groups” section,

- **Office Hold:** Assign Office Holds as you normally would, using guidance from SAB.
- **Respondent contact:** Enumerator should make their first contact in person to either collect the data or to set up an appointment at a later time. (Talking points for the initial contact are given at the end of this document).
- **Enumerator assignment:** Assign these cases to enumerators as you normally would, but have the enumerator make the followup contact in person.
- **Data collection:**
  - Follow other procedures as usual.
  - Fill out the Scoring Supplement.

Talking points for in-person followup contact:

- Remind the operator that they received a questionnaire in the mail in late December or early January that combined this data collection with the mandatory 2012 Census of Agriculture.
- Give a brief description of the ARMS survey and tell them that their operation was selected.
- Give information on why this particular operation is important and that you are visiting them specifically because of their importance.
- Give examples of how the data are used.
- Tell the operator that they can fill out the questionnaire and mail it back, fill it out through EDR, or you can have an enumerator set up an appt.
- Give the operator the name of the enumerator who will call, if possible.
- Ask if they have any questions.

## Assignment and Labeling of Impact Group Codes

### Assignment of Impact Group Codes

There were two steps in the assignment of the Impact Group for the 2012 ARMS III.

#### 1. Nonresponse Propensity Score Flags

RDD (Melissa Mitchell) assigned Nonresponse Propensity Score flags to the entire ARMS Phase III sample using the classification tree models. For ARMS Phase III, 140 classification trees were grown using Census of Agriculture variables. For each tree, a propensity was calculated for each operation which indicates their likelihood of being a nonrespondent. Operations that had an average propensity of .70 across all 140 trees were flagged to signify that they were highly likely to be a nonrespondent.

The operations that were identified by the models as the most likely to be nonrespondents were then divided into either the control sample or the treatment sample. Using all ARMS sample from all versions, 887 operations with an average nonresponse propensity score of .70 across all trees were flagged, with 441 in the treatment sample and 446 in the control sample.

#### 2. Impact Group Score

The treatment and control sample cases were then sent on to SMB (Eric Porter/Suzette Qualey). SMB divided those operations in the control and treatment samples into 3 “impact groups”, based on their importance to the calibration targets, by state. The control sample was divided into impact groups for analysis purposes only.

To make the assignments, SMB downloaded the control data that matched each calibration target for the records in the ARMS sample. Then, point assignments were made using the following criteria:

- a. A record received 1 point for having any positive value for each calibration target or for value of sales. For example, if an operation had 5 acres of corn and 10 cattle, it automatically received 2 points, one for each item of interest.
- b. If a record was in the top 10% of production or inventory within their state (from the approximately 887 records in the control and treatment groups) for any particular item, that record received 3 points.
- c. If a record was in the top 10% of sales within their state, they would also receive 3 points.

The points across all states ranged from 1 – 18.

Finally, using the point totals, the records were split into 3 groups: 1 = Impact Group 1, 2 = Impact Group 2, and 3 = Impact Group 3. Since Group 3 records require the most intensive follow-up work, our target for Group 3 was to have less than 20 operations selected for each state to make this task manageable. The splits resulted in the following breakdowns:

Group 1: Points  $\geq 7$

Group 2: 4 – 6 points

Group 3: 0 – 3 points

### **Labeling of Impact Group Codes**

Records identified for this study are identified using the Sample Master variable “Scoring”. Values for “Scoring” are “blank”, 11, 12, 13, 21, 22, or 23 based on which group they were placed in. The first digit indicates whether the operation is in the control (1x) or treatment group (2x) and the second digit indicates which impact group they were assigned to. Sample Design Section included the “Scoring” variable on the Sample Master for all values, but only values 21, 22, and 23 will show up on the markedSample table (all others will be blank) under the x5 variable. When labels are produced, the x5 variable will be pulled from the markedSample table for the labels. Therefore, operations in the control group will not be marked on the labels.

