United States Department of Agriculture

National Agricultural Statistics Service

July 1997

1997 Agricultural Resource Management Survey (ARMS)

Phase II - Production Practices

Interviewers Manual

Contents of this Chapter

Chapter 1 - ARMS Purpose

ARMS developed from a combining of the old Cropping Practice Survey (CPS) and the Farm Costs and Returns Survey (FCRS). The initiative to combine these surveys came from:

- A growing interest in tying the resources used in agricultural production and the farm financial information to allow a closer examination of the relationships between various production practices (such as chemical and tillage use) and farm financial conditions;

- The need to improve the efficiency of data collection by combining identical information collected in both the CPS and the FCRS into one survey.

Data collected in the ARMS provides the primary source of information to the U.S. Department of Agriculture on a broad range of issues about agricultural resource use and costs, and farm sector financial conditions. Because of the variety of issues needing to be addressed with ARMS, it was designed with a flexible structure that allows using different questionnaire versions to focus more specifically on topics of interest. For example, commodity versions are used on a rotating basis every 5-6 years so they may focus on resource use and production cost for each commodity. Other versions appear from time to time that focus on specific resource use or financial issues, such as national irrigation use, animal waste management, or risk management strategies such as revenue insurance.

The ARMS is conducted in three phases. The initial phase, which takes place from May through July, collects general farm data such as crops grown, livestock produced, and farm sales. This data is used to qualify farms for the other phases. With the screening data, we are better able to choose respondents for commodity versions based on whether they had the commodity of interest.

The second phase, conducted from September through December, collects data associated with agricultural production, resource use, and costs-of-production.

Phase III, conducted from February through April, collects data to examine farm sector financial conditions, such as income, assets, and debt.

Respondents to some versions of Phase II will be asked to complete a Phase III follow-on to report a shortened set of farm financial, resource use, and cost-of-production questions. It is vital for both the Phase II and III reports to be completed for each respondent so the link between agricultural resource use and farm financial conditions may be established. This is a cornerstone of the ARMS design.

Uses of ARMS Data

Generally, farmers benefit from the use of ARMS data indirectly. They see the information through contact with extension advisors, in reports issued by State colleges and universities, in farm magazines, newspapers, and on radio or TV spots. Most respondents probably do not realize the data came from this study.

Farm organizations, commodity groups, agribusiness, Congress, and the USDA use the information to evaluate the financial performance of farm/ranch businesses and to make policy decisions affecting agriculture. Producer associations and the USDA Farm Service Agency (FSA) also ask for ARMS data on the costs of production, particularly when developing proposals for commodity programs.

Specifically, the ARMS:

- gathers information about the relationships among agricultural production, resources, and the environment. ARMS data provide the necessary background information to support evaluations of these relationships. The data are used to understand the relevant factors in producing high quality food and fiber products while maintaining the long term viability of the natural resource base.

- determines what it costs to produce various crop and livestock commodities, and the relative importance of various production expense items.

- helps determine net farm income and provide data on the financial situation of farm and ranch businesses, including the amount of debt they have. ARMS data provide the only national perspective on the annual changes in the financial conditions of production agriculture.

- provides the farm sector portion of the Gross Domestic Product (GDP) for the Nation. If the ARMS data were not available, the

Bureau of Economic Analysis would have to conduct their own survey of farm operators to collect this data.

- helps determine the characteristics and financial situations of agricultural producers and their households, including collecting information on management strategies and their off-farm income.

Natural Resource Data and Farm Practices

To guide policy makers in the decision-making process, it is necessary to have reliable information about the production practices used and the relationship of the practices to changes in water quality and changes in the rate of erosion. Decisions will be made with or without data. It is far better to have factual information to guide the decision process. Farm production covers a major share of the natural resources of the country and as policy suggestions concerning how to manage production are put together, a better understanding of the production process can prevent unwise choices.

The agricultural community is currently faced with many complex issues concerning the environment. ARMS data will be useful in addressing some of these concerns. For instance, fertilizer and pesticide data are used to study water quality. Data on production practices such as machinery use and crop rotation help to identify tillage systems and crop residue levels affecting soil erosion. Pesticide data help measure the economic impact on agricultural production from restricted use or cancellation of a pesticide product or to determine the human and environmental risk of continued use. Data measuring the extent and intensity of pesticide use will aid in the development of residue monitoring programs to improve food safety.

Cost of Production

Congress or USDA mandates exist for the development of annual estimates of the cost of producing wheat, feed grains, cotton, peanuts, tobacco, sugar, and dairy commodities. The legislative background on use of cost estimates by Congress are described in **Exhibit 1** at the end of this chapter. The 1997 ARMS will collect detailed production data from soybean and cotton producers.

Exhibit 5 displays the law mandating costs of production estimates. To assure accurate and reliable estimates, a comprehensive survey is needed to obtain data on production practices and on the amounts of inputs used. Crop and livestock costs and returns estimates provide a basis for understanding changes in the relative efficiency of crop and livestock production and the break even prices needed to cover all costs. The ARMS provides the data needed to develop commodity accounts showing costs and input use by size and type of farm in different regions of the country. The “commodity account" shows the costs of resources provided by both this operation and any landlords that are involved with producing the specific commodity (see **Exhibit 5** for an example of a commodity account).

For several farm inputs, detailed information is needed to estimate commodity costs. Most farm operations produce more than one commodity, such as corn and soybeans. This farm diversity causes special problems in determining commodity costs. For example, seed corn can easily be allocated to commodity costs for corn because it is only used to grow corn. However, machinery such as tractors and implements can be used for many activities on the farm and costs for a commodity like corn cannot easily be separated from whole farm costs. Therefore, it is necessary to collect detailed data on each field operation in order to estimate machinery costs for the commodity being surveyed.

USDA is required to update commodity costs annually while the ARMS is conducted for a specific commodity only once every five or six years. With the physical input data from ARMS, such as seed, fertilizer, and chemical use, analysts can update costs using input prices from other annual surveys. For example, state-level seed prices from the NASS Prices Paid Survey can be used with the seeding rates from ARMS to give an updated estimate of seeding expenses in years when the survey is not conducted. To estimate fuel costs in non-survey years, annual fuel prices can be updated while fuel use from the survey year are kept constant. Minor adjustments can be incorporated based on changes in acreage and yields.

Income, Financial, and Household Data

In addition to the resource management and cost of production data obtained in Phase II, Phase III of the ARMS will obtain additional detailed information about farm finances, debt, assets, and household

characteristics. The ARMS is the only national data source for determining the effect of price, debt, and other financial variable changes on different types and sizes of operations on an on-going basis. Responses to questions about farm assets and debts are used to develop a balance sheet for the farm as well as to provide a variety of financial ratios for use in measuring financial performance.

Publication of ARMS

NASS publishes two reports from the ARMS. The first one is called Agricultural Chemical Usage - Field Crops. This report will be released in April 1998. It will show acreage treated with fertilizer and chemicals and total amounts applied. The second report is called, Farm Production Expenditures. The 1997 survey results will be released in July 1998. It will show expenditures for the U.S., 10 farm production regions, 5 U.S. economic sales classes, and U.S. crop and livestock farms.

Most State offices carry information from these two reports in their State publications.

ERS prepares state, regional, and national reports. These reports show operating and financial characteristics by type of farm, and by income and debt/asset categories. The reports are available to NASS State Offices for publishing the information in State releases.

ERS publishes a number of reports which depend on data from the ARMS:

Annual Report to Congress on the Status of Family Farms

(See **Exhibit 3** at the end of this chapter for this report's legislative background.)

Financial Performance of U.S. Farm Businesses

Farm Operating and Financial Characteristics

Characteristics of Farms with Sales of $50,000 or more

U.S. "Commodity" Production Costs and Returns , 1996: An Economic Base book

The Economic Well-Being of Farm Operator Households

National Financial Summary

Productivity & Efficiency Statistics

ARMS expense, income and financial data are used in the "Farm Business Economics Report" publication which includes the State and National financial summary and costs of production.

ARMS data are also used to develop USDA's Agricultural Income and Finance Situation and Outlook report.

Exhibit 1: Legislative Background of Cost Of Production (COP) Estimates

1973	Cost of Production Study (see Exhibit 4)
1977	COP estimates were to be used directly in adjusting target prices for wheat, corn, cotton, and rice.
1978	Emergency Farm Act modified 1977 Act to provide that when set-aside programs were in effect the adjustment in target prices was to be based on costs of set-aside.
1981	COP estimates were to be used only indirectly as guides to adjusting target prices for wheat, corn, cotton, and rice; for peanuts, COP estimates were to be used directly in setting support levels. Established a National Agricultural Cost of Production Standards Review Board composed of 11 members appointed by the Secretary. Seven members are farmers who produce at least one major commodity, three members have extensive knowledge of production costs by virtue of their training and experience, and one member represents the Department. The responsibility of the Board is to review the adequacy, accuracy, and timeliness of the COP methods used by the Department.
1985	COP estimates are to be used in establishing support levels for peanuts. If a wheat marketing quota is established, COP estimates are to be used to set loan rates and target prices. COP estimates are to be used as guides to establishing support levels for sugar.
1990	Cost of Production Review Board extended with modifications to membership requirements.
1995	Cost of Production review board authorization expired September 30, 1995.

Exhibit 2: References to Parity in Statutes Currently in Effect

Agricultural Adjustment Act of 1933, as reenacted and amended by the Agricultural Marketing Agreement Act of 1937:

Sec. 2 (7 USC 602) & Sec. 8 (7 USC 608c) - Requires price parity comparisons in administering marketing orders for agricultural commodities.

Agricultural Adjustment Act of 1938, as amended:

Sec. 301 (7 USC 1301) - Defines terms related to parity.

Agricultural Act of 1949, as amended:

Sec. 106 (7 USC 1445) - Sets tobacco price support level.

Sec. 201 (7 USC 1446) - Sets honey price support level.

Sec. 401 (7 USC 1421) - Authorizes price support programs.

Agricultural Act of 1954, as amended:

Sec. 703 (7 USC 1782) [The National Wool and Mohair Act of 1954] - Sets wool and mohair price support levels.

Foreign Assistance Act of 1961, as amended:

Sec. 604 (22 USC 2354) - Prevents procurement of any agricultural commodity or product outside the United States when its domestic price is less than parity.

Food and Agriculture Act of 1977:

Sec. 1002 (7 USC 1310) - Establishes loan levels at 90 per cent of parity for certain agricultural commodities when commercial export sales are suspended because of short supply determinations.

Agriculture and Food Act of 1981:

Sec. 007 (7 USC 4103) - Authorizes review of parity formula by the National Agricultural Cost of Production Standards Review Board.

Sec. 1204 (7 USC 1736j) - Sets price support at 100 percent of parity when national security or foreign policy interests mandate an agricultural export embargo.

Exhibit 3: Annual Report to Congress

United States Code, Title 7, Chapter 55.

2266. Congressional reaffirmation of policy to foster and encourage family farms ; annual report to Congress

- (a) Congress reaffirms the historical policy of the United States to foster and encourage the family farm system of agriculture in this country. Congress believes that the maintenance of the family farm system of agriculture is essential to the social well-being of the Nation and the competitive production of adequate supplies of food and fiber. Congress further believes that any significant expansion of non-family owned large-scale corporate farming enterprises will be detrimental to the national welfare. It is neither the policy nor the intent of Congress that agricultural and agriculture-related programs be administered exclusively for family farm operations, but it is the policy and the express intent of Congress that no such program be administered in a manner that will place the family farm operation at an unfair economic disadvantage.

  (b) # (1) In order that Congress may be better informed regarding the status of the family farm system of agriculture in the United States, the Secretary of Agriculture shall submit to Congress, by July 1 of each year, a written report containing current information on trends in family farm operations and comprehensive national and State-by-State data on non-family farm operations in the United States.

  # (2) The Secretary shall also include in each such report -

  " (A) information on how existing agricultural and agriculture-related programs are being administered to enhance and strengthen the family farm system of agriculture in the United States;

  " (B) an assessment of how tax, credit, and other current Federal income, excise, estate, and other tax laws, and proposed changes in such laws, may affect the structure and organization of, returns to, and investment opportunities by family and non-family farm owners and operators, both foreign and domestic;

Exhibit 3: Annual Report to Congress (continued)

" (C) identification and analysis of new food and agricultural production and processing technological developments, especially in the area of biotechnology, and evaluation of the potential effect of such developments on -

Q (I) the economic structure of the family farm system;

Q (ii) the competitive status of domestically-produced agricultural commodities and foods in foreign markets; and

Q (iii) the achievement of Federal agricultural program objectives;

" (D) an assessment of the credit needs of family farms and the extent to which those needs are being met, and an analysis of the effects of the farm credit situation on the economic structure of the family farm system;

" (E) an assessment of how economic policies and trade policies of the United States affect the financial operation of, and prospects for, family farm operations;

" (F) an assessment of the effect of Federal farm programs and policies on family farms and non-family farms that -

Q (I) derive the majority of their income from non-farm sources; and

Q (ii) derive the majority of their income from farming operations; and,

" (G) such other information as the Secretary considers appropriate or determines would aid Congress in protecting, preserving, and strengthening the family farm system of agriculture in the United States.

Exhibit 4: Cost of Production Study

United States Code, Title 7, Chapter 35A, Subchapter II

1441a. Cost of production study and establishment of current national weighted average cost of production

The Secretary of Agriculture, in cooperation with the land grant colleges, commodity organizations, general farm organizations, and individual farmers, shall conduct a cost of production study of the wheat, feed grain, cotton, and dairy commodities under the various production practices and establish a current national weighted average cost of production. This study shall be updated annually and shall include all typical variable costs, including interest costs, a return on fixed costs, and a return for management.

Exhibit 5: Example of a Commodity Account

Table 1--U.S. corn production **cash** costs and returns, 1994 (dollars per planted acre)	
Gross value of production (excluding direct Government payments):	
Corn	296.32
Total, gross value of production	296.32
Cash expenses:	
Seed	22.67
Fertilizer, lime, and gypsum	46.07
Chemicals	25.22
Custom operations 1/	10.05
Fuel, lube, and electricity	18.96
Repairs	16.13
Hired labor	7.54
Other variable cash expenses 2/	.44
Total, variable cash expenses	147.08
General farm overhead	13.49
Taxes and insurance	20.68
Interest	15.96
Total, fixed cash expenses	50.13
Total, cash expenses	197.21
Gross value of production less cash expenses	99.11
Harvest-period price (dollars/bu.)	2.07
Yield (bu./planted acre)	143.15
U.S. corn production **economic** costs and returns, 1994 (dollars per planted acre)	
Gross value of production (excluding direct Government payments):	
Corn	296.32
Total, gross value of production	296.32
Economic (full ownership) costs:	
Variable cash expenses	147.08
General farm overhead	13.49
Taxes and insurance	20.68
Capital replacement	32.96
Operating capital	3.43
Other nonland capital	13.32
Land	66.48
Unpaid labor	24.03
Total, economic costs	321.47
Residual returns to management and risk	-25.15
Harvest-period price (dollars/bu.)	2.07
Yield (bu./planted acre)	143.15
1/ Cost of custom operations, technical services and commercial drying.	
2/ Cost of purchased irrigation water.	

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Chapter 2 - Terms and Definitions

Enumerators working on the ARMS should be familiar with the definitions of the terms listed below. To gain the most benefit from training, enumerators should review the definitions of these terms before attending the State ARMS training workshop. Appendix A of the "Interviewer's Manual" should serve as a reference for many of the definitions. An asterisks after a term indicates the term will not be found in the “Interviewer’s Manual” but is defined at the end of this chapter. Descriptions of irrigation systems are also provided in the “Interviewer’s Manual” at the end of Appendix H. Those systems not described in that appendix have been described in this manual (**Exhibits ?** and **?**, Section G, Chapter 5). Check the index located at the conclusion of this manual to identify where these terms may be used in this manual.

actual nutrients
ALS herbicides *
ALS resistance *
beneficial insects *
Bt *
carryover
check-off
commission charges
commodity
confidentiality
conservation tillage
contract
contract, marketing
contract, production
contract sale
contractee
contractor
contour farming *
Cooperative State Research, Education, & Extension Service (CSREES)
cost of production
cropland
crop insurance *
crop rotation
date, due
date, mailing
date, reference
date, release
defoliant
direct sales
double crop
drip irrigation
dryers
- batch *
- bin *
- continuous flow *

drying
- aeration *
- high temperature *
- low temperature *

editing
EIN
electronic information service
expenses, production
fallow
farm
fertilizer
fertilizer analysis
field
forage
fringe benefits *
fungicide
gallons per minute *

grassed waterways *
grazing allotment
grazing association
greenhouse
gypsum
harvested acres
hay
highly erodible land (HEL) *
herbicide
hundredweight (cwt)
idle land
implement
improvements
inaccessible
input
input provider *
insecticide
integrated pest management
irrigation set *
landlord
lime
mail maintenance system (MMS)
micronutrient
military time
N-P-K
name & address master
Natural Resources Conservation Service (NRCS) *
nitrogen (N)
nitrogen crediting
nonresponse
no-till *
operator
out-of-business
partner
pesticide
pheromone lures *
phosphate (P)
plant tissue test *
potash (K)
power-take-off (PTO)
purchased water *
questionnaire
record status code
refusal
rent
rent, cash
rent, share
respondent
sample, list
sample, multi-frame
sample, probability
sampling frame
sampling unit
scouting *
seed
set-aside
software
solar power
SSN
state EIN
straw
strip cropping *
sub-irrigation *
surface water sources *
surfactant
survey
survey period
survey, statistically defensible
tank mix *
terraces *
underground outlets *
wages
water rights
wetting agent
work, agricultural
work, contract
work, custom
work, service
worker
well casing *
wetlands *
yardage
yield map *
yield monitor *

ALS (*acetolactate synthase*) herbicides	Herbicides that bind to the ALS enzyme in the plant.
ALS resistance	Resistance is caused by a modified ALS enzyme that no longer allows herbicide binding at the site of action. When a modified ALS enzyme has been identified, the enzyme is likely to be resistant to other ALS inhibitor herbicides as well.
Beneficial insects	Natural insect enemies used to control important insect pests.
Bt (*Bacillus Thuringiensis*)	A bacterial organism which causes fatal diseases in specific insect pests when ingested. Several varieties of the bacteria are available to control a number of target pests on corn, cotton, fruits, vegetables, and many other crops. The Bt varieties control European corn borer, cotton bollworm, army worm, tobacco budworm, loopers, gypsy moth, and many other foliar eating larvae when applied at appropriate insect development stages. In addition, some new varieties of corn contain natural genes and genes produced from the soil bacteria Bt to give them host plant resistance to certain insect pests.
Contour farming	The practice of performing tillage operations and planting crop rows across the slope of the land. Furrows, crop rows, and wheel tracks across the slope act as miniature terraces which detain water, resulting in increased infiltration.
Cooperative State Research, Education & Extension Service (CSREES)	A USDA agency providing leadership, coordination, and evaluation to farmers and rural people in support of state and county educational programs. It provides access to ag research and information on federal regulations and policy, food safety, ag marketing, disaster awareness, sustainable agriculture, waste management, water quality and youth at risk. The agency formerly called Extension Service is now a part of CSREES.

Crop insurance	Any Federal, state, or private insurance (multi-purpose or specific to hail or wind).
Dryers, Batch	Facilities outside of a bin into which a batch of wet grain is added and dried. The batch dryer is then emptied and another batch is added. These dryers are used almost exclusively with high temperature drying but may also be used for cooling.
Dryers, Bin	Facilities attached to a grain bin which dry grain added to the bin. Bin dryers are commonly used with both high and low temperature drying as well as aeration.
Dryers, Continuous Flow	Facilities outside a bin in which wet grain is continuously added at the top and is dried as it moves down through the facility. These dryers are used almost exclusively for high temperature drying although they may have stages where the grain is cooled.
Drying, Aeration	Involves no heating; just the removal of moisture by blowing air through the grain.
Drying, High Temperature	Removing of the moisture by blowing air heated 100 - 200 degrees through the grain. If the air blown through the grain is heated to 25 or more degrees above the temperature around the dryer, the drying method should be considered high temperature.
Drying, Low Temperature	The use of fans to blow air (heated to 5 - 10 degrees higher than the temperature around the dryer) through the grain.
Fringe benefits	Employer provided cash payments for such items as health insurance, life insurance, holiday pay, vacation pay, sick leave, time-off with pay, Workers' Compensation, employer's share of Social Security and Medicare, pensions and retirement plans.
Gallons per minute	A water flow-rate measurement. The quantity of water flow (or pumped) during one continuous minute measured in gallon units.

Grassed waterways	Water drainage channels located in a field, often shaped or graded, with a permanent vegetative cover established. Include channels used as outlets for terraces and for the disposal of runoff from diversion channels, stabilization structures, contoured rows, and natural depressions.
Highly erodible (HEL land)	Erodibility is a function of rainfall, soil erodibility, field slope, and length. NRCS uses these characteristics and a measure of soil loss tolerance to construct an erodibility index. If the Index is greater than 8 the field is highly erodible.
Input provider	The company or individual selling or contributing products used in the production of agricultural commodities.
Irrigation set	The area of the field irrigated by an irrigation system as it moves across a field while not ceasing operation.
Natural Resources Conservation Service (NRCS)	A USDA agency charged with the national soil and water conservation program in cooperation with landowners, operators, other land users, developers, community planning agencies, and other local, state and federal agencies. The Agency called Soil Conservation Service is now part of the NRCS.
No-till	The soil is left undisturbed from harvest to planting except for the injection of nutrients. Planting is completed in a narrow seedbed or slot created by coulters, row cleaners, disk openers, in-row chisels or roto-tillers.

Pheromone lures	Insects of the same species can communicate with one another by releasing small quantities of chemical substances from their bodies into the air. These distinct scents, called pheromone, attract others to the source of the scent. Because the chemical composition of the pheromone differs from species to species, the attraction of an insect's pheromone is specific to that species alone. Researchers have been able to chemically identify many of these individual pheromone and duplicate them. As a result, it is now possible to attract certain insects by using these synthesized pheromone, enabling us to disrupt them from their normal behavior.
Plant tissue test	Plant tissue analysis provides information on how the plant is using particular nutrients and can give important clues for deciphering nutrient deficiency or excess problems
Purchased water	Water is considered purchased if the operator and/or landlord paid a fee for water used on the selected field and the water originates from an off-farm source. Even if an irrigation district, water-supply ditch association, or canal company does not charge a water fee, but only charges the producer for the cost of water delivery or for the maintenance cost of water delivery facilities, report the water as purchased water.
Scouting	A process of checking a field for the presence of weeds, insects, or diseases and gathering information about pest population levels, activity, size and/or density.
Strip cropping	A process where cultivated crops, typically row-crops and close growing crops, such as grasses, are planted in alternate strips across the slope of the land. The water runoff from the cultivated crop is slowed by the close growing crop, resulting in greater moisture absorption and deposition of sediment.

Sub-irrigation	Maintenance of a water table at a predetermined depth below the field surface by using ditches or sub-surface drains and water-control structures
Surface water sources	Water stored in natural ponds or lakes, flowing in streams and rivers, and water stored in man-made reservoirs
Tank mix	Two or more pesticide products mixed in the spray tank by the farmer/custom applicator immediately before application and applied to the field as a single treatment.
Terraces	Raised level areas of a field supported on one or more sides by a wall or bank of turf. Terraces are usually classified according to the method of runoff disposal, the shape of the terrace cross section, or by the alignment between terraces.
Underground outlets	Systems of water runoff control carrying water through an underground pipe to disposal areas. The underground outlet consists of vertical intake risers carrying water to an underground outlet conduit such as tile drainage.
Water sources	Water sources include only surface water and/or ground water. Surface water consists of water stored in natural ponds or lakes, water that flows in streams and rivers, and water stored in man-made reservoirs. Surface water may originate on farm, but also includes all water supplied by an off-farm water supplier. Ground water is water stored beneath the ground surface in aquifers. Water pumped from on-farm wells is ground water.
Well casing	The outer metal or concrete liner of an in ground well. Within the well casing will be the pipe through which the water is pumped.

Wetlands	Areas inundated or saturated by surface or ground water at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions. This is the normal condition of the soil.
Yield map	A map prepared from data collected by a yield monitor attached to harvesting equipment. A yield map shows variation in yields for small areas within a field and is a key component in the detailed planning inherent in precision farming.
Yield monitor	A monitor mounted on harvesting equipment that measures yields continuously as the harvester moves through a field. These yield measures can be tied to specific locations in the field through GIS and converted into yield maps. Such yield maps can then be compared with the fertilizer or pesticide application map, and used to customize a new application map for the next season.

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Chapter 3 - Survey Procedures

This chapter provides an overview of the questionnaire and other materials for the ARMS, and general guidelines for collecting data. Administrative matters are covered in the NASDA Enumerator Handbook.

You will receive the following from your State Office:

Copies of pre-survey publicity letters mailed to each respondent
Copies of the publicity brochure
Questionnaires with labels identifying the assigned operations
A few questionnaires without labels
Screening Report from the Screening Survey conducted during the summer of 1997
Respondent Booklets containing code tables and a burden statement
Calendar/Target Pest Showcard
Supplements for any questionnaire(s) you are assigned
County maps for recording field locations
Envelopes for mailing completed questionnaires
Several copies of NAS-011 (Time, Mileage, and Expense Sheet) and envelopes for mailing them
(Other materials may also be provided by your State Office)

You should have these materials on hand:

Interviewer's Manual
Highway and/or street maps
Black lead pencils
Name tag
NASDA Identification Card
NASDA Enumerator Handbook
Ball point pen for completing NAS-011

You will need to use a calculator for this survey; a clipboard may also be handy.

Questionnaire Versions

Eight questionnaire versions will be used in this year's Phase II of the ARMS. The names, version numbers, and paper colors of each version appear in **Exhibit 1**.

Exhibit 1: ARMS Questionnaire Versions and Colors

Questionnaire	Version	Color
Soybean Production Practices & Costs Report	2	
Cotton Production Practices & Costs Report	3	
Corn Production Practices Report	5	
Soybean Production Practices Report	6	
Wheat Production Practices Report	7	
Cotton Production Practices Report	8	
Potato Production Practices Report	9	
Multi-Crop Production Practices Report	10	

Version number 1 has been reserved for the Farm Operator Resource Version of the ARMS Phase III. Version number 4 is not used in 1997.

Versions 2, 3, 5, 6, 7, 8, and *9* are used to enumerate information for one target commodity. Samples drawn for *Version 10* have been selected for TWO target commodities, so you will collect information for both crops on the *Version 10* questionnaire. If you are using *Version 10* in your state, labels inside the questionnaire will tell you which crops to enumerate.

Be sure to be familiar with the questionnaire versions being used in your state. Also be familiar with which commodities are the target commodities in your state.

All versions have a Face Page. Some questionnaires will have a Screening Supplement inserted in the questionnaire by the State Office. Chapter 4 of this manual gives instructions for the Face Page and the Screening Supplement

All the remaining questionnaire sections are identified by both letter and title. The letter and title pairings do not change. For example, Section D

is always "Pesticide Applications -- Selected Field" and the topic "Pesticide Applications -- Selected Field" is always covered in Section D. These sections are discussed in Chapter 5. The amount of detail asked in a section may vary from one questionnaire version to another. To help you find instructions, the letter of the section discussed on a page is shown at the bottom of the page along with the chapter and page number (i.e. A-5001).

Respondent Booklets

Five Respondent Booklets are used with the questionnaires listed in **Exhibit 1**. Which respondent booklet you use depends on the questionnaire version. The Respondent Booklets, the questionnaire version to use them with, and their paper colors appear in **Exhibit 2**.

Exhibit 2: Respondent Booklets

Booklet	Questionnaire Version(s)	Color
Soybean	2, 6	
Cotton	3, 8	
Corn	5	
Wheat	7	
Potato	9	

There is not a single Respondent Booklet specifically for *Version 10*. If you are using *Version 10* for a sampled operation for which two crops are to be enumerated, you will need Respondent Booklets for both crops. For example, if you are using *Version 10* for a sampled operation drawn for both soybeans and cotton, you will need to take with you a Soybean Respondent Booklet and a Cotton Respondent Booklet.

The Respondent Booklets contain information that respondents will need for answering some of the survey questions, such as Code Lists and more detail on some items. In many cases, this information does not appear in the questionnaire.

The purpose of the Respondent Booklets is to **help** the respondents in answering the questions. Using Respondent Booklets can prevent confusion and save interview time.

In some cases, you may need to help the respondent become familiar with how to use the booklet. This is especially important when using the longer Code Lists, such as Chemicals and Pesticides, and Machinery and Implements. Take a minute when you first turn to these pages to show them how to look things up in the booklet. This should help the interview go more quickly.

Some lists in the Respondent Booklets are there to let the respondent know what types of items we are looking for in response to certain questions. For example, in Section C or D, when you ask the respondent "How was this (fertilizer or pesticide) product applied?", show the respondent the Fertilizer/Pesticide Application Method Code List printed in the Respondent Booklet. Then the respondent will know what categories we're interested in. Otherwise the respondent may explain in detail how the material was applied, which will take additional time, when all you really wanted to know was that the material was "banded in the row" (method code 7).

Respondent Burden

Be thoroughly familiar with each questionnaire version you will be using and the instructions for it so you won't waste the respondent's time.

Follow skip instructions to avoid asking questions needlessly. If no skip instructions appear after an item, continue with the next item.

Also be aware of the estimate of average completion time in the Burden Statement for each version. The estimated average completion time is based on the length of pretest interviews, experience with the 1996 ARMS Phase II, and the judgement of NASS and the Office of Management and Budget (OMB). (The OMB is an agency that approves all surveys conducted by the federal government.) The expected average interview length for each questionnaire version appears in **Exhibit 3**.

Exhibit 3: Expected Interview Lengths by Version

Questionnaire	Minutes
Soybean Production Practices & Costs Report	75
Cotton Production Practices & Costs Report	75
Corn Production Practices Report	45
Soybean Production Practices Report	45

Exhibit 3: Expected Interview Lengths by Version

Questionnaire	Minutes
Wheat Production Practices Report	45
Cotton Production Practices Report	45
Potato Production Practices Report	45
Multi-Crop Production Practices Report	75

Burden Statements are printed on the back cover of the Respondent Booklet used with each questionnaire version. At the end of the interview, call the respondent's attention to the burden statement on the Respondent Booklet for that questionnaire version. Respondents who have questions or comments about the Burden Statement or paperwork reduction should send them to the address shown in the Burden Statement.

The Burden Statement printed on the Soybean and Cotton Respondent Booklets list the expected interview completion time for the Production Practices *Versions 2 and 3* separately from that for *Versions 6 & 8*.

Since *Version 10* does not have its own separate Respondent Booklet, you will use the Burden Statements from two Respondent Booklets for samples drawn for two crops. However, the interview length for *Version 10* averaged one and a half the length of the time to complete any single crop version in 1996.

Questionnaire Format

The following formatting conventions apply to the ARMS questionnaires:

Example A Enumerator instructions

Enumerator instructions are printed in italics and enclosed in brackets.

1. How many acres of corn did this operation plant in 1997 ?
[*If no acres planted, review information on Screening Report. Make notes, then go to item 2 of Conclusion, back page*.] . . . . . TOTAL PLANTED ACRES ____.___

Example B Data fill-in

When the reference to a previous item number is printed in italics and enclosed in brackets, you should take the data that you just entered in that previous item and use it to FILL IN for the item number when you read the question. In Example B1 below, you would read the question filling in the data entered in Item 1, saying "How many of the 110 corn acres were owned by this operation?" when 110 was the figure reported in Item 1.

2. How many of the [*item 1*] corn acres were--

a. owned by this operation? . . . . . ACRES ____.___

Example C Text fill-in

Questions in table headers frequently refer to text in the rows that you should use to FILL IN to complete the wording of the question.

1	2 What crop was PLANTED on this field in-- [*column 1*]		3 Was this crop irrigated on this field?
	NAME	CODE	YES=1
a. FALL of 1996?			

Example D Instructions for respondents

Prompts, "includes and excludes", and other instructions for respondents are also printed in italics but enclosed in parentheses. Read these only when needed.

b. What was the **total** number of inches of water applied **per acre** to this field during the entire growing season? (***Include*** *ALL water used from both on-farm and off-farm sources*.) . . . . . INCHES PER ACRE [ ]

Example E Optional Wording

Optional wording for items or questions is shown in plain print enclosed in parentheses.

a. How many consecutive years has no-till been used on this field (regardless of which crop was planted or grown)? . . . . . YEARS [ ]

Example F Office Use Boxes

Office-use boxes are printed with thick solid lines in dark type (boldface).

OFFICE USE [ ]

Example G Item code boxes for interviewer use

Item code boxes for interviewer use are generally printed with thin solid lines.

21. Have you (the operator) completed courses leading to certification for applying “Restricted Use” pesticides? . . . . . YES = 1 [ ]

Example H Item code boxes with decimal points

Some item code boxes have a printed decimal point followed by 1 or 2 marked spaces. They show that the data should be reported to the tenth or hundredth place. When entering data into these cells, locate the number correctly in relation to the decimal points, and fill in every space printed after them. Fill in zeros when answers are not given to as many decimal places as allowed for, or when answers are given in whole numbers. For example, if a cell has a decimal point followed by one underlined space, responses are supposed to be recorded in TENTHS, and an answer like 40 should be entered as 40.0.

TOTAL PLANTED ACRES

1. How many acres of corn did this operation plant in 1997? . . . . . ___.___

Example I Item code boxes for recording the dates

Some item code boxes are set up for recording dates in MM DD YY format. These cells have six preprinted underlines. MM stands for the two digits that refer to the month, DD is for the 2-digit date for the day, and YY is for the two digits for the year. Sometimes the year is preprinted. Leading zeros are only needed for the DD portion of the date. For example, April 2, 1997, should be entered as 4 02 97; April 24, 1997, should be entered as 4 24 97; December 12, 1996, would be 12 12 96; and January 1, 1997, would be 1 01 97.

MM DD YY

9. On what date was this field planted? . . . . . __ __ __ __ __ __

Example J Boxes made of dot-dash lines in boldface

Boxes made of dot-dash lines in boldface are for data which will be broken down into greater detail in later questions.

