APPENDIX A: CASE STUDIES OF FEDERAL STATISTICAL AGENCY TRAINING PROGRAMS

Survey and Statistical Training at Federal Statistical Agencies
Training Program Case Study #1

BUREAU OF THE CENSUS
U.S. Department of Commerce

I. The Agency

The training available to Bureau of the Census statisticians and mathematical statisticians is described below. This training supports both individual career interests and the mission of the agency. The mission of the Bureau of the Census is to collect and report statistical information on people, places, and things. It is further described by the following statement:

> In its best interests, a civilized nation counts and profiles its people and institutions. Doing so ably and objectively is the abiding mission of the United States Census Bureau. We honor privacy, shun partisanship, invite scrutiny, and share our expertise globally. Striving to excel, we chronicle the Nation's past, describe its present, and illuminate its future.

The Bureau's mission of data collection and dissemination is carried out by a workforce of about 5,000 employees. The majority of them work at BoC headquarters in Suitland, Maryland. The remaining employees work in the twelve regional offices, the two telephone centers in Hagerstown, Maryland and Tucson, Arizona, and the Data Processing Division in Jeffersonville, Indiana.

II. Description of Statistical Employees

There are three statistical occupational series in the Census Bureau: mathematical statistician (1529), statistician (1530), and statistical assistant (1531). In 1976, during the period covered by this report, the Census Bureau employed 278 mathematical statisticians, 998 statisticians, and 269 statistical assistants. All of these mathematical statisticians and statistical assistants were assigned to BoC headquarters, except for seven statistical assistants who worked in the Census Bureau's telephone centers; statisticians were employed both at BoC headquarters and in regional offices.

The Bureau of the Census carries out demographic and economic programs that require the technical abilities of statisticians and mathematical statisticians. The demographic programs — such as surveys

— deal with people; the economic programs deal with institutions. *Statisticians* who work in both program areas have the same tasks:

- design and carry out sample surveys,
- design and test survey instruments,
- define statistical input/output requirements,
- prepare estimates and forecasts,
- plan and conduct research in estimation techniques, and
- provide technical assistance to state and local data centers.

In addition to survey and census work, *mathematical statisticians* (especially those in the Methodology and Standards Division) perform statistical and methodological research. In concert with statisticians and mathematical statisticians, *statistical assistants* perform support tasks such as tabulation of raw data, elementary survey research, program specifications for data processing, and routine narratives for statistical reports.

III. Training in Statistics and Surveys for Statistical Employees

Training for Statisticians at BoC Headquarters. The Census Bureau provides a range of training opportunities for statistical employees, in both technical and non-technical subjects. The purpose of training for statisticians and mathematical statisticians, as for all BoC employees, is to ensure that they have the necessary knowledge, skills, and abilities to perform their assignments successfully. The Census Bureau places high priority on training for statisticians, mathematical statisticians, and computer programmers because the proficiency level of these individuals affects the quality of BoC products. The Census Bureau provides both technical and non-technical training. The non-technical classes such as public speaking and writing are designed for employees in all occupational series.

Five types of training are available to statisticians and mathematical statisticians: college and university courses, on-site seminars, statistical association conferences, outside vendors, and staff rotation. Each type is described below.

College and university courses: Each division in the Census Bureau determines what college courses its statisticians and mathematical statisticians should take to meet the needs of the particular division. Shown below are the courses that statisticians and mathematical statisticians across the Bureau most often take.

Statisticians	Mathematical Statisticians	Both
Applied Sampling	Differential and Integral Calculus	Demographic Analysis
Econometrics Theory and Practice	Linear Algebra	Research Methods
Theory of Sample Surveys	Multivariate Analysis	Statistical Inference
Probability	Probability and Statistical Analysis	
Questionnaire Design	Regression Analysis	

While these courses are taken in sequence and the skills, knowledge, and abilities that employees acquire are job-related, there is no other structure or direction in terms of the purpose of the training. This issue was addressed to a large extent by the Joint Program for Survey Methodology (JPSM), established in 1993. This program, a result of a partnership among the University of Maryland, the University of Michigan, and Westat, Inc., serves current and future professionals of the federal statistical system.

The Joint Program offers four forms of instruction: introductory short courses designed for all professional staff, advanced topic short courses designed for senior technical staff, a Master of Science in Survey Methodology, and the Washington, D.C.-area offerings of the University of Michigan Survey Research Center's Summer Institute in Survey Research Techniques.

The Census Bureau annually places up to six employees in the MS program; nineteen had received degrees as of May 1998. This program offers concentration in two areas, statistical science and social science. Both programs have the same core courses; each area of concentration also requires its own specialized courses.

Core Courses	Social Science Program	Statistical Science Program
Survey Practicum I, II Data Collection Advanced Sampling Randomized/non-randomized Design Total Survey Error Federal Statistics System I, II Survey Design Seminar I, II	Social Statistics I, II Questionnaire Design Social and Cognitive Foundations of Survey Measurement Analysis of Complex Sample Data Survey Management	Introduction to Probability Theory Introduction to Statistics Statistical Methods I, II Sampling Theory Inference from Complex Surveys Topics in Sampling

To the extent that the Joint Program continues to provide quality educational experiences, the time and money expended on trainees are taken to be well spent. It is believed that a cost/benefit analysis should be conducted in the near future in terms of the impact of the training and job performance; this might be done in 1998, at the end of the Program's fifth year.

On-site seminars: Weekly, the Census Bureau conducts open seminars in its auditorium for all interested employees (and non-employees) on subjects related to survey and statistical aspects of the Bureau's work, such as research methodology, sample survey design, and measurement techniques. These seminars provide "state-of-the-art" overview and enhance working relationships between researchers and survey designers.

Non-technical courses also are conducted frequently in the Census Bureau for all employees: project management, managing time and stress, effective writing, professional presentations, customer services, problem solving, teamwork, and effective meetings. Non-technical training enables employees to carry out assignments more effectively by providing them with "people" or "human interaction" skills essential to good performance.

