Department of Energy
Washington, DC 20585

March 27, 2007

MEMORANDUM FOR DISTRIBUTION

FROM: PATRICE M. BUBAR Patrice M. Bubar
DIRECTOR
OFFICE OF CORPORATE SAFETY ANALYSIS
OFFICE OF HEALTH, SAFETY AND SECURITY

SUBJECT: U.S. Department of Energy Analytical Services Program
Fiscal Year 2006 Report

Attached is the Department of Energy's Analytical Services Program (ASP) Fiscal Year 2006 Report developed by the Office of Health, Safety and Security's Office of Corporate Safety Analysis. The Report summarizes the ASP's corporate activities, which support field implementation of analytical services in the following areas:

- Auditing
- Department of Energy Consolidated Audit Program (DOECAP)
- Proficiency Testing
- Mixed Analyte Performance Evaluation Program (MAPEP)
- Software Development and training activities
- Systematic Planning and Data Assessment Tools and Training Program

This corporate program provides various programmatic benefits to the Department. These include reducing liabilities associated with analytical data and the proper disposition of low-level and mixed radioactive and chemical wastes, the elimination of costly redundant audits, improvements in the defensibility and credibility of data to support regulatory compliance and field decision making, and the availability of software toolkits to help more efficiently plan field data collection in meeting Data Quality Objectives.

Thirty-six DOECAP audits of analytical laboratories and commercial waste treatment, storage, and disposal facilities (TSDFs) were completed in fiscal year 2006. The laboratories and TSDFs are under contractual agreements with field contractors to provide analytical data services and waste disposal of low-level, mixed, and chemical wastes. The consolidated audits eliminated duplicative

independent audits by the field at an estimated cost savings to the taxpayer in excess of $2.3 million.

Over 120 analytical laboratories and 15 international laboratories participated in the Department's corporate proficiency testing program as implemented by the Radiological and Environmental Sciences Laboratory at the Idaho National Laboratory. The proficiency testing of radiological, stable inorganic, and organic constituents assists the field in ensuring the defensibility of environmental data in support of meeting regulatory standards, remedial cleanup actions, and closure sites.

Development of software toolkits to support the planning and design of environmental field sampling and decision making was developed in response to field-identified needs. Training courses were taught at field sites using the Visual Sample Planning software and Data Quality Objectives planning process.

For further information about the Department's corporate Analytical Services Program, please contact Charles Lewis, Director, Office of Corporate Safety Programs, at (301) 903-1250 or charles.lewis@hq.doe.gov; or George E. Detsis, ASP Manager, at (301) 903-1488 or george.detsis@hq.doe.gov.

Attachment:

- U.S. Department of Energy Analytical Services Program Fiscal Year 2006 Report

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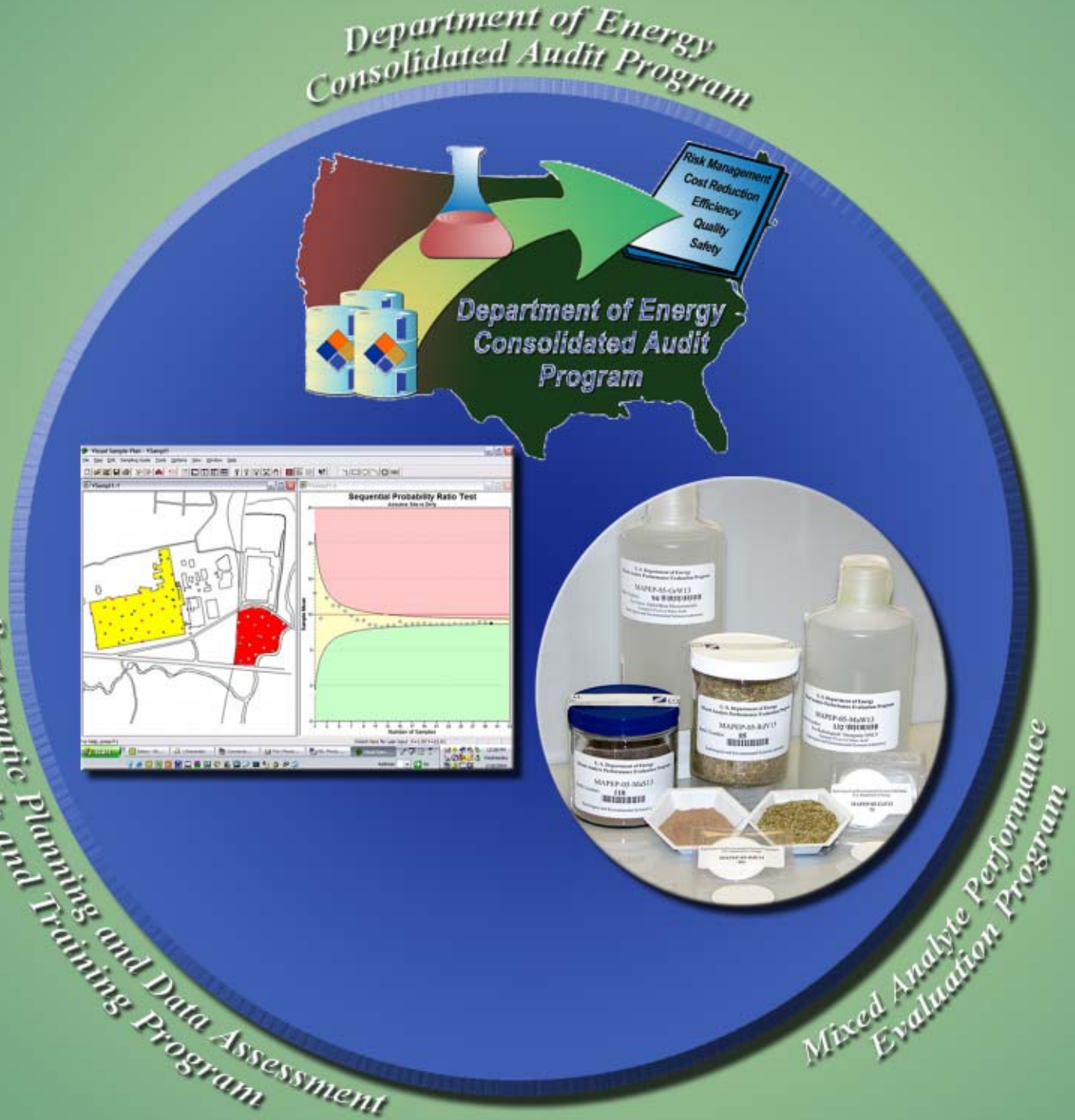
U.S. Department of Energy

Office of Health, Safety and Security

Analytical Services Program

Fiscal Year 2006 Report



March 2007

Foreword

One of the priorities of the U.S. Department of Energy (DOE) is to ensure the health, safety, and security of DOE employees, contractors, and subcontractors. To provide the corporate-level leadership and strategic vision necessary to better coordinate and integrate health, safety, environment, security, enforcement, and independent oversight programs, the Secretary of Energy officially established the Office of Health, Safety and Security (HSS) on August 30, 2006. The HSS is committed to excellence in protecting the health and safety of our workers, the public, the environment, and our national security assets.

A key environmental focus for DOE is to ensure confidence in analytical data results and accountability in waste treatment and disposal. The *Analytical Services Program Fiscal Year 2006 Report* provides an overview of DOE's Analytical Services Program (ASP) activities. The ASP comprises three components: the DOE Consolidated Audit Program (DOECAP), the Mixed-Analyte Performance Evaluation Program (MAPEP), and the Systematic Planning and Data Assessment Tools and Training (SPADAT) Program.

Benefits derived from these components include reduced Departmental liability associated with analytical data and the proper disposition of low-level and mixed radioactive and chemical wastes, elimination of redundant audits from multiple field entities, improved audit quality and consistency, improved data quality and reliability necessary to ensure regulatory compliance and support DOE decisions, and the availability of tools used by site personnel to plan data gathering efforts and to assess whether the data gathered meet Data Quality Objectives.

My memorandum of January 9, 2007, soliciting complex support for Federal program line and field staff involvement in the DOECAP as audit team members and team leads, is just the first of many initiatives HSS will undertake as we assume the leadership of and responsibility for the ASP. I wish to affirm our commitment to this program to the various Federal programs and contractors that depend on the ASP to meet regulatory and contract requirements.

Glenn S. Podonsky
Chief Health, Safety and Security Officer

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Acronyms

A2LA ..... American Association for Laboratory Accreditation
AIT ..... Auditor-in-Training
AL ..... Action Level
AMESH ..... Assistant Manager for Environment, Safety and Health
ASP ..... Analytical Services Program
BOA ..... Basic Ordering Agreement
CAA ..... Clean Air Act
CAP ..... Corrective Action Plan
CDC ..... Centers for Disease Control and Prevention
CERCLA ..... Comprehensive Environmental Response, Compensation, and Liability Act
CWA ..... Clean Water Act
DHS ..... Department of Homeland Security
DoD ..... Department of Defense
DOE ..... Department of Energy
DOECAP ..... DOE Consolidated Audit Program
DOELAP ..... DOE Laboratory Accreditation Program
DQA ..... Data Quality Assessment

DQOs ..... Data Quality Objectives
EDS ..... Electronic Data System
EH ..... Office of Environment, Safety and Health
EM ..... Office of Environmental Management
EPA ..... Environmental Protection Agency
FY ..... Fiscal Year
GIS ..... Geographical Information Systems
GOCO ..... Government-Owned, Contractor-Operated
HQ ..... Headquarters
HSS ..... Office of Health, Safety and Security
ILAC ..... International Conference on Accreditation of Laboratories
ISO ..... International Organization for Standardization
LANL ..... Los Alamos National Laboratory
LBGR ..... Lower Bound of the Gray Region
LM ..... Office of Legacy Management
MAPEP ..... Mixed Analyte Performance Evaluation Program
MaS ..... Mixed Analyte Soil
MIS ..... Multi-Increment Sampling
NELAC ..... National Environmental Laboratory Accreditation Conference
NIST ..... National Institute of Standards and Technology
NNSA ..... National Nuclear Security Administration
ORNL ..... Oak Ridge National Laboratory
ORO ..... Oak Ridge Office
OSWER ..... Office of Solid Waste and Emergency Response
PE ..... Performance Evaluation
POC ..... Point of Contact
PSO ..... Program Secretarial Office
QSAS ..... Quality Systems for Analytical Services
RCRA ..... Resource Conservation and Recovery Act
RdV ..... Radiological Vegetation
RESL ..... Radiological and Environmental Sciences Laboratory
RMCCP ..... Radiation Measurements Cross-Calibration Project
RPM ..... Remedial Project Manager
RTP ..... Radiological Traceability Program
SC ..... Office of Science
SOP ..... Standard Operating Procedure
SPADAT ..... Systematic Planning and Data Assessment Tools and Training
SRS ..... Savannah River Site
TSDF ..... Treatment, Storage, and Disposal Facility
VSP ..... Visual Sample Plan
VSS ..... Visual Sample Size

Executive Summary

This report provides an overview of the Department of Energy (DOE) Analytical Services Program (ASP) activities for Fiscal Year 2006 (FY06). The ASP is managed through the Headquarters Office of Health, Safety and Security, Office of Corporate Safety Analysis, Office of Corporate Safety Programs, HS-31. Component elements of the ASP are the:

- DOE Consolidated Audit Program (DOECAP),
- Mixed Analyte Performance Evaluation Program (MAPEP), and
- Systematic Planning and Data Assessment Tools and Training (SPADAT) Program.

Additional information may be obtained by accessing the ASP web page at http://www.hss.energy.gov/CSA/Analysis/asp.

DOECAP

The DOECAP conducts annual audits of analytical laboratories and commercial waste treatment, storage, and disposal facilities (TSDFs) that have contracts or agreements to provide services to the DOE. DOECAP audits are performed on behalf of, and with the participation of, sites throughout the DOE complex and across all Departmental program line organizations. First formulated in the mid-1990s, the intent of this corporate Departmental program is to conduct consolidated audits to eliminate redundant audits previously conducted independently by DOE field element sites; and achieve standardization in audit methodology, processes, and procedures. Additional information may be obtained by accessing the DOECAP Electronic Data System (EDS) at https://www.oro.doe.gov/DOECAP.

Specific benefits derived through implementation of the DOECAP include:

- ***Risk Management*** – Reduced potential Departmental liability associated with the quality of analytical data used in environmental decision making, and the proper disposition of low-level and mixed radioactive waste and chemical waste,
- ***Cost Reduction*** – Cost savings to the Department and taxpayer of at least $2.3M annually by eliminating redundant audits,
- ***Efficiency*** – Increased efficiency through the use of centralized DOECAP functions, managed processes for communication amongst stakeholders, and technical and analytical quality standards that can be affixed to any contract,
- ***Audit Quality*** – Improved audit quality and consistency as a result of forming audit teams from a pool of "volunteer" technical experts from throughout the DOE complex, and through the use of standardized DOECAP processes and documents,
- ***Data Quality*** – Improved analytical laboratory performance and data quality resulting from resolution of audit findings through implementation of the DOECAP corrective action process, and
- ***Safety*** – Enhanced safety handling DOE samples and waste through verification of compliance with applicable standards and regulations.