## APPENDIX B: COA SPLITTING VARIABLES

Rank	Variable Name
1	Total Sales Not Under Production Contract (NUPC)
2	Total Value of Products Sold + Government Payments
3	Total Production Expenses
4	The Number of Hired Workers Employed More than 150 Days
5	Machinery and Equipment Value in Dollars
6	Acres of Cropland Harvested
7	Cropland Acres
8	Total Reported Acres of Crops Harvested
9	Acres of Land Owned
10	State
11	Total Acres Operated
12	The Number of Hired Workers Employed Less Than 150 Days
13	Any Migrant Workers Y/N
14	Total Cattle and Calf Inventory
15	Total Expenditures
16	Farm Type Code
17	Type of Organization
18	Percent of Principle Operator's Income from the Farm Operation
19	Computer Used for the Farm Business Y/N <sup>3</sup>
20	Acres of All Other Land
21	Principal Occupation of Principle Operator is Farming Y/N
22	Total Government Payments
23	ARMS III Production Region (Atlantic, South, Midwest, Plains, or West)
24	Acres of Land Rented from Others
25	Any Hired Manager Y/N
26	Operation had Internet Access Y/N
27	Number of Households Sharing in Net Farm Income
28	Acres of all Irrigated Hay and Forage Harvested
29	Number of Days Principle Operator Worked off Farm
30	Total Fruit Acres
31	Total Acres of Vegetables
32	Acres of Woodland Pasture
33	Principal Operator's Age
34	Acres of Woodland Not in Pasture
35	Number of Operators
36	Acres on Which Manure Was Applied
37	Acres of Permanent Pasture & Rangeland
38	Acres of all Hay and Forage Harvested
39	Total Poultry Inventory

<sup>3</sup> Only asked on the 2002 Census of Agriculture.

40	Partnership Registered Under State Law Y/N
41	Acres of Cropland Used for Pasture
42	Total Hog and Pig Inventory
43	Principal Operator Lives on Operation Y/N
44	Percent of Operators that are Women
45	Acres of Cropland for Which All Crops Failed
46	Acres of Cropland in Summer Fallow
47	ARMS III Questionnaire Version
48	Total Sales Under Production Contract (UPC)
49	Total Citrus Acres
50	Nursery Indicator Y/N
51	Principal Operator's Sex
52	Principal Operator – Race, Black
53	Acres of Land Rented to Others
54	Operation Farm Tenure (1=full owner, 2=part owner, or 3=tenant)
55	Number of Persons Living in Principle Operator's Household
56	Acres of Cropland Idle or Used for Cover Crops
57	Have other farm Y/N
58	Principal Operator – Race, White
59	Sheep and Lamb Indicator Y/N
60	Year Principal Operator Began this Operation
61	Number of Women Operators
62	Other Livestock Animals
63	Agriculture on Indian Reservations Y/N
64	Principal Operator – Race, American Indian
65	Acres of Christmas Trees and Short Rotation Woody Crops
66	Acres of Certified Organic Farming
67	Possible duplicate Y/N
68	Principal Operator is of Spanish Origin Y/N
69	Principal Operator – Race, Asian
70	Aquaculture Indicator Y/N
71	Principal Operator – Race, Native Hawaiian or Pacific Islander <sup>4</sup>

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<sup>4</sup> Not significant at the 0.20 level.

## APPENDIX C: SCORING SUPPLEMENT SHEET



### AGRICULTURAL RESOURCE MANAGEMENT SURVEY (ARMS) – PHASE III SCORING SUPPLEMENT

VERSION ____	ID _____	IRACI <b>01</b>	SUBIRACI ____
-----------------	-------------	--------------------	------------------

**[NOTE: This supplement must be completed for ALL operations with a scoring indicator on the label marked a 21, 22, or 23. Include BOTH respondents and non-respondents.]**

1. Please indicate the non-response prevention/conversion method(s) used below. Enter a '1' for all methods used in the middle column. In the last column, please indicate which method(s) was used last. If more than one method was used last (i.e., a supervisory enumerator was sent and provided a NASS logo token item), mark both in last column.