Statistical Associations: Statisticians and mathematical statisticians, in particular, are encouraged to participate in American Statistical Association conferences and Washington Statistical Association seminars. Such participation enables employees to develop public relations skills as well as to learn how other organizations in the federal statistical system operate. It is a good networking and professional development experience.

Vendors: The Census Bureau sponsors about 2,000 instances of "human interaction" type training (non-ADP, non-academic) by outside, private vendors. About half of these are attended by statisticians and mathematical statisticians.

Career Development Program: The Census Bureau has been experimenting on a small scale with a mathematical statistician career development program. Employees enter the program at their current grade level (9 to 13) through a competitive process. Sixteen individuals have participated in the program. This program is described in Chapter 4, "Education and Career Development Programs."

Regional Office Training for Statisticians at BoC. Training for statistical employees located in the Census Bureau's twelve regional offices is different from that at BoC headquarters because the jobs of regional-office employees are entirely different. In the field, statistical employees in grades 9 or above actually serve as supervisors almost as soon as they are hired. They supervise field representatives and senior field representatives; these "representatives" are actually the ones who go door-to-door collecting information for a particular survey, such as the Current Population Survey. Each senior representative supervises a crew of field representatives, and the statistical employee supervises the whole group.

Given the demands of the job of a statistical employee in the field, therefore, it is critical that these individuals understand and master teamwork and basic supervisory skills as soon as possible. To help accomplish this goal, each regional office conducts an intensive orientation for new employees where all expectations are discussed extensively. The orientation, which may extend up to a week, is the basic training given to all field employees. Other sources of training, such as the Office of Personnel Management's training centers and local private vendors, are utilized to round out new employee's scope of knowledge. Outside training typically covers basic management principles such as coordination, budgeting, reporting, motivating employees, and project review and analysis.

Training for Interviewers. This is described in Chapter 5, "Interviewer Training."

IV. Training in Statistics and Surveys for Non-employees

Training for non-employees provided by the Census Bureau is primarily for representatives of governmental and statistical agencies outside the United States. This is described in Chapter 2 (at page 25).

V. Training Costs

The Census Bureau supports trainees in the Joint Program by paying tuition and related fees, reimbursing employees for mileage beyond their normal commuting distance, and providing up to 20 hours of work

release time to commute and attend classes. Other training costs are paid by the relevant employee's division.

Survey and Statistical Training at Federal Statistical Agencies
Training Program Case Study #2

BUREAU OF LABOR STATISTICS
U.S. Department of Labor

I. The Agency

The Bureau of Labor Statistics (BLS) is the principal fact-finding agency for the federal government in the broad field of labor economics and statistics. The BLS is an independent national statistical agency that collects, processes, analyzes, and disseminates essential statistical data to the American public, the U.S. Congress, other federal agencies, state and local governments, business, and labor. The data relates to employment, unemployment, and other characteristics of the labor force; consumer and producer prices, consumer expenditures, import and export prices; wages and other worker compensation; productivity and technological change; employment projections; occupational illness and injuries, and international comparisons of labor statistics. The BLS also serves as a statistical resource to the Department of Labor.

BLS data must satisfy a number of criteria, including relevance to current social and economic issues, timeliness in reflecting today's rapidly changing economic conditions, accuracy and consistently high statistical quality, and impartiality in both subject matter and presentation.

II. Description of Statistical Employees

In FY 96 the BLS had a total of 2,449 Headquarters and field office personnel:

Mathematical Statisticians (1529 series)	91
Statisticians (1530 series)	33
Economists (0110 series)	1,166
Computer Specialists (0334 series)	282
Computer Assistants (0335 series)	20
Statistical Assistants (1531 series)	19
Psychologists (0180 series)	9
All Others	829
Total	2,449

Mathematical statisticians at BLS are responsible for assuring the statistical integrity of the sample survey estimates. As a result, many positions offer opportunities in the design of large-scale sample surveys and some positions involve research into new techniques for sample design and estimation. In planning and designing sample surveys, statisticians work closely with economists and computer specialists regarding program objectives, survey design, and systems development. Mathematical statisticians perform work involving the development and adaptation of mathematical statistical theory and methodology for a wide variety of statistical investigations. They investigate and evaluate the applicability, efficiency, and accuracy of the theory and methods used by subject-matter specialists or other statisticians in various statistical programs and studies. Typical duties include:

- developing and refining sampling frames,
- defining and implementing sample survey designs,
- measuring quality of data collected and improving data collection and processing procedures,
- deriving or selecting appropriate estimation procedures and preparing written systems requirements,
- evaluating the results of surveys for sample design and accuracy,
- researching and developing statistical procedures to improve surveys,
- serving as statistical consultant for economic analysts of the Bureau.

III. Training in Statistics and Surveys for Statistical Employees

The BLS has a fully equipped on-site training and conference center that provides a wide variety of classes and seminars. An on-going information technology training program is designed to meet the needs of staff. In addition to on-the-job training and technical training attended during regular work hours, there are opportunities to attend courses at local universities and to participate in conferences and seminars around the country.

Additionally, BLS provides various training seminars for its national office and field staff in the areas of data collection and program methodology. This training focuses on the areas of federal/ state data collection, the Consumer Price Program, and Wage and Compensation programs. The seminars are designed for economists, statisticians, researchers, analysts, and managers, to strengthen the participants' ability to collect and analyze economic and labor statistics and data.

IV. Training in Statistics and Surveys for Non-employees

The BLS provides international training seminars of three to eight weeks at its training facilities in Washington, D.C. The seminars are designed for economists, statisticians, researchers, analysts, and managers for labor ministries, planning ministries, central statistical offices, central banks, development agencies, social affairs ministries, universities, trade unions, and the private sector. These seminars are specialized training based upon the needs and interests of the participants. They are designed to strengthen participants' ability to collect and analyze economic, labor, and social statistics as well as their ability to apply the results to policy formulation, especially for human resources development.

V. Training Costs

In FY 1996, the BLS training budget was $1,206,000. Approximately 7.7 percent of that was spent on statistical training courses and seminars alone.