1. How many acres of corn did this operation plant in 1997?
[*If no acres planted, review information on Screening Report. Make notes, then go to item 2 of Conclusion, back page*.] . . . . . TOTAL PLANTED ACRES ____.____

Example J Boxes with dotted outlines indicate less preferred unit for reporting

For some items, respondents have a choice of two different units for reporting. When two boxes appear for recording the respondent's answer, only one box should be used. The outline of the box indicates which unit, if any, is the preferred unit for reporting. If one box in a pair of boxes has a dotted outline and the other box has a solid outline, The box with the dotted outline is okay, but is less preferred. The box with the solid outline is the preferred cell for reporting.

13. How much of the cotton seed planted in this field was received in trade by this operation? . . . . . PERCENT ____ OR TOTAL BUSHELS ____

Yes / No Questions:

There are two formats for YES/NO questions. Answers to YES/NO questions should be recorded the same way in either case. If the answer to a YES/NO question is YES, enter code 1. If the answer is NO, then you must enter a dash in the box to indicate that the question was asked and the respondent answered NO. Since you are not entering a number for NO, this is the only way to indicate that the answer was NO. If the respondent doesn't know whether the answer is YES or NO, then record DK or "DON'T KNOW" in notes. If the respondent refuses to answer, then record REFUSED" in notes.

Example K YES/NO check boxes

One format for YES/NO questions is to use check boxes. These are used when there is a "GO TO" instruction associated with either the YES or NO answer.

8. Is **gypsum** ever applied to this field? CODE

☐ **YES** - [*Enter code 1 and continue.*] ☐ **NO -** [*Go to item 9.*] . . . . . [ ]

Example L YES=1 boxes

The other format for YES/NO questions is the response code YES=1 printed next to the code box.

8. Did you decide to use ***pre*-emergence** herbicides based on--

a. a routine treatment for weed problems experienced in previous years? . . . . . **YES = 1** [ ]

Example M Multiple choice questions with coded response categories

Multiple choice questions are when the respondent must choose only ONE answer from several possible answer choices that you offer. Each response category is given a code number and the group of answer choices are enclosed in a box with a solid outline. When you enter the respondent's answer, you are entering a code number.

19. **What was your primary outside source of information on pest management recommendations for the 1997 cotton crop?**
[*Use Pest Management Information Sources code List.*]

PEST MANAGEMENT INFORMATION SOURCES
CODE LIST
[*Choose one.*]

☐	**1**	**Extension Advisor, Publications or Demonstrations** (County, Cooperative or University)
	2	**Farm Supply or Chemical Dealer**
	3	**Commercial Scouting Service**
	4	**Crop Consultant or Pest Control Advisor**
	5	**Other Growers or Producers**
	6	**Producer Associations, Newsletters or Trade Magazines**
	7	**Television or Radio Programs, Newspapers**
	8	**Electronic Information Services** (*World Wide Web, DTN, etc.*)
	9	**Other**
	10	**None**

[*Choose one.*]
CODE . . . . . ☐

Example N Questions with more than one sub-part

Questions with more than one sub-part are separate questions. The main question or the "stem" of the question is attached to an item number, and the different endings for the question, the sub-parts, are identified with a lower-case letter. Each sub-part is a separate question and must be asked separately. You should read the question stem followed by the ending sub-part associated with the letter. If there are lots of sub-parts, you will probably only need to read the stem for the first two or three sub-parts. Once the respondent understands that the stem is repeated, though unspoken, then you can continue reading only the sub-parts.

10. Did you decide to use ***post*-emergence** herbicides based on--

a.	a routine treatment?	**YES = 1**	
b.	type and/or density of weed(s) present?	**YES = 1**	

Example O Direction through tables indicated by an arrow

In some tables, the direction to go through the table is indicated by an arrow. A vertical arrow pointing down means to go down each column in the table, completing all the rows for the column before moving to the next column. A horizontal arrow pointing right means to complete all the columns for a row before moving to the next row.

LINE	**2 ➜ ➜ MATERIALS USED** [*Enter percentage analysis or actual pounds of plant nutrients applied per acre.*]			**3 What quantity was applied per acre?** [*Leave this column blank if actual nutrients were reported.*]	**4** [*Enter material unit code.*] 1 POUNDS 12 GALLONS 19 POUNDS of ACTUAL NUTRIENTS	**5 When was this applied?** 1 Before seeding (fall) 2 Before seeding (spring) 3 At seeding 4 After seeding	**6 How was this applied?** 1 Broadcast, ground without incorporation 2 Broadcast, ground with incorporation 3 Broadcast, by air 4 In Seed furrow 5 In irrigation water 6 Chisel, Injected or Knifed in 7 Banded/Sidedressed in or Over Row 8 Foliar or Directed Spray 9 Spot treatments	**7 How many acres were treated in this application?**
	N Nitrogen	**P_2O_5** Phosphate	**K_2O** Potash					**ACRES**
01								. ___
02								. ___

Example P Table columns outlined with bold dot-dash borders

Some tables have columns outlined with bold dot-dash borders. Complete these columns first. After completing as many lines of the bold dot-dash column as are needed, then complete all the columns of the table for each row with data entered.

1 **LIST WORKERS**	2 [*Enter number of workers.*] NUMBER	3 **Was** (*worker*)**--** 1 PAID 2 UNPAID CODE	[*If PAID, ask--*]		[*If PAID or UNPAID, ask--*]
			4 **Was** (*worker*)**--** 1 FULL TIME 2 PART TIME 3 SEASONAL CODE	5 **What was the average hourly cash wage rate paid** (*per person*) **for ALL of** (*worker's*) **work on this field?** DOLLARS& CENTS PER HOUR	6 **OTHER THAN THE HOURS JUST REPORTED OPERATING MACHINES, what was the TOTAL number of hours** (*worker*) **worked on activities for this field?** (***Include*** *time spent loading materials into equipment, scouting, irrigating, hauling with trucks, burning, drying and management activities*.) TOTAL HOURS
☐ **You** (the operator)					
☐ **Partners**					
☐ **Spouse**				. ___ ___	
				. ___ ___	
				. ___ ___	

Completing Version 10 for 2-crop samples

In some states, *Version 10*: CROP PRODUCTION PRACTICES REPORT (Multi-crop) questionnaires will be used to collect information for operations that have been sampled for two target commodities. The names of each target commodity will be printed on the Random Number Labels placed in Section A of the questionnaire for field selection.

After randomly selecting the field for each of the target commodities according to the procedures explained in Section A of Chapter 5, you will complete the questionnaire for both of these target commodities.

There are some additional questionnaire formatting conventions used in *Version 10* to guide your path through the questionnaire, and to help keep the respondent on track. These include:

Example Q [commodity] Text fill-ins

Fill in the name of the target commodity when you see the [*commodity*] notation.

1.	How many acres of [*commodity*] did this operation plant in the selected field in 1997? . . . . . ACRES	xxxx . ___	xxxx . ___

Example R Commodity-specific cell boxes

Enter the data for the target commodity in the column of cells labeled with the commodity name in the header. Answer cell boxes for a particular commodity are always in the SAME column position throughout the questionnaire. If a cell is missing in that commodity's column for a particular question, then that question is skipped for the commodity. In this example, the cells for corn and cotton are missing in the third row of cells. This means that the question associated with that row of cells would not be asked for corn or cotton. Sometimes, an arrow will be present to direct you to skip the items for that commodity.

16. **Were (was)**--	CORN	SOYBEANS	UPLAND COTTON
a. a biological soil analysis done on the [*commodity*] field to detect the presence of soil pests, such as insects, diseases or nematodes? . . . . . YES = 1			
b. beneficial insects considered in selecting and using pesticides on the [*commodity*] field? . . . . . YES = 1			
c. [*For **soybean,** continue*--] weeds removed in infested areas in this soybean field to prevent insect egg laying? . . . . . YES = 1			
d. seed treatments used on soybean for seedling blight control? . . . . . YES = 1			
e. diseased plants from this soybean field sent to a lab for diagnosis? . . . . . YES = 1			

When you are completing *Version 10* for an operation that was sampled for two crops, proceed with the interview by asking each question first for the selected [*commodity 1*] field, then for the [*commodity 2*] field. For some items, such as harvested acreage and yields, you will ask a short series of questions for the selected [*commodity 1*] field, and then ask a similar series for the [*commodity 2*] field.

For many of the questions on *Version 10*, you will be able to "abbreviate" the question somewhat when you ask it for *commodity 2*. For example, an operation has been selected for both corn and soybeans. You may ask Item 18 of Section B for corn first, like this: "Has harvest of the corn field been completed?" Then you immediately follow this question by asking "How about the soybean field?"

Be careful not to use this procedure too much. It will not be possible to use this procedure for EVERY question, because some questions are not so straightforward.

You will need to be sure that the respondent is answering each question for the correct selected commodity field. You may find that it helps the respondent to stay focused on each selected field if you refer to them occasionally during the interview using the same description that the respondent used when first listing the fields for you. For example, when you originally listed the operation's fields of corn, the respondent described the selected field as "45 acres on Smitty's." The respondent described the selected soybean field as "30 acres north of the highway." Several times during the interview, refer to the selected corn and soybean field using these same words. For example, when you ask Item 1 in Section E, say, "What fertilizers were applied to the 45 acres on Smitty's for the 1997 corn crop?" Then ask, "What fertilizers were applied to that 30 acres soybean field north of the highway for the 1997 crop?"

This procedure of referring to the fields using the respondent's words as you alternate between the two target commodities may reduce or avoid confusion for the respondent. It will also reassure you that the respondent's answers are for the correct field.

As you continue, the respondent will catch on to the procedure, and the interview will go quickly, smoothly, and efficiently.

Be sure you record the response for each question in the cell box for the appropriate commodity. When preparing for each of your *Version 10* interviews, you may find it helpful to circle the crop name headers over the

answer boxes for the two target commodities you will be enumerating, or highlight them with a colored highlighter pen. This will help you identify the answer cells for recording data for each target commodity quickly and easily during the interview.

Entering Data

Use a black lead pencil to record data and make notes; never use ink on a questionnaire. Make all entries clear and easy to read. Entries in check boxes and item code boxes must be entirely inside the boxes.

Record responses in the unit required (such as acres, bushels, or dollars). If a respondent gives an answer in a different unit, write the answer outside the printed box, convert it to the required unit, and record the converted data in the box. If the answer is "none", enter a dash, and not a zero.

For questions answered with a code number, enter the number that goes with the respondent's answer. If the respondent answers using only the code number, verify that the code is correct by repeating back the answer in words.

For YES/NO questions, enter code 1 if the answer to the question is YES. If the answer is NO, then you must enter a dash in the box to indicate that the question was asked and the respondent answered NO. Since you are not entering a code number for NO, this is the only way to indicate that the answer was NO.

The office must always be able to tell the difference between questions that have been asked and the answer was NO or ZERO and questions that were asked but the respondent could not answer (DK) or did not answer (REFUSED).

For any question, if the respondent doesn't know the answer, then record DK or "DON'T KNOW" in notes next to the question. If the respondent refuses to answer, the record "REFUSED" in notes next to the question.

Record data to the nearest whole number, unless a decimal point is printed in the box. Locate numbers correctly in relation to decimal points, and fill in every space printed after them. Use zeros as fill when answers are not given to as many decimal places as allowed for, or are given in whole numbers.

If answers appear unreasonable but really are correct, make notes in the margins or blank spaces to explain. Do not write notes or make unnecessary entries in answer boxes.

The Sample

The operator or operation name, mailing address and ID number are on the questionnaire label, along with any other information the State Office has that might be helpful.

Mark on a map the location of each of the operations assigned to you before you start to interview. Show the location by a small circle with the ID number written beside it. Use this map to plan your daily travel; this will help keep travel expenses down and save time.

You may need to ask Post Office or Farm Service Agency employees for directions to some operations. Try to do this early in the survey so you can put the information on your map as soon as possible. Tell your Supervisor about any operator whose home or office you cannot locate.

Interviewing

Interview the farm operator, if possible, because information collected from other people often is less accurate. If the operator says someone else is more knowledgeable, interview that person.

If the operator is not present when you visit but is expected soon, either wait or make other contacts nearby and return a little later.

If the operator is too busy to be interviewed at that time, set up an appointment at his or her convenience. Be sure to keep the appointment, and be on time! If an emergency prevents you from doing so, inform the operator beforehand and re-schedule the interview.

If the operator will not be available before the survey is over, try to interview someone who is well informed about the operation. A partner, family member or an employee may know enough about the aspects of the farm operation covered in the questionnaire to give you the information needed.

The NASS rule-of-thumb is to make up to three visits (the first visit plus two callbacks), if necessary, to get an interview. If you have an appointment or information from a neighbor on when to try to reach the operator, you should return then. If not, make each visit at a different time of the day or evening.

Respondents often ask how long the interview will take. Never contradict the Burden Statement; however, it is okay to add to it. For example, you might say something like this: "The official nationwide average for this survey is 60 minutes, but the interviews I have done in this area averaged about X minutes." Be honest about the average time, even if your interviews are averaging longer than the time estimate in the Burden Statement.

Encourage respondents to have farm records at hand. If records are used, accurate information will be readily available and answering will take less interviewing time.

Always read questions exactly as they are worded in the questionnaire. If the respondent didn't hear or didn't understand a question, repeat it using the same wording. You may also use any optional wording or explanations printed with the question in the questionnaire. If the respondent still doesn't understand, or asks you to explain, then use what you learned in training and information from this manual to explain what is needed.

Always ask every question and ask the questions in exactly the same order they appear in the questionnaire. Do not skip any questions unless instructions allow you to do so.

Sometimes you find out information you need later in the interview. This does not mean you can skip the question the information goes with. Instead, when you get to a question that the respondent already answered, take the opportunity to verify the information. Say something like, "I think you told me this earlier, but let me just be sure I got it right." And then ask the question exactly as worded. This doesn't make you look like you weren't listening in the first place. On the contrary, it emphasizes to the respondent the need to get things right.

Sometimes you will need to probe in order to get an adequate answer to a question. You should probe when the respondent can't answer the question, when the answer isn't exact enough to record, when you think the answer may be incorrect because it doesn't fit with information you've already obtained, and when you think the respondent didn't understand the question.

The purpose of probing is to verify unusual data or to correct misreported data. You must be careful when you phrase your probing questions that you don't influence the respondent's answers. Probes should be "neutral," that is, they should not suggest one answer over another. In fact, all questions should be asked in a neutral manner.

For example, don't say things like, "Purchase and release beneficial insects in this field, you didn't do any of that, did you?" Instead, say, "Did you purchase and release beneficial insects in this field?" And if the respondent asks for more information, explain that, "Beneficial insects are insects like green lacewings or ladybugs that are natural enemies of crop pests."

In another example, if a respondent tells you that an expense is between two amounts, such as, "Oh, I guess the cost was between three and four dollars an acre," you should ask, "Would you say it was closer to $3.00 per acre or $4.00 per acre, or what amount exactly?"

Probes should also be "non-threatening." Be careful that you don't appear to be questioning or challenging the respondent's answers. Don't say, "That can't be right! Fifteen dollars per bushel is a lot to pay to treat seed!" Instead, say, "Does that fifteen dollars include only the cost of the seed treatment? The cost of the seed itself should not be included in this item." Then make corrections to data items if necessary or make notes of the respondent's answer if it is correct.

Be sure to make good notes. This is especially important when you find unusual situations or the respondent explains why information that seems incorrect actually is correct. Also write down any complicated calculations you have to make to come up with an answer.

These notes will help the survey statistician understand this operation when reviewing the questionnaire. Make sure the notes are clear and can be read. Never erase a note unless it is wrong! Notes can be the single most valuable editing tool available to the office statistician.

After completing each interview, be sure to review the questionnaire while the interview is still fresh in your mind. Make sure all the answers are recorded correctly and the questionnaire is complete. Check your calculations. Make sure all notes are clear.

Framework and Reference Period for Reporting Data

The questionnaires for *Versions 2* and *3*: PRODUCTION PRACTICES & COSTS REPORTS, and *Versions 5*, *6*, *7*, *8*, *9*, and *10*: PRODUCTION PRACTICES REPORTS are set up to collect information about production practices used to produce the 1997 crop of the target commodity on a randomly selected field. *Versions 2* and *3* collect several expense items associated with production of the 1997 crop. Many of these expense items should be reported in the dollar per acre cost for the selected field.

Nonresponses

If an interview cannot be conducted, explain why on the questionnaire. Make a note about whether the operation appears to be a farm, whether it appears any of the target commodities were grown, and any other information you think might be helpful to the State Office.

Most farmers are willing to furnish the information asked for in NASS questionnaires, but in every survey some will refuse to do so.

The key to reducing the chances of getting refusals is to be courteous and friendly, but persistent. Try to get cooperation by explaining the purpose of the survey, the need for accurate agricultural statistics, and the confidentiality of the data. Make use of materials on the survey purpose provided at your State training workshop.

Above all, do not become discouraged when you get a refusal. Continue to meet farm operators with ease, friendliness and optimism as you contact the others in the sample.

Supervision

Your Supervisor will set up an appointment to meet with you early in the survey. This visit will help you get off to a good start by spending some time to review a few of the interviews you have done. Hold all your completed work until this review takes place unless you are told to do otherwise.

Your Supervisor or someone from the State Office will contact a few of your respondents to conduct a quality check. The quality check will verify that you

spoke with the person named in the questionnaire and that the respondent understood the survey procedures.

Completed Questionnaires

Turn in your completed questionnaires according to the instructions you receive. If you think that under these procedures the last few questionnaires you complete might not reach the State Office before the final due date, call your supervisor.

Keep a record of when you complete each questionnaire and when you passed it on to your supervisor or mailed it to the State Office. This will help the Office locate survey materials if they are delayed.

Contents of this Chapter

Chapter 4 - Screening

FACE PAGE

Introduction

Before introducing yourself and this survey to an operator, create an introduction you're comfortable using. In the introduction include who you are, whom you represent and what you want. Become familiar with the information in Chapter One of this manual and be prepared to answer questions about the survey.

Some of the operators may have already heard about the ARMS on radio or television ag broadcasts or short spots. They may also have read about the survey in a pre-survey letter from the State office or in newspaper or farm magazine articles.

When making your introduction, be sure to remind the respondent that the data are strictly confidential and used to make state, regional, and national estimates. Mention that some farm financial records, particularly those for expenses (such as receipts for inputs) are extremely helpful in answering some of the survey questions on *Version 2*: Soybean Production Practices and Costs Report and *Version 3*: Cotton Production Practices and Costs Report. In addition, for these versions, as well as for the Production Practices Reports, *Versions 5, 6, 7, 8, 9,* and *10,* records of fertilizer or pesticide applications will be useful, along with any notes or records of when field operations took place.

Response Codes

Upon completion of the interview, enter the response code in cell 0001 on the Face Page of the questionnaire. Response codes are:

Code 3- **Complete**: The questionnaire is complete. You have obtained all of the data needed for the operation.

Code 4 - **Screen Out** (or Out of Business): If the operation does not qualify as a farm or ranch, assign Response Code 4 (make notes). Also, out of business firms and institutional operations are coded a "4". Institutional operations include prison farms, private or university research farms, high school FFA farms, not-for-profit farms operated by religious organizations, and Indian reservations.

Code 5 - **No Target Commodity (Or Commodities)**: In 1997 the operation was in business but did not grow any of the target commodities in your State. This code can also be used for refusals or inaccessibles when you can get enough information through other sources to be sure the operation was in business but did not grow the target commodities during 1997. Be certain none of the target commodities were grown in 1997 before using code 5 for refusals or inaccessibles.

In order to use response code 5 on *Version 10*: Multi-Crop, the operation must not have grown either one of the target commodities for which it was sampled. For example, if an operation was sampled for both winter wheat and potatoes but did not grow either one of these crops for harvest in 1997, then enter code 5 in cell 0001 on the Face Page. If the operation grew only one of these commodities, but not the other, then enter response code 3 when the *Version 10* questionnaire is completed for the commodity that was grown.

Code 8 - **Refusal**: The respondent refused to cooperate or grant an interview, **but you have identified the target name qualified as a farm operator AND grew the target commodities in 1997**.

Code 9 - **Inaccessible / Incomplete**: The operator was not available throughout the survey period, "inaccessible," **but you have identified the target name qualified as a farm operator AND grew the target commodities in 1997**. Also use code 9 if the respondent gave an interview but couldn't or wouldn't answer a lot of the questions (incomplete questionnaire).

Starting Time

Record the **starting time** (military) of the interview when the respondent agrees to cooperate on the survey and you actually start the interview. We use the interview times to find out how much respondent time we're using

(as a measure of respondent burden) in collecting data. We are trying to reduce interview times as much as possible and still collect the high quality data that we need. Also, by using different questionnaire versions each year, we need to estimate their interview times since we have no recent history.

Name, Address, and Partners Verification -- LIST

All questionnaires will have labels. If the first line (primary name line) of the label after the ID number line has an individual name (JOHN SMITH), this is the target name, (unless the Record Status Code (RS) is 99). If the first line contains a combination of individual names (JOHN AND BILL SMITH) or an operation name (SMITH FARMS), then the name on the next line (the secondary name line) is the target name. If the RS is 99, then the operation named on the primary name line is the target. *When RS= 99, the operation name is the key.*

Remember: The target name NEVER CHANGES. The person actually operating the farm (the farm operator) may change, but the target name is always the person identified on the label.

The first thing you will do is verify the operation's name and address label and the names and addresses of any known partners. If there are partner labels, be sure that the partner names and addresses are correct, and that all partners are listed. Mark through the names of any partners no longer involved in the operation. If all partners aren't listed, record the names and addresses of those partners who aren't listed.

Name, Address, and Partners Verification -- AREA

Versions 2 and 3: Soybean and Cotton Production Practices and Costs

All of the area frame tracts selected for the ARMS were part of the June Agricultural Survey.

In the ARMS we are interested in the operation the way it existed in June, so if changes have occurred in the operation since then, ignore them. Collect interview data for the operation as it existed in June. For example, if the tract was individually operated in June and changed to a partnership

in September, get data for the individual operation for the time it existed (January through August). Do not collect any data for the partnership.

We know that by using this rule we'll lose some data for those few farms or ranches that were formed after June 1. They wouldn't have much impact on the overall estimates from the survey, however, because there usually aren't very many of these operations and they are relatively small.

If you find out that an error was made in June (the operating arrangement was incorrectly identified), make notes to explain the error, but complete the questionnaire for the operation **as it actually existed in June**. *If you have time between your first contact with the respondent (when you find out that the June report was wrong) and your appointment to complete the ARMS interview, call the state office and let them look up the corrected operating arrangement. If it's overlap with the list, you won't have to do an interview*.

EXAMPLE: The June survey questionnaire showed a partnership between Leroy and Wade Johnson. When you're verifying the name, address, and partners, you find out that Leroy and Wade have always farmed as individuals and have never farmed in partnership. In this case, you would complete two questionnaires, one for Leroy's individual operation and one for Wade's.

Screening Report

List operations sampled for ARMS were screened during Phase I for operation description and presence of the target commodity. Area operations sampled for ARMS were selected from June area tracts. The State office will insert a Screening Report inside the questionnaire with information from the screening interview.

Information on the Screening Report includes:

- the number of acres or the number of head of the target commodity reported on the Screening Survey.
- the reporting unit (individual, partnership, managed).
- respondent code.

- enumerator ID.

- an indicator showing if a contact was made during the Screening Survey or whether the information came from another source such as the June Agricultural Survey.

- the sequence (sample) number. This number also appears on the ID label. The sequence (sample) number will be used in plotting the field locations on maps. (See **Chapter 5, Conclusion**.)

- the name of the crop that is designated as *Commodity 1* and the name of crop that is designated as *Commodity 2* on *Version 10*.

You should verify that the reporting unit, as listed on the Screening Report, is still correct, particularly if you made any corrections to the name, address, and partners on the Face Page.

Screening Box on Face Page

If a question or problem exists with the operation description information picked up during the Screening Survey, the State office will want you to ask the screening questions again. This may be because the screening data were collected from sources other than the Screening Survey, the respondent to the Screening Survey may have been someone other than the operator, or incomplete information was obtained on the Screening Survey (for example, partner information was not collected).

If code 1 has been entered in the Screening Box on the Face Page, the Office will have included a Screening Supplement with the questionnaire for you to complete for this operation. If the Screening Box is not marked, then do not screen this operation, and begin the interview.

SCREENING SUPPLEMENT - LIST Only

Farm operations in each state were sampled for the screening phase of the ARMS based on list frame information about crop acreage, livestock, and gross value of farm sales. Agri-business firms and agricultural services that do not have crops or livestock of their own should have been excluded from the sample, but it is possible some names were misclassified.

Screening questions help us find out if the selected name is eligible for this survey.

Institutional farms such as prison farms, private or university research farms, high school FFA farms, not-for-profit farms operated by religious organizations, and Indian reservations are to be excluded from the study. If your assignment includes any of these farms, notify your supervisor or the survey statistician.

If an operation was in business during part of 1997 but went out of business during the year, **complete a questionnaire for the part of the year during which the operation did business**. If the operation was taken over by another operator or operation when it went out of business, make a note of this. This note should include a name, address, phone number and any other pertinent information.

Item 1 Other operation name

Even though you've already verified the label, you need to ask this item to avoid duplication and to make sure the List is up-to-date.

Item 2 Crops, livestock or poultry

Check YES if the operation grew any crops (field crops, fruit/nut crops, vegetables, oilseeds, specialty crops, hay) or had cattle, hogs, sheep, poultry or other livestock during 1997 on the total land operated. If YES, go to Item 5. If NO, continue with Item 3.

For an operation to qualify as growing a crop, it must have made the decisions on planting, caring for and harvesting the crop.

INCLUDE: field crops, fruit and nut crops, vegetables, mushrooms, flowers, nursery stock, greenhouse crops, hay, Christmas trees, etc.

EXCLUDE: home gardens and crops received in the 1997 crop year as payment for land rented to someone else.

This screening question would also be checked YES if the target name had any livestock or poultry, regardless of ownership, on the total acres operated at any time during 1997.

INCLUDE:

1) all cattle, hogs, sheep, mules, goats, chickens, turkeys, ducks, geese, bees, rabbits, mink or other fur bearing animals, and fish that are raised commercially or for home consumption. FFA and 4-H livestock projects should also be included.

2) operations that have five or more pleasure horses.

EXCLUDE:

1) operations that have Only FOUR OR LESS pleasure horses, and any number of other animals kept only for pleasure use or as pets.

2) horse boarding operations, riding stables, or race horse training operations that do not have other agricultural items.

3) **Slaughter or packing houses, auction barns, stockyards or order buyers.** These operations have livestock which are committed for slaughter. The presence of these livestock alone does not qualify an operation for the survey.

Item 3 Sales of agricultural products or receipt of government agricultural payments

Include sales of crops, livestock, fish and other products from the total land in the operation. Include any government payments received under the 7-year market transition program, conservation programs, etc.

This item should be answered NO when the respondent is a landlord who sold agricultural products from or received government farm payments only for land which was rented out.

If this item is checked YES, go to Item 5.

If Items 2 and 3 are both NO, continue with Item 4.

Item 4 Enumerator Action (RS = 99 and Out of Business)

Use this item only if both of the screening questions (Items 2 and 3) were answered NO. This is an item you handle yourself unless the state office has marked it for you. It's not an item you ask the respondent. If the state office hasn't marked this, you may want to circle the Record Status (RS) code on all of the questionnaires with Screening Supplements assigned to you before you go out into the field to enumerate. Check the label on the Face Page of the questionnaire. The state survey statistician will give you a label diagram to show you the location of the Record Status (RS) code on the label. If the RS is not 99 enter code 2 and skip to Item 7. If the RS is 99 enter code 1 and skip to Item 9.

Item 5 Decision-maker for this operation

What we're interested in is how the operation was **managed** on a day-to-day basis. We don't care what the **LEGAL** definition of the operation is.

Definitions of individual, partnership, and managed land are printed in the *Interviewer's Manual*. Landlord-tenant, cash-rent and share crop arrangements should not be considered partnerships.

When an individual operation is reported, enter code 1. When a partnership is reported, enter the number of partners. Include the person listed on the Face Page and all of the other partners. When a manager is reported, enter code 8.

Item 6 Enumerator Action (RS=99)

This is an item you handle yourself unless the state office has marked it for you. It's not an item you ask the respondent. If the operation is an RS 99 sample, begin the interview.

The state office may have marked RS 99 for you. If they haven't handled this, you may want to circle the Record Status (RS) code on all of the questionnaires with Screening Supplements assigned to you before you go out into the field to enumerate. Check the label on the Face Page. The

state survey statistician will give you label diagrams for the location of the Record Status (RS) code on the list frame label.

Item 7 Other operations

This is a screening question to find out if the target name made day-to-day decisions for any other operations in 1997. Each additional operation must be listed or verified on the back side of the Screening Supplement. If there is more than one additional operation, additional copies of the Screening Supplement should be used. The information collected on the Screening Supplement will be used to update your State's list sampling frame.

If The Operator Has Other Operations

If the operator had another operation, turn the Screening Supplement to its back side and complete or verify the information for the second operation. If the operator had a third operation, complete or verify the information on an additional Screening Supplement for this operation. If the operation on the Face Page is still in business (Item 4 is blank), then you'll complete the questionnaire for the operation named on the Face Page.

If the state office already knows about additional operations associated with the target name, there should be labels for Operation 2 on the Screening Supplement. There will be an additional Screening Supplement for Operation 3, if there is a third operation. Verify that the target name is still involved with each of these operations. Also, there may be partner labels for any or all of these operations. Verify the names and addresses of additional operations and of partners associated with them. Mark out any operations the target name was not associated with in 1997. If any partner names are not listed, add them.

If the target name is involved (either as individual operator or as a partner) with any other operations which aren't listed on a Screening Supplement, record these. In the partner space record the names of all of the partners other than the target name associated with each of the additional operations.

If The Operator Does Not Have Other Operations

If there weren't any other operations, and Item 4 was blank (you didn't have to complete it), begin the interview. If Item 4 was code 2 (the operation on the Face Page was out of business), go to Item 9.

Special Situations

Don't include any operation not already listed for which the target name is a hired manager.

A special situation exists if any of the operations for which there is a label on the questionnaire (Face Page, or Screening Supplement) is a managed operation. If the target name is still the hired manager, there is no problem. Handle it as you would normally. If the target name is no longer the hired manager, how you should handle it depends upon whether the label for that operation is on the Face Page or on a Screening Supplement.

If the label for the managed operation is on the Face Page, and the operation was still in business in 1997 under a new hired manager, you'll contact the new hired manager and collect data for the operation named on the Face Page. You'll contact the target name to verify the other operations listed, and if that individual has any additional operations you'll add them to the list on one or more Screening Supplement(s).

If the label for the managed operation is on the Screening Supplement, update the label for the managed operation to show the name of the new hired manager. If the operation on the Face Page is still in business, complete the interview for the operation named on the Face Page.

Item 7a Day-to-day decisions for additional operation

For each of the additional operations, enter the appropriate code to explain who made the day-to-day decisions in 1997. What we're interested in is how the operation was managed on a day-to-day basis. We aren't interested in the LEGAL definition of the operation.

Item 8 Enumerator Action (in business or RS=99 Out of Business)

If Item 4 was blank, then you will complete the interview for the operation named on the Face Page. If you've just finished verifying other operations, be sure to tell the respondent you're interviewing for the operation named on the Face Page. Then begin the interview.

If Item 4 was code 2, enter code 4 in Response Code cell 0001 on the Face Page of the questionnaire. Then go to the Conclusion on the back page, and complete the items in the black-outlined box at the bottom of the page.

Item 9 Out of business determination

Determine if anyone else is now operating the land formerly operated by the target name on the face page. Ask this item only if the respondent answered NO to all of the screening questions. (Either the operation is out of business or there's been a major name change.) If another operation has taken over from the target name on the label, or if there was a major name change, record the name of the operator or operation now operating the land.

This item gives us the information we need to update the List Frame when operations have gone out of business. Record the name, address, and phone number (if available) of the individual or operation now operating land that used to be operated by the target name. If the respondent answers NO to this item, probe to determine what happened to the land, and make notes.

Contents of this Chapter

Chapter 5 - Completing the Questionnaire

Overview

This section provides an overview of how Chapter 5 is organized. It also describes notations used in the chapter for guidance.

Chapter 5 contains question-by-question instructions for every item in every section of questionnaires for Phase II. Versions 2 and 3 are Production Practices and Costs Reports for soybeans or cotton. Versions 5, 6, 7, 8, 9, and 10 are Production Practices Reports for the target commodities: Corn, soybeans, wheat (winter, durum or other spring wheat), upland cotton, or potatoes.

The ARMS questionnaire sections and versions are listed in the **Exhibit 1** at the end of this overview.

There is no special notation for sections that appear in all versions. Sections or questions that do not appear in all versions are marked with the version number(s). For example, Section H appears only in *V2*: *Soybean Production Practices and Costs*. When you turn to Section H in this manual, you will see the notation for ***V2*** under the section title, indicating that this is the only version that Section H appears in.

Most questions are the same on all versions, and their instructions are the same. If questions are the same on all these versions, there is no special notation associated with the Item number. Some questions do not appear in every version or they are not asked for every target commodity. For questions that do not appear on all versions, there are two notations to help you keep track of both the version number and the crop for which the question is to be asked:

1. The notation *V#* (in *BOLD ITALICS*) appears under the question Item number in the question-by-question instructions in this manual. This notation indicates which version(s) the question is on. For example, if the notation *V2, V5, & V10* appears, this indicates that the item applies only to *Versions 2, 5,* and *10.*

2. The name of the *Crop(s)* for which the question is asked appears in *italics* beneath the *V#* indication. This is to assist you in

keeping track of which questions are asked for more than one crop OR for only one crop on the *V10*: MULTI-CROP version.

For example, the following notation is for Item 15 of Section B:

Item 15 Pest resistant seed varieties

V2, V3, V5, V6, V8, V9, & V10

Corn, Soybeans, Cotton & Potatoes only

As you read the manual, you should have copies of your State's questionnaire versions to refer to. If you're working in a state not doing a particular version, ignore instructions that don't apply to you.

As you read and study this manual, you will become familiar with these notations. They will become guides, especially when you use the manual as a reference during the survey period.