In FY06, a total of 36 DOECAP audits were conducted: 25 at commercial analytical environmental laboratories; 4 at government-owned-contractor-operated (GOCO) laboratories located at DOE field element sites; and 7 at commercial TSDFs. Those audits included initial and continuing qualification audits, and surveillance for verification of corrective actions (refer to Appendix A, FY06 DOECAP Audited Laboratories and TSDFs).

Common deficiencies cited in DOECAP laboratory findings were related to inadequate procedure content and control, failure to properly perform and document instrument calibration, and poor waste management practices. Common deficiencies cited in DOECAP TSDF findings were related to either not following required processes or not meeting process requirements, and a lack of complete and acceptable procedures.

All FY06 DOECAP processes, from pre-audit through Corrective Action Plan acceptance, were implemented within timeframes established as program performance metrics. Other FY06 DOECAP highlights included the following:

- Developing and issuing DOECAP Procedure AD-1, DOECAP Policies and Practices, to formally document established program policies and practices; as well as revising an issuing key program documents including the Quality Systems for Analytical Services document (QSAS) and DOECAP laboratory and TSDF audit checklists,

- Completely revising DOECAP online training modules to enhance content as well as improve trainee interface, with all DOECAP auditors and lead auditors successfully completing retraining,

- Implementing enhancements to the DOECAP Electronic Data System (EDS) to increase system utility and efficiency,

- Conducting the DOECAP annual meeting (DOECAP 2006), which was attended by over 120 individuals and brought together DOECAP auditors, Headquarters and field DOECAP points of contact (POCs), analytical laboratory and TSDF representatives, senior DOE management, representatives from other ASP Programs, and representatives from other Federal agencies, and

- Responding to a request from the United States Government Accountability Office (GAO) for information and records regarding a number of analytical laboratories audited by the DOECAP in support of a GAO Report to Congressional Requesters regarding the Rocky Flats closure project (i.e., *Nuclear Cleanup of Rocky Flats – DOE Can Use Lessons Learned to Improve Oversight of Other Sites' Cleanup Activities*).

A continuing programmatic challenge is the number of Federal auditors participating in DOECAP TSDF audits. At present, all three Federal DOECAP TSDF lead auditors are provided from the DOE Oak Ridge Operations Office. In FY07, an initiative will be made to canvass all field sites and program organizations having contracts with commercial TSDFs to increase the Federal TSDF auditor pool. Similarly, efforts will continue in FY07 to encourage DOE sites participating in the DOECAP to qualify additional auditors, as well as encourage non-participating DOE sites and Program Offices to engage in the DOECAP.

MAPEP

The MAPEP provides important quality assurance oversight for environmental analytical services under contract with DOE by performing semiannual performance testing and evaluation of both DOE onsite and commercial analytical laboratories. MAPEP proficiency tests help ensure the accuracy of analytical results reported to DOE field element sites and provide an efficient means for laboratories to demonstrate analytical proficiency. Performance testing and evaluation are implemented through the distribution of mixed analyte water and soil matrices (i.e., containing radiological, stable inorganic, and organic constituents), as well as radiological air filter and vegetation matrices; gross alpha/beta air filter and water matrices are also provided.

The Idaho National Laboratory – Radiological and Environmental Sciences Laboratory (RESL), which administers the MAPEP, is itself directly traceable to NIST in both the analysis and preparation of radiological environmental samples. Performance data for all matrices from a MAPEP test session (i.e., Series) are reported to DOE Headquarters, DOE Field Offices, Sample Management Offices or contractors, participating laboratories, and audit personnel to support quality assurance oversight and quality improvement.

The MAPEP had two shipments for test sessions in FY06 containing a total of 1,046 samples; each shipment included mixed-analyte water, mixed-analyte soil, radiological vegetation and filters, and gross alpha/beta waters and filters. The number of participants also increased to over 120, including 15 international laboratories (see Appendix B).

The international laboratories are participating in DOE sponsored activities or areas of interest. Other FY06 MAPEP highlights included:

- Analytical laboratory data quality issues continued to be identified through routine MAPEP performance testing and specialized testing for false positive, false negative, and sensitivity evaluations, including issues regarding antimony and refractory plutonium analyses,

- RESL achieved ISO 17025:20005 General Requirements for Competence of Testing and Calibration Laboratories Accreditation through the American Association for Laboratory Accreditation (A2LA) for the quality systems and analytical verification process supporting the MAPEP and applied for Proficiency Testing Provider ISO 43 Accreditation in August, 2006 with A2LA, and

- The MAPEP continued to actively seek customer feedback by participation in DOECAP bi-monthly laboratory conference calls and presenting important MAPEP information on the calls and at the annual DOECAP meeting.

SPADAT Program

To ensure that data are of sufficient quality to support confident decisions, DOE must not only ensure that the analytical laboratories are producing high quality results, but also that the appropriate type, quantity, and quality of data are gathered. Decisions influenced by data must reflect the fact that the inherent uncertainties within the data are appropriately taken into account. The SPADAT Program helps site personnel optimally plan data

gathering efforts and assess whether the data gathered meet Data Quality Objectives (DQOs).

DOE leverages off investments made by the Environmental Protection Agency (EPA), Department of Defense (DoD), Department of Homeland Security (DHS), and Centers for Disease Control (CDC) to develop the Visual Sample Plan (VSP) software to support statistical sampling design and data decision assessments. During FY06, additions were made to VSP to support trend detection and estimation for DOE Legacy Management programs. Other major VSP additions included methods for handling less-than-detect values, simultaneous multiple constituents, and hotspots designs with measurement uncertainty. With over 5,000 users, including some from virtually all DOE sites and most regulating entities, VSP is widely recognized as the tool of choice for Systematic Planning and DQO implementation.

VSP training was performed at Oak Ridge, Los Alamos, Sandia, and Grand Junction. Additional training in Systematic Planning, and development of training software aids to assist in understanding statistical concepts, were also performed. Courses offered included Managing Uncertainty with Systematic Planning for Environmental Decision-Making; DQO Applications; Data Quality Assessment; Visual Sample Plan Primer; and Visual Sample Plan Expert. FY07 plans include additional Systematic Planning and VSP training courses throughout the DOE complex.

Additional VSP enhancements requested by DOE personnel will be implemented including long-term monitoring methods, geostatistical techniques, and multi-incremental sampling approaches.

Conclusion

In 2006, ASP activities continued to effectively support all Departmental elements with a corporate approach that provides environmental data quality assurance in a cost-effective manner. Improvement efforts included strengthening audit program procedures and auditor qualification training. Issues identified during audits and performance tests were identified for corrective action. In coordination with several other Federal agencies, the ASP worked to develop software toolkits to support field planning and data assessment.

The Office of Health, Safety and Security will continue to support this corporate approach to the ASP in close partnership with program offices and field elements. One focus area in 2007 will be the enhancement of Federal staff cadre who are trained and qualified as audit team leaders.

1.0 Department of Energy Consolidated Audit Program (DOECAP)

The DOECAP conducts annual audits of analytical laboratories and commercial waste treatment, storage, and disposal facilities (TSDFs) that have contracts or agreements to provide services to the DOE. DOECAP audits are performed on behalf of, and with the participation of, sites throughout the DOE complex and across all Departmental program line organizations. Additional Program information is available on the DOECAP Electronic Data System (EDS) at https://www.oro.doe.gov/DOECAP.

DOECAP ownership rests within the Office of Health, Safety and Security (HSS); a Federal Analytical Services Program (ASP) Manager located in Germantown, Maryland, provides overall policy direction, guidance, funding, and DOECAP complex-wide leadership. A manager from the DOE Oak Ridge Office (DOE-ORO), Office of the Assistant Manager for Environment, Safety and Health (AMESH), as DOECAP Manager provides Federal oversight of the contractor DOECAP Operations Team also located in Oak Ridge, Tennessee. The DOECAP Operations Team is responsible for program administration and implementation from audit scheduling and coordination through tracking and coordinating closure of corrective actions. DOECAP Operations Team members are also qualified as DOECAP auditors. The DOECAP core organization comprises the ASP Manager, DOECAP Manager, Deputy DOECAP Manager, and DOECAP Operations Team.

Beyond the DOECAP core organization, DOECAP lead auditors and auditors, as well as other personnel associated with the Program (i.e., Federal points-of-contact [POCs] and contractor POCs), all participate on an as-needed basis. DOE Program Offices and sites (i.e., laboratory and TSDF contract holders) participate voluntarily in the DOECAP – motivated by historically demonstrated benefits of participation, and provide lead auditors, auditors, and others to support the Program; those personnel have been and continue to be vital to the success and viability of the Program. The cost incurred by Program Offices and sites to voluntarily provide personnel to participate in the DOECAP is a prudent investment, with a considerable dividend returned in the form of significantly reduced costs otherwise incurred by sites performing independent laboratory and TSDF qualification audits. That dividend is further compounded for the Department and the taxpayer by eliminating redundant audits of the same laboratories and TSDFs performed by multiple, independent sites; hence the benefit of pooled resources under a program of consolidated DOE audits. The ability to draw upon voluntary resources from throughout the DOE complex to successfully implement the Program and realize significant cost savings for the Department and taxpayer, as well as increase the overall efficiency and quality of the auditing process, is part of the unique history of the DOECAP. As a result of DOECAP activities, the necessity for approximately twice the number of audits (i.e., over 40 additional annual audits) throughout the DOE complex is eliminated, resulting in an estimated annual cost savings in excess of $2.3M.

1.1 Background and Scope

In the mid-1990s, the DOE Office of the Inspector General and the General Accounting Office issued reports citing inefficiency,

Photo 1.1. DOECAP Laboratory Auditors Interviewing Personnel

redundancy, and ineffectiveness regarding audits of analytical laboratories conducted by the Department. The reports were critical of using funds for individual DOE field elements to perform redundant audits of the same laboratories, employing disparate audit protocol and criteria.

In response, the Office of Environmental Management (EM) mandated implementation of a consolidated, uniform audit program for conducting annual audits of analytical laboratories in support of EM field environmental decision making with the following goals and objectives:

- Eliminate audit redundancy,
- Provide a pool of trained auditors sufficient to support consolidated audits, and
- Standardize terms and conditions of existing and proposed contracts to allow acceptance of consolidated audit results.

Since that time, audits of TSDFs have been added to the scope of the DOECAP, and the Program was transferred to the Office of Environment, Safety and Health (EH) in December 2003 to provide a broader and more cross-cutting Departmental focus, then transferred to HSS in early FY07. However, the DOECAP continues to meet the intent of the original EM mandate through:

- Consolidated audit planning, scheduling, and coordination achieving cost savings for the Department and taxpayers, as well as minimizing impact to contractor laboratories and TSDFs,
- Development and maintenance of standard audit procedures, including standardized audit reports,
- Development of standard qualification requirements, and establishment of a pool of DOECAP-qualified auditors and lead auditors from across the complex to support audits of both laboratories and TSDFs,
- Coordination and centralized tracking of corrective actions and closure of audit findings and observations,
- Establishment of a cadre of DOE and contractor POCs from across the complex, with bi-weekly teleconferences to update POCs and auditors of program-related activities,
- Establishment and maintenance of the EDS to share information, and

- Active participation with state and Federal regulatory agencies, as well as other industry standard-setting groups (e.g., National Environmental Laboratory Accreditation Conference, Interagency Data Quality Task Force).

Specific benefits derived through effective implementation of the DOECAP include:

- **Risk Management** – Reduced potential liability for the Department associated with the quality of analytical data used in environmental decision making, and the proper disposition of low-level and mixed radioactive waste and chemical waste, through rigorous DOECAP qualification audits of laboratories and TSDFs; as well as DOECAP TSDF audits providing an alternative for satisfying requirements established in DOE Order 435.1 for the approval of non-DOE facilities for the storage, treatment, or disposal of DOE radioactive waste,

- **Cost Reduction** – Consistent savings to the Department and taxpayer of at least $2.3M annually derived through audit consolidation by eliminating the need to conduct approximately twice the number of audits throughout the DOE complex,

- **Efficiency** – Increased efficiency through the use of centralized DOECAP functions, managed processes for communication amongst stakeholders, and technical and analytical quality standards that can be affixed to any contract,

- **Audit Quality** – Improved audit quality and consistency as a result of forming audit teams from a pool of technical experts in various areas from throughout the DOE complex and through the use of standardized DOECAP processes and documents (e.g., checklists, templates),

- **Data Quality** – Improved analytical laboratory performance and data quality resulting from resolution of audit findings through implementation of the DOECAP corrective action process, and

- **Safety** – Enhanced safety regarding the handling of DOE samples and waste through verification of compliance with applicable standards and regulations, including conduct of DOECAP regulatory agency reviews as part of TSDF audits.

1.2 FY06 Activities and Accomplishments

1.2.1 Program Processes and Metrics

The following summarizes key processes, as well as any associated metrics, relative to implementation of the DOECAP.

Pre-Audit Process

The DOECAP pre-audit process begins with establishing the FY audit schedule and extends to commencement of the on-site audit. The pre-audit process may be sequentially segmented into six major steps implemented or facilitated by the DOECAP Operations Team, identified in Table 1.1.