Survey and Statistical Training at Federal Statistical Agencies
Training Program Case Study #3

CENTERS FOR DISEASE CONTROL AND PREVENTION

I. The Agency

The Centers for Disease Control and Prevention is composed of eleven Centers, Institutes, and Offices which employ 6900 people in 170 occupations. CDC Headquarters in Atlanta, Georgia at the Clifton Road facility employs over 1600 people. The mission of CDC is: "To promote health and quality of life by preventing and controlling disease, injury, and disability." This outlines the statistical component of CDC's workforce and the statistical training available to them.

II. Description of Statistical Employees

The description of statistical employees given below does not include employees of the National Center for Health Statistics.

Mathematical Statistician, GS-1529, number employed: 67

Serves as technical and research consultant in mathematical and theoretical statistics and statistical analysis, provides assistance in the design of epidemiological studies and the resultant analyses, and develops mathematical models for estimating disease risk.

Statistician, GS-1530, Health or Survey, number employed: 53

R Health Statistician: Provides technical support in all phases of analytical process including design of studies, design of data collection instruments and systems, planning and selecting appropriate statistical techniques for analysis of data, assessing the quality of data, and presenting the results of studies and research.

R Survey Statistician: Participates in the planning, development, and conduct of national surveys; plans and conducts methodological and evaluative studies relating to quality of data, data collection methods, and medical coding techniques and practices.

Statistical Assistant, GS-1531, number employed: 20

Involves one or more of the following assignments: processing questionnaires or reporting forms to obtain and compile data for specific studies; preparing tables, charts or graphs for presentation or publication; editing questionnaires or reporting forms for completeness and consistency; performing scientific support work for statisticians and other professional personnel.

III. Training in Statistics and Surveys for Statistical Employees

Training for Statisticians. No formal policy exists for statistician training. Courses sponsored by CDC are shown below, followed by courses from vendors and three additional training programs.

CDC-sponsored Training for Employees	
Course Title	Course Description
Basic Sampling Methods	Terminology and basic approaches to survey sampling, indicating how these all tie in to the process of designing a good sample.
Categorical Data Methods and Counterparts in Regression	Classical categorical data analysis and modern regression methods that have been developed to perform many of the same analyses.
Design and Analysis of Case Control Studies	Rationale and structure of case-control studies, selecting cases and controls, and performing statistical analyses on case-control study data.
Introduction to Neural Networks: Concepts and Applications	Provides an overview of neural networks.
Neural Networks: Hands-on Training	Using neural networks: computer lab
Modern Regression and Classification	A short course on the state of the art in modeling and prediction.
Regression Modeling	Regression analysis, including logistic regression models.
Research Methods in Epidemiology	Design, analysis, and interpretation of epidemiological studies.
SAS Courses	All levels of SAS training; many courses offered.
SUDAAN, Beginning and Advanced	Introduces researchers to SUDAAN, a statistical software package for analyzing complex sample survey data.
Statistics I	Introduction to descriptive statistics and elementary probability.
Statistics II	Rules of probability and probability distributions.
Statistics III	Estimation, hypothesis testing, and analysis of paired data.
Survey Design and Analysis	Continuation of Basic Sampling Methods

Non-CDC Training for Employees		
Course Title	Sponsor of Training	Cost
Advanced General Linear Models, with Emphasis on Mixed Models	SAS Institute	$ 675
Advanced SAS Programming Techniques and Efficiencies	SAS Institute	550
Applied Introduction to Categorical Data Analysis	American Statistical Association	250
Basic Statistics	Penn State	600
Bayesian Data Analysis	American Statistical Association	350
Building SCL Applications	SAS Institute	675
Exact Statistical Methods in ANOVA and Mixed Models	American Statistical Association	150
Generalized Linear Models	Emory University	1750
Interfacing StatXact-3 and SAS 6.11 for Exact Tests	American Statistical Association	40
Jumpstart S-Plus	Hamilton Labs	85

Non-CDC Training for Employees		
Course Title	Sponsor of Training	Cost
Multivariate Statistics	University of Florida	850
Probability	Emory University	3500
Regression Models for Complex Survey Data	Joint Program in Survey Methodology	375
Sampling Based Methods for Bayesian and Likelihood Inference	American Statistical Association	350
Statistical Disclosure and Disclosure Limitations	Joint Program in Survey Methodology	350
Survival Analysis in Epidemiology	New England Epidemiology Institute	400
Theory of Linear Models	Emory University	1750

Quantitative Methods Enhancement Program. This program is described in detail in Chapter 4, "Education and Career Development Programs."

Long-term Training. Opportunities are available to selected employees. Long-term training is full-time training through non-government facilities that lasts more than 120 consecutive days.

Analytic Methods Forum. Each month this lecture series explores a new topic involving analytical methods. Topics presented in 1996 included estimating risk ratios in logistic regression, analysis of repeated measures of continuous outcomes using mixed models, and interval estimation of the odds ratio in logistic regression. This series is frequently attended by area university students.

Training for Interviewers. Each year a new class of Epidemic Intelligence Service officers is oriented on how to conduct an epidemiological study. Part of their training consists of instruction in how to collect data. Included in this training are guidelines for developing and administering questionnaires.

IV. Training in Statistics and Surveys for Non-employees

Analytic Methods Internship Program. This program is designed for graduate students who wish to gain training and personal experience in the development of statistical and other analytical methods for public health applications.

V. Training Costs

CDC-sponsored training for employees, approx. $246,000
Non-CDC-sponsored training for employees, approx. $40,000

CDC-sponsored training for non-employees . . . . . not reported

Survey and Statistical Training at Federal Statistical Agencies
Training Program Case Study #4

ENERGY INFORMATION ADMINISTRATION

I. The Agency

The Energy Information Administration (EIA) was created by law in 1977 as an independent statistical agency. It consolidated energy data collection and analysis. EIA was designed to be the focal point for Federal energy information. It was designed to serve all decision makers. Between them, EIA's four program offices collect data, monitor energy markets, analyze data, forecast future needs, and prepare reports.