Finally, Chapter 5 is organized so that you can easily remove sections for questionnaire versions not being enumerated in your state:

Sections I and J only appear in ***V2***: *Soybean Production Practices and Costs* and ***V3***: *Cotton Production Practices and Costs*. If *Versions 2 and 3* are not being used in your state, you can remove Sections I and J from this manual.

Section H only appears in ***V2:*** *Soybean Production Practices and Costs*. If your state is not using this version, you can remove Section H from this manual.

Exhibit 1: Questionnaire Sections by Version

Version	Section	Section Title
all	A	Field Selection
all	B	Field Characteristics
all	C	Fertilizer and Nutrient Applications
all	D	Pesticide Applications
all	E	Pest Management Practices
2, 3, 5, 6, 7, 8, 10	F	Field Operations, Labor and Custom Services
all	G	Irrigation
2	H	Drying
2,3	I	Landlord Costs
2,3	J	Vehicles and Trucks

Section A - Field Selection

What is Section A for anyway?

The field level sample is used to supply the specific details needed for the economic analysis of the Production Practices and Costs Reports and the Production Practices Reports for field crops. In order for the field samples to be representative of all fields of the target commodity of interest (corn, soybeans, wheat, cotton, or potatoes), each field must be randomly selected from all of the operation's fields of that crop. Simple random sampling procedures are used for field selection.

Beginning with this section, most of the questions in the questionnaire are about the field selected here in Section A.

Item 1 Total acreage of target commodity planted

Enter the total number of acres of the target commodity that this operation planted for the 1997 crop year. Acres should be recorded in tenths (1/10) of acres. For example, 180 acres should be entered as 180.0.

INCLUDE:

1) acres planted with the intention of harvesting even if they were abandoned or cut for forage or silage. The reason we include these acres is that the operator usually has had expenses associated with them.

2) acres planted and later replanted to that crop. Even if for some reason the operator had to replant some of the acres (poor seed germination and weather are common causes of replanting), count these acres only one time. If acres originally planted to the target commodity had to be replanted to the same target commodity, they should not be counted as abandoned unless the replanted acres were abandoned.

3) acres planted to the target commodity which were later plowed down and planted to some other crop for harvest.

If no acres of the target commodity are reported in Item 1, review the information on the Screening Report inserted with the questionnaire. Make good notes about the reason why the current report of no acres is

different from the information reported on the Screening Report. Then go to Item 2 of the Conclusion, and conclude the interview. Even though no target commodity acres are being reported, this operator will be re-contacted in the spring for the financial information to be collected in Phase III.

There are many good, logical reasons why the Item 1 acreage may be different from the Screening acreage. The information on the Screening Report will be useful to you for determining a likely reason for any differences. For example, the respondent to the Screening Survey may have been a different person from the respondent you are interviewing. Or the Screening acreage may have represented intentions and not crops that had already been planted. Don't assume that something is wrong. It may not be wrong, just different. You may tell the operator your notes from the Screening Survey conducted in May and June show the operation with "X" acres, and ask the operator to explain the difference. Make a note of the explanation on the questionnaire, or make corrections to Item 1 acreage, if necessary.

Item 2 Land tenure

V2 & V3 Only

Soybean and Cotton Production Practices and Costs

Complete Items 2a - 2d by recording the number of acres of the target commodity the operation had in each category: owned by the operation, rented for cash, share rented, or used rent-free. Acres should be recorded in tenths (1/10). The total number of target commodity acres must equal those recorded in Item 1.

Item 2a Acres planted on owned acres

V2 & V3 Only

Soybean & Cotton Production Practices and Costs

Record the number of acres of the target commodity planted on land the operation owned.

Items 2b-2d Land rented

V2 & V3 Only

Soybean & Cotton Production Practices and Costs

Record the total acres of the target commodity planted on rented acres, by type of rental arrangement.

INCLUDE:

1) all land for which the operator paid cash rent on a per acre basis (Item 2b).

2) all land for which the operator paid the landlord a share of the crop (either standing or harvested). The respondent may need to add all the share rented units together to get a total share rented figure (Item 2c). Include acres of the target commodity planted on share rented land, even if the crop was plowed under or abandoned and, therefore, the landlord's share was zero, as long as the rental agreement specifies the rental fee is to be a share of the crop grown.

3) all land belonging to others (private individuals, federal, state, railroad, etc.) which the operator used rent free (Item 2d). If the rental agreement specifies the landlord only receives a share of the government payments, and no share of the crop, then this should be counted as land used rent free.

Item 3 Number of Fields

Item 3 asks for the number of fields of the target commodity planted on the operation for the 1997 crop.

On *Version 7*: Wheat Production Practices Report and *Version 10*: Crop Production Practices Report, when enumerating WINTER WHEAT, include only fields harvested for grain. For durum wheat and other spring wheat, include all fields, regardless of intended use.

On *Version 8*: Cotton Production Practices Report and *Version 10*: Crop Production Practices Report, include only fields of Upland cotton. Exclude fields of American Pima cotton.

If the operator had only 1 field of the target commodity, enter a 1 in Item 3 and go to Item 5.

When the operator has more than 1 field of the target commodity, enter the number of fields in Item 3 and continue with Item 4.

NOTE: If the operator had no fields of the target commodity, conclude the interview. Go to Item 2 of the Conclusion. On *Version 10*: Multi-crop, be sure to ask about fields of both *target commodity 1* and *target commodity 2*. If the operator had no fields of *target commodity 1* and *target commodity 2*, then conclude the interview by going to Item 2 of the Conclusion.

Item 4 Identification of Fields

Ask the respondent to list the fields of the target commodity for the operation. If there are more than 18 fields, list only the 18 fields closest to the operator's permanent residence. Record these fields on the lines provided in the questionnaire. The fields do not have to be listed in any particular order as long as they are the (up to 18) closest fields to the operator's permanent residence. Do not skip any lines when completing this listing.

Operators can list these fields using any description that is meaningful to them. Some operations have a formal field numbering or naming system, but others may use informal names or descriptions for their fields. Many operators identify fields of crops using some combination of their location and acreage. Many refer to their fields by the name of the current or previous property owner. It does not matter what kind of field identification system is used as long as the respondent can list the fields by these names, numbers, or other description and knows which field is which.

If the operator is unable to list the fields of the target commodity by number, name, or other description, use the Field Selection Supplement grid to draw off (up to 18 of) the operation's fields closest to the operator's permanent residence.

The grid may be used if the respondent cannot adequately describe the target commodity fields without drawing them. Prior experience has shown the grid to be very beneficial in these cases. However, experience has also shown grid use to be necessary only in a few cases each survey.

When you select a field, the respondent must be able to focus on that field, and provide you with information for only that field.

Item 5 Random Number Selection

The State Office staff will have affixed a Random Number Label in the designated box on the Field Selection page in each questionnaire. Read across the FLD (field) line to match the number of fields you listed in Item 4. On the SEL (selected) line below is the number of the randomly selected field for this operation.

Circle the pair of numbers on the label associated with the last numbered field line in Item 4. Write the randomly selected field number in the cell. Circle the randomly selected field in the Item 4 listing.

If there is only ONE field of the target commodity (Item 3 is 1), enter 1 in the Item 5 cell and continue.

Item 6 Informing Respondent of Field Selection

Tell the respondent which field of the target commodity you have selected, and be certain that both of you can identify that field.

Field Selection on Version 10: Multi-crop

When you've completed field selection for *Commodity 1* identified on the Random Number label on page 3 in Section A, proceed with field selection for *Commodity 2* identified on the Random Number label on the page 4. Use the same procedures for Items 3, 4, 5, and 6. Be sure the respondent understands that you will be asking questions about **each** of these fields, and **only** these selected fields of each commodity.

Proceed with the interview, asking each question first for the selected [*commodity 1*] field, then for the [*commodity 2*] field. For some items, such as harvested acreage and yields, you will ask a short series of questions for the selected [*commodity 1*] field, and then ask a similar series for the [*commodity 2*] field. As you continue, the respondent will catch on to the procedure, and the interview will go quickly, smoothly, and efficiently.

Be sure you record the response for each question in the cell box for the appropriate commodity.

If the respondent had no fields of *target commodity 1* AND had no fields of *target commodity 2*, go to Item 2 of the Conclusion and conclude the interview.

Using the Field Selection Supplement Grid

The reason we use the Field Selection Supplement grid is to be able to list the respondent's fields systematically so that a single field may be randomly selected. You will not need this procedure if the respondent has names or numbers for the fields, or is able to describe them. The exception may be when the operator has more than 18 fields, and it is difficult to identify the 18 fields closest to the operator's permanent residence. Experience of doing field selection on the 1996 ARMS and past Vegetable and Fruit Chemical Use surveys has shown that this supplement is used very few times during the survey. Most of the time operators have little problem identifying their fields using some sort of description or using field names or numbers.

Grid Mapping

Beginning with the field of the target commodity closest to the operator's residence, draw off the operation's fields. There is no need to draw off more than 18 fields, since the Random Number Label accounts for up to 18 fields. Sketch in any boundaries such as roads and rivers which may help you and the respondent locate the fields accurately. It may be helpful to use a county map along with the grid.

Do not spend a lot of time trying to make your map a work of art. Drawing to scale is not important, but the relative location of fields to the operator's permanent residence is important. The field furthest north should be nearest the top of the grid, and the field furthest west should be at the far left of the grid. When the fields are located, you are ready to begin numbering them.

Using Farm/ranch Maps

If the respondent has a farm or ranch map you can write on, locate and mark (an X is fine) up to 18 of the operation's fields of the target commodity. Begin numbering the fields as you mark them. Remember,

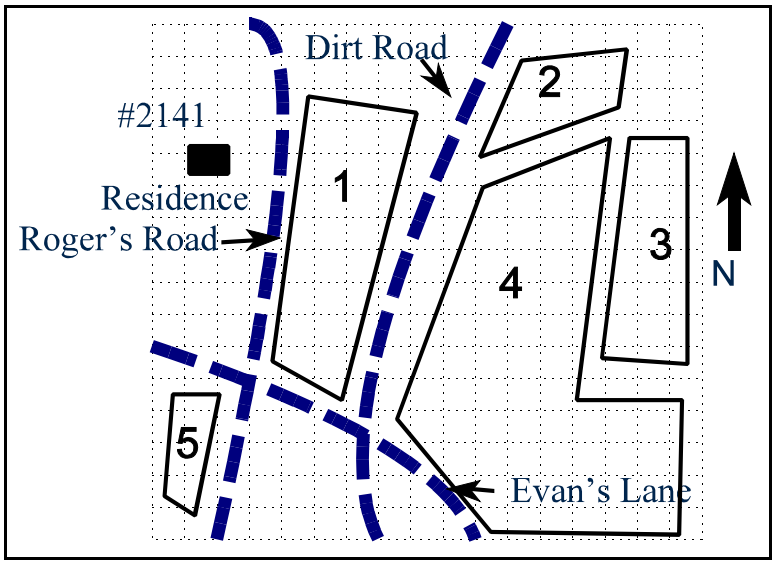
we are locating the fields closest to the operator's permanent residence. Continue marking and numbering up to a maximum of 18 fields per operation.

Some operators have copies of maps or aerial photos from their local county office of USDA's Farm Service Agency (FSA). The operator's fields are drawn off on these maps or aerial photos and identified with letters and numbers. These maps may also be helpful in the field selection process for this survey. On these FSA field maps, identify the operation's fields of the target commodity, mark them and number them beginning with number 1. Or you may use the FSA letters and numbers when listing the fields in Item 4. Be sure the operator can identify the selected field when you've completed field selection.

Numbering the Fields

Begin numbering the fields. If there are 18 or less fields, you can number in any sequence you want. If there are 19 or more fields, you must number the 18 fields closest to the operator's permanent residence. However, the field closest to the residence does **not** have to be "1", and the next closest "2". You only need to make sure that the closest 18 fields to the residence are listed.

Exhibit 2: Grid Mapping Example



Random Number Selection Example

The respondent tells you that there are 5 fields of soybeans in the operation, but does not have identifying names or numbers for them. The respondent does not feel confident about describing them very well, but says drawing them would help. Refer to **Exhibit 2**.

1) For Item 3, enter "5".

2) Turn to the Field Selection Supplement grid in the questionnaire. You may also use a map of fields supplied by the respondent.

3) Draw the 5 fields on the grid (or map) in relation to the operator's residence.

4) Number the fields drawn on the grid (map). Continue with Item 4, and list the 5 fields as the respondent identifies them.

5) Looking at the Random Number Label, you search along the FLD line for the number 5.

```
ST:  xx SOYBEANS
FLD:  1 2 3 4 5 6 7 8 9
SEL:  1 2 2 4 3 5 7 6 2

FLD:  10 11 12 13 14 15 16 17 18
SEL:  5 6 10 9 10 14 11 8 16
```

6) Circle the pair of numbers on the label associated with the number 5. For this example, the soybean field listed on line 3 of Item 4 is selected as the random field.

7) Record the randomly selected field number, number 3, in Item 5.

8) Circle field 3 in the Item 4 listing and on the grid (or map).

9) Identify this field for the respondent as the selected field for this interview. Be sure that the respondent knows which field this is. Tell the respondent that most of your questions will be about this selected field, and that these questions should be answered with information about this field only.

You may find that it helps the respondent to stay focused on the selected field if you refer to it occasionally during the interview using the same description that the respondent used when first listing the fields for you. For example, when you originally listed the operation's 14 fields of soybeans, the respondent called field #3 "45 acres on Smitty's." Several times during the interview, refer to this selected soybean field using these same words. For example, when you ask Item 1 in Section C, say, "What fertilizers were applied to these 45 acres on Smitty's for the 1997 soybean crop?"

You may find this procedure of referring to the field using the respondent's words to be especially helpful when completing the *Version 10* questionnaire, where you will be alternating questions for selected fields of two different target commodities. This may reduce or avoid confusion for the respondent and reassure you that the respondent's answers are for the correct field.

Section B - Field Characteristics

What's Section B for anyway? How is the information used?

Section B obtains information for calculating costs of production per planted acre on the selected field. This is because, if a crop was planted, costs were incurred, regardless of whether the crop was harvested or not. Cost items are handled differently depending on whether the crop was grown on owned or rented land. If rented land was used, you must have the cost of that rent.

In some parts of the country, it is common to let land lie fallow (no crop harvested) for an entire season to conserve moisture and/or improve soil quality. In calculating cost estimates, this fallow land has a cost, and this cost is assigned to the crop that is planted and harvested following the fallow period. If the fallow acres were planted to a cover crop, that seed cost is needed. In non-survey years, knowing what the cover crop was allows ERS to adjust cover crop seed costs using NASS' annual seed prices.

For the crop, the seeding rate and costs of purchased seed are needed to determine the cost of planting the crop. The seeding rate allows ERS to adjust seed expenses between survey years using NASS' annual seed prices.

To estimate the value of the crop, we have to know yields.. Producers often ask why we ask both actual yields and expected yields. The cost and return accounts published by ERS use actual yields reported by farm operators. However, policy makers often ask about the "typical" situation. It may be that crop conditions were unusual during the survey year and the operators' responses reflected an unusual situation. With "expected" yields, ERS can see how conditions would have changed if operators had harvested what they thought they would harvest.

The previous crop data provide information on cropping patterns, important in analyzing fertilizer and pesticide use. In addition, USDA is required to evaluate conservation tillage systems. The previous crop is used in conjunction with the machinery data collected in Section F to estimate residue levels and determine tillage systems. The resulting information is used to evaluate soil erosion losses and water quality. Fertilizer and manure data are needed to address water quality issues.

USDA is responsible for publishing estimates of the amount of fertilizer used in crop production.

Item 1 Field acres

Enter the number of acres planted in the selected commodity field. Round to nearest tenth (1/10) of an acre.

Item 2 Tenure arrangement

Determine if the selected field was owned by the operation, or if it was rented for cash or for a share of the crop produced from the selected field, or if it was used rent free.

Item 2a Acres in field owned

Record the number of acres of the target commodity planted on land the operation owned.

Items 2b-2d Acres in field rented

Record the total acres of the target commodity planted on rented acres, by type of rental arrangement.

INCLUDE:

1) acres in the field for which the operator paid cash rent on a per acre basis (Item 2b).

2) acres in the field for which the operator paid the landlord a share of the crop (either standing or harvested). The respondent may need to add all the share rented units together to get a total share rented figure (Item 2c). Include acres of the target commodity planted on share rented land, even if the crop was plowed under or abandoned and, therefore, the landlord's share was zero, as long as the rental agreement specifies the rental fee is to be a share of the crop grown.

3) acres in the field belonging to others (private individuals, federal, state, railroad, etc.) which the operator used rent free (Item 2d). If the rental agreement specifies the landlord only receives a share of the government payments, and no share of the crop, then this should be counted as land used rent free.

This item, along with Items 3 and 4 (*V2 & V3*), are used to determine the cost of land for crop production. In addition, tillage practices on owned fields may differ from those used on rented fields.

Item 3 Cash rent paid

V2 & V3 only

Soybean and Cotton Production Practices and Costs Report

If any part of the selected field is cash rented (recorded in Item 2b), ask how much was paid in cash rent. Record cash rent in dollars and cents per acre. If this figure cannot be obtained, ask for the total dollars paid in cash rent for the field.

Item 4 Landlord's share or the crop

V2 & V3 only

Soybean and Cotton Production Practices and Costs Report

If any part of the selected field is share rented (recorded in Item 2c), record the percent of total production from the selected field that belonged to the landlord.

Item 5 Type of cotton planted

V3 only

Cotton Production Practices and Costs Report

Enter the code indicating the type of cotton planted in the selected field.

NOTE: For ***V8***, only upland cotton fields should be listed in Section A!

Item 6 Expected yield

V2 & V3 only

Soybean and Cotton Production Practices and Costs Report

Record the yield per acre the operator expects the (soybean, cotton) crop on the selected field to yield during a normal or typical growing season. Record soybean yield in bushels per acre. Record cotton yield in pounds per acre. If the respondent reports in units other than bushels (or pounds), record the response and reported units in the margin next to Item 6.

Most operators budget for the crop season based on an expected yield per acre for each crop they grow. If you have to probe to obtain the yield, it may help to ask the operator what yield he budgeted for in 1997.

The reason we ask this item is that 1997 yields may not have been normal, and data from this survey will be used as the basis for estimating production costs for several years. Asking the operator about the yield he expected should provide a good measure of "normal" yields.

Item 7 Expected market price at planting

V2 & V3 only

Soybean and Cotton Production Practices and Costs Report

Record the price the producer was expecting for the crop at planting time. Enter the expected price in dollars and cents per **bushel** for soybeans, or cents per **pound** for cotton (for example, 2.35). If the response is in units other than bushels or pounds, record the response and reported units in the margin next to item 7.

The purpose of the question is to determine how producers make their decisions about planting and what crops to plant. When the producer decided to plant soybeans or cotton, costs of producing the crop were likely considered. The producer probably also had an expectation about the price that would likely be received when the crop was sold. If the budget for expenses exceeded the expected return per acre, the producer would probably not have planted soybeans or cotton.

Item 8 Was a no-till system used?

V2, V3, V5, V6, V7, V8 & V10

Soybeans, Corn, & Wheat only

Ask if a no-till system was used to prepare and plant the selected field. If YES, enter code 1 and ask Item 8a. If NO, go to Item 9.

In a no-till system, no tillage type implements (those that disturb the soil surface) cross the field before the planter. This would exclude implements such as shredders and rock pickers that do not disturb the soil.

Item 8a Consecutive years no-till system used

V2, V3, V5, V6, V7, V8 & V10

Soybeans, Corn, & Wheat only

If no-till was used, then determine the number of **consecutive** years that no-till has been used on the selected field. The key word is consecutive. This is regardless of previous crop type.

For example, the target commodity is soybeans and a corn/soybean rotation is used over the years. If the operator no-tills only soybeans each time, this would only be **one** consecutive year for the target commodity of soybeans. The number “1" would be entered in Item 8a.

Item 9 Planting date

Record the date the selected field was planted.

If the operator does not know the planting date, ask what week the field was planted. Then enter the date for the WEDNESDAY of that week.

Record month, day, and year, in digits. For example, May 8, 1997, will be entered as 5 08 96. The year is preprinted on the questionnaire as **97** for all crops except in the cell for winter or durum wheat in *V7* and *V10*. Be sure to record the correct year for the planting date of these crops.

If the field was reseeded or replanted, record the date the field was planted the first time. If more than one day was needed for planting the field (the first time), enter the date planting was completed.

Item 10 Seeding rate

Determine the initial (first) seeding rate per acre for the selected field. Do NOT include any reseeding or over seeding (full or partial) as part of this rate.

Enter the RATE of seeding and also the UNIT for the seeding rate. Rate and unit may vary by crop. Record the units to the nearest TENTH (1/10). For example, if the operator responds in bushels per acre, be sure to record the tenths of bushels. For example: 1.0 bushels per acre. Enter 1.0 in the cell labeled RATE PER ACRE. Enter code 3 for bushels in the cell labeled UNIT CODE.

Item 10a Type of planting system

V2, V3, V5, V6, V8 & V10 only

Soybeans, Cotton & Corn only

For the selected field, determine what type of planting system was used. If more than one method was used, record the acreage of each in the margin, and enter the code for the method used for most of the acres.

Item 10b Row width

V2, V3, V6, V8 & V10 only

Soybeans, Cotton & Corn only

Record the row width in whole inches. If the primary planting method was “broadcast”, then skip this item.

Item 10c Skip row cotton

V3, V8 & V10 only

Cotton only

It is common is some areas to plant cotton in fields with alternating rows of cotton and another crop or idle land. Planting cotton in alternating rows with another crop or land use is referred to as “skip row”. Enter a code 1 if the cotton field was planted in a skip pattern, then continue with Item 10d.

Item 10d Skip pattern

V3, V8 & V10 only

Cotton only

Enter the rows of cotton and rows of skip used in the skip pattern. Common skip patterns are:

Planting Pattern	
Cotton Rows	Skip Rows
2	1
2	2
2	4
4	2
4	4

Item 10e Width of skip

V3, V8 & V10 only

Cotton only

Enter the width of the skip in inches if cotton was planted in a skip pattern.

Item 11 Acres reseeded

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

Record the total number of acres of the selected field that were reseeded. Enter acres to the nearest TENTH of an acre.

If some acres were reseeded more than once, count them again: number of acres reseeded times number of times reseeded. EXAMPLE: In a 30 acre field, if 10 acres were reseeded three times and 10 acres were reseeded once, the total acres reseeded would be 40.0 acres.

Item 12 Seed source

V2, V3, V6, V7, V8, V9, & V10

Soybeans, Wheat, Cotton, Potatoes only

Record the source of the seed used on the selected field. Use the following response categories:

Code 1 - **Purchased**: This is seed that was bought from a seed dealer or another operator.

Code 2 - **Homegrown or Traded**: "Homegrown" is seed grown on the farm by the respondent and used for planting the selected field in 1997. "Traded" is when the operator swaps seed with no cash changing hands, such as swapping with a neighbor.

Code 3 - **Both**: The operator used both homegrown or traded AND purchased seed to plant the selected field. If both were used on the farm and the operator cannot determine which was used on the selected field, use code 3 (BOTH).

Item 13 Amount of home grown or traded seed

V2, V3, V6, V8 & V10

Soybeans & Cotton only

If any of the seed used was grown on this operation or traded, then record the amount of home grown / traded seed used in the selected field in Item 13. Although percent can be entered, the actual number of bushels (or pounds) is the preferred response.

Item 14 Cost for treating seed

V2 & V3 only

Soybean & Cotton Production Practices and Costs only

The seed used may have been treated with an insecticide or fungicide prior to planting. Record the cost of this seed treatment in dollars and cents per bushel (or pound). Exclude the cost of chemicals applied at planting time, these will be obtained in the Pesticide Applications section.

Item 15 Pest resistant seed varieties

V2, V3, V5, V6, V8, V9, & V10

Soybeans, Cotton, Corn & Potatoes only

Determine if a pest resistant seed variety was used on the selected field. Show the operator the Seed Variety Code List in the Respondent Booklet. The Code Lists printed in the Respondent Booklet identify various seed varieties by name. The operator may need this visual aid as a reminder that such a variety was planted. Determine if one of the TYPES of varieties listed was used for the 1997 crop.

If the same crop was planted in the field in 1996, find out if one of the resistant varieties was planted in 1996.

Different types of resistance cannot be "stacked." That is, seed varieties currently on the market do not carry more than one type of resistance.

If more than one type of variety was used on the field, select the variety used on the most acres in the field.

For corn, cotton, and potatoes, code 2 is for a Bt variety for insect resistance. "Bt" means *Bacillus thuringensis*, which is a bacteria that is used to control many larva, caterpillar, or insect pests. Some new seed varieties contain genes from the bacteria Bt, which provides resistance to certain insect pests as the plants grow.

Item 16 Reason for use of herbicide resistant seed

V2 & V3 only

Soybean & Cotton Production Practices and Costs only

Herbicide resistant seed varieties usually add to the cost of producing a particular crop. For this reason, analysts are interested in the reason a producer would incur the additional cost. This item is intended to determine if the decision to use a herbicide resistant variety was driven **primarily** by economic reasons (the cost of the variety is offset by reduced herbicide costs because a lower cost herbicide can be used), environmental reasons (the variety is resistant to an overall less toxic herbicide), or some other reason. If the producer indicates some other reason led to the choice of the herbicide resistant variety, record a '5' in the answer cell and write a note to describe the producer's reason. If the respondent indicates that more than one reason led to the choice of the variety, probe to obtain which reason was the most important in making the decision.

Item 17 Seed cost

Record the per unit cost of the purchased seed for the selected field. If both homegrown or traded seed and purchased seed were used on this field, record the cost per unit for the portion that was purchased only. Include landlord's cost.

Record the cost in dollars and cents per unit and enter the code for the appropriate unit. The unit may vary by crop. *Example*: $11.90 per bushel. Enter 11.90 in the cell labeled DOLLARS & CENTS PER UNIT. Enter code 4 for bushels in the cell labeled UNIT CODE.

Corn may be purchased in bags that are measured by the number of kernels in the bag. When such a measure is used, the number of kernels in a seed corn bag may vary from 60,000 to over 90,000. If the measure of the bag size is in kernels, enter code 1 for APPROX. 80,000 KERNEL BAG.

On *V5* and *V10*, if seed corn was grown on the selected field and the operator does not know the cost of the seed because it was provided by the contractor, be sure to make notes and record DK (Don't Know) to indicate that the operator did not know the cost.

Item 18 Harvest completed

Determine if harvest of the selected field has been completed at the time of the interview. If harvest has not been completed, use alternative wording in parentheses in the next few questions about what the operator expects to be the result of harvest.

Item 19 Commodity name

V10 Only

Complete the left-hand Columns 2, 3, and 4 for whichever of Items 19a-g are identified for *target commodity 1*, then complete the right-hand Columns 2, 3, and 4 for whichever of Items 19a-g are identified for *target commodity 2*.

In the header over the lefthand set of Columns 2, 3, and 4, write in the name of *target commodity 1*.

In the header over the right-hand set of Columns 2, 3, and 4, write in the name of *target commodity 2*.

If you accidentally reverse the order of the commodities, for example, because the respondent answers for the target commodity 2 field first, simply record in the appropriate header the name of the commodity for which Items 19a-i are answered. The Office will code the Office Use boxes accordingly and the computer will get it straight. You don't need to transfer data just because the order of commodity 1 and 2 were accidentally reversed.

If more than one type of wheat are target commodities in your state, be sure to identify the type of wheat when writing in the name of *target commodity 1* or *2*.

Item 19a-i Acres harvested (Column 1)

Determine how many acres in the selected field were harvested for each purpose identified in Items 19a-i, depending on the commodity. If harvest of the field has not been completed at the time of the interview, use the alternative wording in parentheses and ask how many acres **will be** harvested for each purpose listed. Record acres in each use to the nearest TENTH of an acre.

For CORN, ask the number of acres harvested (or to be harvested) for:

Item 19a - GRAIN
Item 19b - SILAGE (green chop)
Item 19c - SEED for planting
Item 19h - ABANDONED
Item 19i - OTHER USE

For SOYBEANS, ask the number of acres harvested (or to be harvested) for:

Item 19a - BEANS (for oil or meal)
Item 19h - ABANDONED
Item 19i - OTHER USE

For WHEAT, ask the number of acres harvested (or to be harvested) for:

Item 19a - GRAIN
Item 19b - SILAGE (green chop)
Item 19c - SEED for planting
Item 19h - ABANDONED
Item 19i - OTHER USE

For COTTON, ask the number of acres harvested (or to be harvested) for:

Item 19d - COTTON LINT
Item 19h - ABANDONED
Item 19i - OTHER USE

For POTATOES, ask the number of acres harvested (or to be harvested) for:

Item 19e - PROCESSING POTATOES
Item 19f - TABLE STOCK POTATOES
Item 19g - SEED FOR PLANTING
Item 19h - ABANDONED
Item 19i - OTHER USE

Item 19a-g Yield per acre (Columns 3 & 4)

If the selected field has been harvested, record average yield per acre for each use identified in Column 2. If harvest of the selected field is not complete, use the alternative wording in parentheses and ask the operator what yield per acre is expected at harvest. In Column 3, record the yield

per acre to the nearest tenth. In Column 4 record the appropriate unit code for the reported yield.

Item 20 Commodity name

V10 Only

In the header over the **lefthand** set of Columns 2 and 3, write in the name of *target commodity 1*. Then complete these columns of Items 20a-e for that target commodity.

In the header over the **right-hand** set of Columns 2 and 3, write in the name of *target commodity 2*. Then complete these columns of Items 20a-e for that target commodity.

If you accidentally reverse the order of the commodities, for example, because the respondent answers for the target commodity 2 field first, simply record in the appropriate header the name of the commodity for which Items 20a-e are answered. The Office will code the Office Use boxes accordingly and the computer will get it straight. You don't need to transfer data just because the order of commodity 1 and 2 were accidentally reversed.

If more than one type of wheat are target commodities in your state, be sure to identify the type of wheat when writing in the name of *target commodity 1* or *2*.

Items 20a-f Previous crops planted in field (Column 1)

In the series of Items 20a-f, you will ask the operator to identify the crops that were previously planted on the selected field during the time periods working backwards to 1994.

Include cover crops planted during the indicated period.

The **action** of planting the crop must have occurred during the time period named in each individual item. If a perennial crop is growing on the field during a particular time period, but it was not planted during that period, then code 318 (for fallow, idle/diverted) should be entered in the appropriate cell. Perennial crops, such as alfalfa, clover, or other grasses, should only be captured in the time period during which they were actually planted. The one exception to this rule is Item 20f (SPRING/SUMMER of

1994). If a perennial crop was growing on the field at that time, it should be recorded, even if it was not planted at that time.

Completing this question has presented some difficulties, especially when double-cropping occurred. To address these problems we have defined the planting periods as Spring/Summer and Fall.

The reason for including summer in the spring planting period is that in some States when double cropping occurs, the second crop may not be planted until late June or early July. Thus, the spring/summer period really extends up to the fall planting period. The fall period would be for planting winter crops, such as winter wheat or cover crops.

Enter the crop code for the crop previously planted on the selected field for **each** of the designated time periods. Use the Partial Crop Code List printed in the questionnaire. For any crops not listed in the Partial Crop Code List, write the crop name beside the cell and leave the cell blank. The survey statistician in the Office will fill in the correct crop code for that crop. If the operator did not have the field in any of the previous time periods and doesn't know what crops were planted, make a note explaining that.

Record crops if they were **planted** during the time period, even if the crop abandoned before harvest because of drought, hail, or some other event.

If the current field was subdivided into two or more fields in a previous period, record the crop that occupied the largest portion of the current field. For example, if the current field is 100 acres and last year 60 acres were fallow and 40 acres were wheat, record fallow (Code = 318) as the previous crop.

Important: All cells must have an entry. **A dash (-) is unacceptable**. (The only exception is Item 20a should be left blank on *Version 7* and *Version 10* when WINTER WHEAT is the target commodity.) This should get each past crop entered in the time period in which it was planted. For Items 20-20e, if no crop was **planted** during the specific time period, enter code = 318 (fallow, idle, or diverted). This includes perennial crops growing, but not planted, during that period. However, for Item 20f, if a perennial crop (alfalfa, etc.) was growing in that period, although it was actually planted earlier, enter the code for that perennial.

Item 20a Previous crop planted in fall 1996

Record the code for the crop **planted** on the selected field in the fall of 1996. If a crop was planted, it would likely be a cover crop or a winter crop. Use code 318 if **no** crop was planted during that period, if the selected field was fallow, idle, or diverted, or if a crop planted during the previous period was growing.

On *Version 7*: WHEAT and *Version 10*: MULTI-CROP, skip Item 20a when WINTER WHEAT is the target commodity for the selected field.

Item 20b Previous crop planted in spring/summer 1996

Record the code for the crop planted on the selected field in the spring/summer of 1996 (for example, spring wheat = 164). Use code 318 if no crop was planted during that period or if the selected field was fallow, idle, or diverted, or if a previously planted crop was already growing.

Item 20c Previous crop planted in fall 1995

Record the code for the crop planted on the selected field in the fall of 1995. If a crop was planted, it would likely be a cover crop or a winter crop. Use code 318 if no crop was planted during that period or if the selected field was fallow, idle, or diverted, or if a previously planted crop was already growing.

Item 20d Previous crop planted in spring/summer 1995

Record the code for the crop planted on the selected field in the spring/summer of 1995 (for example, corn for grain = 6). Use code 318 if no crop was planted during that period or if the selected field was fallow, idle, or diverted, or if a previously planted crop was already growing.

Item 20e Previous crop planted in fall 1994

Record the code for the crop planted on the selected field in the fall of 1994. If a crop was planted, it would likely be a cover crop or a winter crop. Use code 318 if no crop was planted during that period or if the selected field was fallow, idle, or diverted, or if a previously planted crop was already growing.

Item 20f Previous crop planted in spring/summer 1994

Record the code for the crop planted on the selected field in the spring/summer of 1994 (for example, corn for grain = 6). Use code 318 if no crop was planted during that period or if the selected field was fallow, idle, or diverted.