Method	1 Mark all methods that were used  YES = 1	2 Which of these methods were used LAST?  YES = 1
a. First followup contact was made in person (did not call first)	1348	1349
b. FO Director/Deputy Director made in-person visit prior to data collection. ....	1321	1333
c. Sent FO Director/Deputy Director to collect info during data collection. ....	1322	1334
d. FO Director/Deputy Director contacted respondent by telephone. ....	1323	1335
e. Sent Supervisory Enumerator to collect data. ....	1326	1338
f. Sent Refusal Conversion Enumerator to collect data. ....	1325	1337
g. Sent Field Enumerator to collect data. ....	1324	1336
h. Sent someone else to collect data (note below). ....	1327	1339
i. Sent personalized/customized letter. ....	1329	1341
j. Provided NASS logo token item (hat, gloves, calendar, etc.). ....	1330	1342
k. Provided ARMS data product (ERS glossy ARMS booklet, etc.). ....	1331	1343
l. Other method used, specify: _____	1332	1344
m. Questionnaire was received by mail or EDR	1346	1347

2. Do you have any comments on how you handled this record?

YES - [Enter code 1, then write comments below]     NO - [Enter code 3]. ....

CODE
1346

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## **APPENDIX D: CONCLUSIONS FROM THE ARMS CALLBACKS**

Conducted and written by Miriam Thorne, July 2013

### **Background**

As part of 2012 ARMS data collection, enumerator incentives were offered to enumerators who completed records in the treatment sample in any of the three impact groups. Enumerators were given a bonus of twenty dollars for every flagged operation in the treatment group for which they obtained a response. To confirm that these enumerators actually collected the survey data from respondents—and did not fill in the data themselves—we called back a sample of ARMS respondents to verify that an enumerator showed up and conducted the survey with them. We chose a simple random sample of 40 individuals who had responded to ARMS and whose interviewers were offered the monetary incentive. Staff at headquarters made all of the callbacks in May and June 2013, 2-4 months after the initial survey, and tried to call each respondent 5 times. Of the 40 respondents in our sample, we were only able to reach and speak with 21 individuals. We used the standard Quality Control Worksheet that asks respondents about the enumerator's visit and a few questions from ARMS data to cross-check the data recorded during the interview. The Worksheet is 2 pages long and is shown in Figure 1.

### **Fraud**

Almost all respondents (95%) clearly remembered an enumerator coming to conduct the survey. There was one respondent who did not remember an enumerator coming for the ARMS survey but he said that he responded to many surveys and could not pinpoint this one survey and enumerator. Most (86%) confirmed that the enumerator had verified their name and address and those who did not say that the enumerator had done so simply did not remember; none of the 21 respondents said that the enumerator did not show up or did not ask those questions. Given this, there is no reason to believe that enumerators filled in the survey themselves or that the data was falsified.

### **Data Quality**

After reviewing the callback results, there may be reason to be concerned about errors in the ARMS data. Close to half of the respondents (43%) gave at least one answer in the callback interview that did not match the answers recorded during ARMS. In some cases, respondents seemed unsure of the answer they gave in the callback, asking us to clarify terminology or simply saying that they were not certain of their answer. But in other cases, respondents seemed very sure of their answer, even when it was different from the answers recorded in ARMS.

It seems most likely that respondents gave different answers during the callbacks and ARMS because the questions were not clear, leading respondents to interpret the question differently at different times. During the ARMS interview, the questions are in context and the enumerator can explain the questions, but in the very short callback, there is not the same context or

explanation given. 38% of respondents expressed confusion with at least one question during the callbacks. Respondents seemed most confused by the questions about marketing contracts and production contracts (4b and 4c). Numerous respondents asked for definitions of these terms and, even with the definitions, were still unsure about what the terms meant and whether they had the contracts. Some respondents were also confused about what land we were asking them to measure in question 4a. It is possible that some answers from the callbacks do not match the answers from ARMS because respondents included different types of land in their calculation during the callback and during ARMS. It may be worth clarifying these questions to reduce confusion and errors in the data.