The special characteristics of EIA include:

1. Within the Department of Energy, EIA is nonetheless an independent agency.
2. EIA gathers information for both regulatory and statistical uses.

EIA's vision is:

> "On-line and off the shelf, EIA is the first place to go for the last word in energy information."

EIA's mission is:

> "The Energy Information Administration is a leader in providing high quality, policy independent energy information to Government, industry, and the public, in a manner that promotes sound policy making, efficient markets, and public understanding."

EIA prides itself on its customer-oriented attitude. It seeks to provide timely, relevant and accurate products and services and strives for quality and cost effectiveness. EIA pursues its customers' trust through open processes, clear communication, and responsiveness to their needs.

At the top of the EIA organization is the Administrator, who reports directly to the Secretary of Energy. The second in command is the Deputy Administrator. EIA currently has four program offices. These are the Office of Oil and Gas, the Office of Energy Markets and End Use, the Office of Coal, Nuclear, Electric and Alternate Fuels, and the Office of Integrated Analysis and Forecasting. Other groups within the agency include the National Energy Information Center, which answers energy questions and distributes energy publications; the Office of Resource Management, which handles budget and personnel issues; the Information Technology Group, which is responsible for computer operations and internal computer training; and the Statistics and Methods Group, which is responsible for providing statistical and analytical support to the Agency (including the task of organizing statistical and industry seminars and workshops).

At the end of FY 1995, there were 464 employees in EIA; by the end of 1996, the number had declined to 420. The distribution of employees by job series was similar in the two years.

At the end of FY 1995, the number of EIA mathematical statisticians was 36 and the number of survey statisticians was 41. At the end of FY 1996, the number of EIA mathematical statisticians had declined to 33, and the number of survey statisticians to 37.

II. Description of Statistical Employees

Statisticians at EIA perform a wide range of activities. Some manage all aspects of the operation of a survey, from mail-out to obtaining data that are ready for publication. Others concentrate on the development of statistical methodology such as sampling, estimation, editing and imputation procedures. Some statisticians focus on ensuring the quality of the data through performance measures, evaluations and other special studies. Others are involved in forecasts and analyses pertaining to energy issues.

III. Training in Statistics and Surveys for Statistical Employees

Training for Statisticians. EIA provides several types of training for statisticians. The first type is formal classroom training at universities or from outside vendors. Formal training included courses in statistics, computer skills, energy industry, technical writing, and quality control.

The Office of Statistical Standards (now the Statistics and Methods Group) offered statistical and industry seminars and workshops. In 1995, Office of Statistical Standards training included:

FEDWORLD Internet System
Determinants of Long-Run Energy Demand
Intermediate Econometrics
Restructuring the Electric Power Industry
Commodity Pricing of Natural Gas
Writing Well and Writing for Results
Structural Econometric Modeling, Forecasting, and Uncertainty

In 1996, Office of Statistical Standards training included:

On Writing Well
Writing For Results
Structural Econometric Modeling, Forecasting and Uncertainty
Electric Utility Restructuring
Basic Statistics
A Basic Understanding of the Electricity Futures Market
Electricity Transmission (Network Theory)
Qualitative Choice Analysis

Because EIA maintains its own computer center, it also provides computer training such as Microsoft Access. EIA has several computer self-paced tutorials, such as Statistical Analysis System (SAS). EIA also offers informal training such as one-on-one coaching and mentoring.

Training Policy for Statisticians. EIA has as a strategic goal: to work together to achieve the full potential of a diverse work force through teamwork and employee development. In the past EIA's practice has been to hire highly-trained personnel. Thus, career development programs have not been formalized as they have been for the statistical agencies featured in Chapter 4.

One issue that affects training policy is the budget. The allocation of training funds must be adequate and allocated according to well-developed plans.

Training for Enumerators. EIA conducts two surveys that involve enumerators. The Residential Energy Consumption Survey (RECS) collects information from households across the United States through an in-person on-site interview. The Commercial Buildings Energy Consumption Survey (CBECS) collects similar information from commercial buildings. For the 1997 RECS and the 1999 CBECS, interviewing will utilize the Computer-Assisted Personal Interviewing (CAPI) technique. The training procedures for RECS have been developed and are described below. Detailed procedures for CBECS have not yet been developed, but will be similar to RECS.

For RECS, each interviewer has a laptop computer loaded with the Household Questionnaire, as well as case management information to help both the interviewer and Headquarters (HQ) staff track survey response status. The CAPI Questionnaire leads the interviewer through the survey instrument and the interviewer keys in the respondent's answers. The completed interviews are then sent to the contractor's HQ via a modem. For the 1997 RECS, there were two three-day in-person training sessions, held during the first two weekends in April.

The training included a small amount of home study prior to the session and a practice interview with a respondent of the interviewer's choice after the session. After the practice interview had been completed and reviewed by HQ, the interviewers began their assigned data collection cases. Approximately 200 interviewers were trained in the two sessions. Because of the hands-on nature of CAPI training, all of the training was conducted in small groups of 16-17 interviewers each.

There was a pretest of the 1997 RECS CAPI Household Questionnaire at the end of 1996. During that time, a "mini" training session was held for the group of interviewers involved in the pretest. The current training content reflects input from that pretest training, previous experience and "lessons learned" from 1995 Commercial Buildings Energy Consumption Survey CAPI training, and the survey contractor's experience with both CAPI and previous RECS and/or CBECS. The basic content of the three-day training includes: CAPI Training, a review of the Case Management System, RECS sampling exercises, practice sessions of easy, medium, and difficult versions of the Household Questionnaire, and discussions of Questionnaire topic areas.

IV. Training in Statistics and Surveys for Non-employees

EIA does not currently offer any formal statistical or survey training courses for non-employees. Contractors working on EIA tasks have the opportunity to enroll in courses that are offered to EIA employees.