The facility usage query was completed and the tentative audit schedule for FY07 developed in the fourth quarter of FY06. Audit dates are established and teams staffed as far in advance of the audit as practicable. A goal of providing audit packages to audit team members at least 14 days prior to commencement of the audit is

1. FY audit schedule developed based upon field response to 'facility usage query' (i.e., laboratories and TSDFs projected to be used by sites throughout the DOE complex)
2. Audit date set with audited facility (i.e., laboratory or TSDF), and audit notification letter sent
3. Lead auditor selected and audit team formed based upon sites using the audited facility, personnel availability, and shared DOECAP resources from throughout the DOE complex
4. Pre-audit information requested from audited facility (e.g., procedures, licenses, permits) for inclusion in audit packages
5. Audit packages (i.e., CDs) developed, including pre-audit information provided by audited facility as well as other audit tools and information (e.g., audit checklists, reference material), and sent to audit team members
6. Pre-audit conference call conducted with audit team

Table 1-1. DOECAP Pre-Audit Process

targeted, and generally met unless delays are encountered receiving pre-audit information requested from the audited facilities. Pre-audit conference calls are typically conducted the week before the audit.

A total of 162 laboratory audit packages and 62 TSDF audit packages were distributed to audit team members in FY06.

Audit Performance

Audits are performed following a standardized format by teams comprising a DOECAP qualified lead auditor, and an appropriate number of DOECAP qualified auditors determined by varying factors (e.g., audit scope and complexity, personnel availability, individual site interests). In addition, DOECAP auditors-in-training (AITs) as well as observers may be authorized by the DOECAP Manager to join the audit team. Additionally, DOE Headquarters oversight of auditing activities occurs on selected laboratory and TSDF audits. While DOECAP laboratory lead auditors may be either Federal or contractor personnel, DOECAP TSDF lead auditors are limited to only Federal employees due to the need for DOE accountability for low-level radioactive waste emanating from DOE sites. DOECAP checklists are used to guide auditors through each area of the audit; checklists are available online from the DOECAP EDS at https://www.oro.doe.gov/DOECAP. The six DOECAP laboratory audit areas and associated checklists are identified in Table 1.2, and the seven DOECAP TSDF audit areas and associated checklists are identified in Table 1.3. The previous DOECAP audit report, as well as the associated Corrective Action Plan (CAP) submitted in response by the audited facility and accepted by the DOECAP, are also used by the auditors to evaluate the implementation and effectiveness of corrective actions and to determine whether those corrective actions warrant the closure of open findings previously issued by the DOECAP.

1. Quality Assurance Management Systems and General Laboratory Practices
2. Data Quality for Organic Analyses
3. Data Quality for Inorganic and Wet Chemistry Analyses
4. Data Quality for Radiochemistry Analyses
5. Laboratory Information Management Systems and Electronic Data Management
6. Hazardous and Radioactive Materials Management

Table 1.2. DOECAP Laboratory Audit Areas and Associated Checklists

1.	Quality Assurance Management Systems
2.	Sampling and Analytical Data Quality
3.	Waste Operations
4.	Environmental Compliance/Permitting
5.	Radiological Control
6.	Industrial and Chemical Safety
7.	Transportation Management

Table 1.3. DOECAP TSDF Audit Areas and Associated Checklists

In addition to the on-site audit, a review is conducted at the offices of the cognizant regulatory agency(ies) as part of a DOECAP TSDF audit. Regulatory agency reviews may be conducted remotely via telephone conversations with regulatory agency personnel, followed by visits to regulatory agency offices as determined necessary by the lead auditor.

Photo 1.2. DOECAP TSDF Auditor Inspecting Waste Containers

In FY06, a total of 36 DOECAP audits were conducted: 25 at commercial analytical laboratories; 4 at government-owned-contractor-operated (GOCO) laboratories located at DOE field element sites; and 7 at commercial TSDFs accepting DOE low-level and mixed radioactive waste and chemical waste. While these audits were primarily initial and continuing qualification audits, four were conducted as surveillances for verification and acceptance of corrective actions.

The 29 FY06 DOECAP laboratory audits were conducted by teams comprising a total of 141 DOECAP auditors, provided by 9 different DOE sites, for a total of 429 auditor-days on site at the audited laboratories. The 7 FY06 DOECAP TSDF audits were conducted by teams comprising a total of 56 DOECAP auditors, provided by 9 different DOE sites, for a total of 168 auditor-days on site at the audited TSDFs. A listing of laboratories and TSDFs audited by the DOECAP in FY06 is provided in Appendix A of this report.

Post-Audit Process

The DOECAP post-audit process extends from completion of on-site audit activities and issuance of the audit report through notifying the audited facility of acceptance of the proposed Corrective Action Plan (CAP), and includes entering new findings and updating the status of previously issued findings on the DOECAP EDS after the final audit report has been approved by the DOECAP Manager. The post-audit process may be sequentially segmented into the seven major steps identified in Table 1.4.

The process for monitoring the timeliness of completing post-audit processes, first implemented in FY05 as an opportunity for

1.	Audited facility reviews draft audit report for "factual accuracy" and resolves any issues with audit team, after which Lead Auditor submits draft audit report to DOECAP Operations Team for review
2.	DOECAP Operations Team reviews draft audit report, resolves any issues (e.g., ambiguity, incorrect references) with audit team, and submits proposed final audit report to DOECAP Manager for review and approval as well as resolution of any issues not previously settled
3.	DOECAP Manager reviews/approves proposed final audit report, including resolution of any issues not previously settled, followed by issuance of approved final audit report to audited facility
4.	Audited facility develops CAP in response to audit findings, and submits CAP for review by audit team
5.	Audit team reviews proposed CAP, including resolution of any issues (e.g., corrective action does not adequately address finding) with the audited facility, and notifies DOECAP Operations Team of acceptance (this step is facilitated by the DOECAP Operations Team)
6.	DOECAP Operations Team processes approved CAP and submits to DOECAP Manager for acceptance
7.	DOECAP Manager reviews and accepts CAP, followed by notification of CAP acceptance sent to audited facility (includes DOECAP Operations Team entering CAP into EDS for tracking corrective actions to closure)

Table 1.4. DOECAP Post-Audit Process Overview

Program assessment and improvement, continued in FY06. A goal of completing the post-audit process within 110 days after completion of the on-site audit is currently targeted, with an actual average of 111 days achieved in FY06; compared to an average of 124 days in FY05. Figure 1.1 illustrates the post-audit process and provides a comparison of target to average actual time for completing each step in FY06. Many factors can impact the timeliness of completing the post-audit process, including the time lapse between completion of the on-site audit and completion of the factual accuracy review, and the amount of time required to communicate and resolve audit report issues. In light of these factors, FY06 timeliness of completing the post-audit process compared to currently targeted goals is considered acceptable. However, performance will continue to be monitored and further consideration will be given to improving Program performance in this area, as well as potentially adjusting targets based on FY07 performance.

The concerted effort initiated in FY05 to increase the overall quality of DOECAP audit reports continued in FY06. Specific focus was placed upon report text clarity and succinctness, differentiation between findings and observations, and accuracy of citations (i.e., regulatory or programmatic bases) for findings. This topic was also addressed with DOECAP participants via presentations during the DOECAP annual meeting in August 2006. Continued improvement in audit report quality was achieved as a result of this effort, and will remain an area of focus for FY07.

Program Participation and Support

A fundamental DOECAP premise is that most DOE sites have auditors qualified to meet certain site-specific needs, which the DOECAP leverages with existing resources to build complex-wide teams resulting in lower cost to any given site, as well as to the Department and taxpayer. Past Program success has been enhanced by sites designating appropriate

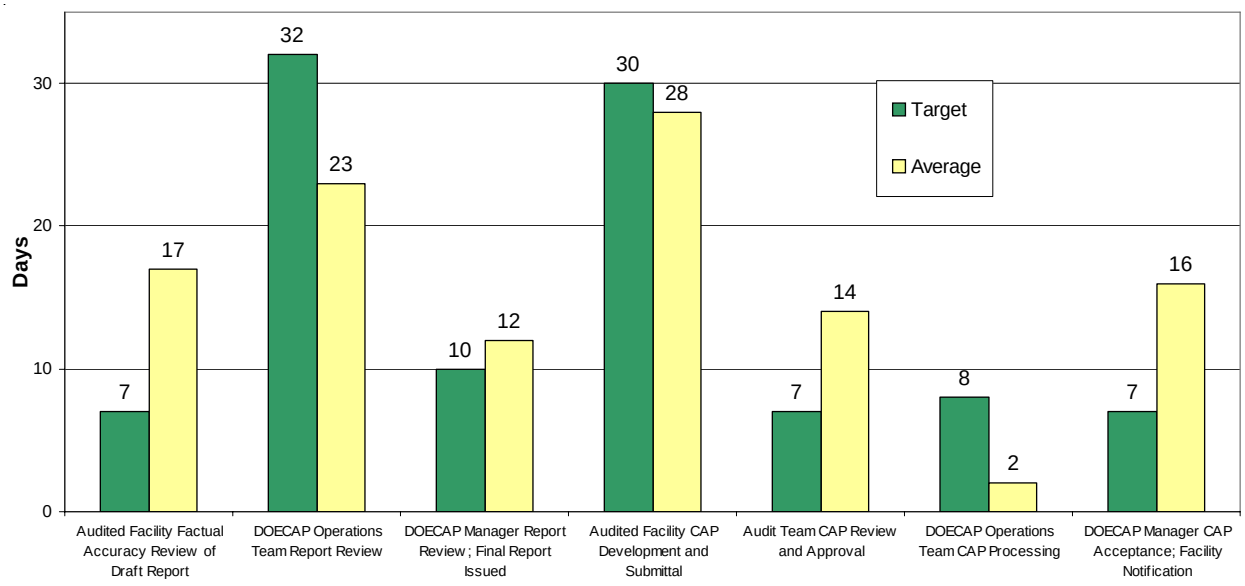

Figure 1.1. FY06 DOECAP Post-Audit Process Timeliness

POCs and submitting technically qualified personnel for qualification as DOECAP auditors. Figure 1.2 identifies participants across the DOE complex that supported FY06 DOECAP audits of laboratories and TSDFs, along with the number and allocation of qualified auditors.

Efforts continued in FY06 to encourage DOE sites participating in the DOECAP to qualify additional auditors, as well as encourage non-participating DOE sites and Program Offices to engage in the DOECAP. Active participation will continue to represent a challenge to continued Program viability as DOE sites continue the closure process.

Figures 1.3 and 1.4 illustrate DOE participation in DOECAP audits of laboratories and TSDFs, respectively, for the past 3 years.

Prospective DOECAP auditors (and lead auditors) are submitted for qualification by sponsoring DOE sites in a particular audit area or areas (see Tables 1.2 and 1.3 for audit areas); many auditors maintain qualification in multiple audit areas. Requirements are established in DOECAP Procedure AD-1, DOECAP Policies and Practices, regarding submittal of auditor qualification documentation, evaluation and approval. Upon approval by the DOECAP Manager, successful candidates are notified and must complete online DOECAP auditor training prior to receiving DOECAP auditor certification. Each auditor must complete at least one DOECAP audit every two years, and complete periodic online training as required, in order to maintain certification.

As illustrated in Table 1.5, the qualified DOECAP auditor pool remained steady during FY06; auditors from several DOE sites were added during the year to offset losses incurred by site closures and other factors (e.g., reductions in force at other participating sites). Two laboratory lead auditors were lost due to site closures at the end of FY06, and one laboratory lead auditor was added.

DOECAP TSDF audits are led by Federal employees due to the need for DOE accountability for low-level radioactive waste emanating from DOE sites. As has been the case in previous years, the three DOECAP TSDF lead auditors for FY06 were all provided by DOE-ORO.

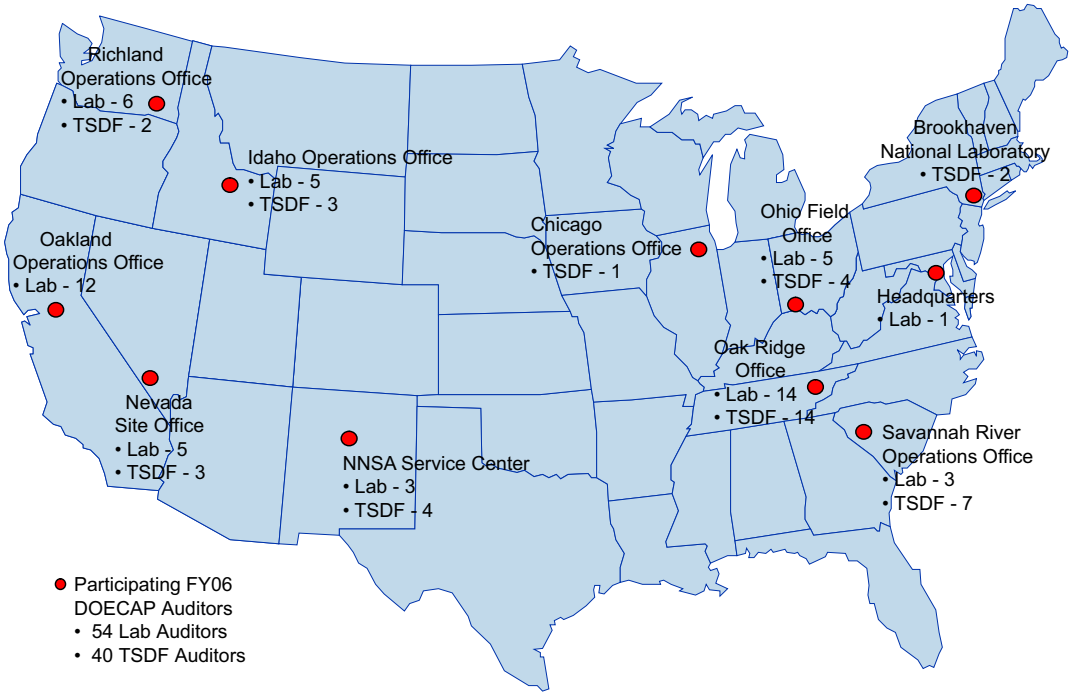

Figure 1.2. FY06 Participating DOECAP Laboratory and TSDF Auditors

A DOECAP auditor may be qualified in multiple audit areas. Table 1.6 illustrates the distribution of qualified DOECAP auditors at the end of FY06 per audit area. While sites are encouraged to submit prospective auditors for qualification in all audit areas, specific laboratory audit areas requiring additional qualified auditors are Laboratory Information Management Systems and Electronic Data Management, and Hazardous and Radioactive Materials Management; and specific TSDF audit areas requiring additional qualified auditors are Radiological Control, Industrial and Chemical Safety, and Transportation Management.