# Figure 1, page 1



NATIONAL  
AGRICULTURAL  
STATISTICS  
SERVICE

U.S. Department of Agriculture  
Rm 5829, South Building  
1400 Independence Avenue, S.W.  
Washington, D.C. 20250-2000  
1-800-727-9540  
Fax: 202-690-2090  
E-mail: [nass-dc@nass.usda.gov](mailto:nass-dc@nass.usda.gov)

## QUALITY CONTROL WORKSHEET for 2012 AGRICULTURAL RESOURCE MANAGEMENT SURVEY PHASE III

Form Approved  
OMB Number 0535-0218  
Approval Expires 10/31/2015  
Project code 904

State: _____	Farm, Ranch, or Operation Name: _____
Version: _____	Operator's name: _____
ID/POID: _____	Address: _____
Enumerator: _____	_____
Interview Date & Time: _____	Telephone: _____
Survey Respondent: _____	<input type="checkbox"/> Operation Mgr/ Partner <input type="checkbox"/> Spouse <input type="checkbox"/> Accountant/ Bookkeeper <input type="checkbox"/> Other
Current Respondent: _____	<input type="checkbox"/> Operation Mgr/ Partner <input type="checkbox"/> Spouse <input type="checkbox"/> Accountant/ Bookkeeper <input type="checkbox"/> Other

### INTRODUCTION:

*[Introduce yourself, and ask for the survey respondent. Rephrase in your own words.]*

Recently you should have been contacted by one of our interviewers, Mr./Ms. \_\_\_\_\_, for the Agricultural Resource Management Survey. This telephone call is part of our survey quality assurance measures to verify that personal contact was actually made with you for that purpose. Your response is voluntary and not required by law, but your cooperation will be appreciated. Facts about your farm/ranch will be kept confidential.

1. During the past few days, do you recall an interview with Mr./Ms. \_\_\_\_\_, for the purpose of obtaining information about your farming or ranching operation?  
 YES - [Go to item 3.]  
 NO - [Go to item 2.]  
 DON'T REMEMBER - [Go to item 2.]
2. During the past few days, did any other person from the \_\_\_\_\_ Agricultural Statistics Service, NASS, or USDA, interview you to obtain information about your farm or ranch?  
 YES - [Go to item 3.]  
 NO - [Conclude interview.]  
 DON'T REMEMBER - [Conclude interview.]
3. Did the person conducting the interview ask you to verify the spelling of your name, address and the operation name?  
 YES  
 NO  
 DON'T REMEMBER

[Continue on back.]

# Figure 1, page 2

- 2 -

## 4. Now I need to verify farm operation items that are critical to our survey procedures.

- |   | Reported                     | Verified |
|---|------------------------------|----------|
| a. Total Land Operated (Section 1, item 4)  | _____                        | _____    |
| b. Did this operation have <b>marketing contracts</b> for any commodities delivered in 2012?<br><i>(A marketing contract is a verbal or written agreement reached before harvest of a crop or before completion of a livestock production stage, setting a price or pricing formula and market for the commodity.)</i>  |                              |          |
|   | <input type="checkbox"/> YES |          |
|   | <input type="checkbox"/> NO  |          |
| c. Did this operation have <b>production contracts</b> for any commodities it produced in 2012?<br><i>(A production contract is a verbal or written agreement setting terms, conditions, and fees to be paid by the contractor to the operation for the production of crops, livestock, or poultry. The contractor usually owns the commodity and often provides inputs.)</i> |                              |          |
|   | <input type="checkbox"/> YES |          |
|   | <input type="checkbox"/> NO  |          |
| d. Was debt used in funding the operation of this farm/ranch in 2012, including any loans obtained in earlier years?<br><i>(Include seasonal production and other loans taken and repaid during 2012.)</i>  |                              |          |
|   | <input type="checkbox"/> YES |          |
|   | <input type="checkbox"/> NO  |          |
| e. Did you use hired labor (either for wages, contract, or custom) in 2012?   |                              |          |
|   | <input type="checkbox"/> YES |          |
|   | <input type="checkbox"/> NO  |          |

## 5. Did Mr./Ms. \_\_\_\_\_ conduct the interview in a knowledgeable and professional manner?

- YES
- NO – Explain: \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

## 6. Do you have any additional comments you would like to make concerning our survey contact?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**This concludes the interview. Thank you for your help.**