V. Training Costs

For FY 1996, the total operating expenditures were $72.150 million and the total training expenditures were $226,000, or 0.3 percent. The costs for FY 1997 are projected to be $70.927 million for total operating expenditures and $218,000 for training, or 0.3 percent.

Survey and Statistical Training at Federal Statistical Agencies
Training Program Case Study #5

NATIONAL AGRICULTURAL STATISTICS SERVICE
U. S. Department of Agriculture

I. The Agency

This is an overview of the National Agricultural Statistics Service (NASS), USDA's statistics agency, and of its training programs referred to throughout this report. NASS produces estimates for "production, stocks, inventories, disposition, utilization, and prices of agricultural inputs and commodities," and other items, such as labor, farm numbers, and agricultural chemical usage. NASS provides its services through a main Headquarters unit located in Washington, DC, and in 45 State Statistical Offices (SSOs) serving all 50 states. The mission of NASS is: "To serve the United States, its agriculture, and its rural communities by providing meaningful, accurate, and objective statistical information and services."

II. Description of Statistical Employees

The following sections describe the five types of statistical employees in NASS: mathematical statisticians, ADP statisticians, agricultural statisticians, survey statisticians, and statistical assistants. Listed are the title, occupational series, grade level, location, and duties and responsibilities of each type.

Mathematical Statistician - 1529	
Headquarters, GS-12 and above	State Statistical Office, GS-09 and above
C design and conduct research on new procedures for agricultural data collection, estimation, forecasts C research to improve crop and livestock production estimates/models and forecasts using LANDSAT and remotely sensed data C plan, co-ordinate, and conduct major remote sensing research projects C crop yield estimation using weather data modeling and satellite sensor input C develop new methodologies to use satellite digital data to improve area estimates of U.S. crops C international projects to improve foreign agriculture estimation, including design of area sampling frame, sample selection procedures, questionnaire design, data collection, editing, and processing C publish research	C crop and livestock tasks, similar to the duties of a 1530 C recommend math techniques/methods to plan/conduct surveys C recommend sample frames and data sources C design, allocate, and supervise drawing of samples C recommend questionnaire design/construction C train enumerators/data collectors (office and/or field) C perform mathematical analyses for isolating and measuring sampling and non-sampling errors to increase statistical sampling efficiency C work with commodity statisticians to build list frames C use multiple frame sampling techniques to design/draw list frame samples C evaluate data collection forms for efficiency in data conversion and processing C determine validity and representativeness of data C prepare estimates/forecasts C serve on Agricultural Statistics Board

ADP Statistician - 1530	
Headquarters, GS-12 and above	State Statistical Office, GS-05 and above
C implement end-user training for LAN hardware and software C provide network and LAN administration support C install and provide training on software products for personal computers C collaborate with those outside NASS to support the development of end-user computing applications C provide advice to NASS staff in matters pertaining to hardware and software	C basic statistical survey methods and techniques C analyze and maintain list frame C conduct surveys C assist with enumerator training C make objective yield counts for yield determinations C participate in automated data processing projects C prepare flow charts C write simple automated applications C create job control statements C participate in analysis of survey data C examine survey forms to determine validity

Agricultural Statistician - 1530	
Headquarters, GS-12 and above	State Statistical Office, GS-05 and above
C plan, direct, implement nationwide programs C formulate overall policies, programs C define statistical input/output requirements C determine estimates and forecasts for programs C plan and conduct research in estimation techniques C serve on Agricultural Statistics Board and World Agricultural Outlook Board C analyze/interpret survey data C set national estimates C provide technical assistance to SSOs C represent the agency at industry meetings C crops work assignments: crops programs such as oil seeds and Crop Weather C livestock work assignments: animal programs such as cattle and poultry C economics work assignments: ecology programs such as pesticide usage	C plan, direct, implement statewide programs C prepare reports critical to agricultural production and state economy C determine statewide procedures for conducting surveys, analyzing and preparing estimates and forecasts, and editing data C disseminate data to the public in the state C serve on Agricultural Statistics Board C crops work assignments: specialist on a group of crops C livestock work assignments: animal specialist

Survey Statistician - 1530	
Headquarters, GS-12 and above	State Statistical Office, GS-05 and above
C data collection methodology/questionnaire design C evaluate survey for data collection effectiveness C conduct cognitive studies for questionnaires C evaluate data collection procedures to improve data quality, decrease respondent burden, and produce more timely collecting and editing of data C ensure content consistency: between paper and computer assisted questionnaires; across NASS nationwide survey programs; sound data collection methods across surveys C serve on Agricultural Statistics Board C assist SSOs with data collection procedures, questionnaire	C plan, direct, and implement various surveys C determine statewide procedures for conducting surveys, analyzing/preparing estimates and forecasts, and editing data C disseminate data to the public in the state

Statistical Assistant - 1531	
Headquarters, GS-05 to GS-09	State Statistical Office, GS-05 to GS-08
C responsible for complex technical work C collect, validate, tabulate, and analyze data to prepare reports C maintain master/historical files C collect data via telephone from non-respondents C reconcile data inconsistencies with respondents C use micro computers and software to validate/tabulate data C assist crop/livestock statisticians C prepare statistical tables, time series charts, and narratives for publication C prepare spreadsheets and documentation for Agricultural Statistics Board	C assemble data for state release and reports C establish/conduct routine reoccurring surveys C prepare survey materials C check completed surveys for accuracy, consistency C review and summarize data C co-ordinate data entry C recommend estimates C lead technical support assistant C update list sampling/area frame records after each survey C statistical/clerical work during all survey phases: pre-survey, survey, post-survey

III. Training in Statistics and Surveys for Statistical Employees

This section describes the training opportunities available to NASS statistical employees. The learning activities can be divided into two categories: non-competitive and competitive. NASS Policy and Standards Memorandum 20-96 states the NASS policy on employee training activities.