	Laboratory	TSDF
Lead Auditors beginning FY06	10	3
Lead Auditors ending FY06	9	3
Auditors beginning FY06	47	27
Auditors ending FY06	46	38

Table 1.5. FY06 DOECAP Lead Auditor and Auditor Qualification Status

EDS Usage

One of the major tools for sharing Program information is the DOECAP EDS. Due to the confidential and potentially business sensitive nature of stored information regarding audited laboratories and TSDFs, access to the inner (i.e., password-protected) portion of the EDS is limited to active DOECAP participants who are required to sign a confidentiality agreement stipulating authorized uses of the information. Access for DOECAP non-participants, including representatives of audited laboratories and TSDFs, is limited to the outer (i.e., unprotected) portion of the EDS which contains key Program correspondence

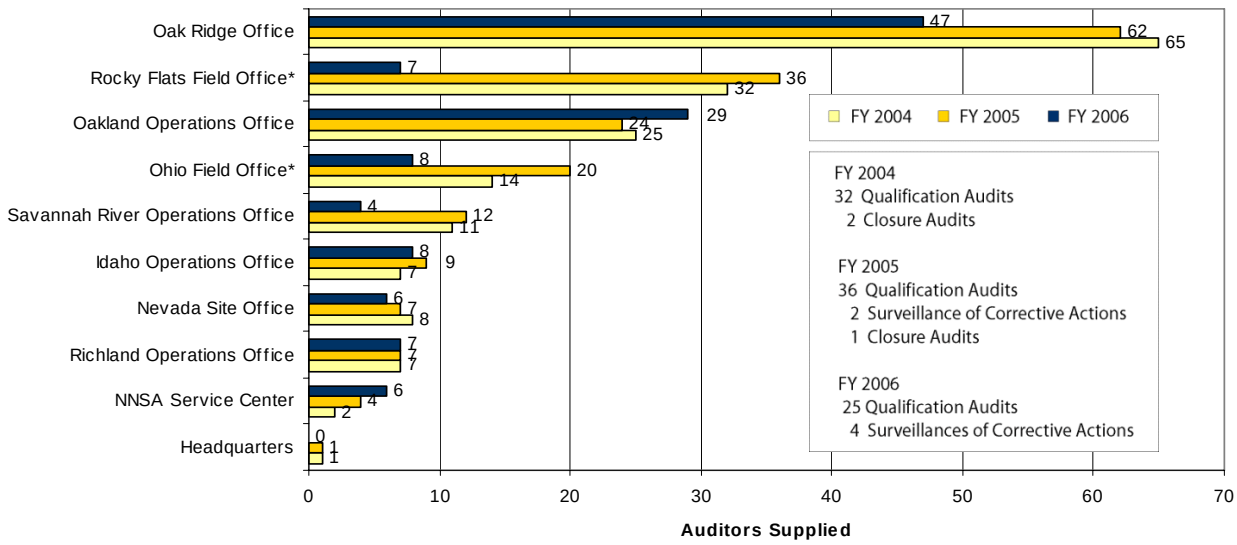

Figure 1.3. DOECAP Laboratory Audit Participation for the Past Three Years

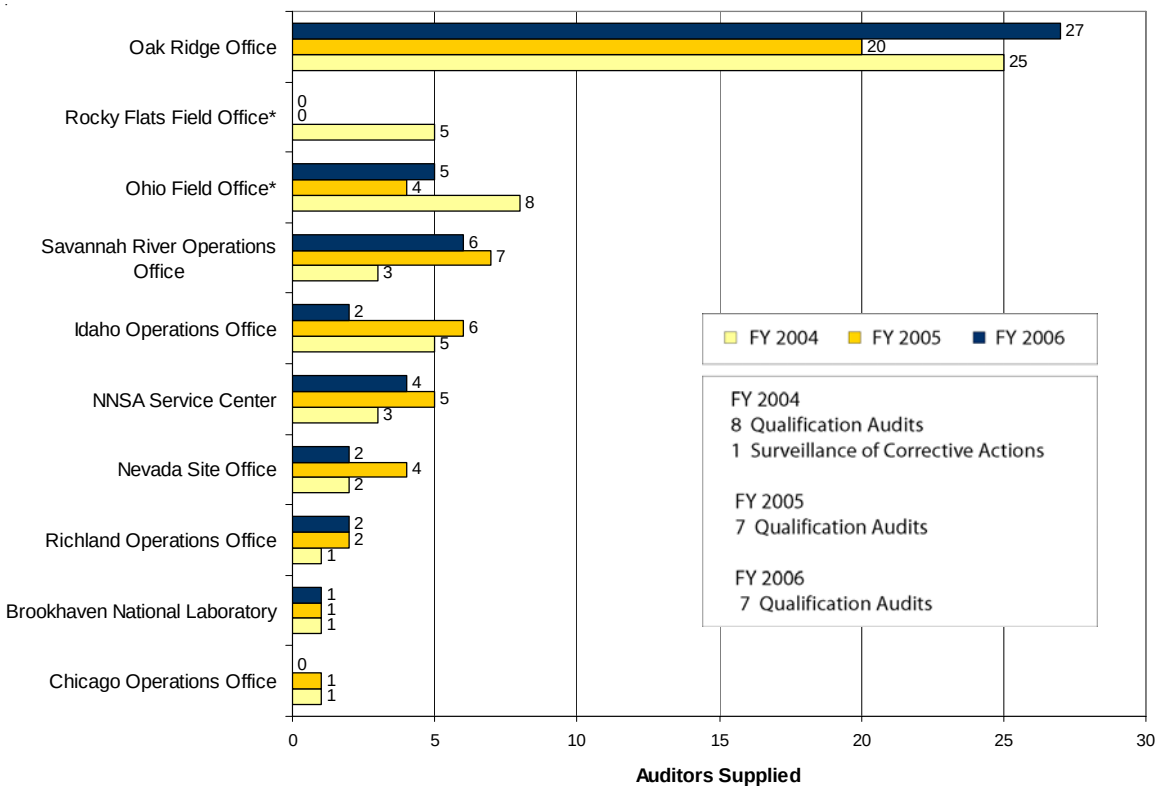

Figure 1.4. DOECAP TSDF Audit Participation for the Past Three Years

**Note: Rocky Flats completed closure activities in 2006. Mound and Fernald (part of the Ohio Field Office) are currently in the process of closure.*

and documents, contractual information, and Program contact information. The unprotected portion of the EDS may be accessed at https://www.oro.doe.gov/DOECAP.

In FY06, the protected laboratory section of the EDS was accessed 3,350 times, and the protected TSDF section was accessed 1,401 times. (Note: The number of times each EDS section was accessed in FY06 is potentially understated due to the EDS user-convenience feature added in FY06 that allows authorized users to transfer from one EDS section to the other without logging in/out or being tracked.) Access to the unprotected portion of the EDS is not tracked.

Proposed FY07 Audit Schedule

The DOECAP pre-audit process begins with the DOECAP Operations Team conducting a facility usage query; i.e., a field data call to identify which DOE sites have contracted for services with analytical laboratories and TSDFs, as well as estimated volume (dollars) of work. Responses to the facility usage query are compiled, evaluated, and presented to the DOECAP Manager for use in developing a tentative DOECAP audit schedule for the next FY.

In order for a laboratory or TSDF to be audited by the DOECAP, the following basic criteria must generally be met:

1. Usage by more than one DOE site, and

2. Ability to staff an audit team with personnel from sites using the laboratory or TSDF, augmented by auditors from other DOECAP participating sites.

DOECAP Laboratory Audit Area	Auditors Qualified as of 9/30/06
Lead Auditors	10
Quality Assurance Management Systems and General Laboratory Practices	30
Data Quality for Organic Analyses	16
Data Quality for Inorganic and Wet Chemistry Analyses	18
Data Quality for Radiochemistry Analyses	13
Laboratory Information Management Systems and Electronic Data Management	4
Hazardous and Radioactive Materials Management	7

DOECAP TSDF Audit Area	Auditors Qualified as of 9/30/06
Lead Auditors	3
Quality Assurance Management Systems	16
Sampling and Analytical Data Quality	8
Waste Operations	9
Environmental Compliance/Permitting	9
Radiological Control	8
Industrial and Chemical Safety	6
Transportation Management	7

Table 1.6. FY06 DOECAP Auditor Distribution per Audit Area

Exceptions may be made by the DOECAP Manager based on extenuating circumstances such as providing a unique analytical or waste processing capability, or the likelihood that additional DOE sites will need services from that laboratory or TSDF in the future.

The FY07 facility usage query, completed in the beginning of the fourth quarter of FY06, resulted in the development of the tentative FY07 audit schedule covering 30 laboratories - an increase of 6 more than FY06, and the same seven TSDFs audited in FY06. The increase in the number of DOECAP FY07 laboratory audits is attributed to new subcontracts issued for analytical services by certain DOECAP participating sites. Also, the FY07 facility usage query indicated an increase in the utilization of certain laboratories that were not audited in FY06 due to lack of usage.

1.2.2 Audit Findings

A DOECAP finding is defined in DOECAP Procedure AD-1 as a factual statement issued from a DOECAP audit to document a deficiency. Findings are issued in two categories: Priority I and Priority II.

A Priority I finding represents a significant item of concern, or significant deficiency regarding key management/programmatic controls, which in and of itself represents a concern of sufficient magnitude to potentially render the audited facility unacceptable to provide services to the DOE if not resolved via immediate and/or expedited corrective action(s). The DOECAP issued one Priority I finding in FY06 to an analytical laboratory in the area of Data Quality for Inorganics due to laboratory practices failing to conform with established procedures, as well as deficiencies in quality control, personnel training and instrument calibration. No other Priority I findings were issued in FY06. Previously, a total of four Priority I findings were issued to laboratories and TSDFs in FY05, with a total of eight Priority I findings issued by the DOECAP to laboratories and TSDFs over the past five years. All open Priority I findings (i.e., four issued in FY05 and one issued in FY06) were closed during FY06 following DOECAP verification of effective corrective actions.

A Priority II finding represents a deficiency which in and of itself does not represent a concern of sufficient magnitude to render the audited facility unacceptable to provide services to the DOE. A total of 210 Priority II findings were issued as a result of FY06 DOECAP laboratory audits, with another 58 findings issued from FY06 DOECAP TSDF audits. Also in FY06, 87 percent of previously issued (i.e., issued prior to FY06) DOECAP laboratory findings were closed or became inactive, as were 80 percent of previously issued TSDF findings. The inactive finding status was added during FY06 to manage open findings previously issued to audited facilities subsequently designated as inactive DOECAP facilities (i.e., dropped from the DOECAP audit schedule to lack of DOECAP contract-holders), or open findings previously issued to audited facilities against a particular service no longer offered by that facility. Figure 1.5 illustrates the percent distribution of FY06 Priority II findings by audit area for laboratories and TSDFs.

Evaluation of Priority II findings issued to TSDFs in FY06 did not reveal any notable trend relative to common deficiencies in a specific audit area. However, documentation and a lack of complete and acceptable standard operating procedures (SOPs) was a noted common deficiency across all audit areas.

Evaluation of Priority II findings issued to laboratories in FY06 reveals notable trends. The following provides an overview of laboratory Priority II findings for each audit area.

Quality Assurance Management Systems and General Laboratory Practices

Most findings were related to SOPs, generally addressing documentation and review. Either SOPs were not reviewed within the required time frame, processes defined in SOPs were not documented or not documented correctly, or laboratory personnel were not following SOPs. Calibration issues were the second most often cited finding in this area, typically related to mechanical volumetric dispensing devices and measuring and test equipment.

Data Quality for Organic Analyses

Findings were most often associated with SOP issues and lack of documentation, with insufficient corrective actions and calibration deficiencies being the most significant.

Data Quality for Inorganic and Wet Chemistry Analyses

As was the case in FY05, the most significant findings were related to calibration. Generally, calibration issues resulted from the laboratory failing to perform the calibration or failing to perform the calibration correctly. These issues were often related to the number of findings addressing SOP deficiencies, the second most common source of findings in this audit area: i.e., laboratories failed to follow calibration requirements established in SOPs.