If a perennial crop, such as alfalfa, clover, or other grasses, was growing on the selected field in this time period, enter the code for the perennial crop, even if it was not planted during this period.

Completing Item 20a-f Column 1: Examples

We know that the target commodity was planted in the spring/summer of 1997. The only exception is when the target commodity is WINTER WHEAT, which would have been planted in FALL of 1996 (and Item 20a is left blank).

Now we need to record the crops PLANTED in the previous time periods.

Example 1: Continuous soybeans; **target commodity soybeans**.

1	2 What crop was PLANTED on this field in-- [*column 1*]	
	NAME	**CODE**
a. FALL of 1996?	*none*	*318*
b. SPRING/SUMMER of 1996?	*soybeans*	*26*
c. FALL of 1995?	*none*	*318*
d. SPRING/SUMMER of 1995?	*soybeans*	*26*
e. FALL of 1994?	*none*	*318*
f. SPRING/SUMMER of 1994?	*soybeans*	*26*

Items 20a, 20c, and 20e receive code 318, even though this is only a normal time period between continuous crops. No crop was **PLANTED** on the selected field during these fall periods.

Example 2: Continuous double crop soybeans with winter wheat; **target commodity winter wheat**.

1	2 What crop was PLANTED on this field in-- [*column 1*]	
	NAME	**CODE**
a. FALL of 1996?	-	-
b. SPRING/SUMMER of 1996?	*soybeans*	*26*
c. FALL of 1995?	*winter wheat*	*165*
d. SPRING/SUMMER of 1995?	*soybeans*	*26*
e. FALL of 1994?	*winter wheat*	*165*
f. SPRING/SUMMER of 1994?	*soybeans*	*26*

Example 3: Continuous double crop soybeans with winter wheat **target commodity soybeans**.

1	2 What crop was PLANTED on this field in-- [*column 1*]	
	NAME	**CODE**
a. FALL of 1996?	*winter wheat*	*165*
b. SPRING/SUMMER of 1996?	*soybeans*	*26*
c. FALL of 1995?	*winter wheat*	*165*
d. SPRING/SUMMER of 1995?	*soybeans*	*26*
e. FALL of 1994?	*winter wheat*	*165*
f. SPRING/SUMMER of 1994?	*soybeans*	*26*

Example 4: Perennial crop seeded in earlier period **any target crop**.

1	2 What crop was PLANTED on this field in-- [*column 1*] NAME	CODE
a. FALL of 1996?	*alf. growing*	*318*
b. SPRING/SUMMER of 1996?	*alf. growing*	*318*
c. FALL of 1995?	*alf. growing*	*318*
d. SPRING/SUMMER of 1995?	*alfalfa*	*1*
e. FALL of 1994?	*none*	*318*
f. SPRING/SUMMER of 1994?	*soybeans*	*26*

Item 20a-f Irrigation of previous crops (Column 3)

For each previous crop identified in Column 2 of Items 20a-f, determine if that crop was irrigated during the designated time period. Enter code 1 for YES in Column 3 if the Column 2 crop was irrigated.

Item 21 Crop residue removal

Check to see if the most recent crop was a small grain. The most recent crop would be the first item in Item 20 that is not code 318 for FALLOW/IDLE/DIVERTED. This would be Item 20a for a cover crop when winter wheat is not the target commodity, or Item 20b for target commodity winter wheat **or** if no crop was planted in Item 20a, or Item 20c if winter wheat was target commodity **and** no crop was planted in 20b. Small grains include barley, oats, wheat, rye, canola, etc. If NO small grain preceded the target commodity, then skip Item 22.

If the most recent crop was small grain, then determine if the crop residue (normally after harvest) was removed from the field. Methods of removal could include baling, burning, and removing loose straw. Code 1 for YES if residue was removed.

Item 22a-g Land-use practices

Determine whether the land use practices in Items 22a-h were used on the selected field for the target commodity. Include land not planted to the target commodity if the operator considers it to be part of the selected field. For example, corn may be strip cropped with alfalfa in the same

field. Only the acres planted to corn were counted in Item 1. However, since the entire field features strip cropping, the answer to Item 22e described below would be code 1= YES.

Each of the individual Items 22a, 22b, 22c, 22d, 22e, 22f, and 22g must be asked. This is not a multiple choice question -- that is, there may not be just one single answer. The operator may use more than one of the land use practices listed. Enter code 1 = YES for each practice the operator used.

In Item 22a, determine if the operator uses terraces in the selected field. Terraces are raised level areas of a field supported on one or more sides by a wall or bank of turf.

In Item 22b, determine if the operator uses contour farming in the selected field. Contour farming is when producers perform tillage operations and plant crop rows across the slope of the land. Furrows, crop rows, and wheel tracks across the slope help retain water so that it can seep into the soil, instead of running off, taking loose topsoil with it.

In Item 22c, determine if the operator uses temporary or permanent levees . . . .

In Item 22d, determine if the operator uses grassed waterways in the selected field. Grassed waterways are water drainage channels in a field. Often they have been shaped or graded, and a permanent cover of vegetation has been established. Include channels that are used as outlets for terraces and for disposing of runoff from diversion channels, stabilization structures, contoured rows, and natural depressions.

In Item 22e, determine if the operator uses strip cropping in the selected field. Strip cropping is when strips of row crops and other cultivated crops alternate with grasses or other close growing crops. These alternating strips are planted across the slope of the land. Water runoff from the row crop is slowed down by the grasses, allowing it to seep into the soil better.

In Item 22f, determine if the operator uses underground outlets such as tile drainage in the selected field. Underground outlets such as tile drainage control water runoff by carrying water through underground pipe to areas where it can run away without disturbing the soil.

In Item 22g, determine if the operator uses other drainage channels or diversions in the selected field. Other drainage channels or diversions

include any other types of structures used to control or dispose of surface water runoff. Their purpose is to prevent or reduce soil erosion.

Item 23 NCRS classification of Highly Erodible Land

Determine if the Natural Resources Conservation Service or NRCS has notified the operator that the selected field has been classified as "Highly Erodible" or HEL land. If YES, enter code 1.

NRCS would have evaluated the selected field and notified the operator of its classification if the operator had requested any kind of federal program benefits for the selected field.

Whether a field is classified as Highly Erodible depends on rainfall, the potential for soil erosion, and the length and slope of the field. NRCS uses these characteristics and other information to classify fields as Highly Erodible or not.

Item 24 Wetland

Determine if the NRCS has notified the operator that the selected field contains a wetland. If YES, enter code 1.

Wetlands are areas where the normal condition of the soil is to be wet enough for long enough to support the continued growth of the kinds of plants that prefer wet soil conditions.

Section C - Fertilizer and Nutrient Applications

What is Section C for? How is the information used?

USDA is responsible for publishing estimates of the amount of fertilizer used in crop production. Accurate data on fertilizer application rates are also needed for conducting sound economic analyses to address many complex issues concerning water quality and food safety. These analyses enable policy makers to make informed decisions.

Specifically, the data collected will be used to analyze issues and policies in the following general areas:

- Water Quality: fertilizer data enable a determination of the geographic extent and intensity of use.

- Food Safety: data are needed to determine the extent and intensity of fertilizer use to aid in the development of residue monitoring programs.

Nutrient management practices can help farmers adjust fertilizer application to crop needs and reduce losses to the environment. Legume production, storage and use of livestock and poultry manure, soil, plant, and tissue testing are all methods for computing nutrient balances that establish the basis of sound nutrient management.

In addition, ERS uses the questions on costs to estimate the fertilizer expense for the year of the survey. For non-survey years, the actual materials and application rates are used with data from other surveys to create a cost index that is then applied to the actual expense from the survey year.

The general purpose of the section is to identify what fertilizers are actually used to produce the 1997 crop on the selected commodity field. Include the cost of all fertilizers applied to the selected commodity field during 1996 and/or 1997 for the 1997 crop, even if the materials were purchased before 1997.

Use of Supplements

If more lines are needed than the number available in the table, use a FERTILIZER SUPPLEMENT. Copy the identification as it appears on the main questionnaire to the identification box on the supplement. Assign the next Table number, 002, 003, 004, etc., to each additional supplement used. You begin numbering the supplements with Table 002 because Table 001 already appears in the questionnaire. Use as many supplements as you need.

Item 1 Fertilizer table

Determine if chemical fertilizers (nitrogen, phosphate, and/or potash) were applied to the selected field. Respondents must include all chemical fertilizer materials applied specifically for the 1997 crop. This includes fertilizer applied in the fall of 1996. If the selected field was fallow during the summer of 1996, include fertilizers applied during that period. Include custom applied fertilizers. Exclude micro-nutrients, such as iron, zinc, and boron.

If any fertilizers were applied, complete the Fertilizer Table. If no fertilizers were applied, go to Section D.

On *Version 10*: Multi-crop, enter code 1 for YES in the correct cell for the selected commodity fields. Complete the Pesticide Table for each commodity field that fertilizers were applied to. If no fertilizers were applied to the selected commodity field, dash the cell.

V2 & V3: If no fertilizers were applied to either of the selected fields, then go to Item 3.

V5, V7, V8 & V9: If no fertilizers were applied to either of the selected fields, then go to Item 6.

V6 & V10: If no fertilizers were applied to either of the selected fields, then go to Item 5.

Fertilizer Table Commodity Code (Column 1)

V10 only

Corn, Soybeans, Wheat, Cotton, Potatoes

Enter the commodity code for each selected field as you enumerate the fertilizer applications for that target commodity.

When the fertilizer applications are completely enumerated for the selected *[commodity 1]* field, proceed to list the fertilizer applications for the selected *[commodity 2]* field.

If the respondent remembers an additional fertilizer application to the selected *[commodity 1]* field after you begin listing the applications for the *[commodity 2]* field, just record it wherever you're at in the table. Be sure to enter the correct commodity code in Column 1.

Fertilizer Table - Materials Used (Column 2)

Record the plant nutrients of each fertilizer material, nitrogen (N), phosphate (P_2O_5), and potash (K_2O), applied to the selected field for the target commodity. Use of these nutrients can be reported in either of two ways:

1. **Percent analysis**: This is the percentage composition of the product expressed in terms that the law requires and permits.

2. **Pounds of actual plant nutrients**.

Record the fertilizer data in terms of pounds, gallons, or pounds of actual plant nutrients applied PER ACRE. Percent analysis is the preferred method of obtaining the data, because products used can be more easily identified this way. Use actual plant nutrients only if absolutely necessary.

Be careful that the respondent does not give you the total amount of fertilizer applied to the entire field. If a respondent knows only the total pounds of fertilizer or plant nutrients applied to the field and not the rate per acre, you must calculate rate per acre and enter it in the table. In the margin of the form, show the computations for deriving the rate per acre.

For some crops, farmers may say that fertilizer applied to the most recent previous crop grown on the field was partly for the benefit of the target

commodity. Only part of this fertilizer was actually carry-over for the target commodity. Watch out for this because we **DO NOT** want to include these fertilizer applications.

Important: Record each individual fertilizer application made to the selected field on a separate line. When fertilizer materials are bulk blended for application (for example, 10-10-10 combined with 18-46-0), each product is recorded on a separate line in the fertilizer table, even though this fertilizer blend was applied in one trip over the field.

Percent Analysis

The most common method for reporting fertilizer materials is by percent analysis of their content of Nitrogen (N), Phosphate (P_2O_5) and Potash (K_2O), in that order. For example, 13-13-13 is 13 percent Nitrogen, 13 percent Phosphate and 13 percent Potash. This means that thirty-nine (13+13+13) out of every one hundred pounds of this fertilizer is active ingredients (N, P and K). Sixty-one (100 - 39) pounds of every one hundred pounds of this fertilizer is carrier material (inert ingredients).

Two of the more common fertilizers used in crop production are 18-46-0 (diammonium phosphate or DAP) and 82-0-0 (anhydrous ammonia). If 18-46-0 were reported, you'd record 18 in Column 2 under N (nitrogen) and 46 under P_2O_5 (phosphate). The K_2O (potash) column would be dashed since there is no potassium (potash) in the mixture. For anhydrous ammonia, you'd record 82 under N. Since there is no phosphorus or potash in anhydrous, the phosphate and potash columns should be dashed.

Some fertilizer materials can also be applied in liquid form. A common liquid fertilizer material used in crop production is 32-0-0 (nitrogen solution). For this material you would record a 32 under N for nitrogen.

No fertilizer reported by analysis will have an N-P-K total of more than 85. Carrier or filler material makes up the rest of the total weight for commercial fertilizers. If a farmer reports 35-45-20, he's probably reporting pounds of actual nutrients instead of analysis since the three percentages add up to more than 85 percent.

For each fertilizer application to the selected field reported by percent analysis, record the quantity applied per acre (including carrier) in Column 3 and the appropriate unit of measure, pounds (code 1) or gallons (code 12), in Column 4.

For bulk blended fertilizer materials, use a separate line for each of the fertilizers that the dealer blended in the mixture. If the dealer mixed 150 pounds of 18-46-0 and 250 pounds of 0-0-60 together, record each on a separate line. DO NOT just add it up and record it on one line as 400 pounds of 18-46-60. This would be a major error, because the correct analysis of this fertilizer is 7-17-38, calculated by:

N 150/400 times .18 = .068 (or 7%)

because there were 150 pounds of 18-46-0 in the mixture and of those 150 pounds, 18% was Nitrogen.

P 150/400 times .46 = .173 (or 17%)

because 46 percent of the 150 pounds was available Phosphorus.

K 250/400 times .60 = .375 (or 38%)

because 250 pounds of the total 400 were 0-0-60 and this material is 60 percent Potash.

Actual Plant Nutrients

Another way farmers commonly report fertilizer use is in terms of Actual Plant Nutrients (APN) applied per acre. This may also be called pounds of active ingredients. If the farmer knew he applied 60 pounds of nitrogen; 35 pounds of phosphorus; and 40 pounds of potash PER ACRE, record this information in Column 2 and record code 19 in Column 4. In this case, no entry is needed in Column 3 because we know the actual amount applied for each of the three materials so we don't need to calculate it from percentages.

When farmers report "units" of N, P or K, this is usually a clue that they are reporting pounds of actual nutrients. A unit of Nitrogen will amount to more than a pound of actual material applied, because part of it is carrier material, just like when the farmer reports by percent analysis. For example, if the farmer reported that he applied 100 units of Nitrogen in the form of anhydrous ammonia, he would have applied about 122 pounds of 82% nitrogen. (122 x .82 = 100) If this were reported by percent analysis, 82 would be recorded in the N column, 122 in Column 3 and 1 in Column 4. If it were reported as pounds of actual nutrients it would be recorded as 100 in the N column and 19 in Column 4. Column 3 would be left blank.

When actual plant nutrients (active ingredients) or "units" of a fertilizer are reported, you should probe to be sure how much was actually applied. One way to do this is to ask (when units were reported) if the actual weight of material applied was more than the number of units reported.

For example, "You said you put down 100 units of UAN32 per acre. Did the material you applied actually weigh more than 100 pounds per acre?"

Other Methods of Reporting Fertilizer Use

Farmers may also report fertilizers by name. **Exhibit 1** at the end of this section contains some of the more common fertilizers with their usual analysis.

Anhydrous ammonia is the strongest nitrogen fertilizer available. It must be kept (in a tank) under pressure; it is applied by injection into the ground or into irrigation water. Anhydrous is a liquid when under pressure, but turns into a gas when released and is lost if not injected into the soil. Anhydrous ammonia is a very popular fertilizer because it is often cheaper (per pound of nutrient) than other forms. It can be reported as "anhydrous", "gas", "NH_3", "82-0-0", or in "units of nitrogen" or as "pounds of actual nitrogen" (N).

Aqua ammonia is one of the more common types of liquid nitrogen fertilizers. It is made up of anhydrous ammonia and water and is often found in Western states. It may be reported in pounds (actual N) or gallons (material or product). Although it is a liquid, it is usually reported in pounds of actual N.

Urea is another commonly used nitrogen fertilizer because it has a high nitrogen analysis. It may be added through an irrigation system, usually as a nitrogen solution.

With many of the other fertilizers listed in the **Exhibit 1**, the analysis may vary. Probe to find out if the farmer knows the analysis or the pounds of actual nutrients applied. If he doesn't know the analysis but knows the name, use the analysis shown in this section of the manual.

Fertilizer Table - Quantity Applied per Acre (Column 3)

If percent analysis is reported, record the amount of material applied to the selected field in terms of pounds or gallons applied per acre. If pounds of

actual nutrients were reported in Column 2, this column should be left blank.

Be careful that the respondent does not give you the total amount of fertilizer applied to the entire field. If a respondent knows only the total pounds of fertilizer or plant nutrients applied to the field and not the rate per acre, you must calculate rate per acre and enter it in the table. In the margin of the form, show the computations for deriving the rate per acre.

Fertilizer Table - Material Unit Code (Column 4)

If percent analysis is reported in Column 2, record either pounds of material (code 1) or gallons of material (code 12). If pounds of actual plant nutrients are reported in Column 2, enter code 19 in Column 4 and leave Column 3 blank.

Fertilizer Table - When was fertilizer applied (Column 5)

Ask the respondent whether the fertilizer application was made before seeding (in the fall), before seeding (in the spring), at seeding, or after seeding.

If the same fertilizer is applied at two separate times, record each application on a separate line.

Fertilizer Table - How was fertilizer applied (Column 6)

Obtain the physical application method used to apply the fertilizer to the selected field.

Show the respondent the Fertilizer/Pesticide Applications Method Codes in the Respondent Booklet.

The Application Method codes are defined as follows:

Code 1 - **Broadcast, Ground Without Incorporation**: Fertilizer material is applied to the entire surface area by land application equipment. Application may occur either before or after planting, usually before crop emergence. No mixing of the fertilizer material into the upper soil surface is needed or planned as part of the application.

Code 2 - **Broadcast, Ground with Incorporation**: Fertilizer material is applied to the entire surface area by land application equipment. Application usually occurs before planting, and a planned mixing of the fertilizer into the upper soil surface is completed at the time or shortly after the time of application. Incorporation of the fertilizer into the upper soil surface is often performed with a field cultivator, disk, or other tillage implement.

Code 3 - **Broadcast by Aircraft**: Fertilizer material is applied to the entire surface area by air application equipment. Include only those applications made by airplane or helicopter.

Code 4 - **in Seed Furrow**: Fertilizer material is placed in the seed furrow at planting time generally through a separate attachment on the grain drill.

Code 5 - **Irrigation Water**: Fertilizer material is mixed with water in either sprinkler or gravity fed irrigation systems. The term used for this procedure is fertigation. The product is metered into the water delivery system (generally a sprinkler irrigation system) and is distributed across the field in the irrigation water.

Code 6 - **Chisel, Injected or Knifed-in**: Fertilizer material is injected under pressure into the soil. This application method (using high pressure) is often used to apply anhydrous ammonia.

Code 7 - **Banded in or over Row**: Fertilizer material is placed in or over the crop row. This method is mainly used for row crops. Products are applied at or after planting. The area between the rows is not treated.

Fertilizer at-planting products are generally granular formulations and are placed in a 3 to 4 inch band on either side or above the seed. Early growing-season applications are also applied (either liquid or granular) on either side of the crop row.

Code 8 - **Foliar or Directed Sprays**: After planting, fertilizer material is sprayed on or under the plant foliage.

Code 9 - **Spot Treatments**: Fertilizer materials are only applied to spots in the field, even if the operator drives over the entire field to apply fertilizer only to these spots. Spot applications should not be confused with treatment of part of a field. When part of a field is

treated, treated acres can usually be distinguished. For example, the north half of the field was treated. These applications are reported just like any other applications.

If treatments were made with any fertilizer product to just certain spots in the selected field, calculate the quantity applied per acre by dividing the total quantity of product applied by the number of acres treated. Record this figure in Column 3 and in Column 7 enter the number of acres that actually received these spot treatments. Do not enter the total acres in the field. For example, if the operator estimates that only 6.5 acres in a 40-acre field were treated with a particular application of fertilizer, then enter 6.5 in Column 7. Spot treatments of fertilizers should be rare.

Fertilizer Table - Number of acres treated (Column 7)

Record the number of acres in the selected field that were treated with the fertilizer materials recorded in Column 2. If only part of a field was treated, record only those acres. For example, if the operator made a particular application of fertilizer to only 25 acres in a 40 acre field, enter 25 in Column 7. Since each individual application of fertilizer must be recorded on separate lines, the figure entered in Column 7 can never be greater than the number of acres in the field.

Acres and tenths of acres must be reported in Column 7. Zero must be recorded after the decimal point if whole acres are recorded. For example, if the operator treated exactly 25 acres, the entry in Column 10 must be 25.0. Otherwise the summary will consider the entry to be 2.5 and we'll get serious errors when we summarize the N, P, K applied per acre.

Item 2 Custom fertilizer application cost

V2 & V3 Only

Soybean & Cotton Production Practices & Costs only

Record the cost of custom application of fertilizers to the selected field of the commodity. Record only the application cost. DO NOT include the cost of fertilizer materials. Include landlord costs. Exclude costs for custom application of lime. If material and application costs can't be separated, record the total in Item 3 and skip Item 2. Enter dollars and cents per acre or total dollars for the field.

Item 3 Total fertilizer materials cost

V2 & V3 Only

Soybean & Cotton Production Practices & Costs only

Record the TOTAL MATERIALS cost for all fertilizer, soil conditioners, micronutrients, etc., applied to the selected field for the 1997 crop of the commodity. Include materials applied to this field if it was fallow in 1996. Include landlord costs. Exclude the cost of lime or purchased manure. If custom applied, include the cost of materials Only, unless materials and application costs cannot be separated.

Item 4 Nitrogen inhibitor applied

V3, V8, & V10 Only

Cotton only

If nitrogen was applied to this field (any entry under N in Column 2 of the Fertilizer Table), then determine if any product was used to slow the breakdown of the nitrogen. If nitrogen was **not** applied, do not ask this question.

Item 5 Fertilizer carryover from 1996

V2, V6 & V10 Only

Soybeans only

For soybeans, farmers may have applied fertilizer to the most recent previous crop grown on the field partly for the benefit of the 1997 soybean crop. Only part of this fertilizer applied to the previous crop was actually carry-over for the target commodity. If fertilizer was applied to the previous crop with the intention that the 1997 soybean crop would utilize the carryover, enter a code 1.

Item 6 Soil and plant tissue test

Many farmers have their soil or plants tested to determine soil nutrient needs or nutrient availability to the plant. The tests may be done in 1997 or in the Fall of 1996 for preparing for the 1997 crop on the field.

Operators using soil or plant tissue tests may follow different fertilizer application schedules, and apply different fertilizer types and amounts than those who use some other method for determining the fertilizer nutrients needed by their crops.

Item 6a Soil test

If a soil test was done on the selected commodity field in 1996 or 1997 for the 1997 crop on the field, enter code 1 for YES.

Item 6b Plant tissue test

Plant tissue tests are done on plants during or at the end of a growing season. Analysis of plant tissues provide information on how plants are using soil nutrients and help the operator adjust fertilizer applications up or down the following year.

If a plant tissue test was done on the selected commodity field in 1996 or 1997 for the 1997 crop on the field, enter code 1 for YES.

Item 6c Cost of soil/plant tests

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

Record the cost of the soil or plant tissue tests performed on the selected field for the 1997 crop. Enter total dollars of all tests done on the selected commodity field. These tests are typically charged on a per sample basis. The number of samples taken per field will vary, depending on the precision the farmer needs for making decisions about the fields nutrients and plant management. Include the costs of tests done in 1996 for the 1997 crop on the selected field. Include landlord's cost.

Sometimes, the farmer is unable to separate the costs of the tests from the cost of fertilizer or custom application charges, especially if the fertilizer dealer or custom applicator does the test. If the fee was included in the cost of the materials or custom application, record a note to explain.

Item 7 Nitrogen test

V3, V5, V7, V8, V9 & V10

Corn, Wheat, Cotton & Potatoes

If a SOIL test for nitrogen was done on the selected commodity field, enter code 1 for YES and ask Item 7a. If no nitrogen soil test was done, go to Item 8.

Item 7a Recommended nitrogen application rate

V3, V5, V7, V8, V9, & V10

Corn, Wheat, Cotton & Potatoes

If the amount of nitrogen applied to the selected field was more than the amount recommended, enter code 1. If the amount of nitrogen applied was less than the amount recommended, enter code 2. If the amount applied was exactly the amount recommended, enter code 3.

Item 8 Gypsum

V3, V8 & V10

Cotton only

Determine if the operator ever applies gypsum to the selected cotton field. Enter code 1 for YES and continue. If the operator does not apply gypsum to this field, go to Item 9.

Item 9 Lime

Determine if the operator ever applies lime to the selected commodity field. Enter code 1 for YES and continue.

V2, V3, V6 & V8: If lime is never applied, go to Item 10.

V5 & V7: If lime is never applied, go to Section D.

V9: If lime is never applied, go to Item 11.

Item 9a Number of years between lime applications

Record the average number of years between lime applications to this field.

Item 9b Lime rate

Record the amount of lime applied per acre to the selected commodity field the last time lime was applied. Enter tons to the nearest hundredth (for example, 2.50). If the operator responds in another unit, such as pounds or hundredweight, convert the rate to tons. For example, if the respondent reports 300 pounds per acre, then the number of tons applied per acre is 300 ÷ 2000= .15 tons. Enter .15 in Item 9b.

Item 9c Lime cost to landlord

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

If the selected field was rented, the landlord may have paid some of the cost of the lime and its application to the selected field. This is more common with share rented land, but it can happen in cash and rent-free arrangements. Record the percent of these costs paid by the landlord.

Item 10 Manure application

V2, V3, V6, V8 & V10

Soybeans & Cotton only

Determine if livestock or poultry manure was applied to the selected field. Exclude commercially prepared manure. If any type of unprocessed livestock manure (beef, dairy, hog and pigs, sheep and lambs, poultry, etc.) was applied to this field, enter code 1 for YES and continue.

Item 10a Manure acres

V2, V3, V6, V8 & V10

Soybeans & Cotton only

Record the number of acres of the selected field on which manure was applied. Enter acres to the nearest TENTH of an acre.

Item 10b Amount of manure applied

V2, V3, V6, V8 & V10

Soybeans & Cotton only

Record the amount of manure applied to the selected field. Enter either total tons to the nearest hundredth (10.85 etc) **or** total gallons. Figures cannot be entered in both cells. That is, if the operator tells you that part of the total amount applied was dry, measured in tons, and part of the amount applied was liquid, measured in gallons, one of these units must be converted. Record this in notes so that the figures can be converted in the State Office to determine the total amount of manure applied to the field.

If the operator does not know the amount of manure applied to the field and it cannot be estimated, instead find out the type and number of animals that produced the manure, and for what time period (all or just part of a year). Also find out how many other acres besides the acres of this field were covered with manure produced on the operation. Make good notes of all this information. Then the amount of manure produced and spread on the field can be estimated by the Office using this information.

Item 10c Manure application method

V2, V3, V6, V8 & V10

Soybeans & Cotton only

Since dry or liquid application and immediate incorporation affects runoff and nutrients available to the soil, specify whether the manure was applied dry or liquid and with or without incorporation. Also, liquid manure may be injected directly into the soil. The manure application method codes are:

Code 1 - **Dry Broadcast without Incorporation**: Dry manure is applied to the entire surface area by land application equipment.

Code 2 - **Dry Broadcast with Incorporation**: Dry manure is applied to the entire surface area by land application equipment.

Incorporation of the manure into the upper soil surface is often performed with a field cultivator, disk, or other tillage implement.

Code 3 - **Liquid Broadcast without Incorporation**: Liquid manure is applied to the entire surface area by land application equipment.

Code 4 - **Liquid Broadcast with Incorporation**: Liquid manure is applied to the entire surface area by land application equipment. Incorporation of the manure into the upper soil surface is often performed with a field cultivator, disk, or other tillage implement.

Code 5 - **Injected or Knifed-in**: Manure is injected under pressure into the soil.

Item 10d Manure source livestock type

V2, V3, V6, V8 & V10

Soybeans & Cotton only

Different types of manure have different nutrient content. Determine whether the major source of the manure applied to the selected field was from beef cattle, dairy cattle, hogs, sheep, poultry, or other livestock. When the **same** amount of two types have been applied, use the code for the type with the higher nitrogen value. The highest value is for poultry, followed by hogs, dairy, sheep and beef. Beef has the lowest nitrogen value.

The code list for the type of manure is:

Code 1 - **Beef Cattle**
Code 2 - **Dairy Cattle**
Code 3 - **Hogs**
Code 4 - **Sheep**
Code 5 - **Poultry**
Code 6 - **Other Type of Livestock**

Item 10e Manure origin

V2, V3, V6, V8 & V10

Soybeans & Cotton only

Determine if the manure was produced on this operation (enter code 1), purchased (enter code 2), or obtained at no cost from some other source (enter code 3).

Item 11 Sulfur

V9 & V10 Only

Potatoes only

If sulfur (S) was applied as a specific chemical application to the selected potato field for the 1997 crop, enter code 1 for YES and ask Item 11a. If no sulfur was applied, go to Item 12.

Sulfur may be contained as part of a chemical fertilizer. In chemical fertilizers containing sulfur, it is indicated as the fourth number of a percent analysis. For example, the percent analysis for diammonium phosphate-sulfur is 16-40-0-13, which means that for every 100 pounds of this fertilizer, 16% is nitrogen (N), 40% is phosphate (P_2O_5), none was potash (K_2O) , and 13 percent was sulfur (S).

Some common chemical fertilizers containing sulfur are ammonium sulfate or potassium sulfate. Some other fertilizers containing sulfur are listed in the **Exhibit 1** at the end of this section.

Item 11a Sulfur rate

V9 & V10 Only

Potatoes only

If sulfur (S) was applied to the selected potato field (Item 11 is code 1 = YES), then determine the number of pounds of sulfur applied to the nearest tenth (for example, 2.5). If the response is in other units, convert the figure to pounds or make notes for the State Office.

If the producer does not know the quantity of sulfur, but knows that a chemical fertilizer mix containing sulfur was applied, then determine the quantity of that product and record a note on the questionnaire. Sulfur is indicated as the fourth number of a percent analysis of chemical fertilizers containing sulfur.

For example, the percent analysis for diammonium phosphate-sulfur is 16-40-0-13, which means that for every 100 pounds of this fertilizer, 16% is nitrogen (N), 40% is phosphate (P_2O_5) , none was potash (K_2O) , and 13 percent was sulfur (S).

The quantity of sulfur can be estimated from the analysis shown in the **Exhibit 1**. For example, ammonium sulfate contains 24 pounds of sulfur per hundred pounds of material, ammonium thiosulfate contains 26 pounds of sulfur per hundred pound of material applied, and potassium sulfate contains 18 pounds of sulfur per hundred pounds of material applied. The percent analysis can be used in a calculation with the application rate per acre to determine the quantity of sulfur applied per acre, which is entered in Item 11a. Be sure to record in notes all the necessary information for the State Office to make calculations.

Record the amount applied this season, even though the sulfur may be used by the plant over several years. Do not allocate the amount applied this year across several seasons.

Item 12 Micro-nutrients

V9 & V10 Only

Potatoes only

If micro-nutrients were applied to the selected potato field, enter code 1 for YES.

Micro-nutrients are nutrients that plants need in only small or trace amounts. Essential micro-nutrients include boron (B), chlorine (Cl), Copper (Cu), iron (FE), manganese (Mn), molybdenum (Mo), and zinc (Zn).

Exhibit 3: Common Fertilizers and Their Percent Analysis

Name	Percentage Active Ingredients			
	N	P_2O_5	K_2O	S
Anhydrous ammonia	82	--	--	--
Aqua ammonia	20	--	--	--
Ammonium nitrate	33	--	--	--
Ammonium sulfate	20	--	--	--
Nitrogen solutions (28 percent)	28	--	--	--
Sodium nitrate	16	--	--	--
Urea	45	--	--	--
Urea ammonium nitrate	32	--	--	--
Super phosphate (22 % & under)	--	19	--	--
Super phosphate (over 22 %)	--	45	--	--
Triple Super Phosphate	--	46	--	--
Ammonium phosphate	16	27	--	--
Diammonium phosphate	18	46	--	--
Monammonium phosphate	11	48	--	--
Potassium chloride	--	--	60	--
Potassium nitrate	13	--	44	--
Potassium sodium nitrate	15	--	14	--
Mixed Fertilizer	2	6	12	--
	3	9	18	--
	3	10	30	--
	5	10	15	--
	5	10	30	--
	5	15	30	--
	6	24	24	--
	8	24	24	--
	9	18	9	--
Soil sulfur	--	--	--	92
Sulfur-bentonite	--	--	--	90
Sulfur dioxide	--	--	--	50
Ammonium polySulfide	20	--	--	45
Ammonium sulfate	21	--	--	24
Ammonium thiosulfate solution	12	--	--	26
Diammonium phosphate-sulfur	16	40	--	13
Potassium sulfate	--	--	49	18
Potassium-magnesium sulfate	--	--	22	22

Section D - Pesticide Applications

What is Section D for? How is the information used?

Pesticide data are needed because USDA is responsible for publishing estimates of pesticide use in crop production. NASS is charged with collecting these data so that issues related to food safety, water quality, and pesticide cancellation can be evaluated. The Economic Research Service conducts research on the impact of alternative regulations, policies, and practices.

This section is similar to the fertilizer section. Chemical mixes are described and application practices are enumerated. On *Versions 2* and *3*, the costs of the materials are collected. The mix information is used in non-survey years to create a cost index for updating the survey responses. Chemical costs are a large part of the variable production costs for most crops, so getting correct chemical information on expenses and usage is important.

Include all chemicals applied for the 1997 crop on the selected field. On *Versions 2* and *3*, account for the cost of all chemicals and pesticides applied during 1996 and/or 1997 for the 1997 crop on this field, even if they were purchased before 1997.

Use of Supplements

The Pesticide Applications table contains a new column in 1997 for entering the number of applications of a specified pesticide. This column allows you to lump multiple applications of the same pesticide, at the same rate, and covering the same area into one line it the table. This procedure should help reduce the need for a supplement.