Training for Statisticians. Each employee in NASS is required to have an approved Individual Development Plan (IDP) on record, updated annually to reflect the mutual needs of the employee and the agency. All GS-05 through GS-11 agricultural statisticians and mathematical statisticians are automatically enrolled in the Core Technical Development Program, which provides cross-series qualifications and activities. The IDP lists the training activities that provide the knowledge, skills, and abilities to perform successfully in the 1529 and 1530 job series at the GS-12 level. Agricultural statisticians and mathematical statisticians have similar core IDPs.

The unique training, educational, and developmental needs and objectives of each employee are coordinated with the career opportunities in the agency. Consideration is given to both the short- and long-term agency goals and the employee's career goals. Individual plans vary, ranging from college courses and other formal programs to "none" for employees who are fully competent at their current tasks and have completed the Core Technical Development Program at the GS-12 level. Activities needed to accomplish goals are planned and scheduled within the unit's workload and budget constraints.

Non-competitive, Job-related Training. Non-competitive training courses are provided for all statistical employees, based on job requirements and need for training. Non-competitive training courses provided for statistical employees are listed below.

Office orientation
Headquarters orientation
On-the-job training / Core Technical Development program
Basic concepts training:
- Survey basics
- Yield concepts
- Estimation basics

Advanced survey training
Advanced estimation training
Special survey training
Senior statistician workshops
Systems services training:
- List frame
- CASIC Coordinator
- LAN Administrator
- ADP

Survey Software:
- Blaise, SAS, PEDBUGS, TSO, FSE, C-list, SPF, etc.

Computer / Agricultural Career Enhancement (CACE)
Mathematical / Agricultural Career Enhancement (MACE)

Competitive Programs. Competitive technical programs fall into one of two types, educational or developmental. They are exemplified by the full-time Graduate Education Program and the Career Development Intern Program.

- Graduate Education Program: An agricultural or mathematical statistician can apply for any of the three competitive, full-time Graduate Education Programs listed below when he/she meets the following requirements: (1) employed by NASS for one year, (2) at GS-09 level or above, (3) performing in a superior manner, (4) making satisfactory progress on IDP, (5) completed course pre-requisites, and (6) satisfies graduate entrance requirements.

  - Mathematical Statistics — Agricultural statisticians and mathematical statisticians take advanced statistics and statistical theory courses to become highly educated mathematical statisticians. Upon completion, graduates are usually assigned to BoC headquarters, either to the Research Division, the Estimates Division, or the Survey Management Division.

  - Survey Methodology — Agricultural statisticians and mathematical statisticians take courses in survey methodology. Participants attend the Joint Program for Survey Methodology at the University of Maryland to become highly educated survey methodologists. Upon completion, graduates are usually assigned to BoC headquarters, either to the Research Division or the Survey Management Division.

  - Information Technology — Primarily designed for computer specialists to acquire advanced training in software engineering, telecommunications, and management information systems. This program is also open to agricultural statisticians and mathematical statisticians with strong interest and background in computer systems and information technology. Upon completion, graduates are usually assigned to BoC headquarters, either to the Research Division or the Systems and Information Division.

  Candidates are competitively selected for the programs but are placed non-competitively in BoC headquarters positions at grade GS-13 after successfully completing the program. Each program usually provides at least one year of full-time, graduate-level education. During the program, candidates develop a new IDP encompassing any pre-requisite courses, as well as all required

courses for the program. Field statisticians are generally reassigned to the SSO nearest the approved university.

- Career Development Intern Program: Field agricultural statisticians can apply for the Career Development Intern Program (CDIP) if they meet the following requirements: (1) at NASS for five years, (2) at GS-11 level for two years, or expecting a relocation to their second SSO assignment, or at GS-12, and (3) making satisfactory progress on their IDPs. The CDIP is expressly designed to provide additional training and career-enhancing experiences so that agricultural statisticians receive the same training opportunities as do statisticians in other series when competing for training programs that culminate in GS-13 positions in Headquarters. Candidates are competitively selected for CDIP. During the program, candidates develop a new IDP reflecting experiences to be gained and courses taken in preparation for the GS-13 level. When the second SSO assignment begins, a program of work is jointly developed by the Field Operations Division, Estimates Division, and the supervising State Statistician. The program typically includes:

    - a full workload in the SSO
    - assignments rotated between commodities and surveys
    - attending commodity meetings with State Statisticians
    - attending national commodity meetings with Estimates Division staff
    - attending supervisory and management workshops
    - taking Dale Carnegie courses
    - joining Toastmasters
    - attending writing workshops

  After successful program completion, CDIP participants may be transferred non-competitively to an agricultural statistician BoC headquarters position at grade GS-13 in the Estimates Division or the Survey Management Division.

Training for Interviewers. Although the staffs at NASS headquarters and field offices coordinate training activities for enumerators and supervisory enumerators, the majority of training sessions are managed by the SSO statisticians.

Enumerator Training by SSO Staff. This is described in Chapter 5, "Interviewer Training."

Enumerator Training by Headquarters Staff. The Data Collection Branch, part of the Survey Management Division in Headquarters, coordinated Telephone Interview Monitoring training during FY 96. Telephone monitoring, a quality control procedure for data collection, is new to NASS. In these training sessions, the office supervisory enumerators learned to electronically monitor both interviewers and respondents during operational telephone data collection conducted in state offices. Monitoring sessions have several uses for supervisory enumerators: (1) train new interviewers by providing feedback on performance, (2) assess each interviewer's strengths and weaknesses, (3) pinpoint areas where interviewers might need additional training, and (4) identify problem areas in the questionnaire.

Forty SSO Telephone Supervisory Enumerators were trained in five two-day sessions, held around the country.

IV. Training in Statistics and Surveys for Non-employees

On a recurring basis, NASS conducts unique survey and statistical training sessions for international groups. For example, a "Basic Agricultural Survey Statistics and Methods" course was conducted in Washington, D.C. from September 16 to October 10, 1996 for eleven statistical employees of organizations in three countries. The course was designed to give a complete overview of an agricultural statistical program. The learning goals were to: (1) understand types of sampling and sampling frames, (2) construct sampling frames and select a sample, (3) design questionnaires for data collection, (4) understand the importance of quality control, (5) implement a control program, (6) edit, summarize, and analyze data, and (7) formulate a report of the results of a survey. Training was accomplished using lectures, audio visual instruction, demonstrations, and field trips. The instructors were NASS subject matter experts, most of whom had extensive international experience.