Data Quality for Radiochemistry Analyses

As was the case in FY05, the most common deficiency cited was inadequate SOPs. Information was often missing or incorrect regarding formulas and calculations. Also, SOPs often did not contain information necessary to properly perform the analysis. The second most common deficiency cited was equipment and instrument calibration not correctly performed or not properly documented. In addition, a number of findings

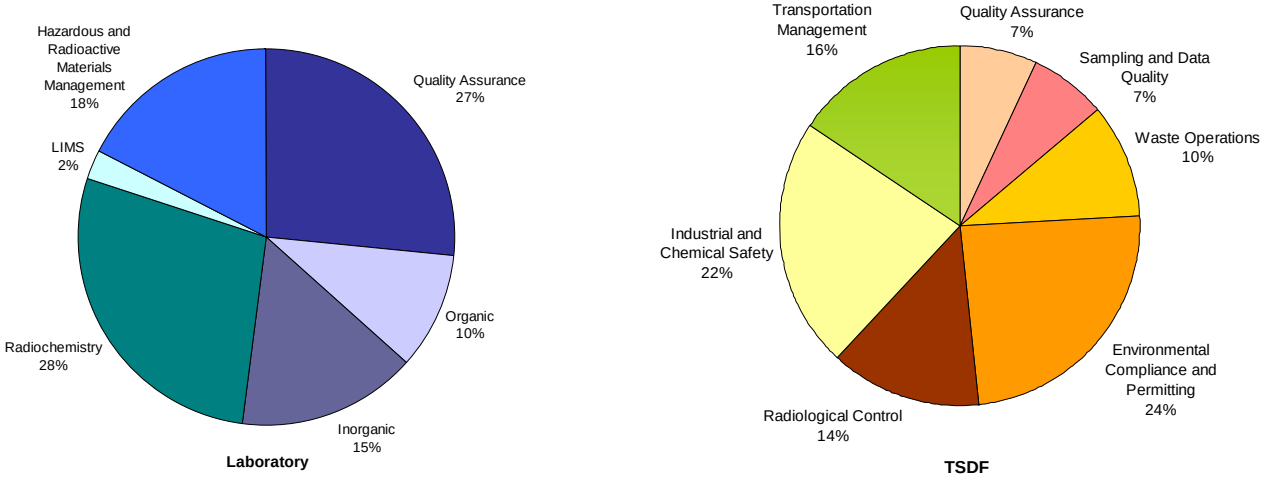

Figure 1.5. Percent Distribution of FY06 Laboratory and TSDF Priority II Findings per Audit Area

regarding background determination and combined standard uncertainty were issued.

Laboratory Information Management Systems and Electronic Data Management

As was the case in FY05, the most common deficiency cited was the absence of SOPs; information management systems were often put into use with few if any SOPs. The second most common deficiency noted was inadequate or incomplete SOPs. One interesting trend noted was that previous year findings were most common regarding system security, and system backup and disaster recovery. However, no findings were issued in FY06 regarding system security, and only one finding was issued regarding backup and disaster recovery; possibly indicating a trend toward better security and recovery.

Hazardous and Radioactive Materials Management

As was the case in FY05, the most common findings were related to waste containers, waste storage, waste disposal and waste management. These findings resulted from incorrect labeling, improper storage, lack of secondary containment, and generally poor waste management practices. The second most common finding noted in FY05 was related to SOP deficiencies; however, significant improvement was noted in FY06 with few SOP-related findings issued. The second most common findings were safety-related, with inadequate personal protective equipment being the most common issue.

1.2.3 Program Document Revision/ Development

The following DOECAP documents and audit tools were revised during FY06:

DOECAP Procedure AD-1

DOECAP Procedure AD-1, *DOECAP Policies and Practices*, was developed during FY06 and approved by the DOECAP Manager in August 2006. The procedure establishes the policies and practices for the DOECAP by documenting requirements, roles and responsibilities, and processes for Program administration and implementation. Issuance of AD-1 is a milestone for the Program since policies and practices were previously inadequately documented or undocumented and left to consensus and precedence.

As discussed elsewhere in this report, the DOECAP internal assessment to be completed in FY07 will assess both Program implementation against requirements of AD-1 as well as assess adequacy of AD-1 content. The need for development of additional DOECAP procedures will also be assessed.

DOE Quality Systems for Analytical Services Document (QSAS)

The QSAS establishes a single, integrated Quality Assurance program for analytical laboratories supporting the DOE, and allows laboratories to implement a unified standard thus improving efficiency and quality in a cost-effective manner. The QSAS establishes criteria for independent assessments, implemented through the DOECAP, to measure quality and promote improvement. Furthermore, the

QSAS represents a significant advance toward normalizing analytical data quality requirements across various Federal agencies and closely follows the approach taken by the Department of Defense (DoD) and the Environmental Protection Agency (EPA). In fact, the QSAS is based in total on the EPA's National Environmental Laboratory Accreditation Conference (NELAC) Chapter 5 – Quality System, based on ISO 17025 – General Requirements for the Competence of Testing and Calibration Laboratories, and also incorporates the EPA's "Performance Approach." However, since NELAC Chapter 5 requirements do not fully address DOE-specific analytical laboratory requirements, information associated with implementation of those DOE requirements has been added to the QSAS.

Most open technical issues from Revision 2 of the QSAS, issued in FY05, were resolved and Revision 2.1 of the QSAS was issued in early FY06 to be used commencing with the FY06 DOECAP laboratory audit cycle. In keeping with the intent for the QSAS to be a "living document," remaining open technical issues as well as potential QSAS enhancements were discussed at the DOECAP 2006 annual meeting in August. Those discussions led to closure of the majority of open issues, with an agreement reached on the path forward for final resolution of remaining open issues in the area of radiochemistry by obtaining a consensus resolution from Program participants as well as audited laboratories. Following resolution of those last remaining open issues, Revision 2.2 of the QSAS will be issued in early FY07 prior to commencement of the FY07 DOECAP laboratory audit cycle.

DOECAP Audit Checklists

DOECAP audit checklists are used to implement the audit process to ensure consistency and enhance efficiency. See the sub-section entitled Audit Performance in section 1.2.1 for more information regarding DOECAP checklists, including Table 1.2 for a listing of laboratory audit checklists and Table 1.3 for a listing of TSDF audit checklists.

The process of revising DOECAP TSDF audit checklists, which began in FY05, was completed as scheduled in early FY06 prior to commencement of the FY06 DOECAP TSDF audit cycle.

Comments on both laboratory and TSDF audit checklists were collected from DOECAP auditors and other Program participants throughout FY06, and were discussed at the DOECAP 2006 annual meeting. Accepted comments will be incorporated into the next checklist revision to be issued in FY07. Laboratory audit checklists will also be revised in FY07 as necessary to reflect QSAS Revision 2.2 changes.

Also, the FY06 goal was met to develop and issue a formal checklist to be used to guide laboratory closure audits performed to verify proper disposition of DOE materials and assess the status of contractual obligation fulfillment.

DOECAP Auditor Training

Following approval by the DOECAP Manager, an individual is required to complete specified training in order to be certified as a DOECAP auditor. Training modules are provided online on the DOECAP EDS.

In FY06 all online training modules were revised. Training content was rewritten to provide enhanced clarity including emphasis on audit report content and identifying findings versus observations, as well as to reflect the content of DOECAP Procedure AD-1, and new quiz questions were developed to improve reinforcement of training content. In addition the software platform supporting the online training was modified to improve training user interface. The revised online training is scheduled to be installed on the EDS and fully functional in early FY07, such that all DOECAP auditors can complete retraining prior to commencement of the FY07 DOECAP audit cycle.

1.2.4 EDS Enhancement

The EDS, a screenshot of which is provided in Figure 1.6, is a web-based system providing the main information sharing tool and repository for the DOECAP, currently maintained within the scope of the DOE-ORO information

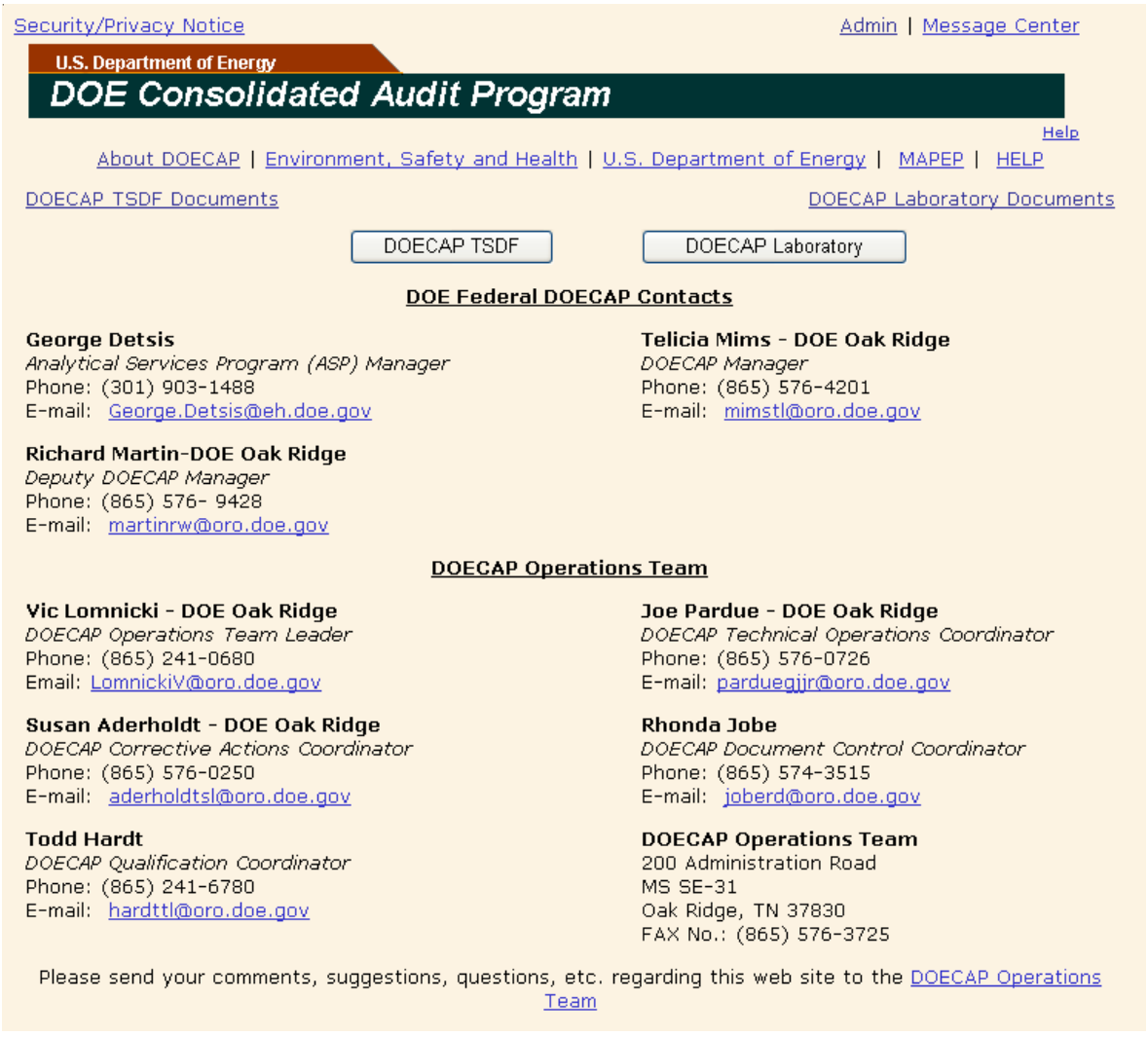

Figure 1.6. Screen Shot of DOECAP EDS Home Page

technology contractor. EDS password-protected information (i.e., audit schedules and team information, audit reports, accepted corrective action plans, key program documentation, on-line training, qualification status) is accessible to designated DOECAP POCs and auditors. EDS non password-protected information (i.e., general program information and documents, contact information, links to related sites) may be accessed at https://www.oro.doe.gov/DOECAP.

A number of improvements were made to the EDS during FY06, including providing a message center/drop box that allows audited facilities to electronically submit requested documents and data to the DOECAP Operations Team for inclusion in pre-audit packages. That provision has greatly decreased the time spent by both audited facilities and the DOECAP Operations Team in providing and compiling pre-audit package information. In addition, the EDS was redesigned to allow users to view information in any selected fiscal year, thereby facilitating user viewing and evaluation of audit information and result trends over a specified timeframe for any given audited facility. A user convenience feature was also added that allows personnel authorized to access both the laboratory and TSDF EDS sections to toggle between the two without logging in/out separately.

1.2.5 Internal Assessment

Toward continuous improvement, the process of conducting the first DOECAP internal assessment in accordance with recently issued DOECAP Procedure AD-1 commenced in late FY06. The assessment will be conducted by members of the DOECAP Operations Team who, to the extent practicable, have no direct responsibility for the areas assigned to assess. The purpose of this internal, independent assessment is to:

- Evaluate elements of DOECAP implementation for compliance with requirements established in DOECAP Procedure AD-1,
- Determine, document, and assess DOECAP implementation requirements not contained in DOECAP Procedure AD-1, and
- Evaluate adequacy of AD-1, and determine if revision to AD-1 and/or additional DOECAP procedures are required.

Assessment logistics and schedule were established and Operations Team member assessment areas assigned, an Assessment Plan was developed and approved by the DOECAP Manager, and assessment checklists were developed which document lines of inquiry based on requirements established in AD-1 for each program element. Given that this is the first DOECAP internal assessment to be performed, along with the scope of the assessment and other Operation Team routine responsibilities for Program implementation, an assessment completion (i.e., assessment report submitted to DOECAP Manager with recommended corrective actions) date of September 30, 2007, has been established.