If more lines are needed than the number available in the table, use a **Chemicals and Pesticides Supplement**. Copy the identification as it appears on the main questionnaire to the identification box on the supplement. Assign the next Table number, 002, 003, 004, etc., to each additional supplement used. Begin numbering the supplements with Table 002 because Table 001 already appears in the questionnaire. Use as many supplements as you need.

Item 1 Pesticide applications

Determine if any pesticides were applied to the selected commodity field for the 1997 crop. Include herbicides, insecticides, fungicides, or other chemicals. **Exclude** fertilizer and seed treatments.

Herbicide materials may be applied before weeds emerge or after the weeds have emerged. Herbicides are sometimes used as a “burn down” to kill weeds prior to planting in no-till systems. Herbicides may also be used to defoliate the crop prior to harvest.

Insecticide materials are applied to control insects that damage plants by feeding on plant tissues.

Fungicides are applied to control disease organisms which effect the growth and development of the plant, such as pod-and-stem blight, anthracnose, brown spot, etc.

If any pesticides were applied, check YES and complete the Pesticide Table. If no chemicals were applied, check NO and go to Section E.

On *Version 10*: Multi-crop, enter code 1 for YES in the correct cell for each of the selected commodity fields. Complete the Pesticide Table for each commodity field that chemicals were applied to. If no chemicals were applied to the selected commodity field, dash the cell. If no chemicals were applied to either of the selected fields, then go to Section E.

Pesticide Table - Commodity Code (Column 1)

V10 only

Corn, Soybeans, Wheat, Cotton, Potatoes

Enter the commodity code for each selected field as you enumerate the pesticide applications for that target commodity.

It may help the respondent to remember the products if you ask for the chemical applications to be listed in the sequence in which they occurred on each field. When the pesticide applications are completely enumerated for the selected *[commodity 1]* field, proceed to list the pesticide applications for the selected *[commodity 2]* field.

If the respondent remembers an additional chemical application to the selected [*commodity 1*] field after you've begun listing the applications for the [*commodity 2*] field, just record it wherever you're at in the table. Be sure to enter the correct commodity code in Column 1.

Pesticide Table - Product Code (Column 2)

Ask the operator to identify the chemical or pesticide products applied to the selected commodity field. Record the product code for each chemical from the Pesticide Code Lists found in the Respondent Booklet.

Many enumerators also use the NOTES column to the left of the Pesticide Table to record the product name. This makes it easier to refer to the product, by name, while asking the remaining questions in the table. It also makes it easier to identify a product and its code when the same product is reported more than once.

Each different application must be recorded on a separate line. However, if a product is applied more than once at the same rate and to cover the same area, the applications can be recorded on one line, with the number of applications recorded in Column 6.

If two or more products are applied with a single application (tank mix) a separate line must be used for each product. Use Column 4 to identify products applied as a tank mix.

To help the respondent, start by asking if any pesticide products were applied in the fall of 1996. Next, ask about other preplant products and then follow with products applied at planting and then after planting. Remind the operator to report all types of pesticides, including herbicides, insecticides, fungicides, defoliants, growth regulators, and desiccants.

"Before-planting" applications may occur the same day or a week or several months before planting. If a tillage implement is used to incorporate the herbicide into the soil, be sure to record this activity in Section F: Field Operations.

"At-planting" herbicide or insecticide materials are applied at the time the crop is planted. These applications may be band treatments covering a small section of the row over the seed furrow or broadcast treatments covering the entire soil surface.

Exclude seed treatments. Most crop seed is treated with an insecticide/fungicide product. If the seed is purchased, seed treatment is done by the seed company prior to delivery to the operator. If the operator uses his/her own seed, it may be treated prior to going to the field or the seed may be treated in the field. Field seed treatment consists of coating the seed with the insecticide or fungicide product just prior to planting.

Herbicides applied at time of planting are generally applied to the entire soil surface (broadcast). Herbicides requiring soil incorporation may be mixed into the soil by the action of the planter or by attachments which are part of the planter. Incorporation also may be accomplished by a tandem hook-up of a tillage implement(s) behind the applicator or planter. Other herbicides are effective by being left on the surface without incorporation.

Granular insecticides are sometimes applied at planting and placed in the seed row (in-furrow) by separate attachment.

"After planting" herbicide, insecticide, or fungicide material is applied after the planting operation is completed. They could be applied a few days or several weeks later.

Use of the Respondent Booklet

Most of the pesticide products used on each target commodity are listed in the Respondent Booklet for that commodity. It is very important to obtain the trade name as well as the formulation from the operation to insure that the proper product code is recorded. In order to report the formulation and whether the product is liquid or dry, the respondent may have to look at the product label or detailed itemized receipts for the product**.**

Both you and the respondent should use a Respondent Booklet. These booklets contain product code listings. Some respondents may be willing to use the booklet and to report the product code for each of the products they used. You should encourage this since it makes the job of enumeration easier as well as making reporting faster and more accurate.

To aid in identification, the products in the Respondent Booklet are categorized as LIQUID(L) or DRY(D) formulations. Ask the respondent if the product was in a liquid or dry state when it was purchased. This should help you and the respondent find and record the correct product codes.

The Respondent Booklet also lists the type or class of each product: Herbicide (H), Insecticide (I), Fungicide (F) and Other products (O). Some chemicals and pesticides have more than one use. Some products with more than one use may be listed twice if the second use is associated with a separate product code. For example,

Gramoxone Extra H 4314

Gramoxone Extra O 9037.

For products that are listed more than once, be sure to probe for what it was used for and record the product code associated with that use.

Note that each product code listed in the Respondent Booklet specifies the trade name and formulation. The numbers and letters after the product name identify the concentration and form. For example, Canopy 75DF: Canopy is the trade name and the 75DF indicates the formulation. The 75 indicates the concentration as the percent of active ingredient in a pound of product, and the DF indicates that the form of the product is Dry Flowable. For Basagran (4L): Basagran is the trade name and the 4L indicates the formulation. The 4 indicates 4 pounds of active ingredient in a gallon of product and the L indicates a Liquid Concentrate.

Also note that for several products there is more than one formulation for a given trade name: Ambush (2EC) and Ambush 25W or Diazinon 14G and Diazinon 4E and Diazinon 50W and Diazinon AG500(4E). Different formulations of a product have different concentrations of the active ingredient and inert materials.

It is extremely important that you get the correct product code because active ingredient concentrations for different products and different formulations vary greatly. Since we summarize by active ingredient in the product, recording a product or its formulation incorrectly will make a difference when the active ingredient application rate per acre is calculated. For example, if you record the code for Dyfonate II 20-G (1037) when you really should have recorded the code for Dyfonate II 10-G (1038), then we will summarize twice the amount of active ingredient than we should. That will make it look like operators apply more chemicals to crops than they actually do.

Also, if you record the Dyfonate II 10-G code when you really should have recorded the code for Dyfonate II 20-G, we will summarize half as much

active ingredient as we should. This is not good either. We need the correct information listed in the questionnaire.

If you cannot find a reported product in the Pesticide Code List in the Respondent Booklet, use the area below the table for notes to provide the information needed to classify and summarize unlisted products. First record the line number of the pesticide application that the information refers to. Then record what it was used for (herbicide, insecticide, fungicide). Next record the EPA registration number, if it is available, or the name and formulation of the product. Finally, record whether the product was liquid or dry when it was purchased.

The EPA Product Registration number is printed on the product label. These numbers are several digits long and look somewhat like many bank and credit card account numbers, such as 312-19-18713 and 2980-4. EPA Product Registration numbers are not the same thing as EPA Establishment numbers.

If the respondent does not know the EPA product number or the trade name and formulation, record as much information about the product as you can, especially the "where purchased." This information will enable identification of the product in the State Office. The "where purchased" is important because if more information is needed, we can then call the dealer.

For example, if the operator has a pesticide applied by a custom applicator, he/she might not know the formulation of the product, but if the "where purchased" is recorded the State Office can check to get the correct formulation.

Example: A good, complete entry for Unlisted Products in the notes portion of the section is as follows:

line 22 Insecticide Danitol 2.4EC EPA# 39398-17 Liquid

Pesticide Table - Liquid or Dry (Column 3)

Ask the respondent if the product was in a liquid or dry state when it was purchased. Record an "L" or a "D" in this column to indicate Liquid or Dry. Be sure the liquid or dry designation listed by the product code selected from the Respondent Booklet agrees with what you record here for the product. Common form abbreviations are:

L (Liquid): These products flow like water. Concentrations are usually expressed in pounds per gallon.

E (EC): Emulsifiable concentrates. These are usually thicker than water and are mixed with water and applied as sprays. They contain one or more active ingredients, one or more solvents and an emulsifier. Their concentrations are generally indicated in pounds per gallon.

F (FL) (Flowable): These products are in liquid form. They contain finely ground active ingredients suspended in the liquid. They are mixed with water for application. Their concentrations are indicated in pounds per gallon.

D (Dust): Dusts contain a low percentage of active ingredients on a very fine dry inert carrier such as talc, chalk or clay. They are usually applied directly as purchased. Their concentrations are expressed as percents.

WP (W), SP (S): Wetable or Soluble Powders. These are dry products, much like flour, which will dissolve or disperse in water. Their concentrations are indicated in percents.

G (Granular): Granular products contain active ingredients coated or absorbed onto coarse particles like clay, ground walnut shells or ground corn cobs. The pellets are about the diameter of the lead in a pencil (or larger); during shipment the granules have a tendency to break down and create dust. These are used as purchased. Their concentrations are expressed as percents.

DF (Dry Flowable), WSG (Water Soluble Granules): Also known as water dispersible granules. These are small pellets formulated to reduce the dust problem created with granules. They are like Wetable powders except that the active ingredient is formulated on a granule instead of a powder. The product pours easily into spray tanks for mixing with water. Their concentrations are expressed as percents.

Bait: Bait products contain active ingredients mixed with food or another attractive substance. Concentrations are expressed in percents.

Pesticide Table - Tank Mix (Column 4)

Most chemicals are applied to the field as single products. However, sometimes two or more individual products are mixed in the spray tank by the farmer/custom applicator and applied to the field as a tank mix.

If products were applied in a tank mix, these must be identified as tank mixes. Since there is only space in the table for one product per line, the separate products in tank mixes must be recorded on separate lines. Identify the products in a tank mix by recording in Column 4 the line number of the first product in the tank mix.

For example, consider a tank mix where you recorded the first product on line 6, the second product on line 7 and the last product on line 8. In Column 4 of line 6 you should record 6 so we will know this was the beginning of the list of products in that tank mix. In Column 4 of line 7, you'll record 6 so we know that this product was part of the same tank mix that you started listing on line 6. In Column 4 of line 8, you will record 6 for the same reason.

For products not applied as part of a tank mix, enter a dash in Column 4.

For the first product in a tank mix, be sure to ask each question in Columns 5 - 12. For each additional product in the tank mix after the first product, be sure to ask the questions in Columns 6, 7, 8, and 12, because the answers may be different than for the first product. Information recorded in Items 5, 9, 10, and 11 should be the same as for the first product in the tank mix. These data can just be copied from the entries in line for the first product.

DO NOT confuse tank-mixes and packaged premixes. A tank mix is any pesticide spray which is prepared immediately before use by mixing two or more chemicals and water in the spray tank. Packaged premixes are brand name products that contain two or more active ingredients. These are products where the manufacturer has taken individual active ingredients and combined them in a container. Examples include Ramrod/Atrazine, Lasso/Atrazine and Bicep (Dual & Atrazine). These manufactured mixes have their own code in the Respondent Booklet, so they don't have to be listed with separate codes for the chemicals included in the product.

Pesticide Table - When applied (Column 5)

Ask the respondent when the product was applied to the selected field (before, at, or after planting), and enter the appropriate code. Because of the record keeping requirements for restricted use chemicals, most operators will have records of chemical applications for each field. Be sure to encourage the respondent to use these records if they are available.

Pesticide Table - Number of applications (Column 6)

If the same product is applied more than once at the same rate, in the same time period (before or after planting), and covering the same area, the multiple applications can be recorded on one line. Column 6 is coded with the number of applications of **this** product and at **this** rate.

If the applications were at different rates, during a different time period, or covering different areas of the field, record each application on a separate line. For example, if 2,4-D was applied before planting, record it on one line. If a second application was made after planting, record it separately on another line.

Pesticide Table - Application rate (Columns 7 & 8)

Column 7 or Column 8 may be used for each product reported. Don't use both on the same line.

Rate per Acre per Application (Column 7)

Record the chemical application rate per acre used on the selected commodity field. Rate per acre is the amount used in one application to one acre. Because rates per acre are often quite small with very toxic chemicals, rates are reported to hundredths of units. Be sure that if whole numbers are reported, zeros are entered after the decimal point.

If an application rate per acre is obtained in Column 7, then nothing should be entered in Column 8.

Total Amount Applied per Application (Column 8)

If the respondent is not able to provide the application rate per acre in Column 7, use Column 8 to record the total quantity applied per application to all acres treated in the selected commodity field. This figure

should be a total quantity for the number of applications recorded in Column 6.

If the respondent is able to give either total quantity applied per application or rate per acre, select the option which the respondent feels will give the most accurate data.

In some cases, respondents cannot report either the rate per acre per application of a product or the total amount of the product applied per application. In these cases, there is one additional way you might be able to collect the data we need. If the respondent knows

1) the amount of the product mixed in every 100 gallons of water,

2) the number of gallons in each tank,

3) the number of tanks used to cover the acres,

make a note of these figures. The Survey Statistician will be able to calculate the amount of product used.

Other ways of reporting include parts per million (PPM) and rate per 100 gallons of water. In these cases, try to find out the amount of actual product (before mixing with water) used, and write lots of notes.

Do not record the spray volume applied to the field. The purchased (concentrated) product is mixed with water and the diluted spray solution is generally applied at rates of 20 - 60 gallons per acre with ground equipment and 5 - 10 gallons per acre by air.

Do not record the inclusion of surfactants or crop oil in the spray solution. They are added to the spray solution to enhance the ability of the pesticide to stick to the foliage and/or aid in the absorption into the plant system.

Do not record liquid fertilizer solutions applied in conjunction with a pesticide in the Pesticide Table. The information on liquid fertilizers should be recorded in the Fertilizer Table.

Pesticide Table - Unit Code (Column 9)

Record the units using the unit codes listed in Column 9. The unit codes are:

Code 1 - **Pounds**
Code 12 - **Gallons**
Code 13 - **Quarts**
Code 14 - **Pints**
Code 15 - **Ounces**
Code 30 - **Grams**

Write notes if any unit other than the ones listed is reported.

When the reported unit is quite small, you may need to make conversions. Some conversion factors you may need to use are:

Liquid Products	Dry Products
1 Gallon = 4 Quarts	1 Pound = 16 Dry Ounces
1 Quart = 2 Pints	
1 Pint = 16 Fluid Ounces	

Be sure to keep the unit code and product formulation consistent. If the operator purchased a LIQUID pesticide product, the unit code must be ounces, pints, quarts, or gallons. If a DRY pesticide product (granular, Wetable powder, or dry flowable) was used the unit code must be ounces or pounds.

Pesticide Table - How applied (Column 10)

Obtain the physical application method used to apply the pesticide product to the selected field. The application methods codes are printed in the **APPLICATION CODES** box positioned above Column 10 of the Pesticide Table. Show the respondent the Fertilizer/Pesticide Applications Method Codes in the Respondent Booklet.

Herbicides, insecticides, and fungicides are most often applied as broadcast treatments to cover the entire soil surface with the pesticide material. Band treatments, where a narrow band of pesticide is applied over the row covering about one-third of the soil surface, is also a common method of application. Less frequent methods include in-furrow, with irrigation water, or as spot treatments.

The Application Method codes are defined as follows:

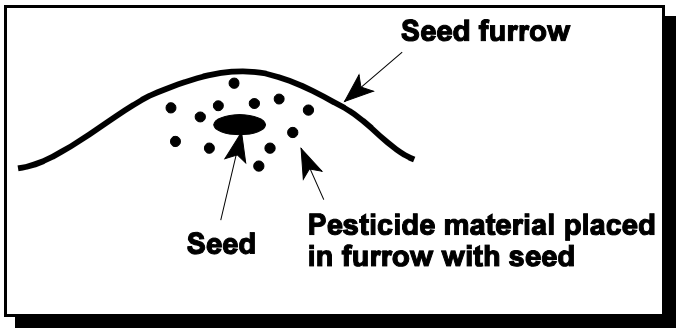
Code 1 - **Broadcast, Ground Without Incorporation**: Pesticide material (herbicide, insecticide, fungicide, or other) is applied to the entire surface area by land application equipment. Application may occur either before or after planting, usually before crop emergence. No mixing of the pesticide material into the upper soil surface is needed or planned as part of the application.

Code 2 - **Broadcast, Ground with Incorporation**: Pesticide material (herbicide, insecticide, fungicide, or other) is applied to the entire surface area by land application equipment. Application usually occurs before planting, and a planned mixing of the pesticide into the upper soil surface is completed at the time or shortly after the time of application. Incorporation of the pesticide into the upper soil surface is often performed with a field cultivator, disk, or other tillage implement.

Code 3 - **Broadcast by Air**: Pesticide material (herbicide, insecticide, fungicide, or other) is applied to the entire surface area by air application equipment. Include only those applications made by airplane or helicopter.

Code 4 - **in Seed Furrow**: Pesticide material (herbicide, insecticide, fungicide, or other) is placed in the seed furrow at planting time generally through a separate attachment on the grain drill. This method is sometimes used for granular insecticides applications.

Do not confuse this with seed treatments where the seed surface is coated with a pesticide product by the farmer or seed dealer before the seed is put in the planter box. Do not record seed treatments.



Code 5 - **Irrigation Water**: Pesticide material (herbicide, insecticide, fungicide, or other) is mixed with water in either sprinkler or gravity fed irrigation systems. The term used for this procedure is chemigation. The product is metered into the water delivery system (generally a sprinkler irrigation system) and is distributed across the field in the irrigation water.

Code 6 - **Chisel, Injected or Knifed-in**: Pesticide material (herbicide, insecticide, fungicide, or other) is injected under pressure into the soil. This application method (using high pressure) is used with pesticide spray materials for nematode control.

Code 7 - **Banded in or over Row**: Pesticide material (herbicide, insecticide, fungicide, or other) is placed in or over the crop row. This method is mainly used for row crops. Products are applied at or after planting. The area between the rows is not treated. Weed control between rows is accomplished with mechanical cultivation.

Application rates for band treatments are to be reported on a per acre basis and not the rate that was applied to the banded segment. Band treatments with the same pesticide product normally result in lower application rates than broadcast treatments. For example, if the band only covers one-third of the row, the application rate will normally be about one-third the broadcast application rate.

- At or after planting herbicides materials are applied by spraying the product in an 8 to 12 inch band over the crop row.

- At planting insecticide and fungicide applications are generally placed in a 4 to 6 inch band directly behind the planter shoe and in front of the press wheel.

Code 8 - **Foliar or Directed Sprays**: After planting, pesticide material (herbicide, insecticide, or fungicide) is sprayed on or under the plant foliage.

Code 9 - **Spot Treatments**: Pesticide material are only applied to "**hot**" spots in the field, even if the operator drives over the entire field looking for the hot spots. Spot herbicide applications are generally made to control problem weeds. Spot insecticide applications are sometimes made to control grasshoppers in the edges

of the field. It is doubtful if any spot treatment of fungicides would ever be made.

Special Instructions for Recording Spot Treatments

Spot applications should not be confused with treatment of part of a field. When part of a field is treated, treated acres can usually be distinguished. For example, the north half of the field was treated. These applications are reported just like any other applications. For spot applications, acres are usually very difficult to define. Usually spot treatments involve workers walking around with tanks on their backs spraying areas which appear to have infestations for which the treatment is being made. This may mean that ten little areas throughout the field were treated, and none of those areas may be near each other.

Spot treatments are most common on cotton, soybeans, and potatoes, especially for herbicide applications to kill large weeds which may interfere with the crop growth or harvesting. If treatments were made only to certain spots or selected plants in the selected field (hence the term spot treatment) , record in Column 8 the total quantity of product applied, and in Column 11 enter the total number of acres **in the field** in which spot treatments were made.

If rates per acre are reported for spot applications, probe to determine the actual total quantity of product applied. For these applications, rate per acre multiplied by the total acres over which the spot treatments were made **does not equal** the total quantity applied. In fact, the result of such a calculation is greater than the actual total quantity applied. This is because not all of the acres in the field were treated in spot applications.

Do not record a rate per acre in Column 7 for spot treatments. Enter only the total amount applied (Column 8) for spot treatments.

Pesticide Table - Acres Treated (Column 11)

Record the number of acres in the selected field that were treated with the pesticide product recorded in Column 2. This will be the same as the number of planted acres recorded for the field when the entire field was treated with the pesticide. If only part of the selected field was treated, then enter the number of acres representing the share of the field actually treated.

Here it is important to know the difference between treated acres and treatment acres. Treated acres are the actual physical (land) acres of crop which were treated -- it doesn't matter how many times they were treated, they are only counted once. Treatment acres are the total number of acres covered by applications of a product regardless of whether they are the same acres or different acres. If the same 40 acres are treated 4 times, the number of treated acres is 40 and the treatment acres is 160 (4 x 40). In this example 40 acres would be recorded. **Never record treatment acres in these questionnaires.**

Acres and tenths of acres must be reported in Column 11. Zero must be recorded after the decimal point if whole acres are recorded. For example, if the operator treated exactly 25 acres, the entry in Column 11 must be 25.0. Otherwise the summary will consider the entry to be 2.5 and we'll get serious errors when we summarize active ingredients applied per acre.

Pesticide Table - Who applied (Column 12)

For each individual treatment, record who made the pesticide application on the selected field. The codes to identify who applied the chemicals are:

Code 1 - **Operator, Partner, or Family Member**
Code 2 - **Custom Applicator**
Code 3 - **Employee or Some Other Person.**

Pesticide Table - Primary Target Pest (Column 13)

Ask the operator to identify the primary target pest for which the product in Column 2 was applied. Use the **Target Pest Code List** printed in the respondent booklet.

If the respondent indicates that there were several pests for which a specific application was targeted, ask him/her to select the main one, or the most important one, for that product application. Only report general pest categories, such as broadleaf weeds, grasses, etc., when the respondent cannot identify a more specific target pest.

Pesticide Table - Optional Item 3 (Cost Per Unit)

V2 & V3 Only

Soybean & Cotton Production Practices & Costs only

Refer to the instructions for Item 3 below. **This Dashed Column: Optional Item 3, should only be used if the operator is unable to report the cost per acre for all chemical and pesticide materials in Item 3.**

If it becomes necessary to use this column, then ask the respondent for the cost per unit paid for each chemical applied to the specific field. Frequently operators who are unable to report the dollar per acre or total cost of chemicals do know the cost per unit they paid for each product they applied to the field. Or they have records or receipts that tell the product cost of these chemicals.

Enumerators sometimes use this information to calculate the cost per acre, multiplying it times the number of applications in Column 6 and the application rate per acre reported in Column 7. Recording this information in this column saves enumerators from doing this calculation, because the computer can calculate the figure using the information recorded in the table. However, this column should only be used as a last resort, because operators may have a more accurate figure available that includes materials not captured in the Pesticide Table.

Item 2 Pesticide custom costs

V2 & V3 Only

Soybean & Cotton Production Practices & Costs only

You will know if any of the pesticide applications were made by custom applicators by looking at Column 12 in the Pesticide Table. Ask this question only if any CUSTOM applications were reported (code 2 entered in Column 12).

Record the amount spent for CUSTOM APPLICATION of chemicals and pesticides on the selected field for the 1997 crop. Include landlord cost. Record only the application cost. Do NOT include the cost of pesticides or chemical materials. Record the cost in dollars and cents per acre or in total dollars for the field.

If material and application costs can't be separated, record the total in Item 3 and skip Item 2.

Item 3 Pesticide material costs

V2 & V3 Only

Soybean & Cotton Production Practices & Costs only

Record the TOTAL MATERIALS cost for all insecticides, herbicides, fungicides, surfactants, wetting agents, defoliants and growth regulators applied to the selected field for the 1997 crop. Include landlord costs.

Include materials applied to this field if it was fallow during 1996. Include materials applied to this field before planting. If custom applied, include the cost of materials ONLY, unless materials and application costs cannot be separated. Record the cost in dollars and cents per acre or in total dollars for the field.

Many operators know the cost per acre of chemicals and pesticides applied on their fields. Some operators will have records of chemical applications and the costs of chemicals applied on each field. Be sure to encourage the respondent to use records if they are available. You should always attempt to get the best figures from the respondent using this item.

However, if the operator is unable to report the cost per acre or the total cost for chemical and pesticide materials used on the selected field, use the Dashed Column: Optional Item 3 in the Pesticide Table.

The Dashed Column: Optional Item 3 should only be used as a last resort, because operators may have a more accurate figure available that includes materials which are not captured in the Pesticide Table (such as surfactants and wetting agents).

Section E - Pest Management Practices

What is section E for? How is the information used?

This section will provide data about pest management practices that growers use on their crops, either as alternatives to pesticides or practices which improve the effectiveness of pesticides. This information provides researchers with better information to analyze the effectiveness and performance of alternative pesticide treatment strategies as well as their potential impacts on the environment and public health.

Several years ago, USDA, along with the U.S. Environmental Protection Agency and the Food and Drug Administration, presented joint testimony to Congress on a new, comprehensive, interagency effort designed to reduce the pesticide risks associated with agriculture. The threefold goal of this effort is "1) to discourage the use of higher risk products; 2) to provide incentives for the development and commercialization of safer products; and 3) to encourage the use of alternative control methods which decrease the reliance on toxic and persistent chemicals". This joint testimony also expressed support for 'integrated pest management', and set the goal of developing and implementing Integrated Pest Management (IPM) programs on 75 percent of total U.S. crop acreage by the year 2000.

Integrated Pest Management (IPM) is an approach used by farm operators to control pests in an environmentally responsible manner. IPM combines biological, cultural, and chemical methods of pest control such as monitoring of pest populations and use of natural enemies of pests. Other methods of cultural controls are used, including pest resistant crop varieties or traditional plowing and crop rotation, and use of pesticides when necessary.

Some producers may hire professionals to check their fields to determine the presence of pests. Proper identification of pest problems may potentially reduce pesticide usage. These issues relate to and address food safety, water quality, and pesticide regulation. Data from these questions will provide vital information to address these concerns.

Item 1 Introduction and definition of pests

This item introduces this section about pest management practices. The introductory statement does two things to help the respondent:

1) It explains that you will be shifting gears for a while and asking the operator about what the pest management practices are that are used on the selected field and about how decisions were made regarding those practices.

2) It defines PESTS for the operators to include WEEDS, INSECTS, AND DISEASES. Frequently, many operators tend to focus on one kind of pest, depending on the crop, but they are concerned about other types of pests as well.

For example, corn growers may tend to only think about weeds as pests; cotton growers may focus only on insects as pests. But in this section, when the word PESTS is used, it refers to ALL three kinds, WEEDS, INSECTS, AND DISEASES. If you don't define that for all operators, they may only answer the questions for one kind of pest.

Item 2 Commodity Name

V10 Only

In the header over the **lefthand** set of Columns 2 and 3, write in the name and enter the commodity code for *target commodity 1*. Then complete these columns of Items 1a-c for that target commodity.

In the header over the **right-hand** set of Columns 2 and 3, write in the name and enter the commodity code for *target commodity 2*. Then complete these columns of Items 1a-c for that target commodity.

If you accidentally reverse the order of the commodities, for example, because the respondent answers for the target commodity 2 field first, simply record in the appropriate header the name of the commodity for which Items 1a-1c are answered, and enter the associated commodity code so the computer will get it straight. You don't need to transfer data just because the order of commodity 1 and 2 were accidentally reversed.

Item 2 Scouting (Columns 1 & 2)

Determine if the selected field was scouted for weeds or insects or diseases. Scouting is checking a field for the presence, population levels, activity, size and/or density of weeds, insects, or diseases. A variety of methods can be used to scout a field. For example, the methods used to scout for insect pests include sweep nets, leaf counts, plant counts, soil samples, and general observation.

For each type of pest (weeds, insects, diseases) for which the field was scouted, enter code 1 = YES in Column 2, and ask Column 3 for weeds and insects. If no scouting was done, go to Item 6.

Item 2 Who scouted most (Column 3)

Find out from the respondent who did the majority of the scouting in the field for weeds and/or insects, whichever was scouted according to the answer YES=1 recorded in Column 2. If two or more people did equal amounts and there is no clear-cut major "scouter", enter the first (lowest) code of those scouting. If the operator, a partner, or a family member did the most scouting, enter code 1. If most was done by an employee (other than the operator, a partner, or a family member), enter code 2. If most of the scouting was done by the dealer or an employee of a farm supply or chemical company, enter code 3. If a hired crop consultant or a commercial scouting service was used, enter code 4.

Column 3 is not completed for scouting done for diseases.

On *V5 and V10,* if seed corn was grown on the selected field and the contractor provided the scouting services for the field, enter code 4 for CROP CONSULTANT OR COMMERCIAL SCOUT.

Item 3 Scouting Cost

V2 & V3 only

Soybean & Cotton Production Practices and Costs only

Ask this question only if a hired crop consultant or commercial scout did most of the scouting for weeds or insects (code 4 appears in Column 3 of Item 2). Be sure to enter the cost per acre in dollars and cents or the total cost for scouting services on this selected field. **Include** landlord cost.

If Column 3 of Item 2 does not contain a code 4, then go to Item 4.

Item 3a Insect scouting cost

V2 & V3 only

Soybean & Cotton Production Practices and Costs only

Record the percentage of the total scouting cost entered in Item 3 that was for insect scouting. Ask the respondent to give a best estimate if exact figures are not available.

Item 4 Hours Spent Scouting

V2 & V3 only

Soybean & Cotton Production Practices and Costs only

Ask this question for the selected field only if the operator, a partner, a family member, or an employee did the scouting (code 1 or 2 appears in Column 3 of Item 2). Obtain the total number of hours spent scouting this field for all pests during the entire season.

If scouting was done by more than one person of the type recorded in Column 3 of Item 2, obtain the total hours spent by all of these people. For example, if two employees scouted the corn on the selected field, one for 1 hour and the other for 2 hours, enter 3 in Item 4.

Both Item 4 and Item 3 may contain positive answers. For example, if the operator did the scouting for weeds and a scouting service did the scouting for insects, then both Items 3 and 4 would be answered.

Item 5 Pest records

If the field was not scouted for pests (Column 2 of Item 2 is NO for weeds, insects, and diseases), then skip Items 5 and 5a and go to Item 6.

In Item 5, we only want organized or formal records, not just notes jotted down on scraps of paper. It doesn't matter by who kept the records -- it can be the operator or someone else.

If this field was scouted for pests (Column 2 of Item 2 contains a positive entry), determine if some type of formal or organized written, electronic, or mapped records were kept for this field of specific pest activity, infestation levels or numbers of each type of pest listed.

Example of a Written Pest Record

A specific example of keeping formal pest records comes from the North Carolina Cooperative Extension Service. Three steps are recommended to scout for weeds

1) make at least 10 stops in each field;

2) at each stop, mark off approximately 30 feet of row (10 paces);

3) record the type and number of weeds found within a 1-foot band in the row. Then record the scouting results on a "weed threshold worksheet" like the one below:

Weed	Number Counted	Number of Stops	Number of Weeds per Stop

The information recorded on the worksheet is used with other information to determine whether an herbicide treatment is necessary.

Item 5a Pests tracked with records

If written pest scouting records were kept, record the specific pests tracked in Item 5a. Using the Target Pest Code List, enter up to four target pests written records were maintained for in the available cells. If more than

four pests were tracked with written records, record the other pest codes in the margin.

Item 6 Enumerator Action: Were Herbicides Used?

If any HERBICIDES were recorded in the Pesticide Table in Section D, then Items 7-10 must be asked. Check back to responses recorded in Column 2 of Item 1 of Section D. All herbicide products have a code number in the series 4000-4999.

V2 & V6: If no HERBICIDES were used, then go to Item 11.

V3, V5, V7, V8 & V9: If no HERBICIDES were used, then go to Item 12.

V10: If no HERBICIDES were used, then go to Item 11 for soybeans, **or** go to Item 12 for all other crops.

Item 7 Were Pre-emergence Herbicides Applied?

Ask the operator if herbicide applications were made on the selected field **before** weeds emerged. If yes, enter code 1 and ask Item 8. If no, go to Item 9.

Items 8a-e Reasons for applying pre-emergence herbicides

Items 8a-e obtain the reason or reasons the operator had for using pre-emergence herbicides on the selected field. Each of these must be asked. This is not a multiple choice question -- that is, there may not be just one single answer.

The operator may have more than one reason for applying pre-emergence herbicides. Enter code 1 = YES for each reason the operator used. It is also possible for the operator to say NO to all Items 8a-e. If this happens, it will be apparent that the operator bases decisions on some reason besides those named in Items 8a-e, because these are all NO.

In Item 8a, if the operator's reason for using pre-emergence herbicides was because it was a routine treatment for weed problems observed in previous years, enter code 1 for YES.

In Item 8b, if the operator based the decision to apply pre-emergence herbicides on a map drawn of the field indicating locations where specific

weed species were present the previous year, enter code 1 for YES. These areas could be "spot treated" this year with selective herbicides.

In Item 8c, determine if a computerized decision model was used to aid the operator's decision to apply pre-emergence herbicides to this field. An example of what a computerized decision model can do is to determine whether or not it is cost effective to manage weeds in a field and identify the most cost effective treatment (broadcast or band applied herbicides or cultivation).

In Item 8d, determine if recommendations from a chemical dealer were considered in the operator's decision to apply pre-emergence herbicides.

In Item 8e, determine if recommendations from an independent crop consultant were considered in the operator's decision to apply pre-emergence herbicides. Do not include recommendations or consultation with a farm supply or chemical dealer. Include only services for which the operator paid.

Item 9 Were post-emergence herbicides applied?

Ask the operator if herbicide applications were made on the selected field **after** weeds emerged.

V2 & V6: If no post-emergence herbicides were used, then go to Item 11.

V3, V5, V7, V8 & V9: If no post-emergence herbicides were used, then go to Item 12.

V10: If no post-emergence herbicides were used, then go to Item 11 for soybeans, **or** go to Item 12 for all other crops.