V. Training Costs

NASS allocates annually about 3.0 percent of its appropriated budget to human resource development activities, including statistical and survey training. Training costs were 2.41 percent of the $90 million FY 96 budget; 3.18 percent of the FY 95 budget; and 2.75 percent of the FY 94 budget.

Survey and Statistical Training at Federal Statistical Agencies
Training Program Case Study #6

THE NATIONAL CENTER FOR EDUCATION STATISTICS
U.S. Department of Education

I. The Agency

The National Center for Education Statistics (NCES) is the primary apolitical federal agency for collecting, analyzing, and reporting data related to education in the United States and other nations. It is headed by a Commissioner appointed by the President, and is currently a part of the Office of Educational Research and Improvement, U.S. Department of Education.

NCES' mission is to fulfill a congressional mandate to collect, collate, analyze, and report full and complete statistics on the condition of education in the United States; conduct and publish reports and specialized analyses of the meaning and significance of such statistics; assist state and local education agencies in improving their statistical systems; and review and report on education activities in foreign countries (see Section 406(b) of the General Education Provisions Act, as amended (20 U.S.C. 1221e-1)).

NCES activities are designed to address high priority education data needs; provide consistent, reliable, complete, and accurate indicators of education status and trends; and report timely, useful, and high quality data to the U.S. Department of Education, the Congress, the states, other education policymakers, practitioners, data users, and the general public.

II. Description of Statistical Employees

As of March 1997, NCES had 108 employees, the majority of them statisticians. The staff was made up of:

14 mathematical statisticians (GS-1529),
64 statisticians in education (GS-1530), and
3 statistical assistants (GS-1531).
9 program analysts (GS-0343),
5 office automation assistants (GS-0326),
1 computer specialist,
1 economist, and
11 others.

In general, statisticians are involved in the development and implementation of data collection, analysis, report writing, and information dissemination. Most of them, particularly those at higher grade levels

(GS 13 and up), also have responsibility for monitoring contracts with private firms that carry out projects for NCES, including survey design, data collection, data analysis, and report writing.

Several mathematical statisticians bear responsibility for reviewing the sample design, variance estimation, and imputation procedures for various studies across the Center. They also provide statistical review of NCES products to ensure that the products meet NCES statistical standards.

III. Training in Statistics and Surveys for Statistical Employees

The NCES has training programs for staff to learn or upgrade their knowledge and skills in statistical design, analysis, and project management. These programs are in three categories:

- Training courses provided by the Department of Education;
- In-house training through the NCES University (NCESU); and
- Training courses provided by external sources such as the USDA Graduate School and Joint Program for Survey Methodology.

Through these three types of training opportunity, staff members could upgrade their skills or acquire new knowledge in statistical methods to perform their tasks. In the 1996 Department Employee Survey, over 70 percent of NCES staff expressed satisfaction with the training opportunities available to them.

The Training and Development Center of the Department of Education offers a wide range of courses for employees, including computer software applications, leadership skills, contract and grant management, and technical skills such as writing and basic concepts of statistics. Most of these courses are free to Department of Education staff. In addition, the Department supports a few selected staff members to participate training programs offered by the Office of Personnel Management. Participating members will be selected through a competitive review process.

Training for Statisticians. Training for statisticians is provided through NCESU or external sources. NCES considers training an important professional development activity, and has been generally proactive in providing training opportunities to its staff.

The NCES University (NCESU) offers seminars and courses for its own staff (and staff from other offices within the Department). A number of topics have been covered, including (1) statistical methods such as logistic regression, hierarchical linear modeling, variance estimates for complex sample data, and missing data imputation; (2) computer applications such as SUDAAN and Wesvar PC — special computer programs for handling survey data from complex sample designs; (3) contract management, such as developing the statement of work and project cost estimates; and (4) emerging educational priorities, issues and policies. NCESU also sponsors seminars on products or findings of projects supported by NCES. Courses are either taught by in-house staff who have the needed expertise or outside experts in pertinent fields. These seminars and courses are offered on an as-needed basis. There is no regular schedule for these activities.

NCES also supports programs provided by outside vendors. In FY 96, for example, fourteen staff members participated in courses offered by the JPSM and other universities. Courses include: regression models for complex survey design, variance estimates for sample survey, cognitive and communicative aspects of survey, and total survey error.

Training for Interviewers. NCES does not offer enumerator training. NCES contracts out all data collection to private companies or the Bureau of the Census. These contractors generally train their enumerators before they collect and process data.

IV. Training in Statistics and Surveys for Non-employees

The NCES has a unique training program for external data users to promote the effective and correct use of NCES data. These data users include faculty members and graduate students in higher education institutions as well as researchers and data analysts at the state and local education agencies, professional associations, and other Federal agencies.

Some of these users are also NCES data providers. Thus, the training would help these people gain a better understanding about the importance of the data they provided; in turn, they might possibly help NCES improve its future data collection procedures and data quality.

The training program offers seminars on the use of NCES databases usually in the summer each year. Each seminar is about four to five days long. During these seminars, participants learn how to access and analyze the NCES data properly and correctly. They also review certain statistical topics such as sample design, variance estimation, imputation, sampling weights and their use in analyses. Instructors for these seminars are usually NCES staff, mostly the project officers, who have had extensive knowledge and experience in the subject matter. Sometimes nationally known experts in a field such as hierarchical linear modeling and item scaling are invited to give lectures.

The conduct of seminars is considered NCES ional databases and to improve data quality. For this reason, NCES provide financial support to participants, covering their travel and per diem. Over 800 individuals have participated in these seminars over the past 6 years.

In addition to these programs, NCES frequently conducts training seminars at the annual meetings of professional associations such as the American Educational Research Association and the Association for Institutional Researchers. These seminars help participants gain a proper perspective about NCES data sources and some hands-on experience in accessing and analyzing NCES data.