1.2.6 Program Oversight

In FY06 as in previous years, the ASP Manager provided DOECAP oversight through performance of the annual program review and observation of selected audits, as well as through participation in routine DOECAP conference calls and the annual DOECAP meeting.

The FY 2006 DOECAP program review was conducted in March 2006 in Oak Ridge, Tennessee, between the ASP Manager, DOECAP Manager, and DOECAP Operations Team personnel, for the purpose of management assessment of opportunities for improvement and potential barriers to continued DOECAP success. The status of established FY06 goals was reviewed, and initiatives underway to improve the program were reviewed. The ASP Manager and DOECAP Manager also met with key DOE-ORO personnel (e.g., ORO Manager, ORO AMESH Manager) and program participants located in the Oak Ridge area. The ASP Manager also attended two DOECAP laboratory audits and one DOECAP TSDF audit during FY06 in order to observe implementation of the DOECAP audit process and conduct of DOECAP audit teams.

The ASP Manager participated in weekly DOECAP conference calls with the DOECAP Operations Team, DOECAP POCs and auditors. DOECAP conference calls are conducted by the DOECAP Operations Team to disseminate information amongst Program participants, and the ASP Manager provides DOE HQ insights and perspective. The ASP Manager also participated in routine conference calls conducted with the DOECAP Manager, DOECAP Operations Team Leader, DOECAP Technical Operations Coordinator, and DOECAP Qualification Coordinator to discuss the status of ongoing initiatives and program logistics. In addition, the ASP Manager participated in the FY 2006 DOECAP annual meeting (see section 1.2.7 of this report).

1.2.7 Annual Meeting

The DOECAP annual meeting (i.e., DOECAP 2006) was held August 21 – 25, 2006, in Las Vegas, Nevada, at the Embassy Suites Hotel – Convention Center Las Vegas. The meeting was attended by over 120 individuals, and brought together DOECAP auditors, Headquarters and field DOECAP POCs, analytical laboratory and TSDF representatives, senior DOE management, representatives from other ASP Programs, and representatives from other Federal agencies.

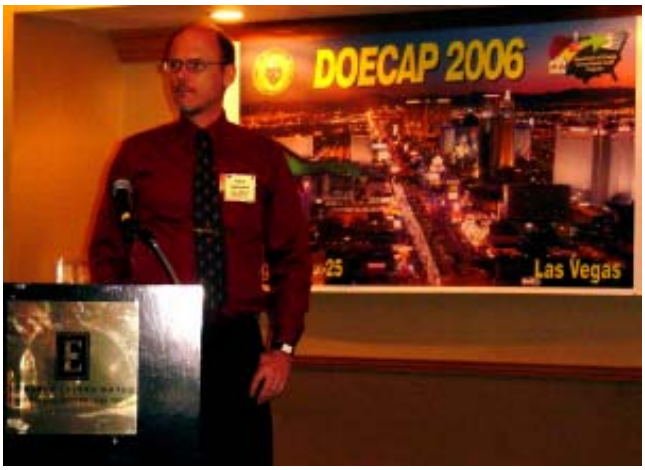

Photo 1.3. Presentation at DOECAP 2006 Annual Meeting

Topics discussed during working sessions included resolution of QSAS Revision 2.1 technical issues, laboratory and TSDF checklist comments, the FY07 DOECAP audit schedule, and feedback on the DOECAP from both Program participants and audited laboratories and TSDFs. Presentations were made by DOECAP representatives and participants on a variety of subjects including Program status, challenges and opportunities; status of various DOE sites relative to closure and projected DOECAP participation; and Program updates such as revision of online DOECAP training, and an overview of the recently issued DOECAP Procedure AD-1. Presentations were also made regarding the other ASP elements; i.e., the MAPEP, and the SPADAT Program.

In addition, as a new feature added to the meeting agenda this year, two members of senior management from the audited facility community (laboratory and TSDF) were invited to provide presentations regarding the DOECAP from the audited facility perspective. The presentations were informative and well received, and it is anticipated that similar presentations from other audited facility representatives will be included in future DOECAP annual meeting agendas.

In addition, presentations were made on topics of general interest to DOECAP participants and audited facilities by representatives from the EPA NELAC, the U.S. Navy Laboratory Quality & Accreditation Office, and the Yucca Mountain Project. Copies of meeting presentations are available on the DOECAP EDS, under either "DOECAP TSDF Documents" or "DOECAP Laboratory Documents," online at https://www.oro.doe.gov/DOECAP.

1.2.8 NELAC Participation

One of the goals of the DOECAP is to actively participate with state and Federal regulatory agencies, as well as other industry standard-setting groups such as the NELAC, to promote interagency normalization of analytical data quality requirements.

In FY06, the ASP Manager and a member of the DOECAP Operations Team, as well as a member of the MAPEP, supported NELAC standards development activities of significance to the DOECAP by participating in the NELAC interim and full meetings. The DOECAP Operations Team member was appointed to the NELAC Environmental Laboratory Advisory Board (ELAB) and is serving on the Measurement and Technology Workgroup, as is also a DOECAP laboratory auditor. In addition, the ASP Manager is the DOE voting representative in the NELAC and a member of the NELAC standards review committee.

The NELAC Designated Federal Official (DFO) also attended the DOECAP 2006 annual meeting and gave a presentation regarding current NELAC status, ongoing initiatives, and interfaces with the ASP.

1.2.9 GAO Support

Early in FY06, the United States Government Accountability Office (GAO) contacted the DOECAP Operations Team requesting information about the Program and access to records regarding a number of analytical laboratories audited by the DOECAP. The GAO was preparing a Report to Congressional Requesters regarding the Rocky Flats closure project (i.e., Nuclear Cleanup of Rocky Flats – DOE Can Use Lessons Learned to Improve Oversight of Other Sites' Cleanup Activities), which included assessment of implementation of key controls regarding analytical data quality. Part of that assessment was to include review of DOECAP audit reports, findings and corrective actions for analytical laboratories utilized by Rocky Flats during the closure project.

The DOECAP Manager granted GAO access to the EDS, and also provided requested information regarding established DOECAP policies and practices. The DOECAP Operations Team also responded to a number of subsequent inquiries from the GAO regarding specific Program and audit details.

The GAO report, issued in July 2006, cites the DOECAP as a source of information, including the following excerpts:

> …And finally, to assess the use of the fourth control, we reviewed reports on audits of laboratories that analyzed data for the site's cleanup. Specifically, we reviewed source documentation from audits conducted by DOE's consolidated audit program and DOE's mixed analyte performance evaluation program. We concentrated our review on laboratory audit results relevant to detecting plutonium for the 3-year period during which cleanup was under way for the four projects.
>
> The 32 laboratories that analyzed samples collected from Rocky Flats were required to undergo annual technical audits to ensure the accuracy of their analytical results. Since 2000, contractor officials said they have largely satisfied the audit requirement by voluntarily participating in DOE's consolidated audit program, with the exception of one on-site laboratory that the contractor audited.

The GAO report also includes a summary description of the DOECAP and discusses results of the assessment conducted using DOECAP records.

1.2.10 National Metals Recycle Program (NMRP) Support

The NMRP manages a Basic Ordering Agreement (BOA) under which TSDFs holding radioactive material licenses may be awarded contracts to process DOE metal for recycling in accordance with existing restrictions.

Early in FY06, the DOECAP Manager was contacted by representatives of the NMRP regarding the potential for the DOECAP to expand the FY audit schedule for TSDFs to include three additional TSDFs participating in the NMRP BOA. Discussions continued over the course of FY06 regarding shared resources, and the DOECAP Manager directed the Operations Team to conduct another site usage query of TSDF contract holders currently participating in the DOECAP to determine if any were using or intended to use the three identified TSDFs. This item was also discussed at DOECAP 2006.

Final responses to the usage query, transmitted in the fourth quarter of FY06, are due back early in FY07. Those responses will be evaluated and a determination made regarding whether sufficient usage or potential usage is indicated to warrant inclusion of any of the three additional TSDFs in the DOECAP. If contract holder usage is indicated of any of the three identified TSDFs sufficient to warrant inclusion in the DOECAP, audits will be conducted accordingly upon approval of the DOECAP Manager with ASP Manager concurrence.

1.2.11 Program Promotion

The ASP Manager and the Deputy DOECAP Manager participated in conferences in FY06 to promote DOECAP participation within the DOE as well as cooperation with other government agencies.

The Deputy DOECAP Manager gave a presentation on DOECAP TSDF auditing activities at the FEDRAD II conference held in June 2006 in Chicago, Illinois. The conference brings together Federal and commercial radwaste generators and service providers, including representatives from the DOE, DoD, EPA, and Army Corps of Engineers.

The ASP Manager gave a presentation on the DOECAP at the DoD Environmental Monitoring and Data Quality Workshop held in April 2006 in San Antonio, Texas. In addition, the ASP Manager discussed with DoD representatives the potential for the DOECAP to conduct joint audits with the DoD for common service providers. That potential continues to be pursued.

1.2.12 Review of FY06 Goals

The following provides a brief summary regarding status of attaining DOECAP goals established for FY06, as documented in the FY05 ASP Annual Report.

- **Program Participation** – Promote DOECAP participation throughout the DOE complex.

Notwithstanding tangible benefits derived by Program participants, promoting active DOECAP participation throughout the complex continues to be a challenge due in part to site closures and budgetary restrictions, and is the focus of continuous efforts.

It is difficult to assess the attainment of this perennial goal more specifically than by the continued viability of the Program. However, a specific related area where progress was made in FY06 resulted from the initiative undertaken to verify POCs from PSOs to the field, including through a work session and query conducted at DOECAP 2006. Gaps in the POC structure were identified and filled. The initiative to continue to promote the Program through enhanced POC participation will continue in FY07.

- **Auditor and Lead Auditor Qualification** – Qualify additional DOECAP auditors from all participating sites sufficient to adequately staff proposed laboratory and TSDF audits. Also, recruit Federal staff to serve as DOECAP lead auditors.

This goal is similar to the goal to promote Program participation: it continues to be a challenge due in part to the same reasons, as well as potential impact from contractual changes for subcontractor support at individual sites; it is the focus of continuous efforts; and, while more easily quantified based on the number of DOECAP qualified auditors and lead auditors at a given point in time, other factors must be taken into consideration to gauge overall goal attainment.

As discussed in subsection 1.2.1 of this report, while progress was made with the addition of DOECAP qualified auditors and (contractor) lead auditors in FY06, the attrition of qualified personnel resultant from site closure and other factors resulted in a net zero change overall. However, a sufficient pool of qualified auditors was maintained to adequately staff laboratory and TSDF audits. Efforts will continue in FY07 to encourage qualification of new auditors and lead auditors.

Regarding the recruitment of Federal staff to serve as DOECAP lead auditors, no new Federal DOECAP lead auditors were qualified in FY06.

- **Code of Conduct** – Develop a code of conduct for DOECAP auditors to provide guidance regarding the avoidance of potential conflicts of interest.

This goal was met with the issue of DOECAP Procedure AD-1, which includes Appendix C, DOECAP Code of Conduct. DOECAP Procedure AD-1 also addresses other auditor responsibilities and requirements for

maintaining qualification, as well as potential consequences for violating the Code of Conduct.

- **Auditor Training** – Complete revision of online DOECAP auditor training modules to enhance content, as well as potentially improve the trainee interface.

As discussed in section 1.2.3 of this report, this goal was met with revision of training module content and format. All DOECAP qualified auditors and lead auditors will complete retraining on the revised modules prior to participation in FY07 DOECAP audits.

- **QSAS Revision 2.1** – Resolve remaining open technical items, and issue QSAS Revision 2.1 for use commencing with the first FY06 DOECAP laboratory audit.

As discussed in section 1.2.3 of this report, this goal was met with the issue of QSAS Revision 2.1. All technical issues remaining open at the time of QSAS Revision 2.1 issue were discussed at DOECAP 2006, and a path forward for resolution established. QSAS Revision 2.2, to be issued prior to commencement of the FY07 DOECAP laboratory audit cycle, will incorporate resolution of all open technical issues.

- **Laboratory Closure Checklist** – Develop and issue a formal checklist to be used to guide laboratory closure audits performed to verify proper disposition of DOE materials and assess the status of contractual obligation fulfillment.

As discussed in section 1.2.3 of this report, this goal was met.

- **TSDF Checklists** – Complete revision of TSDF checklists for use commencing with the first FY06 DOECAP TSDF audit. In addition, develop and issue a checklist to be used to guide regulatory agency reviews conducted as part of TSDF audits

As discussed in section 1.2.3 of this report, the goal of revising TSDF checklists was met.

A draft checklist for regulatory agency review was developed, and a FY07 goal will be to attain DOECAP Manager approval.

- **Procedure Revision** – Revise DOECAP procedures, and develop new procedures, as necessary to more clearly document Program processes and policies.

As discussed in section 1.2.3 of this report, a significant portion of this goal was met with issue of DOECAP Procedure AD-1. As discussed in section 1.2.5 of this report, the DOECAP internal assessment to be conducted in FY07 will include evaluation of the need for the development of additional DOECAP procedures.

- **Records Management** – Review DOECAP records management practices for compliance with applicable DOE requirements and guidance, including retention of electronic files. Procedures will be revised or developed as necessary to more clearly document DOECAP records management requirements.

Limited progress was made toward this goal due to executing routine tasks necessary for program implementation as well as focus on other program improvements. This goal has been deferred to FY07 and incorporated into

the goal to complete the DOECAP internal assessment.