Item 10a-e Reasons for applying post-emergence herbicides

Items 10a-e obtain the reason or reasons the operator had for using post-emergence herbicides on the selected field. Each of these must be asked. This is not a multiple choice question -- that is, there may not be just one single answer.

The operator may have more than one reason for applying post-emergence herbicides. Enter code 1 = YES for each reason the operator used. It is also possible for the operator to say NO to all Items 10a-e. If this happens,

it will be apparent that the operator bases decisions on some reason besides those named in Items 10a-e, because these are all NO.

In Item 10a, if the operator's reason for using post-emergence herbicides was because it was a routine treatment for weed problems observed in previous years, enter code 1 for YES.

In Item 10b, if the operator based the decision to apply post-emergence herbicides on a map drawn of the field indicating locations where specific weed species were present the previous year, enter code 1 for YES. These areas could be "spot treated" this year with selective herbicides.

In Item 10c, determine if a computerized decision model was used to aid the operator's decision to apply post-emergence herbicides to this field. An example of what a computerized decision model can do is to determine whether or not it is cost effective to manage weeds in a field and identify the most cost effective treatment (broadcast or band applied herbicides or cultivation).

In Item 10d, determine if recommendations from a chemical dealer were considered in the operator's decision to apply post-emergence herbicides.

In Item 10e, determine if recommendations from an independent crop consultant were considered in the operator's decision to apply post-emergence herbicides. Do not include recommendations or consultation with a farm supply or chemical dealer. Include only services for which the operator paid.

Item 11 Herbicide resistant weeds

V2, V6 & V10 only

Soybeans only

Repeated use of the same pesticide product may lead to the development of resistance in the target pest. Over time some weeds will develop resistance to certain herbicides.

To date, the main families of herbicides affected are the triazines and those within the group of ALS inhibitors. For soybeans, we are only interested in determining if any weeds in the selected field were resistant to any **ALS** (Amino Acid Synthesis Inhibitors) family herbicides.

Determine if any weeds in the selected field were resistant to any ALS herbicides or ALS inhibitors.

There are three types of ALS herbicides -- imidazolinones, sulfonylureas, and sulfonamides.

A partial list of the ALS inhibiting herbicides are as follows:

ALS Inhibiting Herbicides

	Product Names
Sulfonylurea	
Halosulfuron-methyl	**Permit**
Nicosulfuron	**Accent**
Primisulfuron	**Beacon**
Rimsulfuron	**Basis**
Imidazolinone	
Imazethapyr	**Pursuit**, **Pursuit Plus**, **Passport, Resolve+Dicamba**
Triazolopyrimidine Sulfonanilide (Sulfonamide)	
Flumetsulam	**Broadstrike**

Item 12 Enumerator Action: Were Insecticides Used?

If any INSECTICIDES were recorded in the Pesticide Table in Section D, then Item 13 must be asked. Check back to responses recorded in Column 2 of Item 1 of Section D. All INSECTICIDE products have a code number in the series 1000-1999.

If no insecticides were used, then go to Item 14.

Item 13a-f Reasons for applying insecticides

Every operator decides whether or not to apply insecticides. That is, an operator may decide to apply insecticides or he/she may decide to not apply insecticides. This series of questions is to find out the operator's reasons **to apply** insecticides to the selected field.

Each of the individual Items must be asked. This is not a multiple choice question -- that is, there is no single right answer.

An operator who decided to apply insecticides may have evaluated one or more of these criteria to make the decision. More than one of the listed

reasons may have been considered. Enter code 1 = YES for each reason the operator used. It is also possible for the operator to say NO to all Items 13a-f. If this happens, it will be apparent that the operator based the decision to apply insecticides on some reason besides those named in Items 13a-f, because these are all NO.

In Item 13a, if the operator's reason for using insecticide was because it was a routine preventive treatment for insect problems observed in previous years, enter code 1 for YES.

In Item 13b, [***V3, V8 & V10 only***, *Cotton only*] if the operator's reason for using insecticides was because of boll weevil trapping targets, enter code 1 for YES.

In Item 13c, determine if the operator used scouting data and compared it to University or Extension guidelines for infestation thresholds. If this criteria was the reason for the operator's decision, enter code 1 for YES.

In Item 13d, enter code 1 = YES if the operator decided to apply insecticides because this was standard practice or because there was a history of insect problems on this field.

In Item 13e, determine if the operator's decision to apply insecticides to this field was based on local information (from other farmers, radio, TV, newsletters, etc.) that the pest was present.

In Item 13f, enter code 1 = YES if the operator's own determination of the infestation level was a reason for the decision to apply insecticides to the selected field.

Item 14 Row cultivation

V2, V3, V5, V6, V8, V9, & V10

Corn, Soybean, Cotton, & Potatoes only

Determine whether this field was row cultivated for weed control or to rebuild ridge during the growing season. If YES, enter code 1.

Item 15 Pest control procedures (Columns 1 & 2)

V2, V3, V6, V8 & V10 Only

Soybeans & Cotton only

The series of Items 15a-g asks if the operator used a variety of procedures and practices for the purpose of controlling pests on the selected field. If the procedure was used for this purpose, enter code 1 in Column 2 for YES and ask Column 3. If the procedure was not used for the purpose of controlling pests, then enter a dash for NO and continue with the next item.

In some cases, the operator may have used a particular procedure, but not for the purpose of controlling pests. If this is the case, probe to verify that the operator's purpose was other than to control pests, by saying, for example, "Did you do that to control pests?" If the purpose for the procedure was not for controlling pests, then the answer to the question is NO and a dashed entry should be made.

Item 15 Reason for pest control procedures (Column 3)

V2, V3, V6, V8 & V10 Only

Soybeans & Cotton only

If code 1 for YES is entered in Column 2, ask this question to determine if the main reason for the operator's use of the particular procedure was to control WEEDS (enter code 1), INSECTS (enter code 2), or BOTH weeds and insects (enter code 3).

Item 15a Crops rotated to control pests

V2, V6 & V10 Only

Soybeans only

Find out if crops were rotated in the past 3 years **for the purpose of controlling pests**. Pest control is only one of several reasons crops could have been rotated. Be sure to probe to ensure that the control of pests was in fact a reason the operator employed the practice. If the control of pests was a reason crops were rotated, then enter a code 1.

Item 15b Row spacing & plant density

V2, V3, V6, V8 & V10 Only

Soybeans & Cotton only

Find out if row spacing (width) or plant density (planting rate in seeds per acre) was adjusted in this field for the purpose of controlling pests.

Item 15c Adjust Planting date

V2, V3, V6, V8 & V10 Only

Soybeans & Cotton only

Find out if the planting date was adjusted in this field for the purpose of controlling pests.

Item 15d Alternate Pesticides

V2, V3, V6, V8 & V10 Only

Soybeans & Cotton only

Find out if the pesticide products were alternated in this field from year to year for the purpose of slowing the development of pest resistance. To alternate pesticides means to use products with different active ingredients or from different pesticide families.

Item 15e Prevent Spreading of pests

V2, V3, V6, V8 & V10 Only

Soybeans & Cotton only

Find out if practices, such as mowing, burning, tilling, and chopping of field edges, lanes or roadways, were used to slow or control the spreading of pests into the field.

Item 15f Cleaning of Equipment

V2, V3, V6, V8 & V10 Only

Soybeans & Cotton only

Find out if cleaning the harvesting and/or tillage equipment was used to reduce the spread of pests to or from the selected field.

Item 15g Water Management

V3, V8 & V10 Only

Cotton only

Find out if water management practices were used to control pests in this field. Water management practices include irrigation scheduling, drainage control, and other such water management practices.

Item 16 Pest Control Procedures

V5, V7, V9, & V10

Corn, Wheat, Potatoes only

The series of Items 17a-c asks if the operator used a variety of procedures and practices for the purpose of controlling pests on the selected field. If the procedure was used for this purpose, enter code 1 for YES. If the procedure was not used for the purpose of controlling pests, then enter a dash for NO and continue with the next item.

In some cases, the operator may have used a particular procedure, but not for the purpose of controlling pests. If this is the case, probe to verify that the operator's purpose was other than to control pests, by saying, for example, "Did you do that to control pests?" If the purpose for procedure was not for controlling pests, then the answer to the question is NO and a dashed entry should be made.

Item 16a Adjust planting or harvesting date

V5, V7, V9, & V10

Corn, Wheat, Potatoes only

Find out if the planting or harvesting date was adjusted in this field for the purpose of controlling pests.

Item 16b Alternate pesticides

V5, V7, V9, & V10

Corn, Wheat, Potatoes only

Find out if the pesticide products were alternated in this field **from year to year** for the purpose of slowing the development of pest resistance. To alternate pesticides means to use products from different pesticide families.

Item 16c Grazing date

V7 & V10 Only

Wheat only

Find out if the grazing date was adjusted in the selected wheat field for the purpose of controlling pests.

Item 17a Biological soil analysis

Soil samples may be analyzed for the presence of insects, diseases, nematodes or other soil pests. Determine if the operator had such a biological soil analysis done for the selected field.

Item 17b Consider beneficial insects

Beneficial organisms are predators and parasites and other **natural** enemies of crop pests. Naturally occurring insect predators of mites, aphids and caterpillars in corn and soybeans include predatory mites, aphid predators, green lacewings, and lady beetles.

Some producers will try to protect the beneficial organisms which occur naturally in their fields. They consider the possible impact on beneficial insects when deciding to use pesticides, and what pesticides to use. Find out if the operator considered beneficial insects in the selection and use of pesticides on this field.

Item 17c Remove weeds to prevent egg laying

V2, V6, & V10 Only

Soybeans only

Find out if the operator removed "host" weeds (the weeds used by certain insects in their reproduction cycle) in insect infested areas in order to prevent insect egg laying in the selected corn field.

Item 17d Use seed treatments to control blight

V2, V6, & V10 Only

Soybeans only

Find out if the operator used seed treatments for seedling blight control on this field. If seed treatments on purchased seed included treatment for seedling blight control, then enter code 1=YES. This includes purchased seed that had been treated with Captan.

Item 17e Send plants to lab for diagnosis

V2, V6, & V10 Only

Soybeans only

Find out if the operator submitted diseased plants from the selected field to a lab for diagnosis.

Item 18a Purchase & release beneficial insects

Beneficial organisms are predators and parasites and other natural enemies of crop pests. Some kinds can be purchased by operators and used on their fields. An example of a beneficial organism that is used on corn pests is the *Trichogramma* wasp, which is a very tiny parasite wasp that kills pests by laying eggs inside the pest's eggs.

Find out if the operator purchased and released any beneficial species of insects on this field.

Item 18b Pheromones

Producers may use pheromones [pronounced *fair-eh-moans*] in their effort to control insects. Pheromones are substances, such as sex hormones, that induce one or more reactions in an organism of the same species. The two major ways pheromones are used in agriculture are to monitor insect populations by trapping and to control insects by disrupting mating.

In Item 18b(1), find out if the operator used pheromone traps and lures on the selected field to monitor pests.

In Item 18b(2), find out if the operator used pheromones mating disruption systems to control pests.

Item 19 Biological pest control costs

V3 Only

Cotton Production Practices & Costs only

Record the TOTAL materials and custom application costs for all biological pest controls, including pheromones, pheromone traps, beneficial insects, and floral lures, attractants or repellants applied on this field for the 1997 corn crop.

Exclude Bt cotton seed and boll weevil assessment fees.

Record in either dollars per acre or total dollars. Include any costs paid by the landlord.

Biological methods include beneficial organisms (pest predators and parasites) that are used to control crop pests, biochemical agents such as pheromones, microbial organisms such as Bacillus thuringiensis (Bt) and other bacteria, viruses, fungi, and protozoa.

Item 20 Pest management information sources

Have the respondent select the primary outside source of information on insect, weed and disease management recommendations for the 1997 crop grown in this field. Use the Respondent Booklet and show the operator

the Pest Management Information Sources Code List. If the operator answers using the code rather than the words, verify the code by reading the associated category. For example, if the operator tells you code 2, verify that it means that the operator got pest control recommendations from a farm supply or chemical dealer.

If the operator used more than one source, probe to find out which ONE the operator considered the most important information source for helping control pests on the selected field in 1997.

The codes for Pest Management Information Sources are:

Code 1 - **Extension Advisor, Publications or Demonstrations** (County, Cooperative or University). Many state extension services publish detailed bulletins on local pest densities and other pest management information on a regular basis as well as annual or periodic pest management reports, and conduct regular demonstrations on new technology.

Code 2 - **Farm Supply or Chemical Dealer**. Many farm supply or chemical dealers offer scouting and other pest management services to the farmers that buy inputs from them.

Code 3 - **Commercial Scouting Service**. Some consulting firms provide services that are focused exclusively on pest management. These firms will offer scouting services, and may offer other insect, weed, and/or disease management services.

Code 4 - **Crop Consultant or Pest Control Advisor**. In 1995, there were over 400 crop consulting firms located in over 36 states in the U.S. operating independently from chemical companies and other farm input suppliers. A wide variety of services are offered by these firms, including insect, weed, and disease management.

Code 5 - **Other Growers or Producers**.

Code 6 - **Producer Associations, Newsletters or Trade Magazines.** Farmer cooperatives and other producer associations sometimes provide pest management assistance, and many trade magazines offer pest management information, guidelines, and advice.

Code 7 - **Television or Radio Programs, Newspapers**.

Code 8 - **Electronic Information Services** (*World Wide Web, DTN, etc.*): Information may be obtained electronically using computers. Using the Internet, producers can access the World Wide Web and obtain pest management information from a wide variety of sources. This is like a combination of a communication system and an electronic library.

DTN stands for Data Transmission Network. This is an example of an on-line market information service or market news service that provides market and other agricultural information through a data line, satellite dish, and a "dumb" terminal, which cannot be programmed to carry out computerized functions.

Code 9 - **Other**: An outside source of information other than those already listed. If the operator didn't use an outside source of information, instead relaying on experience or personal judgment, etc., use Code 10 for NONE.

Code 10 - **None**: No outside source of information was used. Use this code if the operator didn't use any other source of information for pest control decisions, besides experience or personal judgment, etc.

Item 21 Pest identification and management training

V2, V3, V6, V8 & V10 Only

Soybean & Cotton only

Determine if operator has attended a short course, workshop, or other training session on pest identification and management sponsored by universities or the Extension Service since October 1, 1996. Do not include seminars put on by chemical dealers.

Item 22 Certified applicator

Determine if operator has completed necessary training to receive certification for applying "Restricted Use" pesticides.

Section F - Field Operations, Labor, and Custom Services

V2, V3, V5, V6, V7, V8 & V10 only

Soybeans, Cotton, Corn & Wheat only

What is Section F for? How is the information used?

The content of Section F in the various questionnaire versions differs between costs versions and non-costs versions. These differences are indicated throughout this section.

Production Practices and Costs Versions

V2 & V3

Soybean & Cotton Production Practices & Costs

In Section F, the operator is asked to list all tractors used on the selected field and then **all** machinery operations performed on that field to raise the commodity of interest, including fertilizer and pesticide applications. The **costs** of custom operations (other than those already collected in earlier sections) are also collected in this section. In addition, labor hours are obtained, aside from hours spent operating machines.

The machines listed in the Field Operations Table are also used in conjunction with tractors listed in the Tractors Table to determine costs of various field operations. Agricultural engineers have studied the relationships between tractor size and type of field operation to determine the costs of field work. Cost of production budget items estimated using data from the Tractors and Field Operations Tables include fuel, repairs, taxes and insurance.

In addition, engineering formulas are used to compute the amount of the physical capital (machines and equipment) is "used up" while performing field operations on each of the commodities of interest. By itemizing the tractors and equipment, the amount of capital invested in machinery is estimated using the prices of equipment and machines. These estimates are used in cost of production budgets to assign annual costs for "capital replacement" and "other non-land capital."

Operators do not pay this cost each year, but when they purchase machinery, they amortize the cost over the life of the machine. ERS estimates a capital replacement and other nonland capital cost based on the total value of the machinery.

Costs for custom and technical services used on the selected field are also collected in this section. These items are used to estimate the costs of the operator hiring out certain farming operations. Usually the custom provider supplies all the equipment and labor for performing the custom operation. A good example is hiring someone to harvest the crop, a common operation with small grains in the Great Plains. In cost of production budgets, the cost of custom operations is listed as a single cost. Since custom operations are enumerated along with other field operations in the Field Operations Table, costs need to be obtained for those operations.

Production Practices Versions

V5, V6, V7, V10

Corn, Soybean, Wheat

Section F obtains all the operations performed on the selected field up to and including planting the target commodity, including custom tillage operations but excluding fertilizer and pesticide applications.

V8 & V10

Upland Cotton

Limited tillage data are collected for cotton in *Versions 8 and 10*.

All Versions

Equipment used for custom operations are enumerated in all versions.

Machinery information is used to identify tillage systems and residue levels. This allows examination of the impact of the conservation compliance provisions of the recent Farm Bills on tillage systems, cropping practices, and crop residue levels.

Item 1 Tractors Table

V2 & V3 Only

Soybean & Cotton Production Practices & Costs only

Include tractors owned, rented, leased or borrowed by the operation and used to produce the target crop on **the selected field**. Tractors owned in partnership should be included if they were used for the target commodity on the selected field.

Exclude:

- tractors used by custom operators,
- tractors owned by the operation which were ONLY used for custom work,
- tractors ONLY used for other commodities, and
- tractors ONLY used on other operations.

Don't list the same tractor on more than one line.

If more than the available number of lines are needed, use a TRUCKS AND TRACTORS SUPPLEMENT. Copy the identification as it appears on the main questionnaire to the identification box on the supplement. The line numbering on the SUPPLEMENT picks up with line number 7 and continues through number 11. If you find more than 11 tractors used on the selected field, continue recording the tractors with line number 12, and make good notes for the State Office.

The line number is used to identify tractors used for field activities you will record in Item 2.

Tractors - Make and model (Column 2)

List the make and model for each tractor used on the selected field, such as “John Deere 4050". Since PTO horsepower may need to be verified in the State Office, the make and model are important items.

List all tractors used on the selected field for the 1997 crop, not just those actually used in 1997. In some cases this will involve recording a tractor

which was not used in 1997 on the selected field at all. This can happen because some of the fieldwork for the crop was done in the fall of 1996.

Tractors - Model year (Column 3)

List the model year for each tractor recorded in Column 2, using the last two digits. For example, if the model year is 1990, enter 90.

Tractors - Drive (Column 4)

Enter the code for the type of drive for the tractor listed in Column 2:

Code 2 - **2-Wheel Drive**
Code 3 - **2-Wheel Drive With Front Wheel Assist**
Code 4 - **4-Wheel Drive**
Code 5 - **Crawler**
Code 6 - **Other**

Tractors - PTO HP (Column 5)

Record the power take-off (PTO) horsepower rating. If the operator is not sure of the PTO rating, get a best estimate and write a note in the margin. Be sure the make and model are correctly listed so the PTO horsepower can be looked up in the State Office.

Tractors - Fuel type (Column 6)

Enter the code for the type of fuel used by the tractor:

Code 1 - **Diesel**
Code 2 - **Gasoline**
Code 3 - **LP Gas** (Liquefied Petroleum or Propane)
Code 9 - **Other**

In many states, products sold as gasoline contain ethanol. For the purposes of this survey, if the product is sold as gasoline or gasohol, record it as gasoline (code 2). If the fuel used is ethanol or mostly ethanol, use code 9.

General Instructions for Field Operations and Equipment

How you administer the Field Operations Table differs somewhat between questionnaire versions. You will need to be aware of the differences and be alert to them when you use different versions as you move from one interview to another.

There are three main reasons for the differences between versions:

1) The primary users of data from the Production Practices Reports have different data needs than do the primary users of the Production Practices and Costs Reports.

2) Both sets of users will be using the data from Production Practices and Costs Reports, so the different needs of both groups must be met with a single structure.

3) If certain information is not needed on a particular version to satisfy the data users, then we do not want to burden the farm operator by asking for information or for detail that will not be used by one set of data users or the other.

Although the amount of detail differs between the two versions of the field operations table, the procedure you will follow to complete the table is the same, regardless of questionnaire version.

Exhibit 4 summarizes the differences among the questionnaire versions.

Exhibit 4: Field Operation Table Details

Instruction	Version	
	V5, V6, V7, & V10 Corn, Soybean, & Wheat Production Practices	**V2 & V3** Soybean and Cotton Production Practices and Costs
Record operations beginning after harvest of previous crop, and **END** with the current crop's --	Planting	Harvest
Necessary to maintain the **SEQUENCE** of individual operations?	YES	YES
Multiple passes using the **same equipment** can be recorded on the **same line**?	NO	NO
How to record tandem implements?	Retain the same SEQUENCE NUMBER in Column 2.	Retain the same SEQUENCE NUMBER in Column 2 **AND**, in Column 8, enter the cell code of the Item 1 line number of the tractor pulling the implements.
INCLUDE **fertilizer** and **pesticide** implements?	NO	YES
INCLUDE machines used by **custom operations**?	YES	YES
Columns to complete:	1(*V10* only),2, 3, 4, 5, 9, 10 & 11	2, 3, 4, 5, 6, 7, 8, 9, 10 & 11

To summarize:

Versions 2 and 3 obtain all equipment operations starting after the harvest of the previous crop and continuing through harvest of the target crop. Pesticide and fertilizer applications are included.

Versions 5, 6, 7 and 10 obtain tillage and land forming operations (operations that disturb the soil) ONLY, beginning after the harvest of the previous crop, and continuing through planting of the target crop. Harvesting operations and pesticide and fertilizer applications are excluded. However, tillage equipment used to incorporate pesticides and fertilizers before or at planting are included.

All versions exclude equipment used to apply lime. All versions include custom operations.

Where to Start?

Introduce the topic to the respondent by reading the introductory statement and instructions ("Begin with the first field operation after harvest of the previous crop," etc...). After reading the instructions, review the checklist with the respondent. The checklist is important to make sure the respondent is aware of the operations to include, and which operations to exclude.

After making sure the respondent understand which operations to report, begin by asking the respondent what happened after the previous crop was harvested from this field. In most cases, this will be the first tillage operation after harvest of the 1996 crop from this field.

Item 2 Field Operations

Record the field operations performed by equipment in the order used to prepare the selected field for planting in the order they occurred.

- If this field was in fallow (idle, diverted) in 1996, record operations starting with the fall of 1995.

- If a crop was grown in 1996, begin with the first operation after the 1996 crop was harvested.

- If the field was double cropped in 1997, and the target crop was the second crop, begin with the first operation after the first crop was harvested in 1997.

The best way to get the information in this item is to ask the operator to describe all of the field work done for the target commodity after harvesting the crop previously grown on the selected field.

Start by asking what happened after harvest of the preceding crop and then keep going in the order that the operations were performed. The sequence of operations and implements must be maintained, because it is very important for determining residue levels.

V5, V6, V7 & V10: *Corn, Soybeans, and Wheat Production Practices Report*

List the operations in the order they occurred AND maintain the order of tandem hook-ups. Enter the SEQUENCE NUMBER of each operation in the order it occurred. List the tillage and planting implements used on this field beginning with the first trip over the field after harvest of the preceding crop and continuing through planting this year's crop. If this field was fallow (idle, diverted) during 1996, list operations starting with the fall of 1995. **Include** plowing, corrugation, land preparation, and planting. **Include** custom operations. **Exclude** fertilizer and pesticide applications. **Exclude** the application of lime.

In sequential order, record all operations performed by tillage and land forming equipment. End with (AND INCLUDE) the implement used to plant the target crop in this field.

V2 & V3: *Soybean and Cotton Production Practices and Costs Report*

After recording operations through planting, continue to list the operations through harvest of the target crop from this field. Record operations in the order they occurred AND maintain the order of tandem hook-ups. Enter the SEQUENCE NUMBER of each operation in the order it occurred. List all implements used on this field beginning with the first trip over the field after harvest of the preceding crop and continuing through harvest of the target crop. If this field was fallow (idle, diverted) during 1996, list operations starting with the fall of 1995. **Include** plowing, corrugation, land preparation, planting, and harvesting. **Include** custom operations. **Include** fertilizer and pesticide applications. **Exclude** the application of lime.

In sequential order, record all operations performed by tillage and land forming equipment. End with (AND INCLUDE) the implement used to harvest the target crop from this field.

Field operations for fertilizer and chemical applications should agree with those reported earlier in Section C and Section D. For example, each fertilizer or pesticide application reported in the Fertilizer Table or in the Pesticide Table should show up here in the Field Operations Table, unless it was applied through the irrigation water (in this case make a note). Custom applications of fertilizers or pesticides should also appear in this section. It may help to finish this section if you ask the operator what operations, if any, were missed.

If any of the target crop acres in the selected field were abandoned, all field work done on these acres until they were plowed under or cut should be included. Exclude the activity of plowing these acres under. If the operator re-seeded acres to the target crop, include all operations. Except where the target crop was replanted, exclude field work done to prepare the field for another crop. Also exclude planting a replacement crop other than the target crop.

V2, V3, V5, V6, V7 & V10

Soybeans, Cotton (costs version), Corn and Wheat

If the operator uses two or more different cropping practices on the selected field (for example, irrigated and non-irrigated acres) and these have different field operations, be sure to enumerate operations for each of the cropping practices. Record each operation in sequence, entering the number of acres in Column 9 for which each practice was applied.

You will record the order of the machine operations by entering SEQUENCE NUMBERS in Column 2. Sometimes the respondent forgets to report an operation in its right order. When this happens, just add the forgotten operation wherever you are in the table when it is reported, and enter its correct SEQUENCE NUMBER. Then go back and change the numbers you previously entered to reflect the correct order of machine operations. BE SURE to correct all SEQUENCE NUMBERS that are affected. This is much simpler than erasing and re-entering in the correct order all the operations you had already recorded in Column 3.

The cell numbers do not have to be changed to correspond to the corrected order, only the SEQUENCE NUMBER entered in Column 2.

NOTE: Include field operations done by neighbors, friends, etc. on a "swap" basis. If these people use their own tractors, the tractors should be recorded in Item 1 in this section.

Field Operations - Commodity Code (Column 1)

V10 Only

Corn, Soybeans, & Wheat only

Enter the commodity code for each selected field as you enumerate the tillage and planting operations for that target commodity.

When the tillage and planting operations are completely enumerated for the selected *[commodity 1]* field, proceed to list the tillage and planting operations for the selected *[commodity 2]* field. When you begin to list the operations for the *[commodity 2]* field, start over numbering the operation SEQUENCE with “1" in Column 2.

Field Operations - Sequence number (Column 2)

V2, V3, V5, V6, V7 & V10 Only

Corn, Soybeans, Cotton (cost version), Wheat

Correct sequence of the operations over the selected field must be maintained. Enter the SEQUENCE NUMBER of each operation, beginning with number “1" for the first operation after harvest of the previous crop. In *Version 10*, after completely enumerating the tillage and planting operations for the selected *[commodity 1]* field, start over with number “1" when you begin to list the operations for the *[commodity 2]* field.

Implements in tandem hook-ups should be entered on separate lines. For a tandem or multiple hookup of individual tillage implements, record the first implement of the set in Column 3 and its implement code in Column 4. When you record the second implement on the next line, keep the same SEQUENCE NUMBER in Column 2 that was entered for the first implement in the set. If more than two implements are in such a set, list them in the appropriate hookup order, each one on its own line, and record the same SEQUENCE NUMBER for all the implements in that same set.

For example, you've just enumerated the first operation (a stalk shredder) on the selected field. Then for the next operation, the operator tells you that he used a flex-tine tooth connected to a field cultivator. After this operation, the respondent reported that he planted. You would record this as follows:

2 SEQUENCE No.	3 What operation or equipment was used?	4 [*Record machine code from Respondent Booklet.*] CODE
1	stalk shredder	205
2	field cultivator	21
2	flex-tine tooth	33
3	conventional	114

Sometimes the respondent forgets to report an operation in its right order. When this happens, just add the forgotten operation wherever you are in the table when it is remembered, and enter its correct SEQUENCE NUMBER. Then go back and change the numbers you previously entered to reflect the correct order of machine operations. BE SURE to correct all SEQUENCE NUMBERS that are affected. This is much simpler than erasing and re-entering in the correct order all the operations you had already recorded in Column 3.

The cell numbers do not have to be changed to correspond to the corrected order, only the SEQUENCE NUMBER entered in Column 2.

For example, you have entered operations 1, 2 and 3 in the previous example, when the operator recalls another operation (a soil finisher) that occurred after the tandem tillage operation and before the planting operation. Correct the SEQUENCE NUMBERS and continue recording operations in order as follows:

2 SEQUENCE No.	3 What operation or equipment was used?	4 [*Record machine code from Respondent Booklet.*] CODE
1	stalk shredder	205
2	field cultivator	21
2	flex-tine tooth	33
~~1~~ 4	conventional	114
3	soil finisher	66
5	...	
6	...	

Field Operations - Implement Used (Column 3)

V2, V3, V5, V6, V7, & V10

Corn, Soybeans, Cotton (cost version), Wheat

Record either the operation or the equipment the operator reports using, such as a plow, disk, harrow, planter, etc. In *V2* and *V3*, continue recording operations or equipment used following planting, such as a cultivator, combine, wagon or cart, etc. If the operator reports using a machine for which a code is not available, ask the operator which one of the implements in the Respondent Booklet best describes it, or describe the machine as completely as possible in notes.

Enter the name of each implement used on a separate line. Each line entry should indicate one complete pass over the field. Obtaining the total number

of passes over a field is an important factor in estimating cost differences between tillage systems.

Record operations in the order that they were performed. Try not to leave blank lines due to limited line space. For *V5*, *V6*, *V7*, and *V10*, the last entry will always be the planting operation. For *V2* and *V3*, the last entry should be equipment used for harvesting the target crop.

Record each implement that was used on the field. If an implement was used on only a part of the field, the number of acres it covered will be obtained in Column 9. On some large acreages, two (or more) tractor-implement sets (for example, two tractors and plows) may have been used at the same time to perform an operation. Record each tractor-implement combination on separate lines and obtain the acres covered by each one in Column 9.

Include custom operations.

For hauling operations (such as hauling debris or rocks from the field), the size recorded in Column 6 should be in pounds or tons, with the appropriate unit code entered in Column 7. Include only hauling done with tractors. Do not include any hauling done with trucks. Trucks will be listed in SECTION J, VEHICLES AND TRUCKS. Recording their use in this section would duplicate information provided there.

Important: If more operations were completed on the selected field than there are lines available on the questionnaire, use a FIELD OPERATIONS SUPPLEMENT. Copy the identification as it appears on the main questionnaire to the identification box on the supplement. Continue enumerating operations (numbered in sequential order) on the SUPPLEMENT.

Field Operations - Implement Code (Column 4)

V2, V3, V5, V6, V7, & V10

Corn, Soybeans, Cotton (cost version) & Wheat

For each operation SEQUENCE NUMBER in Column 2, record the appropriate implement in Column 3 and the appropriate code in Column 4. The codes are listed in the Respondent Booklet. If the implement is not listed in the Respondent Booklet, write a description of that implement in notes on the questionnaire. Probe to see if any names in the Respondent Booklet may be applicable.

For a tandem or multiple hookup of individual implements, record each implement of the set in separate lines and enter the appropriate implement code in Column 4. Maintain the order of tandem hook-ups. Retain the same SEQUENCE NUMBER in Column 2.

Do not consider as a tandem or multiple hookup the attachment of two implements of the same type (for example, two plows hooked side-by-side) for the purpose of allowing wider coverage with one pass over the field. Treat this as one implement.

Implements that have several tillage components attached to a single frame should not be recorded as a tandem or multiple hookup. For example, a "do-all" is a single implement that has disk blades, field cultivator shanks, and some type of harrow mounted on a single frame. Enter the appropriate code for the single implement from the Machinery Code List in the Respondent Booklet. If there is no appropriate code on the Machinery Code List, describe the implement in notes.

Only one code should be entered in Column 4, for example, enter code 5 for a moldboard plow.

If an implement is not included in the Machinery Code List in the Respondent Booklet, enter the implement name on the appropriate line in Column 3, and briefly describe the implement in notes. Be as complete as possible in your description. The equipment will have to coded in the State Office based solely on the name and description that you record.

PROBE for the specific type of implement so that it can be coded correctly (for example, plow = regular chisel plow, disk = tandem disk, harrow or drag = spike tooth harrow).

Field Operations - Worker Performing Operation (Column 5)

V2, V3, V5, V6, V7, & V10

Corn, Soybeans, Cotton (cost version) & Wheat

Enter the code for the type of worker that performed the operation recorded in Column 3, operating the machine or equipment recorded in Column 4. This information will be used, along with the acres per hour and acres covered recorded in Column 9 and 10, to determine the labor usage on the field by type of worker. This method of collecting labor within the Field Operations Table saves us from having to count these hours again in a separate Labor Section.

The types of workers are:

Code 1 - **You** (The Operator)
Code 2 - **Partner**
Code 3 - **Unpaid Worker**
Code 4 - **Paid Part-time or Seasonal Worker**
Code 5 - **Paid Full-time Worker**
Code 6 - **Custom Applicator**

These codes are also listed in the Respondent Booklet under the heading MACHINE OPERATOR LABOR CODES. Point this out to the respondent to refer to easily as you complete the Field Operations Table.

Include family members in the appropriate category, depending on whether they were UNPAID, PAID PART-TIME or SEASONAL, or PAID FULL-TIME. For example, if the operator's daughter operated the piece of equipment, and she is considered a PAID PART-TIME worker on the operation, then enter code 4.

If more than one worker was used to conduct the field operation, report the type of worker that actually operated the machine recorded in Column 4, such as the tractor/truck driver. The labor hours for the other workers will be obtained in Item 8, Column 6, LABOR hours for work other than operating machines. If two people alternated performing a single field operation, record the code for the person who operated the machine over the most acres.

For operations conducted by CUSTOM APPLICATORS, with Code 6 entered in Column 5, go to Column 11. Columns 7, 8, 9, and 10 should not be completed for custom operations.