To facilitate the analysis of NCES data by outside users, NCES also placed a great emphasis on developing user-friendly data files and procedures for assessing NCES databases, including the use of CD ROMs to store data, the use of electronic codebooks to help users identify data elements and create analysis subfiles, and the data license system to allow researchers to access restricted data. These efforts have significantly helped educational researchers and policy analysts outside of NCES.

V. Training Costs

NCES has only limited funds to support staff attendance at training programs outside the agency. In FY 96, the total amount thus spent was $ 8,076, representing about five percent of the training budget of $165,000. For FY 97, the budget for staff training was estimated to be $13,750.

In addition, NCES provides some funds for NCES University and the training of outside researchers. For example, in FY 96 the budget for the NCES University was $25,000 and for the training of outside researchers, $350,000. (The same level of budget was requested for FY 97). These funds were used to pay for instructional materials and reimburse lecturers' costs. The budget for training outside researchers and data providers also covered participants' travel costs, per diem, and costs for labor and for facilities such as computer rentals, meeting room, and software packages.

Survey and Statistical Training at Federal Statistical Agencies
Training Program Case Study #7

THE NATIONAL CENTER FOR HEALTH STATISTICS
Centers for Disease Control and Prevention

I. The Agency

NCHS is one of 10 general purpose statistical agencies that make up the core of the Federal statistical system. Along with the other agencies, NCHS produces statistics for the Nation, sets statistical policy, develops statistical standards and methodology, and leads and advises on statistical data collection. NCHS has special legislative authority for its programs under Sections 304, 306, and 308 of the Public Health Service Act. The Act authorizes data collection, analysis, and dissemination of a broad range of health and health-related areas and provides specific legislative authority to enable the Center to protect the confidentiality of information received in its surveys. In addition the Act provides for NCHS to undertake and support research, demonstrations, and evaluations regarding survey methods and to provide technical assistance to State and local jurisdictions. The Disadvantaged Minority Health Improvement Act authorizes the Center to obtain more detailed data on racial and ethnic populations and subpopulations through vital statistics and national surveys and to establish a grants program for special studies, analyses, and methodological research regarding obtaining data on minority populations.

The mission of the National Center for Health Statistics (NCHS) is to provide statistical information that will guide actions and policies to improve the health of the American people. As the Nation's principal health statistics agency, NCHS design, develops and maintains more than a dozen data systems that cover the full spectrum of health concerns. These data systems provide essential information to policy makers, to medical researchers, and to others in the health community.

II. Description of Statistical Employees

Currently NCHS has 482 employees:

185 Statisticians/assistants
- 15 Math Stats (1529 series)
- 146 Survey Stats (1530 series)
- 10 Stat Assistants (1531 series)

115 Computer Specialists/coding clerks
27 Medical/Public Health Group (600 series)
30 Publication/information specialists
125 All Others

Statisticians are involved in the development and implementation of data collection, analysis, report writing and information dissemination. Their work includes monitoring contracts with private companies that carry out projects for NCHS. The agency advises on the availability and appropriateness of health statistics. The NCHS staff makes numerous presentations and publications on research findings of our data systems as well as on survey methods and techniques.

III. Training in Statistics and Surveys for Statistical Employees

NCHS has an extensive training program available to all employees. The training is provided from sources such as the SAS Institute, university-based, and on-site vendors. The university-based training included eight employees on survey research course work as well as two employees at the Summer Epidemiology Program at the Johns Hopkins University. NCHS also supports one employee each year in the Long Term Training Program, which allows one to complete doctoral studies full-time at a local university. All employees continuously upgrade their software application skills through training with vendors on-site (SUDAAN, FoxPro, SAS, S-plus, etc.).

Training for Statisticians. There is no written training policy for statisticians, but NCHS has a strong commitment to their professional development and supports training as a large part of that development. In particular, NCHS supported 89 employees at various JPSM courses in FY 96: Statistical Disclosure and Disclosure Limitations, Variance Estimation for Sample Surveys and Regression Models for Complex Survey Data, etc.

Training Enumerator. NCHS does not offer enumerator training. NCHS has contracted out all data collection to private companies or the Bureau of Census. These contractors generally train their enumerators before they go out to collect and process data.

IV. Training in Statistics and Surveys for Non-employees

NCHS provides training to various federal agencies, academic researchers, and local and state public health professionals:

- The Applied Statistics Training Institute (ASTI), a collaboration between the Schools of Public Health, the State and local offices of public health, and NCHS. ASTI provides basic and advanced training on current statistical topics that are meant to inform and direct public health practice, primarily for use in State and local settings.

- NCHS provides training to public health professionals through a five-day course on Vital Statistics Records and their Administration and a course on Vital Statistics Measurement and Production, which covers basic vital statistics measures for fertility and mortality, concepts of classification, and practices of classification with emphasis on International Classification of Disease (ICD).

- NCHS collaborates with the Department of Biostatistics, University of North Carolina at Chapel Hill, on The Minority Health Statistics Grants Program to sponsor a Summer Public

Health Research Institute on Minority Health. Modules addressing theoretical and practical issues related to the collection, analysis and interpretation of racial and ethnic data are offered.

- NCHS teaches a two-day course on Analysis of Data from the National Health Interview Survey, which includes estimation and variance estimation to government and academic researchers.

- NCHS hosts a biennial Data Users Conference where each of our data systems is described in detail, as are methodological issues related to content, estimation, and analysis.

- Each of NCHS's four Data Divisions produce periodic Data Systems Seminars, which are devoted to in-depth explanations for using each of the systems.

- For the benefit of federal statistical agencies and academic researchers, the Office of Research and Methodology sponsors one-day seminars on the geographic analysis of health data.

- The University Visitation Program is a series of lectures and presentations by NCHS staff covering the programs, surveys, activities and data of the Center.

V. Training Costs

NCHS has a training budget of $388,000, which encompasses all areas of training. Approximately 30 percent of that budget was spent on statistical training in FY 96.