1.3 FY07 Goals and Challenges

The following summarizes opportunities for improvement and potential barriers to continued DOECAP success.

1.3.1 Program Participation

Participating site closures (i.e., Rocky Flats and Fernald) and other factors continue to represent a challenge to promoting DOECAP participation. Decline in DOECAP participation represents a primary barrier to continued Program success and viability. If the DOECAP is to continue to achieve goals and objectives previously established, it is essential to increase and sustain participation throughout the complex.

While progress was made promoting the Program in FY06, proposed FY07 actions/goals to continue to promote DOECAP participation throughout the DOE complex include:

- Increase participation within PSOs beyond EM, with special emphasis on NNSA, SC, and LM,
- Increase participation of currently identified POCs (Federal and contractor) by continuing the initiative commenced in FY06 by requesting replacements for POCs who do not actively participate in the Program,
- Increase active participation by sites in teleconferences and the DOECAP annual meeting, and
- Identify and pursue opportunities to increase site participation, particularly sites that use DOECAP audit results without actively participating in the Program.

1.3.2 Auditor and Lead Auditor Qualification

As discussed elsewhere in this report, while progress was made with the addition of DOECAP qualified auditors and lead auditors in FY06, the attrition of qualified personnel resultant from site closures and other factors resulted a net zero change overall. Accordingly, a FY07 goal is established to continue to seek and qualify additional DOECAP auditors from all participating sites sufficient to adequately staff proposed laboratory and TSDF audits.

Also, the FY06 goal to recruit Federal staff to serve as DOECAP lead auditors is renewed for FY07.

1.3.3 DOECAP Internal Assessment

A FY07 goal is established to conduct the DOECAP internal assessment discussed in section 1.2.5 of this report. The internal assessment will include evaluation of records management, thereby incorporating that goal previously established for FY06.

1.3.4 Auditor Training

A FY07 goal is established to complete the process of online DOECAP auditor training revision by having the revised training loaded on the EDS and having all auditors and lead auditors complete retraining prior to their participation in FY07 DOECAP audits.

1.3.5 QSAS Revision 2.2

A FY07 goal is established to resolve remaining open technical items from QSAS Revision 2.1, and issue QSAS Revision 2.2 for use commencing with the first FY07 DOECAP laboratory audit.

1.3.6 Audit Checklists

A FY07 goal is established to issue revised laboratory and TSDF audit checklists incorporating accepted comments submitted by DOECAP auditors and other Program participants throughout FY06. A FY07 goal is also established to revise laboratory audit checklists as necessary to reflect QSAS Revision 2.2 changes.

In addition, an FY07 goal is established to attain DOECAP Manager approval of the draft checklist to be used to guide regulatory agency reviews conducted as part of TSDF audits.

1.3.7 Additional TSDF Audit Determination

An FY07 goal is established to complete the TSDF usage query commenced in FY06 to determine whether TSDF contract holders currently participating in the DOECAP use or intend to use the TSDFs requested to be audited by the DOE National Metals Recycle Program, as discussed in section 1.2.10 of this report. If contract holder usage is indicated of any of the three identified TSDFs sufficient to warrant inclusion in the DOECAP, audits will be conducted accordingly.

2.0 Mixed Analyte Performance Evaluation Program (MAPEP)

2.1 Background and Scope

The Mixed Analyte Performance Evaluation Program (MAPEP) is a performance evaluation (PE) program designed to help assure the quality and reliability of analytical data necessary to assure regulatory compliance and support to DOE's decisions. The U.S. Department of Energy's Radiological and Environmental Sciences Laboratory (RESL) administers the MAPEP under the direction and guidance of the Headquarters Office of Corporate Safety Programs (HS-31). The MAPEP is the only PE program that targets radiological and non-radiological constituents (i.e., mixed analytes) in the same sample for quantification and analytical performance evaluation in water and soil matrices. Air filter and vegetation matrices are also prepared for radiological constituents, and gross alpha/beta samples are provided for air filter and water matrices. MAPEP participants can efficiently demonstrate proficiency in radiological, stable inorganic, and organic analyses from single-blind PE samples traceable to the National Institute of Standards & Technology (NIST). The MAPEP is performance-based and does not dictate the methodology to be used for the various sample analyses.

MAPEP samples are distributed twice a year in a test session described as a Series. A MAPEP Series refers to the complete set of water, soil, vegetation and air filters per distribution. Within a Series the specific Study refers to the particular matrix and compound classification (e.g., Mixed Analyte Soil [MaS], Radiological Vegetation [RdV]). Laboratory performance on these PE samples is reported by RESL as

Photo 2.1. MAPEP Performance Testing Standards

"Acceptable" (A), "Acceptable with Warning" (W), and "Not Acceptable" (N) according to criteria described in the MAPEP Handbook, which can be found on-line at http://www.inl.gov/resl/mapep/. Performance results are reported to the individual participants and to the appropriate DOE Field Offices, Sample Management Offices, DOE HQ, and other MAPEP stakeholders. The MAPEP also provides a forum in which analytical deficiencies and areas of improvements can be identified, technical assistance can be requested, and various methodologies can be compared. Auditors from the DOECAP use MAPEP performance evaluations when conducting laboratory audits.

2.2 FY06 Activities and Accomplishments

2.2.1 Sample Distribution and Program Expansion

The MAPEP distributes four matrices twice per year: mixed-analyte soil, mixed-analyte water,

radiological analyte vegetation, and radiological analyte air filters. In FY04 the MAPEP transitioned from distributing one matrix (soil or water) per test session to providing four matrices (soil, water, air filter, and vegetation) per test session. Table 2.1 illustrates the increase in total PE sample distribution by the MAPEP and analyses performed by participating laboratories from FY04 through FY06 (FY04 does not include W11). Figure 2.1 illustrates the increase in participating laboratories from MAPEP Series 12 distributed in July 2004 through Series 16 distributed in July 2006 by sample matrix. RESL staff accomplished the increased work load with existing resources through process improvement and enhanced efficiencies.

The PE samples for MAPEP Series 16 test session were distributed to over 100 laboratories in July 2006 (See Table 2.2). Appendix B of this report lists participating laboratories in Series 16 including fifteen foreign laboratories. Most foreign laboratories participate in the MAPEP as the PE program for the DOE sponsored Radiation Measurements Cross Calibration Project (RMCCP) in the Middle East, being facilitated by Sandia National Laboratories and the International Atomic Energy Agency (IAEA). Other foreign laboratories participate in the MAPEP when a DOE connection can be provided. Foreign laboratories are currently using the MAPEP to establish quality assurance and cross calibration of radiological measurements crucial to:

Fiscal Year	Series	Number of MAPEP Samples	Number of Analyses by Laboratories
FY04	12	477	6,134
FY05	13, 14	1,031	10,653
FY06	15, 16	1,046*	13,968*

*Includes an estimate for Series 16

Table 2.1. Increase in Samples Distributed and Analyses by Laboratories

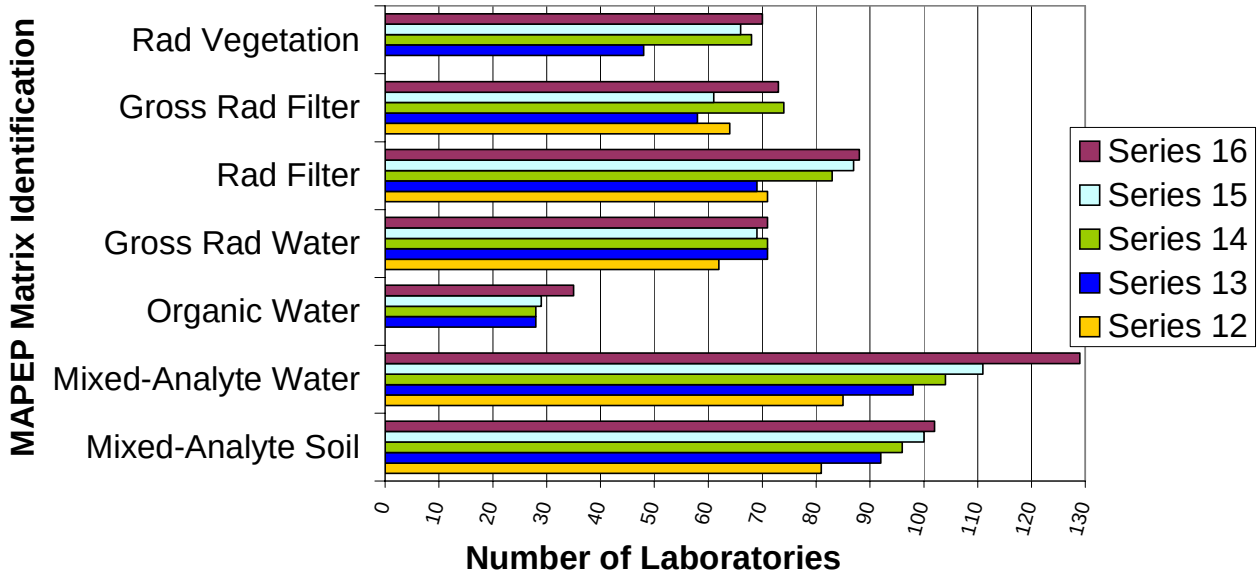

Figure 2.1 – MAPEP Laboratory Participation from 2004 to 2006

MAPEP Matrix Series 16	Matrix Id.	Total Labs	Foreign Labs
Mixed-Analyte Soil	MaS	103	14
Mixed-Analyte Water	MaW	115	15
Semi-volatile Organic Water	OrW	29	0
Radiological Vegetation	RdV	68	13
Radiological Air Filters	RdF	88	13
Gross alpha/beta Water	GrW	70	9
Gross alpha/beta Filter	GrF	73	8

Table 2.2. Laboratories Participating in MAPEP Series 16 (July 2006)

- Responding in the event of a terrorist attack (e.g., dirty bomb),
- Promoting and monitoring nuclear nonproliferation treaties,
- Providing accurate environmental surveillance, and
- Promoting overall security in the region (i.e., Middle East).

2.2.2 Quality Issues Identified by MAPEP Performance Tests

Laboratories in MAPEP Series 14 and 15 were reviewed and evaluated for historical performance, performance within Series 14 and 15, and also for non-reporting of analytes during a false positive test or sensitivity evaluation. The MAPEP issues a Letter of Concern to a participating laboratory upon identification of a potential analytical data quality problem in MAPEP results, in order to help participants identify, investigate, and resolve potential quality issues. For example a laboratory reporting results for Pu-239, but not for Pu-238, would receive a "Not Acceptable" flag for Pu-238 since a laboratory reporting Pu-239 obviously has the capability to also analyze for Pu-238. Laboratories may fail to report an analyte if they suspect it is a false positive test or sensitivity evaluation. Laboratories have been cautioned repeatedly that they must report a result for radionuclides they routinely analyze or readily have the capability to analyze for DOE. Forty-four laboratories after Series 14, and 48 laboratories after Series 15, were sent Letters of Concern. This represents a total of 92 letters sent for about 12,548 analyses performed in Series 14 and 15, pointing out potential quality issues based on historical and within-Series results. These letters represent a small fraction (approximately 0.7%) of all the analyses performed by MAPEP laboratories in FY06. DOE HQ, DOE Field Offices, and the appropriate site contractor personnel were sent

Photo 2.2. Chemist Preparing MAPEP PE Sample by Fusion for Actinide Analyses

copies of these letters in an effort to ensure all stakeholders were aware of the performance evaluations. Letters of Concern specifically address areas of significance to the DOECAP, as laboratory participation in PE programs is typically assessed during a DOECAP audit. A Memo detailing the criteria used for issuing a Letter of Concern can be found at http://www.inl.gov/resl/mapep and in Appendix C of this report. The sections below summarize the important quality issues identified by the MAPEP during Series 14 and 15 test sessions.

False Positive and Sensitivity Tests

In addition to laboratories demonstrating the ability to accurately report analyte concentrations well above detection limits, they should also be able to detect and accurately measure analyte concentrations at or near detection limits without incorrectly reporting analytes that are not present. The MAPEP uses false positive testing on a routine basis to identify laboratory results that indicate the presence of a particular radionuclide in a MAPEP sample when, in fact, the actual activity of the radionuclide is far below the detection limit of the measurement.

In a sensitivity evaluation the radionuclide is present at or near the detection level, and the difference between the reported result and the MAPEP reference value is evaluated based on combined total uncertainties. Laboratories that do not detect the targeted radionuclide are identified. It is also possible to fail a sensitivity evaluation by reporting a false negative. In this scenario the sensitivity of the reported measurement indicates that the known specific activity of the targeted radionuclide in the sample should have been detected, but was not. In addition to identifying false positive and false negative results, the false positive and sensitivity evaluation tests are designed to help participants ensure they are not underestimating or over-inflating total uncertainties.

False positive tests in earlier MAPEP test sessions sometimes showed as many as 50% of laboratories reported false positives for some radionuclides. The MAPEP will continue to include false positive tests while including more sensitivity evaluations. The sensitivity evaluations work in tandem with the false positive tests. Table 2.3 and Figures 2.2 and 2.3 provide the results of false positive and sensitivity tests that were included in MAPEP Series 14 and 15. Results are designated as "Acceptable" (A), "Acceptable with Warning" (W), or "Not Acceptable" (N). The laboratories are showing marked improvement over earlier performance for false positive and sensitivity tests.