Field Operations - Size of Machine (Column 6)

V2 & V3 Only

Soybean & Cotton Production Practices & Costs only

Enter the width of the area covered by the equipment on a single pass over the field. **Size means the swath covered by the machine, not necessarily how wide the equipment is**. For instance, a broadcast fertilizer spreader may be only 6 feet wide, but it can spread fertilizer over a swath of 35 feet. In this case, "35" would be the right entry in Column 6, and code "1" for feet should be entered in Column 7.

Field Operations - Unit code for machine size (Column 7)

V2 & V3 Only

Soybean & Cotton Production Practices & Costs only

Enter the code for the unit of width associated with the swath size recorded in Column 7. The unit codes for width are:

Code 1 - **Feet**
Code 2 - **Row**
Code 3 - **Moldboard** (Bottoms)

For example, if a 4-bottom moldboard plow was used, record "4" as the equipment size in Column 6 and enter code "3" in Column 7.

Unit codes for hauling operations are:

Code 4 - **Pounds**
Code 5 - **Bushels**
Code 6 - **Tons**

Unit codes 4, 5, and 6 should only be used for hauling operations using trailers, carts or wagons.

Field Operations - Line number of tractor used (Column 8)

V2 & V3 Only

Soybean & Cotton Production Practices & Costs only

Enter the line number of the tractor (Item 1) that was used to pull the equipment. If the equipment was self-propelled, enter code 99. If two tractors were used simultaneously to pull one piece of equipment, identify both tractors and write a note at the bottom of the page. If horses, mules or other draft animals were used to pull the equipment, enter code 66. If it was pulled by a pick-up, enter code 77. If a truck other than a pick-up was used to pull the piece of equipment, enter code 88.

For a tandem or multiple hookup of individual implements, record the first implement of the set in Column 3 and its machinery code in Column 4. Along with other data in this line, complete Column 8 identifying the Item 1 line number of the tractor used. Then record the second implement on the next line, completing Columns 3 and 4. In Column 8 on this line, enter the **cell code** of the Column 8 cell containing the Item 1 line number of the tractor pulling the equipment. This will indicate which tractor provided the power to pull the tandem implements. If more than two implements are in such a set, list them in the appropriate hookup order, each one on its own line, and enter the **cell code** of the tractor identified as pulling the first implement in the set.

Complete instructions for recording tandem operations and examples of recording tandem operations follow the Column-by-Column instructions for the Field Operations Table.

Field Operations - Number of acres covered (Column 9)

V2, V3, V5, V6, V7, & V10

Corn, Soybeans, Cotton (cost version) & Wheat only

Record the number of acres covered for this operation on the selected field. Enter the number of acres covered on a single pass of the equipment over the field, not the total for multiple passes of the same equipment over the field. Multiple passes of the same equipment should be recorded on separate lines as separate operations in the correct sequence.

If only part of the field was covered, enter the number of acres in the part of the field covered. If more than one piece of equipment operated on the field at the same time, such as more than one combine doing harvesting, enter each piece of equipment on separate lines, along with the acres covered by each.

Record acres covered to the nearest TENTH of an acre.

Land forming equipment includes machines used to make or close ditches, or to change the slope of the land. The field acreage covered is not a good indicator of total machine use. For land forming equipment, Column 9 should be completed by recording the **total hours** that the equipment was used in production of the target commodity. Then leave Column 10 blank.

When recording information about equipment used in hauling operations, such as carts and wagons, Column 9 should be completed by recording the total hours that the hauling activity took for the selected field. Then leave Column 10 blank.

Field Operations - Acres Covered Per Hour (Column 10)

V2, V3, V5, V6, V7, & V10

Corn, Soybeans, Cotton (cost version) & Wheat only

This information will be used along with the tractor information to compute per acre labor, machine, and fuel costs.

Record the acres covered per hour for this operation on the selected field. Operators usually know this as the equipment speed. They usually know the speed at which the tractor used pulled the specific implement on a given field, saying something like " Well, this tractor pulling that piece of equipment on

that land (or the type of land in that field, such as hills, flats, etc.) goes about X acres per hour."

If the operator does not know this precisely, obtain a best estimate. Ask how long this operation took on this field. If the total hours is unknown, ask for an estimate of how long it would normally take to do this operation. Then divide this total or estimated time into the number of acres covered:

Acres Per Hour = (Acres Covered) ÷ (Hours to Complete Operation).

Record acres per hour to the nearest one-tenth.

If the respondent will not or cannot do this, leave Column 10 blank and write DK (for "don't know") in notes near the item cell.

An alternative method of estimating acres per hour is possible if the operator knows the machine width in feet and the speed that was traveled. Then use the following formula:

Acres Per Hour = (Machine Width in Feet) x (Speed in MPH) ÷ 10.

Field Operations - Month of operation (Column 11)

V2, V3, V5, V6, V7, & V10

Soybeans, Cotton, Corn & Wheat only

This information is needed in order to allow wind erosion to be considered in identifying the tillage system.

Record the number of the month of the year when the operation was performed. Use the two digit MM format for recording the month number. For example, for operations completed in April, enter 4.

How to Record Tandem Field Operations

Often farmers perform two or more field operations at the same time. A common example of this is a spike tooth harrow connected to a regular tandem disk, pulled by one tractor.

Equipment used for fertilizer and chemical applications included in the Field Operations Table in *Versions 2 and 3* may also be commonly done as tandem operations with another operation. Each separate item of equipment must be

identified in order to calculate costs or to identify the tillage system used on the field.

When a farmer reports a tandem field operation:

1. Record the first piece of equipment just like any single machine field operation. Record the SEQUENCE NUMBER in Column 2 in order from the previous operation. Enter the data for all remaining columns in that line.

2. On the next line, record the tandem operation in Column 3 and the machinery code of the second piece of equipment in Column 4. Record the same SEQUENCE NUMBER as the operation entered on the previous line in Column 2.

   V2 & V3: Skip Columns 5, 6, and 7. In Column 8, enter the **cell code** of the Column 8 cell containing the Item 1 line number of the tractor pulling the pieces. This is on the same line as the first machine in the tandem sequence. Entering the cell code number will indicate which tractor is providing the power for both implements. Skip Columns 9, 10, and 11 and go to the next operation in sequence.

   V5, V6, V7 & V10: Skip Columns 5, 9, 10 and 11 and go to the next operation in sequence.

3. If more than two pieces of equipment were used in tandem, repeat step 2 for each additional piece of equipment.

Be sure each required column is completed for every piece of tillage and/or planting equipment used to prepare and plant the target commodity on the selected field. Also, be sure to record tandem operations on adjacent lines.

EXAMPLE: The following example illustrates how tandem operations would be recorded in the FIELD OPERATIONS TABLE on *V2 & V3*. Note **cell code (532)** entered in Column 8 instead of the tractor number for the second implement in the tandem operation.

2 **SEQUENCE No.**	**3** **What operation or equipment was used?**	**4** [*Record machine code from Respondent Booklet.*] **CODE**	**5** **Who was the machine operator--** [*Enter code from above.*] **CODE**	[***If CUSTOM (column 5 = code 6), skip columns 6-10.***] **6** **What was the size or swath of the** [*machine*] **used?**	**7** [*Record size code.*] 1 Feet 2 Row 3 Moldboard (*bottoms*) **Hauling** 4 Pounds 5 Bushels 6 Tons **CODE**	**8** **Which tractor was used?** [*Record line number from item 1.*] 66 Animal Drawn 77 Pick-Up 88 Other Trucks 99 Self-Propelled **CODE**	**9** **How many acres were covered?** 1/ **ACRES**	**10** **What were the acres covered per hour?** **ACRES PER HOUR**	**11** **In what month was this operation done?** **MM**
0369		0394	0424	0471	0501	0531	0561	0586	0641
1	*coulter plow*	*2*	*1*	*16*	*1*	*1*	*62.0*	*5.0*	*4*
0370		0395	0425	0472	0502	**0532**	0562	0587	0642
2	*tandem disk*	*15*	*1*	*21*	*1*	*2*	*62.0*	*10.0*	*4*
0371		0396	0426	0473	0503	0533	0563	0588	0643
2	*roller-packer*	*53*				***532***			
0372		0397	0427	0474	0504	0534	0564	0589	0644
3	*no-till planter*	*113*	*1*	*20*	*1*	*2*	*62.0*	*15.0*	*5*

EXAMPLE: The following example illustrates how the same tandem operations would be recorded in the FIELD OPERATIONS TABLE on *V5, V6, V7 and V10*.

2 SEQUENCE No.	3 What operation or equipment was used?	4 [*Record machine code from Respondent Booklet.*] CODE	5 Who was the machine operator-- [*Enter code from above.*] CODE	[*If CUSTOM (column 5 = code 6), skip columns 9 and 10.*] 9 How many acres were covered? 1/ ACRES	10 What were the acres covered per hour? ACRES PER HOUR	11 In what month was this operation done? MM
0369 *1*	*coulter plow*	0394 *2*	0424 *1*	0561 *62.0*	0586 *5.0*	0641 *4*
0370 *2*	*tandem disk*	0395 *15*	0425 *1*	0562 *62.0*	0587 *10.0*	0642 *4*
0371 *2*	*roller-packer*	0396 *53*	0426	0563	0588	0643
0372 *3*	*no-till planter*	0397 *113*	0427 *1*	0564 *62.0*	0589 *15.0*	0644 *5*

Item 3 Soybean hauling operations

V2 only

Soybean Production Practices and Costs only

Include hauling by trailer, cart, or other towed hauling equipment to barns, grain bins, dryers or cleaners**.** Include hauling the crop in trailers or carts to market directly only if the crop is hauled directly to market from this field. Exclude hauling to market from storage at a later date.

Do not include any hauling done only by trucks. Trucks will be listed in SECTION K, VEHICLES AND TRUCKS. Recording their use in this section would duplicate information provided there.

Item 4 Hauling and handling of cotton

V3 only

Cotton Production Practices and Costs only

Item 4a-4c Percent hauled (Column 1)

Item 4a-4c Percent hauled in trailers (Column 2)

Item 4a-4c Percent hauled in modules (Column 3)

Item 4a-4c Percent hauled by something else (Column 4)

Item 5 Number of equipment used to haul cotton

V3 only

Cotton Production Practices and Costs only

Item 5a-5c Type of equipment used (Column 1)

Item 5a-5c Number of equipment used (Column 2)

Item 5a-5c Average capacity of equipment used (Column 3)

Item 5a-5c Number of equipment owned (Column 4)

Item 6 Module builders

V3 only

Cotton Production Practices and Costs only

Item 6a Size of tractor used

Item 6b Total hours of operation

Item 6c Number provide by gin at no charge

Item 6d Number rented for a fee

Item 6d(1) Rental charge per bale

Item 7 Distance from field to gin

V3 only

Cotton Production Practices and Costs only

Item 8 Non-machine labor used on the field

V2 & V3 Only

Soybean and Cotton Production Practices & Costs only

The purpose of this item is to collect data on labor used on the selected field for activities other than operating machines. This data will be combined with the information collected in the Field Operations Table to compute the total labor used on this field. Acres Covered and Acres per Hour will be used to calculate the labor hours spent operating machines for each field operation. This data will be combined with labor hours collected in Item 8 to provide an estimate of the total labor hours used to produce the target commodity on the selected field. These calculations save us from having to ask for ALL the labor hours separately. In addition, wage rates are collected for ALL the paid workers that worked on the field, so that labor costs can be calculated as well.

The procedure used in Item 8 to collect labor hours is to ask the operator to identify and list all the workers that worked on the selected field, and then ask how many hours each worker or each group of workers spent doing various activities on that field to produce the target crop in 1997. This procedure is called a roster. It was developed because, in past surveys, many enumerators tended to use a procedure like this to add up labor hours for various types of workers. We developed the roster for this survey so that all enumerators could take advantage of the same method that already was working well for some enumerators.

Complete Item 8 by listing all the workers in Column 1 first, and then complete Columns 2-6 for each worker or group of workers reported in Column 1.

Item 8 Workers (Column 1)

V2 & V3 Only

Soybean and Cotton Production Practices & Costs only

Begin by listing all workers, both paid and unpaid, who provided labor to produce the 1997 target crop on the selected field.

If the operator, partners, or the operator’s spouse worked on the selected field, check the check-boxes in Column 1 and continue.

List workers using whatever identifier is comfortable for the respondent. If names are used, record first names only. Workers may be identified by their relation to the operator, or by the type of work. For example, the operator may identify a daughter, a grandson, a hired hand, and the tractor driver as workers on the field.

If several workers of the same type were used, they may be grouped and listed on a single line. Workers may be grouped in any manner convenient for the respondent. For example, the respondent may group workers by type of work, such as all workers hauling grain away from the field.

Data recorded in Columns 3, 4, and 5 must be the same for all workers grouped together. For example, a paid part-time worker making $8.00 per hour should be listed on a separate line from another paid part-time worker making $6.50 per hour. Also, if the same worker routinely worked both paid and unpaid hours, record these on separate lines.

Be sure to include ALL workers that worked on the selected field to produce the 1997 target crop. Be sure to include workers that did activities other than driving tractors or operating equipment on the selected field. Probe to include workers who worked on the field during the fall of 1996 to prepare for the 1997 crop, or earlier if the field was left fallow during 1996.

Exclude contract or custom labor.

After completing the list of all workers in Column 1, proceed to complete Columns 2-6 of the table for each worker or group of workers listed. It is important to identify all workers in Column 1 first before asking additional questions, because the respondent may decide to leave out some workers to avoid the additional questions you'll be asking about each one.

Item 8 Number of workers (Column 2)

V2 & V3 Only

Soybean and Cotton Production Practices & Costs only

Enter the number of workers in the group listed in Column 1. If an individual worker is recorded in Column 1, enter the number "1." If the PARTNERS box in Column 1 is checked, enter only the number of partners working on the selected field, not the total number of partners.

Item 8 Paid or unpaid worker (Column 3)

V2 & V3 Only

Soybean and Cotton Production Practices & Costs only

Record whether the worker or group of workers listed in Column 1 was:

Code 1 - **Paid**
Code 2 - **Unpaid**.

If the box for the operator's SPOUSE is checked in Column 1, determine if he/she is a PAID or UNPAID worker on the operation.

Workers receiving only a "draw" should be considered unpaid.

For PAID workers (code 1), complete Columns 4, 5 and 6.

For UNPAID workers (code 2), skip to Column 6.

Item 8 Type of worker (Column 4)

V2 & V3 Only

Soybean and Cotton Production Practices & Costs only

If Column 3 is Code 1 (PAID), determine whether each PAID worker or group of PAID workers listed in Column 1 is:

Code 1 - **Full Time**
Code 2 - **Part Time**
Code 3 - **Seasonal**.

Item 8 Wage rate for paid workers (Column 5)

V2 & V3 Only

Soybean and Cotton Production Practices & Costs only

For PAID workers only (Column 3 is Code 1), record the cash wage rate paid for ALL the work performed on this field by each worker or group of workers listed in Column 1. Enter the wage rate in dollars and cents per hour.

If multiple workers are recorded in Column 2, the wage rate entered in Column 5 should be the same for all workers. Enter the average wage per hour paid to each worker in Column 5. Do not multiply the average wage per worker times the number of workers!. If two workers are paid $5.00 each per hour, enter 5.00, not 10.00 in Column 5.

If the worker is paid by the week or month, or is paid an annual salary, you will need to probe for an estimate of the average number of hours worked per week, month, or year. Then calculate the hourly wage. For example, if a worker is paid $1500 per month and works an average of 200 hours per month, then compute the hourly wage rate as 1500÷200 = $7.50 per hour, and enter “7.50" in Column 5.

Item 8 Hours worked on field (Column 6)

V2 & V3 Only

Soybean and Cotton Production Practices & Costs only

For each worker or group of workers listed in Column 1, record the total hours worked on this corn field in ALL activities other than operating machines (reported in Item 2). This includes, but is not limited to:

- scouting,
- irrigation,
- hauling with trucks,
- drying,
- time spent moving machinery and equipment to and from the field,
- time spent loading materials into equipment,
- management activities associated with the selected field only, and
- other hours working in the field but not operating equipment.

Report the **total hours** worked by each worker or group of workers listed in Column 1, **only for activities done on this field**.

If multiple workers are recorded in Column2, enter the total hours worked by all the employees in Column 6. If two workers worked in the field (not operating machinery), one for a total of 8 hours and the second for a total of 4 hours, enter “12" in Column 6.

Item 9 Percent of unpaid work done by those under 16

V2 & V3 Only

Soybean and Cotton Production Practices & Costs only

Considering the total hours worked by unpaid workers on this field (Column 1 workers with Code 2 (UNPAID) in Column 3 of Item 8), enter the percent of those hours worked by unpaid workers who were under 16 years old.

Remember that this question is about the percent of ALL the hours worked on this field by UNPAID workers, not just the hours recorded in Column 6 of Item 8 (which accounts for only non-machine hours).

We will value unpaid labor hours dedicated to the target crop with an appropriate wage rate to estimate the economic cost of unpaid labor. Since younger workers are often paid less than more experienced workers, we want to separate unpaid labor hours for workers under 16 so we can value them with a different wage rate.

Item 10 Custom and technical services

V2 & V3 Only

Soybean and Cotton Production Practices & Costs only

Custom operations and/or technical services performed on the field in 1996 for the 1997 crop should be included. Exclude custom fertilizer and chemical applications. These have been recorded in Sections C and D.

Sometimes farmers rent machines and operate them themselves. This isn't custom service, it's machinery rental. Exclude machinery rental from this item. Operations performed with rented machinery should be reported in the FIELD OPERATIONS table, Item 2. Exclude "swap" labor (work done on the selected operation by a friend or neighbor in return for the selected operator's working on the friend or neighbor's operation). These operations should also have been included in the FIELD OPERATIONS table in each version.

Item 10 Custom or technical service (Column 1)

V2 & V3 Only

Soybean and Cotton Production Practices & Costs only

Several custom or technical services are listed. ALL custom machinery operations were obtained in the Field Operations Table. Refer back to the Field Operations Table Item 2) and identify which custom or technical services listed in Column 1 were performed on the selected field. CHECK the check box in Column 1 for each custom operation reported in the Field Operations Table. Ask Columns 2 and 3 for each item checked.

Item 10 Cost per acre for the custom/technical service (Column 2)

V2 & V3 Only

Soybean and Cotton Production Practices & Costs only

Record the operation's cost per acre for each custom operation or agricultural service done on the field. Include all custom work or technical service fees paid by landlords. Record the cost in dollars and cents per acre.

Item 11 Moldboard plow used on cotton

V8 & V10 Only

Upland Cotton only

Ask the respondent if a moldboard plow was used to prepare the selected field for seeding the 1997 cotton crop. If YES, enter code 1 and ask Item 11a. If NO, go to Item 12.

Item 11a Date moldboard plow used

V8 & V10 Only

Upland Cotton only

If a moldboard plow was used (Item 11 is code 1 = YES), then ask what month the selected cotton field was plowed using the moldboard plow.

Item 12 Stale seedbed

V8 & V10 Only

Upland Cotton only

Determine if a “stale seedbed” system was used to prepare this field for seeding this cotton crop. A "stale seedbed" system has all tillage done in the fall after harvest. Either a cover crop is seeded or weeds are left. Only a "burndown" herbicide is applied in the spring before planting, with NO spring preplant tillage operations.

Section G - Irrigation

What is Section G for? How is the information used?

This section is used in a way similar to field operations in that the questions are designed to identify operating characteristics of irrigation system(s) and the amount and source of water used on the selected commodity field. Engineering relationships are then applied to the field information to estimate irrigation costs.

There can be more than one type of irrigation system used on a particular crop field. To save space and interview time on the Production Practices and Costs *Versions 2* and *3*, information is only collected for the two most common systems used on the selected field. The costs derived from the irrigation data are reported in cost-of-production budgets in several places. For example, the cost of purchased irrigation water obtained in this section is reported under a budget line item called "Purchased Irrigation Water." Operation costs of the irrigation systems listed in other parts of the section are reported under budget line items for fuel, repairs, capital replacement, etc., just like machinery costs.

Irrigation methods usually involve using either pressurized or gravity-flow systems. Pressurized systems can involve various types of sprinkler or low-flow drip/trickle systems. Gravity-flow systems can involve various types of flood or furrow irrigation systems and subirrigation systems. How water is applied depends on the crop features, the physical features of the land (slopes, hills, and gullies), the type of soil, the amount of water available, how well special equipment would work, and the cost. To conserve both water and money, it is necessary to have some degree of control over the amount of water applied and the distribution of water across a field. For example, when crops are over-watered, minerals are washed from the soil, salts build up and soil erodes. Also, when water is not applied uniformly across a field, crop yield is reduced.

Item 1 Acres of SELECTED CROP irrigated in this field

Record the number of acres of the selected crop in the field that were irrigated for the 1997 crop. Enter the number of irrigated acres to the nearest TENTH.

NOTE: Don't list any system or irrigation technology that wasn't used on soybeans or cotton for this field, even if it was used on other fields or other crops on the farm operation.

Acreage should be counted as irrigated if water was applied at least once during the growing season or if the acres were irrigated before planting. If only part of a field was irrigated, count only the acres that actually were irrigated. Even though the crop may have received water several times, count irrigated acres only once.

In some states, non-irrigated land may also be called "dryland".

Exclude from irrigated acreage:

- acreage from the selected field which could have been irrigated (facilities were available) but which was not irrigated for the 1997 crop.
- land for the selected field in irrigation ditches, trenches, borders, levees and skip rows.
- fringe areas of the selected field (generally in fields with sprinkler systems such as center pivot systems) which did not receive water.

Item 2 Irrigation operations

In Item 2 of the Production Practices and Costs Versions, *V2 (Soybean)* and *V3 (Cotton)*, include only the irrigation system(s) used to irrigate the selected field for the 1997 crop year. Fill out the table by asking Items 2b - 2l for each of the System Types identified in Item 2a. That is, go down the column labeled System 1 for the first system type named, then go down the column labeled System 2 for the second system type (if a second system was used). Information about at most two system types can be collected.

Items 2b-2l of the Production Practices Versions, *V5*, *V6*, *V7*, *V8*, *V9*, and *V10* are not broken down by system type. These versions ask for information about irrigation on the selected field in total, regardless of the type of system used.

NOTE: Don't list any system or irrigation technology that wasn't used on soybeans or cotton for this field, even if it was used on other fields or other crops on the farm operation.

Item 2a Type of system(s)

V2 & V3 Only

Soybean & Cotton Production Practices & Costs only

Record the System Type Code(s) in Columns 1 and 2 for at most two irrigation systems used to irrigate most of the acres on the selected field of soybeans or cotton during the 1997 growing season. If only one system was used on this field, then use only Column 1 for responses to questions 2a - 2l.

The Irrigation System Type Codes are:

Pressure Systems

Code 1 - **Hand-move**
Code 2 - **Solid or Permanent Set**
Code 3 - **Side Roll or Wheel Line**
Code 4 - **Center Pivot or Linear Move With Sprinklers on Main Line**
Code 5 - **Center Pivot or Linear Move With Sprinklers below Main Line, But More than 2 Feet above Ground**
Code 6 - **Center Pivot or Linear Move With Sprinklers less than 2 Feet above Ground**
Code 7 - **Big Gun**
Code 8 - **Low-flow Irrigation** (Drip, Trickle, or Micro Sprinkler)
Code 9 - **Other Pressure System** -- Specify Type

Gravity Systems

Code 10 - **Siphon-tube System from Unlined Ditches**
Code 11 - **Siphon-tube System from Lined Ditches**
Code 12 - **Portal- or Ditch-gate System from Unlined Ditches**
Code 13 - **Portal- or Ditch-gate System from Lined Ditches**
Code 14 - **Poly-pipe System**
Code 15 - **Gated Pipe** (Not Poly Pipe)
Code 16 - **Improved Gated Pipe** (Surge Flow or Cablegation, Not Poly Pipe)
Code 17 - **Subirrigation**
Code 18 - **Other Gravity System** -- Specify Type

Each of these irrigation systems is described in **Exhibits 5** and **6** at the end of this section. The descriptions are designed to explain system characteristics

and how the system applies the water to the field. These systems are on-farm, field-level irrigation technologies and do not describe the water distribution systems of an irrigation district or company.

Additional system descriptions are provided in **Exhibits 5** for an end-tow sprinkler and carousel sprinkler-traveler system. If either of these systems are used on the field, enter them as a side roll/wheel line system using a code 3.

Additional system descriptions are also provided in **Exhibits 5** for big-gun systems, including descriptions for a self-propelled big-gun system, and descriptions for both reel-type hose pull and reel-type cable pull systems that use large gun-type sprinklers. Each of these systems should be entered as a big-gun system using a code 7.

Item 2b Total inches of water applied per acre

Record the total number of inches of water applied per acre to the target commodity in the selected field during the entire 1997 crop year. In *V2* and *V3*, record this separately for each Irrigation System Type recorded in Item 2a. Include any preplant water application.

Item 2c & 2c(1) Estimating water applied

These items are asked only if the operator cannot provide a response to Item 2b.

Item 2c Total hours water applied

The operator should estimate the total amount of time (in hours) that water was applied to the selected crop in the field during the 1997 growing season. In *V2* and *V3*, this should be obtained separately for each irrigation system. This is equivalent to estimating (for each system) the total number of hours each system was in operation for the selected field during 1997. It is possible for some fields for the total hours of system operation to range from one to greater than 1000 hours.

For example, if a system was used to irrigate a field three different times during the growing season - once continuously for six days, the second time for eight days (but only from 8 p.m. to 8 a.m. daily), and the third time continuously for six more days - then the total number of hours this system irrigated this field was 384. This is computed as follows:

First irrigation: 6 days (irrigation non-stop, day and night) 6 x 24 = 144 hours
Second irrigation: 8 days (irrigation from 8 p.m. to 8 a.m. daily) 8 x 12 = 96 hours
Third irrigation: 6 days (irrigation non-stop, day and night) 6 x 24 = 144 hours

Total = 384 hours

Item 2c(1) Average gallons per minute

V5, V6, V7, V8, V9, & V10

Corn, Soybean, Wheat, Cotton, Potatoes

Record the operator's best estimate of the average gallons per minute that the irrigation system(s) applied water to the selected field during the hours of irrigation reported in Item 2c.

Item 2d Percent surface water used

Water sources can involve surface water and/or ground water (water from wells). Sometimes the same acres are irrigated using more than one source of water. Record the operator's best estimate of the percent of all the water used to irrigate the selected field from surface water sources.

Surface Water Sources: Surface water is water stored in natural ponds or lakes, flowing in streams and rivers, and water stored in man-made reservoirs. Surface water can originate on the farm or from off-farm sources. Water sources are different from water suppliers. Here, it does not matter who supplied the water to the farm. It only matters whether the water originated from a surface-water source.

Sometimes a single irrigation system uses more than one source of water. For each system type reported in *V2* and *V3*, record the operator's best estimate of the percent of the total water the system used to irrigate the selected field from surface water sources. Percents for each system can range from zero to 100 percent.

Item 2e Number of times field was irrigated

The number of times a field is irrigated during the growing season will vary across farms depending upon the system, and other characteristics such as soil type and season weather.

Record the number of times the selected field was irrigated during the 1997 crop year. A time period generally involves an uninterrupted amount of time the system was actively irrigating the field. Include all applications of water made to benefit the 1997 crop-year production for the selected field. Include any pre-plant water applications.

For each irrigation system reported in *V2* or *V3*, record the number of times each system was used to irrigate the selected field for the 1997 crop.

For example, if a system was actively irrigating a field first for 6 days, later for 8 more days, later still for 5 more days, and finally later for 4 more days, then this system irrigated this field 4 different times during the growing season.

If the system operated continuously during the crop season, this would be counted as 1 irrigation.

Item 2f Pump type

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

To apply water to a field, some irrigation systems may have to lift the water from a well and/or put the water under pressure to distribute it across the field. Systems that pressurize water do so using a pump. For each system reported, identify and record the code for the most common pump type used to lift and/or distribute water across the field.

The Codes for Pump Type Are:

Code 1 - **Turbine**
Code 2 - **Submersible**
Code 3 - **Centrifugal**
Code 4 - **Booster**
Code 5 - **Siphon**
Code 99 - **No Pump**

If there is more than one pump used with a single system, such as a booster pump, etc., record the pump type for the pump on the farm, closest to the water source for the field.

Exclude pumps owned and operated by an irrigation company or district even if the respondent is part-owner of the irrigation company.

If no pumps were used to get water to the field or to apply it (water flows by gravity only), enter code 99 and go to Item 2k.

Item 2g Average pumping rate

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

For each system reported, enter the average pumping rate in gallons per minute (GPM) for the pump type recorded for that system. Report the pumping rate(s) used during normal operation.

Item 2h System operating pressure

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

If the system type recorded in item 2a is NOT a Pressure System (codes 1 through 9), skip to Item 2i.

Ask this item whenever a pressure irrigation system is used (Item 2a is code 1-9). Enter the average system operating pressure in pounds per square inch (PSI). Report the system operating pressure used during normal operation.

Item 2i Pump motor type

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

Systems using a pump to deliver water to the field require a motor to operate the pump. For each system reported, enter the code which identifies the fuel or power type for the motor used to operate the pump type entered in Item 2f.

If a tractor was used, enter the motor type of the tractor.

The codes for motor type are:

Code 1 - **Diesel**
Code 2 - **Gasoline**
Code 3 - **LP Gas**
Code 4 - **Natural Gas**
Code 5 - **Electricity**
Code 6 - **Solar Power**

Item 2j Average pump motor size

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

Enter the average horsepower rating of the motor type recorded in Item 2i. For tractors enter the PTO horsepower.

Item 2k Average flow rate

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

This item is asked only for the system(s) the respondent indicates that **NO PUMP** was used (code 99 entered in Item 2f).

If no pump was used with a system, then the respondent should estimate the average flow rate in gallons per minute that the irrigation system applied water to the selected field.

Item 3 Purchased water

If any water was purchased to irrigate the selected field, enter code 1 for YES and continue.

V2 & V3: If no water was purchased, go to Item 4.

V5, v6, V7, V8, V9 & V10: If no water was purchased, go to Item 7.

Water is considered purchased if the operator and/or landlord paid a fee for water used on the selected field and the water originates from an off-farm source. Do not consider water pumped from on-farm sources to be purchased water.

Water may be purchased from the U.S. Bureau of Reclamation; an irrigation district; mutual, private, cooperative, or neighborhood ditch associations or canal companies; and commercial or municipal water systems. The purchase fee may be a yearly fee or charges for each application of irrigation water.

Water that comes from an irrigation district, water-supply ditch association, or canal company should be considered purchased water no matter where the off-farm water supplier got the water. These water suppliers generally provide water through canals which are served with water from lakes, reservoirs, or rivers and streams. All water supplied by these organizations should be listed as purchased water. Even if an irrigation district, water-supply ditch association, or canal company does not charge a water fee, but only charges the producer for the cost of water delivery or for the maintenance cost of water delivery facilities, **report the water as purchased water**.

Sometimes a farmer near an area served by an irrigation district is charged a fee by the irrigation district even if the farm doesn't get any water from that district. The fee may be charged because there is a value attached to the groundwater recharge which occurs due to the use of irrigation district water by other irrigators in the area. When the operator pays a fee of this sort, but doesn't irrigate using irrigation district water, do not record the field as being irrigated with purchased water.

Item 3a Percent purchased water

Record the operator's best estimate of the percentage of all the water applied to the selected field during the 1997 growing season that was purchased from off-farm water sources. The percentage may range from zero to 100 percent.

Item 3b Purchased water cost

Record only the total cost of the water purchased from off-farm water sources that was used to irrigate the **selected target commodity** in **the selected field** for the 1997 growing season. Purchased water costs include the water fees and costs that are incurred to deliver the off-farm water to the farm for this field.

Include in the expenses associated with purchasing the off-farm water used on the selected field:

- fees associated with the water quantity;
- all fees not associated with water quantities, such as fees charged to cover water delivery and maintenance costs incurred by the off-farm water supplier; and
- any purchased water costs paid for by the landlord.

Exclude any costs associated with pumping or distributing the water on the farm or the selected field.

Item 4 Replacement cost for siphon tubes

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

Ask this item only if a siphon-tube gravity system was used to irrigate the selected field of the target crop during the 1997 growing season (either column of Item 2a is code 10 or 11).

Record the operator's best estimate of the total cost to replace all of the siphon tubes used on the selected field. This item provides data to calculate a cost for the irrigation system.

Item 5 Cost for poly pipe

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

Ask this item only if poly pipe was used to irrigate the selected field of the target crop during the 1997 growing season (either column of Item 2a is code 14).

Record the total expense for poly pipe used to irrigate the selected field. This item provides data to calculate a cost for the irrigation system.

Item 6 Gated pipe system used

Ask Items 6a and 6b ONLY if a gated-pipe system was reported (either column of Item 2a is code 15 or 16).

Item 6a Average diameter of gated pipe

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

Record the average diameter of the gated pipe used for irrigating the selected field during the 1997 growing season.

Item 6b Total length of gated pipe for field

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

Record the total length (in feet) of all the gated pipe used in irrigating the selected field during the 1997 growing season.

Item 7 Water from wells

If water from wells (ground water) was used to irrigate the selected target commodity field for the 1997 crop, enter code 1 for YES and continue.

V2 & V3: If water from wells was not used to irrigate the selected field, go to Item 8.

V5, V6, V7, V8, V9 & V10: If water from wells was not used to irrigate the selected field, go to the Conclusion.

Item 7a Number of wells

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

Record the number of wells used to irrigate the selected field during the 1997 growing season. The wells could also have been used to irrigate other fields, but they must have been used at least partly to irrigate this field.

Item 7b Average well casing diameter

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

Record the average diameter of the outer well casing of all the wells used to irrigate the selected field during 1997. The average diameter of the outer well casing will probably be between 12 and 36 inches; 20 inch casings are relatively standard throughout much of the West. Do not record the average diameter of the well column pipes (the well pipes the pumps are attached to).

Item 7c Average pumping depth

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

Record the average pumping depth (in feet) of the wells used to irrigate the selected field during 1997.

Well pumping depths depend on the level of the water table and the amount of drawdown on the water table during pumping. In other words, pumping depth is the depth to water at the start of the irrigation season, plus an average decline in the water level caused by pumping during the irrigation season.

Item 7d Other acres irrigated from these wells

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

Record the number of ALL other crop acres (including other acres of the commodity of interest) and pasture land irrigated on this operation using the same wells used to irrigate this field. Exclude the acres of the selected field.

Item 7e Pumping costs

Record the total fuel and power expenses incurred to pump the irrigation water from wells used to apply water to the selected field during 1997.

Fuel and power pumping costs may include expenses for fuels, lubrication, and electricity. Include the landlord's share of total pumping costs and any pumping expenses incurred for preplant irrigation applications.

Item 8 Additional pipe used

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

This question is asked to find out if any other pipe besides pipe that was part of the irrigation system itself was used for irrigating the selected field during 1997. Additional pipe includes mainline or lateral pipe but not the pipe that is in the system itself. If additional pipe was used on the selected field, enter code 1 for YES and continue. If no additional pipe was used, go to Item 9.

A mainline pipe connects the pump or water source and the field or the lateral pipes. Mainline pipes can be either portable or buried in the ground.

Lateral pipes are pipes that carry water from the mainline pipe to the discharge or distribution point in the field. There can be more than one lateral pipe, and they can be permanent or portable.

Item 8a Most common type of additional pipe used

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

Enter the code for the most common type of mainline or lateral pipe used. Exclude pipe that is part of the irrigation system, such as gated pipe, sprinkler pipe, etc.

Item 8b Average diameter of additional pipe used

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

Record the diameter in inches of the additional mainline or lateral pipe used. If there are different diameters of pipe used, record the average diameter.

Item 8c Feet of additional pipe used

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

Enter the total feet of mainline or lateral pipe used to carry water to the selected field during 1997. Exclude pipe that is part of the irrigation system, such as gated pipe, sprinkler pipe, etc.

Item 9 Field run-off

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

Record the code the operator indicates best describes what happens to the run-off from irrigation for the selected field.

Field run-off is the portion of the irrigation water applied to the field that does not soak into the soil in the part of the field where the crop is growing. It flows across a field and collects to form a pool of extra water at the end of the field, or it flows off the field. The pool of extra water is not large enough or doesn't last long enough to prevent normal farming operations for the field;

This question is like a multiple choice question. Be sure to read ALL of the items in the Run-Off Code List before accepting an answer from the respondent. The respondent may want to answer before hearing all the possible answers, and one of the later codes may be the best answer. Do not ask "Was there any run-off from this field?"or "What happens to the run-off from this field?". These questions are not correct. Many operators will say there is no run-off when, in fact, one of the other codes is what really happens. The respondent will not know that these codes are acceptable answers if you don't read ALL of them before accepting an answer.

The codes describing field run-off are:

Code 1 - **Retained at the End of the Field**: This is when the pool of extra water is held at the end of the field because the field is bordered or there is a natural basin at the end of the field. The run-off is not re-used for irrigation.

Code 2 - **Re-used to Irrigate on the Farm**: Extra irrigation water from the field collects in an on-farm lake, pond, or pit below the field, and is re-used to irrigate the same field or another field on the farm.

Code 3 - **Collected in Evaporation Ponds on the Farm**: The extra irrigation water collected in an on-farm pond or pit below the field is not re-used for irrigation. Instead it remains in the pond or pit until it evaporates. Evaporation ponds are sometimes used for disposal of poor quality drainage flows.

Code 4 - **Drained from the Farm**: Run-off drains off the field and away from the farm through man-made drainage ditches or natural water courses. Run-off drained from a farm may be recovered by another farm or it may re-enter the water supply downstream as return flow.

Code 5 - **No Run-off**: Irrigation water is applied to the field so that no extra water collects at the end of the field or drains from the field.

Exhibit 5: Types of PRESSURE Irrigation Systems

Hand-move Sprinkler System (Code 1)	Portable pipe system, usually aluminum pipe, which must be moved by hand one or more times per day during irrigation periods. Irrigation requirements of the field are met by successive moves of the system to water one strip of the field at a time (an irrigation set). The system's sprinklers can use a variety of orifice sizes and configurations. The system may be adapted to most soil types, topography, field size and shapes; however, it is not suited for all crops since tall crops, such as corn, hinder pipe movement. The sprinkler line(s) are served water by mainlines of aluminum or PVC that may be buried or above ground.
Solid-set or Permanent Sprinkler Systems (Code 2)	A buried pipe system with only the risers and sprinklers above ground, or a portable pipe system which is placed in the field at the start of the irrigation season and left in place to the season end. Both of these system types require no labor to move the system to a new location once established for the irrigation season. Adapted to most crops, soil types, topography, field sizes and shapes.

Side-roll or Wheel-line Sprinkler Systems (Code 3)	A wheel-move, lateral-line system which moves as a unit in fixed increments (irrigation sets) across the field. The system is powered by a small gasoline engine that is manually operated. The system is stationary while irrigation is taking place. Some variations of the system may have tow lines trailing the main lateral line with additional sprinklers on each tow line. Tow line systems irrigate a wider strip at each set, up to 180 feet compared to the 60-foot strip of standard side-roll systems. Wheels are generally spaced 40 feet apart and are 5-7 foot in diameter, with the main system pipe serving as an axle in the middle of the wheel. The system is designed for reasonably flat, rectangular or square fields and is suited to crops less than 4 feet in height. The sprinkler may use flexible hose, aluminum pipe, or PVC pipe to connect to mainlines (above or below ground) or on-site pressurization pumps.
End-tow Sprinkler System *INCLUDE as a side-roll system (Code 3)*	Wheel or skid, lateral-line system which is end-towed via tractor to new locations in the field. The system is stationary while irrigation is taking place. System is designed for reasonably flat or slightly rolling, rectangular or square fields with an alley through the center of the field. Designed for hay and pasture irrigation, the system may be used on some row crops and orchards.
Carousel Sprinkler-traveler System *INCLUDE as a side-roll system (Code 3).*	Wheel-mounted system with a rotating boom that sprinkles or sprays water. The system may be self-propelled with a mounted engine, or towed via pick-up or tractor to the next field location (irrigation set). Water is supplied to the system by hose or supply ditch.

Center Pivot or Linear Move with Sprinklers on Main Line (Code 4)	Self-propelled, continuous-move sprinkler system that either travels in a circle (center pivot) or laterally (linear move) across a field. Sprinklers are located directly on the system's main water-supply pipe, which is supported by A-frame towers. Some circle systems have features that provide coverage of most of the corners on a square field. Some systems may be towed to adjacent fields to increase system use by irrigating a different crop with different timing of water needs. Water is delivered to a fixed center point for center-pivot systems and by hose or supply ditch for lateral move systems. Center-pivot systems have been developed for areas from 40 to 240 acres, but most systems irrigate 128-132 acres of a square 160 acre field. Lateral moves require a square or rectangular field of 40 to 240 acres. These systems may be adapted to most crops, soil types, and level to gently-rolling topography. Systems with sprinklers directly on the main water-supply line will tend to be medium to higher pressure (above 30 psi) and use impact sprinklers.

Center Pivot or Linear Move, with Sprinklers below the Main Line, but More than 2 Feet above the Ground (Code 5)

Self-propelled, continuous-move sprinkler system that either travels in a circle (center pivot) or laterally (linear move) across a field. Sprinklers or sprayers are located on drop-tubes or booms suspended below the system's main water-supply pipe, but more than 2 feet above the ground. This includes most standard drop-tube sprinkler systems.

Some circle systems have features that provide coverage of most of the corners on a square field. Some systems may be towed to adjacent fields to increase system use by irrigating a different crop with different timing of water needs. Water is delivered to a fixed center point for center-pivot systems and by hose or supply ditch for lateral move systems. Center-pivot systems have been developed for areas from 40 to 240 acres, but most systems irrigate 128-132 acres of a square 160 acre field. Lateral moves require a square or rectangular field of 40 to 240 acres. These systems may be adapted to most crops, soil types, and level to gently-rolling topography. Systems with sprinklers below the main water-supply line will tend to be lower pressure (below 30 psi), with spray nozzles rather than impact sprinklers.

Center Pivot or Linear Move, with Sprinklers less than 2 Feet above the Ground (Code 6)	Self-propelled, continuous-move sprinkler system that either travels in a circle (center pivot) or laterally (linear move) across a field. Sprinklers or sprayers are located on drop-tubes suspended below the system's main water-supply pipe and are located less than 2 feet above the ground. This includes low pressure precision application systems (LEPA) and other below-the-crop-canopy systems. Some circle systems have features that provide coverage of most of the corners on a square field. Some systems may be towed to adjacent fields to increase system use by irrigating a different crop with different timing of water needs. Water is delivered to a fixed center point for center-pivot systems and by hose or supply ditch for lateral move. Center-pivot systems have been developed for areas from 40 to 240 acres, but most systems irrigate 128-132 acres of a square 160 acre field. Lateral moves require a square or rectangular field of 40 to 240 acres. These systems may be adapted to most crops, soil types, and level to gently-rolling topography. Systems with sprinklers suspended to within 2 feet of the ground tend to be very low pressure (below 15 psi) and use spray nozzles and bubblers. Some units may run water directly on the ground using a cloth-like extension attached to the drop tube.

Big Gun (Code 7)	A single, large gun-type sprinkler mounted on a trailer, carriage, or skid. Water is supplied to the sprinkler through a flexible hose. The mounted gun sprinkler is either pulled across a field or moved across a field using a self-propelled drive system for each irrigation set. An irrigation set is the area of the field that is irrigated by the gun sprinkler as it moves across the field. When an irrigation set is completed, the entire system is moved and the process repeated. The system is designed for straight rows, flat topography, and medium to high infiltration soils. It is best suited for crops that can withstand heavy bursts of water. Systems are high pressure, greater than 60 psi. Three specialty-type big-gun systems are defined below, including a self-propelled gun traveler system, a reel-type hose pull system, and a reel-type cable pull system.
Self-propelled Gun Traveler *INCLUDE as a big gun system (Code 7).*	Single, large gun on a four-wheel trailer. Self propelled by a separate engine or a hydraulic continuous move. Water is supplied through a flexible hose. Systems are high pressure, greater than 60 psi.
Reel-type Hose Pull *INCLUDE as a big gun system (Code 7).*	Single, large gun-type sprinkler on a carriage. A flexible, but noncollapsible hose is attached to a large reel at one end of the field. The carriage and sprinkler is attached to the unrolled hose and stationed at the other end of the field. Water movement through the hose activates a drive system that rolls the hose on the reel, drawing the sprinkler and carriage across the field. When an irrigation set is completed, the reel, sprinkler, and carriage may be moved and the process repeated. Systems are high pressure, greater than 60 psi.

Reel-type Cable Pull *INCLUDE as a big gun system (Code 7).*	Similar to hose-pull system, except a cable is used to reel the gun-type sprinkler and carriage across the field. This enables a flexible, collapsible hose to be pulled behind the carriage. When an irrigation set is completed, the cable reel, hose, sprinkler, and carriage may be moved and the process repeated. The system often requires a grass strip to operate on since the hose is pulled behind the unit. Systems are high pressure, greater than 60 psi.
Low-flow Irrigation System (Drip, Trickle, Micro Sprinkler) (Code 8)	Low-pressure systems designed for frequent water applications using small-diameter tubing and low-volume emitters to distribute water directly to the crop root zone. Tubing and emitters can be installed below ground, under plastic or mulch, or above ground, and alternatively, tubing may be installed below ground with emitters on risers above ground. While used primarily on trees, vines, and vegetable crops, these systems are only in limited use on field crops due to the high initial capital costs. Drip and trickle systems have been adapted to all crop types; micro-sprinklers are generally used on perennial crops where a larger wetted area is needed to encourage root development. These systems are adaptable to most soils and may be used on topography where slope prevents irrigation from other system types.

Exhibit 6: Types of GRAVITY-FLOW Irrigation Systems

Siphon-tube System with Unlined Ditches (Code 10)	System uses short curved tubes, usually aluminum or plastic, to siphon water onto a field from an **unlined** ditch across the head of the field. Siphon tubes are curved to fit over the ditch bank and most range from 1 to 3 inches in diameter and from 3 to 5 feet in length. Water, once on the field, may flow down furrows, between borders or dikes, or in corrugations. The unlined ditch is formed with mechanical operations using only the soil on the field. The ditch may be reformed each year or reused with maintenance.
Siphon-tube System with Lined Ditches (Code 11)	System uses short curved tubes, usually aluminum or plastic, to siphon water onto a field from a **lined** ditch across the head of the field. Siphon tubes are curved to fit over the ditch bank and most range from 1 to 3 inches in diameter and from 3 to 5 feet in length. Water, once on the field, may flow down furrows, between borders or dikes, or in corrugations. The ditch may be lined with concrete, plastic, clay, or other nonporous material. The ditch is permanent and is reused each year.
Portal- or Ditch-gate System with Unlined Ditches (Code 12)	System uses openings in the ditch bank, either portals with covers or tubular openings closed with a gate, to discharge water onto a field from an **unlined** ditch across the head of the field. Portals in the ditch bank can be of any diameter and are covered with a metal, plastic, or wood cover to regulate water flow onto the field. Ditch openings can be any size, including openings for the entire flow of the ditch, and water-flow control gates can be made of wood, metal, plastic, or canvas. Water, once on the field, may flow down furrows, between borders or dikes, or in corrugations. The unlined ditch is formed with mechanical operations using only the soil on the field. The ditch may be reformed each year or reused with maintenance.

Portal- or Ditch-gate System with Lined Ditches (Code 13)	System uses openings in the ditch bank, either portals with covers or tubular openings closed with a gate, to discharge water onto a field from a **lined** ditch across the head of the field. Portals in the ditch bank can be of any diameter and covered with a metal, plastic, or wood cover to regulate water flow onto the field. Ditch openings can be any size, including openings for the entire flow of the ditch, and water-flow control gates can be made of wood, metal, plastic, or canvas. Water, once on the field, may flow down furrows, between borders or dikes, or in corrugations. The ditch may be lined with concrete, plastic, clay, or other nonporous material. The ditch is permanent and is reused each year.
Poly Pipe System (Code 14)	A system using a flexible, collapsible, plastic (polyethylene) tube up to 18 inches in diameter. The poly-tubing is unrolled along the head of the field and holes punched or closeable gates installed to match furrow, border, or dike width. A well or supply canal provides water to the tube. The tube is installed at the beginning of the irrigation season, and since it lays flat when not in use, can remain in the field the entire season. The tubing may be reused for more than one year, but single season use is most common.
Gated Pipe (Not Poly) (Code 15)	A system using rigid PVC plastic or aluminum pipe with manually-operated closeable gates at regular intervals. The pipe is installed at the head of the field, but may need to be removed for cultural operations or moved to new field locations through the season. The gates usually match row widths so water can flow directly into rows. Gated-pipe systems may also be used on flood or corrugation water-control systems. The pipe is reused for many years.

Improved Gated Pipe System (Surge Flow or Cablegation, Not Poly) (Code 16)	A system using rigid PVC plastic or aluminum pipe with manually-operated closeable gates at regular intervals, but with an **automated water-control system**. Automated water control is achieved by (1) using a surge valve to alternate pipe sets receiving water, (2) using a moveable plug inside the gated pipe, controlled by a cable, to adjust the water flow from open gates, or (3) other automated methods using gated pipe to control water flow and improve the uniformity of water applications, such as pneumatically controlled bladders to regulate water flow on individual gates. Gated pipe is installed across the head of the field, but may need to be removed for cultural operations or moved to new field locations through the season. The gates usually match row widths so water can flow directly into rows. Gated-pipe systems may also be used on flood or corrugation water-control systems. The pipe is reused for many years.
Sub-irrigation (Code 17)	Maintenance of a water table at a predetermined depth below the field surface by using ditches or sub-surface drains and water-control structures. Water is added or removed as needed to maintain the water level of the water table at a specific depth using the ditches or drains. Lateral movement of water through the soil provides water to the crop root zone. Conditions for use of this system are limited. Land must be flat and suitable for rapid lateral water movement. The irrigation system may also be used as a drainage system.

Section H - Drying

V2 only

Soybean Production Practices & Costs Report

What is Section H for? How is this information used?

Engineering relationships are used to estimate the operating and ownership costs of drying facilities. The drying systems use various fuels as a heat source and electricity to power the fans that force the air through the grain. The costs are added to other costs for things such as fuels and electricity, repairs, etc.

Item 1 Drying method

Record whether soybeans from the selected field were (or will be, if harvest is not complete):

Code 1 = **Custom Dried**
Code 2 = **Dried Other Than Custom Dried**
Code 3 = **Not Dried**

If more than one of these choices apply for the soybeans harvested from the selected field, use the code for the choice that applies to the largest portion of the crop harvested from this field.

Custom drying may also be called commercial drying. If drying facilities on another operation were used to dry the soybeans from the selected field, record this as custom dried.

Include the landlord's share of the crop from this field.

Code 1: If custom dried, continue with Item 2.
Code 2: If dried other than custom dried, skip to item 3.
Code 3: If not dried, skip to Section I

Item 2 Custom drying cost

If the soybeans from this field were custom dried (Item 1 = Code 1), record the amount paid by the operator in either cents per bushel or total dollars for custom drying the soybeans from the selected field.

If drying facilities on another operation were used to dry the crop from the selected field, record any rent paid for using the drying facilities. Record the operator's estimate of the value of the drying if no direct cash payment was made (for example, if the commodity was dried free-of-charge on another operation).

Exclude landlord expense.

Item 3 Dried other than custom

If the soybeans from the selected field were dried but not custom dried (Item 1 = Code 2), complete Items 3a and 3b

Item 3a Type of fuel used to dry crop from selected field

Record the main fuel type used to dry the crop from the selected field. Choices are:

Code 1: **Diesel**
Code 2: **Gasoline**
Code 3: **LP Gas**
Code 4: **Natural Gas**
Code 5: **Electricity**
Code 6: **Other**

If more than one fuel type was used to dry the crop from the selected field, enter the code for the type of fuel used to dry most of the crop.

Item 3b Average moisture removed by drying

Ask the respondent to estimate the average percent of moisture dried from the soybeans from the selected field.

Section I - Landlord Costs

V2 & V3 Only

Soybean & Cotton Production Practices & Costs only

What is Section I for? How is the information used?

If the selected field was rented, the landlord may have paid some of the variable costs associated with producing the crop. This is more common with share rented land, but it can happen in cash or rent-free rental arrangements.

This section obtains variable expenses paid by landlords to produce the target crop. These figures are added to the expenses provided by operators for to develop estimates of the total costs incurred to produce the target crop in the selected field.

It's even more important to have a good estimate of landlord expenses when the operation's expenses are expanded determine the costs of producing the target crop. If landlord expenses are incomplete or understated, then total expenses will be understated.

Item 1 Landlord share of expenses

Item 1a Landlord seed cost

Record the landlord's share of the seed cost for the target commodity in the selected field, either in percent or in total dollars.

Item 1b Landlord custom fertilizer application cost

Record the landlord's share of the cost of custom fertilizer applications made on the selected field for the 1997 crop of the target commodity. Exclude material costs; these should be recorded in Item 1c. Enter percent or total dollars. Refer to Item 2 in Section C for the total cost, including the landlord's share.

Item 1c Landlord fertilizer materials cost

Record the landlord's share of the cost of fertilizer materials (fertilizers, soil conditioners, and micronutrients) applied to this field for the 1997 crop. Exclude application costs; these should be recorded in Item 1b. Enter percent or total dollars. Refer to Item 3 in Section C for the total cost, including the landlord's share.

Item 1d Landlord custom chemical/pesticide application cost

Record the landlord's share of the cost of custom chemical/pesticide applications made on the selected commodity field for the 1997 crop. Exclude material costs; these should be recorded in Item 1e. Record percent or total dollars. Refer to Item 2 in Section D for the total cost, including the landlord's share.

Item 1e Landlord chemical/pesticide materials cost

Record the landlord's share of the cost of chemical/pesticide materials applied to the selected commodity field for the 1997 crop. Exclude application costs; these should be recorded in Item 1d. Record percent or total dollars. Refer to Item 3 in Section D for the total cost, including the landlord's share.

Item 1f Landlord cost for soil/plant tests

Record the landlord's share of the costs of soil/plant tests for the selected field, either in percent or in total dollars. Refer to Item 6c in Section C for the total cost, including the landlord's share.

Item 1g Landlord cost of scouting services

Record the landlord's share of the cost of scouting services for the selected field, either in percent or in total dollars. Refer to Item 3 in Section E for the total cost, including the landlord's share.

Item 1h Landlord cost of biological pest control

V3 only

Cotton Production Practices and Costs only

Record the landlord's share of the cost of biological pest controls for the selected field, either in percent or in total dollars. Refer to Item 18 in Section E for the total cost, including the landlord's share.

Item 1i Landlord cost of other custom technical services

Record the landlord's share of the cost of other custom technical services (not accounted for in Items 1f, 1g, or 1h) used on the selected field, either in percent or in total dollars. Refer to Item 10 in Section F to see if any per acre amounts were entered in Item 10e.

Item 1j Landlord cost of custom land preparation

Record the landlord's share of the cost of custom land preparation for the target commodity in the selected field, either in percent or in total dollars. Refer to Item 10a in Section F to see if any per acre amounts were entered.

Item 1k Landlord cost of custom cultivating

Record the landlord's share of the cost of custom cultivating for the target commodity in the selected field, either in percent or in total dollars. Refer to Item 10b in Section F to see if any per acre amounts were entered.

Item 1*l* Landlord cost of custom planting

Record the landlord's share of the cost of custom planting for the target commodity in the selected field, either in percent or in total dollars. Refer to Item 10c in Section F to see if any per acre amounts were entered.

Item 1m Landlord cost of custom harvesting

Record the landlord's share of the cost of custom harvesting of the target commodity in the selected field, either in percent or in total dollars. Refer to Item 10d in Section F to see if any per acre amounts were entered.

Item 1m Landlord cost of custom harvesting

Record the landlord's share of the cost of custom hauling of the target commodity from the selected field, either in percent or in total dollars. Refer to Item 10d in Section F to see if any per acre amounts were entered.

Item 1n Landlord cost of custom drying

V2 only

Soybean Production Practices and Costs only

Record the landlord's share of the cost of custom drying the target commodity, either in percent or in total dollars. Refer to Item 1 in Section H to see if any of the target crop was custom dried

Items 1o - 1q Landlord irrigation and water management expense

In Items 1o - 1q, enter the landlord's share of irrigation costs incurred only for the selected field of the target commodity during the 1997 irrigation season. If the landlord owns and maintains the irrigation system and pays all costs, probe for the operator's best estimate of the landlord's costs for the selected field for each cost Item 1o - 1q. Refer to Item 1 in Section G to see if any of the target crop was irrigated. If not, skip to Section J.

Item 1o Landlord irrigation fuel expense

Record the landlord's share of total expenses for fuels, lubrication, and electricity used to irrigate the selected field of the target commodity for the 1997 irrigation season. Enter the landlord's share in either percent or total dollars. Refer to Item 7e in Section H to see if any cost was incurred for fuel and power to irrigate the 1997 target crop in this field.

Item 1p Landlord irrigation repair expense

Record the landlord's share of total expenses for repairs made to the irrigation equipment used to irrigate the selected field of the target commodity for the 1997 irrigation season. Enter the landlord's share in either percent or total dollars.

Item 1q Landlord irrigation water expense

Record the landlord's share of the total purchase cost of the irrigation water purchased to irrigate the selected field of the target commodity for the 1997 irrigation season. Enter the landlord's share in either percent or total dollars. (Purchased water is water purchased from an off-farm water source as defined for Item 3, Section G.) Refer to Item 3b in Section G to see if any water was purchased to irrigate this field.

Section J - Vehicles and Trucks- Enterprise

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

What is Section J for? How is the information used?

With the exception of the land, a farm or ranch operator has more money invested in machinery and equipment than in any other input. An operator also spends more time in field work than in any other endeavor. ERS uses the data collected in Section J in two ways. By itemizing the vehicles and trucks, along with the tractors picked up in Section F, we can estimate the amount of capital invested in machinery. These estimates are used in the cost of production budgets in assigning annual costs for "capital replacement" and "other non-land capital." Operators do not pay this amount each year, but when they purchase machinery, they amortize the cost over the life of the machine. ERS estimates a capital replacement and other nonland capital cost based on the total value of the machinery.

Item 1 Introduction

The introduction to this section is very important to inform the respondent that you are now shifting the frame of reference for obtaining information. Most of the interview questions related only to the selected field. Both you and the respondent have become very accustomed to thinking only about the selected field and the various activities and equipment required to produce the selected target crop (soybeans or cotton) on that field.

For the remainder of the interview, you will be obtaining information related to entire target crop (soybeans or cotton) enterprise. **Now both you and the respondent must shift gears from thinking about only the selected field to thinking about the entire enterprise**. Inform the respondent that you are done with questions only about the selected field, and that your remaining questions relate to the entire target crop (soybean or cotton) enterprise. It takes only a moment to make this clear to the respondent in the introduction to this section. Otherwise confusion may result that will likely take additional time to clear up or will result in incorrect data being collected.

Shifting to enterprise-level amounts to only one section of questions about vehicle and truck use. The reason for the shift from collecting information about only a selected field to collecting information to the enterprise is

because it is difficult for respondents to isolate these items directly to a single field of soybean or cotton production.

Vehicles Table

Count all of the **pick-ups, cars, sport utility vehicles, all-terrain vehicles (ATVs) and motorcycles** owned, leased, rented or borrowed, if they were used for the **any of the 1997 crop, not just those used on the selected field.**

Exclude:

- vehicles used by custom operators,
- vehicles owned by the operation but used ONLY for custom work, and
- vehicles used ONLY for other commodities or ONLY on other operations.

Only count vehicles used for the target commodity (soybean or cotton) enterprise.

Number of pick-ups, cars, sport utility vehicles, ATVs and motorcycles (Column 2)

Enter the total number of each type of vehicle used for the target commodity enterprise. Sport utility vehicles are usually four-wheel drive and include such models as Jeeps, Explorers, Broncos, Blazers, etc.

Total miles driven by these vehicles (Column 3)

Report the total miles driven by all of the vehicles listed on that line FOR FARM USE during the last 12 months. Include all mileage driven on farm related business, such as trips to town for parts, visits to offices of USDA's Farm Service Agency (FSA), accountants, etc.

Miles for target commodity enterprise (Column 4)

Record the operator's best estimate of the total miles, or percent of the total miles driven that was for the target commodity (soybean or cotton) enterprise.

Trucks Table

Include trucks that were owned, rented, leased or borrowed by the operation and used for **any of the 1997 crop of the target commodity, not just for the selected field**. Trucks owned in partnership should also be included.

Exclude:

- trucks used by custom operators,
- trucks owned by the operation which were ONLY used for custom work,
- trucks ONLY used for other commodities or ONLY used on other operations, and
- pick-ups and sport utility vehicles recorded earlier.

Don't list the same truck on more than one line.

If more than the available number of lines are needed, use a TRUCKS AND TRACTORS SUPPLEMENT. Copy the identification as it appears on the main questionnaire to the identification box on the supplement and assign supplement code 01, 02, 03, 04, etc. to each page. Use as many supplements as you need.

Truck make (Column 1)

Enter the make of each truck. You must account for all trucks used for the production of the 1997 soybean or cotton crop. It may be easier to start with the smallest truck and go to the largest. Exclude pickups and sport utility vehicles; they should be recorded in the table at the top of the page.

Fuel type (Column 2)

Enter the code for the type of fuel used:.

Code 1 - **Diesel**
Code 2 - **Gasoline**
Code 3 - **LP Gas** (Liquefied Petroleum or Propane)
Code 9 - **Other**

In many states, products sold as gasoline contain ethanol. For the purposes of this survey, if the product is sold as gasoline or gasohol, record it as gasoline (code 2). If the fuel used for the tractor is ethanol or mostly ethanol, use code 9.

Size (Column 3)

Enter the size code for each truck:

Code 1 - **Single Axle**
Code 2 - **Tandem Axle**
Code 3 - **Semi**

Total miles for farm use (Column 4)

For each of the trucks listed, record the operator's best estimate of the total number of miles driven during the last 12 months for all farm-related purposes. Don't include mileage driven for operations other than the selected operation.

Percent for commodity (Column 5)

Record the operator's best estimate of the total miles or percentage of all farm-use miles driven (recorded in Column 4) which were for the target commodity (soybean or cotton) enterprise.

Back Cover - Conclusion

Item 1 Location of Selected Field

Tell the respondent that you need to mark the location of the selected field(s) of the target commodity on a map. On *Version 10*, you will locate the selected field of *target commodity 1* and *target commodity 2*.

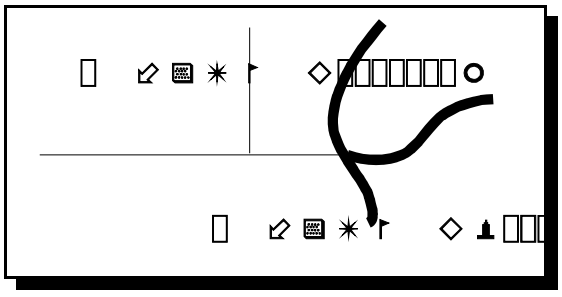
Ask the respondent what county the selected field is located in, and record the county name in the space provided.

Mark the location of the selected field of the target commodity with an "X" on the county maps provided by the Office. Verify with the respondent that you have located the field correctly. Be sure that the "X" you mark on the map is in the county named in Item 1.

Next to the "X", record "1-" followed by the sequence (sample) number that appears on the label on the Face Page of the questionnaire. The "1" indicates that this is an ARMS survey sample. This identification code is needed to link the "X" on the map with the data in the completed questionnaire.

For ***V10***, record the name of the selected commodity next to the "X".

An example of plotting the location of two selected fields for a *Version 10* appears below. In this example, X 1-47, the "X" on the map marks the location for each selected target commodity (soybean and cotton) field for Sample Number 47 of the ARMS.



NASS will use this "X" to determine the longitude and latitude in degrees, minutes and seconds for the selected target commodity field for each sampled operation. ERS will use this information to access the Natural Resources Conservation Service's (NRCS, formerly Soil Conservation Service) Soils V

Database. This data base contains soil type, slope, leaching characteristics and other geologic information that is needed for analysis.

Item 2 Re-contact in the spring 1998

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

Inform respondents that they will be re-contacted in February or March of 1998 to collect additional information to complete the profile of their operations for the Agricultural Resource Management Study. Explain that you'll be asking about entire year and year-end information at that time, and it will be easier to collect these figures when their records for 1997 are complete.

It is important that you leave the interview on a good note and that you put the Spring contact in as positive light as possible. After the first of the year, when records are complete and individual receipts and record book line items have been summarized, collecting the information will be easier and take less time. It would be difficult to answer the Spring questions right now, because records are incomplete.

Also, it is important to retain the respondent's cooperation for the Spring interview, because very limited use of the respondent's Production Practices & Costs data can be made if data from the Spring interview is not available. Information would be lost to the ARMS, and this operation would not be represented in the full Agricultural Resource Management Study.

Emphasize that you will call to make an appointment for a time convenient to the respondent for conducting the Spring interview.

Survey Results or Other Agency Publications

After completing the interview, offer the results of the survey or other Agency or State Office publications to the respondent. A number of publications will result from the ARMS, and they will be published in a variety of sources. Many of these are explained in Chapter 1 of this Manual. In addition, there may be other releases from NASS or your State Office that responding farm operators may be interested in. We would like to serve the respondents better by providing survey results and other information that they will find useful and interesting.

Your Survey Statistician will explain which publications from Headquarters or from your State Office to offer to participants in the ARMS. The Survey Statistician will instruct you how to record requests for information from each respondent, if any Release order forms need to be filled out, or if any additional coding is required on the questionnaire.

Respondent Code

The respondent code is used so we can identify the person who was interviewed. Enter the code identifying the person who provided most of the data. Respondent codes are:

Code 1 = **operator, manager, or partner**
Code 2 = **operator's spouse**
Code 3 = **accountant or bookkeeper**
Code 4 = **someone other than these people**.

If the respondent was an accountant, bookkeeper or someone other than the codes listed, record the respondent's name and phone number.

Records Use -- Fertilizer and Chemical/Pesticide Data

For ***V10***, enter the code for the selected commodity 1 in cell 0026, and the code for the selected commodity 2 in cell 0030. Valid codes are:

203	= Corn (all)
26	= Soybeans
201	= Upland Cotton
165	= Winter Wheat
163	= Durum Wheat
164	= (Other) Spring Wheat
20	= Potatoes

If farm records were used for completing the majority of the **fertilizer** data items in the questionnaire, enter code 1=YES in cell 0027. For ***V10***, enter a 1 in cell 0027 if records were used for commodity 1, cell 0031 if records were used for commodity 2.

If farm records were used for completing the majority of the **chemical and pesticide** data items in the questionnaire, enter code 1=YES in cell 0028. For ***V10***, enter a 1 in cell 0028 if records were used for commodity 1, cell 0032 if records were used for commodity 2.

Records Use -- Expense Data

V2 & V3 only

Soybean & Cotton Production Practices & Costs only

Indicate whether farm/ranch records were used for the completing most of the **expense** items in the questionnaire. In Cell 0029, enter 1 for YES.

Supplements Used

As instructed in earlier sections of this manual, record the total number of each type of supplement used in completing this interview. Be sure all of the supplements are inside the questionnaire before mailing the questionnaire or turning it over to a supervisor.

Production Practices and Costs Reports (*V2 & V3*) may have supplements for Fertilizer Applications, Chemical and Pesticide Applications, Field Operations, and/or Trucks and Tractors.

Production Practices Reports (*V5, V6, V7, V8, V9,* and *V10)* may have supplements for Fertilizer Applications, Chemical and Pesticide Applications, and/or Field Operations.

Ending Time

Record the ending time of the interview. If more than one person was interviewed or it took more than one appointment to complete the interview, times should reflect the approximate total time for the questionnaire. Exclude the time you spend reviewing the questionnaire or verifying calculations by yourself after you have completed the interview. Be sure the ending time is after the beginning time entered on the face page. Use military time.

Date

Record the date the questionnaire was completed. Enter the date in MM DD YY format on the lines provided in the date cell. For example, if the interview was completed on November 6, 1997, enter 11 06 97 in the date cell.

Enumerator Name

After signing the questionnaire, record your enumerator ID code.