Series 14 Matrix	False Positive Test	Sensitivity Test
Soil	Ag, Tl	Pu-239/240
Water	Cd, Pb, Ag	Ni-63, Pu-238
Air Filter	NA	NA
Vegetation	Pu-238	NA
Series 15 Matrix	**False Positive Test**	**Sensitivity Test**
Soil	Cs-134	NA
Water	Co, Cs-137	Pu-239/240
Air Filter	Mn-54	Pu-239/240
Vegetation	Cs-134	NA

Table 2.3. False Positive and Sensitivity Tests Included in MAPEP Series 14 and 15

Refractory Plutonium Isotopes

Plutonium is frequently found in environmental samples in a highly insoluble (refractory) form. Soluble plutonium does not always remain soluble, and even some sample prepara-

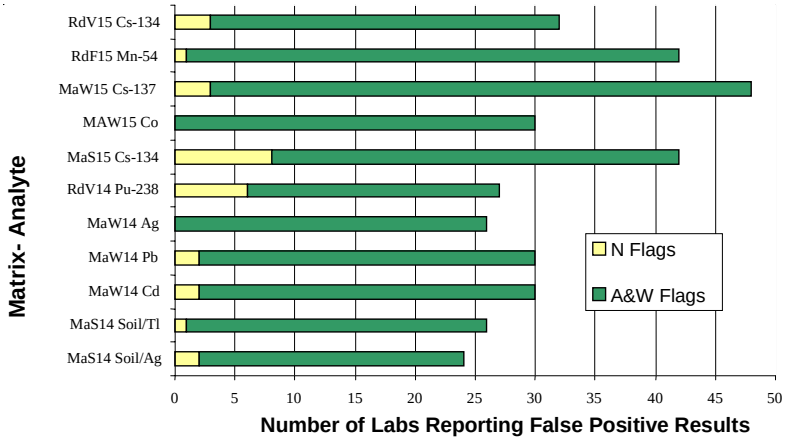

Figure 2.2. Summary of False Positive Tests in MAPEP Series 14 and 15

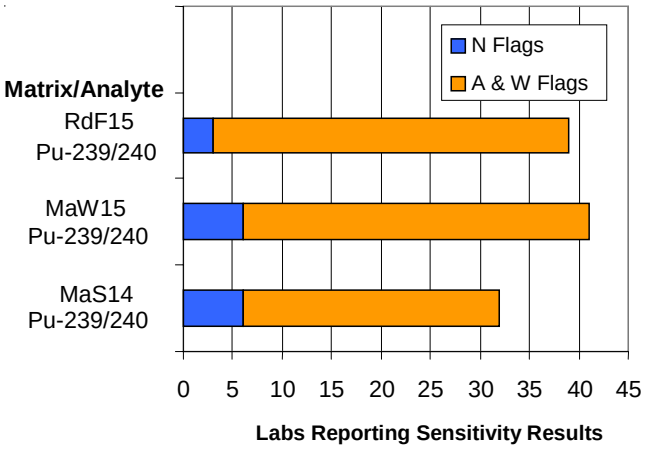

Figure 2.3 – Summary of Sensitivity Testing for Series 15

tion methods can convert soluble (leachable) plutonium to the refractory form. Whether a sample contains soluble or refractory plutonium is not always known, nor can it be known with certainty, by just casual observation. Assuming that an environmental sample contains only soluble plutonium can be a dangerous assumption, especially for commercial laboratories that analyze samples from multiple DOE sites. Analytical methods that do not include the total dissolution of the sample will typically show low recovery of refractory plutonium.

Mixed-analyte soil MaS15 contained refractory Pu-238 and Pu-239/240 isotopes. As illustrated in Figure 2.4, the reported results indicated that six to seven laboratories (about 14%) showed "Not Acceptable" performance. These laboratories also failed to quantify about 70 – 75% of the plutonium present in the soil. This is an improvement over the previous refractory plutonium study in which 14 of 42 (33%) of the reporting laboratories missed about 90% of the plutonium present. Analyses that fail to quantify over 70% of the plutonium present, however, still represent a significant DOE liability risk.

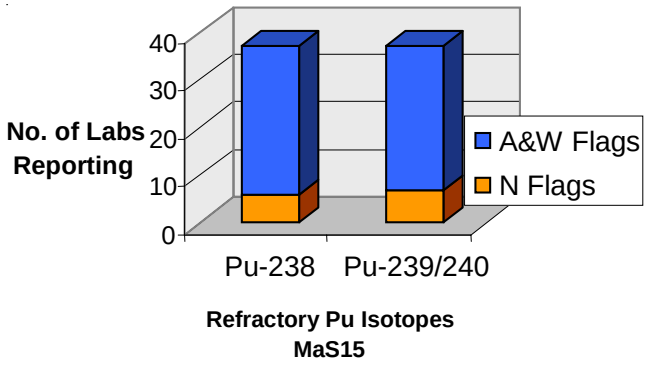

Figure 2.4. Summary of Refractory Plutonium Isotope Results for Series 15

Antimony Analysis in Soil

The MAPEP has identified an area of concern for most laboratories that analyze for antimony in soil. NIST-traceable antimony standards have been spiked into the last five MAPEP soil standards starting with S10. The diluent soil contains negligible amounts of antimony so there is essentially no background contribution. In earlier test sessions, only 3 of 24 labs (S10), 2

of 23 labs (MaS12), and 6 of 23 labs (MaS13) showed "Acceptable" or "Acceptable with Warning" performance for antimony. MAPEP results for Series 14 and Series 15 showed a significant improvement in laboratory performance. The laboratories improved their "Acceptable" performance for the determination of antimony to 18 of 26 reporting laboratories for Series 14 and 18 of 28 reporting laboratories for Series 15. Laboratories that have received consistent "Not Acceptable" evaluations for their antimony results in soil have been sent Letters of Concern. Figure 2.5 illustrates the recent improved performance in the determination of antimony in soil compared to earlier test sessions.

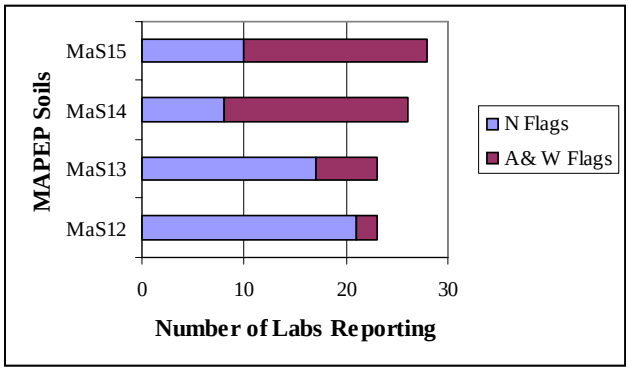

Figure 2.5. Antimony Results for Soil Studies MaS12 – MaS15

Most laboratories are determining antimony with the hot acid leaching methods associated with EPA Method 3050. EPA Method 3050 (and the updated EPA Method 3050B) utilizes multiple techniques for the preparation of soil samples, which means a laboratory must choose, if allowed by the DOE contract, the appropriate analytical technique for the specific analyte determination. The wording of EPA Method 3050B may also lend itself to varying interpretations on which sample preparation technique should be used. However, Method 3050B states:

> Section 7.5 may be used to improve the solubilities and recoveries of antimony, barium, lead, and silver when necessary. These steps are optional and are not required on a routine basis.

A letter received from representatives of the EPA Headquarters - Office of Solid Waste confirmed that antimony in soil requires the use of the alternative Section 7.5 digestion technique to recover the environmentally available antimony. The EPA letter is on file with the MAPEP Coordinator.

Misidentification of Isomers in Organic Compounds

The largest issue of concern for the target organic components has historically been the misidentification of isomers that exhibit chromatographic retention times very close to one another. Reporting laboratories that fail to accurately validate the quantitation of components reported have received Letters of Concern for misidentification of those isomers. The number of letters being issued has remained small; usually about one per sample distribution.

2.2.3 MAPEP Web-Based Reporting and Query System Developments

The MAPEP has been continually improving the data reporting and data review portion of the Web Site (http://mapep.inl.gov) for the past three years. This effort has been a progressive approach to:

- Improve the data entry and data review by the laboratories,

- Provide participants and DOE site personnel with electronic letters of concern at the close of each series,
- Continually improve data processing tools and routines,
- Provide better graphic and query tools for laboratories and auditors to view and review laboratory performance, and
- Assist RESL personnel in rapidly assessing performance data at the close of each MAPEP Series.

The changes in the current MAPEP system are a continuation of the effort to fully automate the MAPEP data reporting, data evaluation and customer reports portions of the MAPEP system. Although these efforts cannot be construed as a final effort, it will eventually close the circle on the MAPEP project to create a fully automated data handling system for the administration of the MAPEP program as well as for the reporting of customer data.

2.2.4 MAPEP Review Board Recommendations Addressed

An independent, interagency, ad-hoc committee of seven members met at RESL in June 2005 to review and potentially provide recommendations for enhancing the MAPEP. The ad-hoc committee was composed of scientific experts from the DOE Federal and contractor field sites, DOE HQ, U.S. Department of Homeland Security (DHS), EPA, and a private technical consultant.

The ad-hoc committee developed 12 recommendations for the MAPEP team to review to potentially enhance the overall

Photo 2.3. Packaging MaW16 for Shipment

effectiveness of the MAPEP. Based on this review, RESL has incorporated several improvements and implemented the following response for each recommendation:

- The assignment of an independent Quality Assurance Officer,
- Development of a fully documented Quality Assurance Project Plan,
- Provided additional information on the tables and graphs in MAPEP reports,
- Continue to conduct statistical evaluations on the data collected in MAPEP studies,
- Developed strategies to sustain the quality of the MAPEP by matrixing and optimizing personnel time,
- Continue to evaluate the potential for automation of various PE processes,
- If volatile organics are included in future soils, the test samples will be prepared in vessels that will preserve sample integrity,

- Conducted a MAPEP Survey of DOECAP federal and contractor points-of–contact, and wrote a draft report concluding that the MAPEP is offering the most requested analytes at the desired concentrations for the DOE-Complex sites; results of the survey supported the fact that the MAPEP is providing the matrices and analytes at the concentrations most requested by DOE sites and programs,

- Established new acceptance criteria for organic compounds based on NELAC criteria cited in the June 2005 acceptance criteria tables,

- Continue using NIST traceable spiked vegetation, but explore the feasibility of using naturally contaminated vegetation if needed,

- Decided that providing a description of the chemical and physical properties of the PE sample matrices is not aligned with the MAPEP goal of providing real-world single blind PE material, and

- Formation of an independent MAPEP Advisory Board as coordinated by both RESL and DOE HQ is still being worked.

The MAPEP underwent an annual review by the ASP Manager the week of July 17, 2006, conducted at RESL. In addition to meeting with the MAPEP team for the annual review, the ASP Manager participated in packaging over 400 Series 16 MAPEP samples for shipment. The annual review followed up on the Ad Hoc MAPEP Review Board's 12 recommendations and the implemented improvements for the MAPEP. MAPEP growth over the last year and future goals were also discussed.

2.2.5 ISO 17025 Accreditation

RESL has completed the process of aligning the laboratory's quality systems and procedures to the ISO 17025:2005 General Requirements for Competence of Testing and Calibration Laboratories. ISO 17025:2005 Accreditation was granted by A2LA on January 25, 2006.

2.3 FY07 Goals and Challenges

The following provides a summary of opportunities for improvement for the MAPEP.

2.3.1 Proficiency Testing Provider Accreditation (ISO 43 Guide Criteria)

RESL has been actively reviewing and revising MAPEP quality systems and procedures against the ISO 43 Proficiency Testing by Interlaboratory Comparisons as detailed in the International Conference on Accreditation of Laboratories (ILAC) Guide 13:2000. An application was submitted to the American Association for Laboratory Accreditation (A2LA) for accreditation of the MAPEP systems for Proficiency Testing Provider on August 30, 2006.

2.3.2 Traceability of RESL to NIST

RESL currently is designated by DOE HQ as the reference laboratory for the DOE Laboratory Accreditation Program (DOELAP) and the MAPEP. The Radiological Traceability Program (RTP) provides for an annual exchange by NIST and RESL of test materials containing a number of radionuclides in various sample matrices (i.e., soil, water, air filter, vegetation, synthetic urine, and synthetic fecal). The RTP is designed to provide a mechanism for evaluating the ability of RESL scientists both to prepare test materials of

known radionuclide activities, and to correctly analyze test materials of unknown activities. Performance testing standards are prepared by NIST, sent to RESL and analyzed by RESL for evaluation by NIST. In addition to assuring the measurement processes of RESL are traceable, RESL also sends prepared performance testing standards to NIST for verification of the known reference values. The two-way exchange of performance testing standards assures that the preparation and measurement processes at RESL are traceable to NIST. The two-year cycle of the RTP for the traceability of MAPEP radionuclides and matrices to NIST will be completed by the end of calendar year 2006. A revised RTP between RESL and NIST is due to be in place by January 2007.

2.3.3 Program Enhancement

MAPEP has identified various FY07 goals to further improve MAPEP ability to meet DOE needs throughout the complex. The goals were developed through the MAPEP program review and customer feedback processes. The MAPEP will:

- Develop strategies for increased participation by domestic and international participant laboratories,
- Continue MAPEP chemists participation in NELAC subcommittees for establishing acceptance criteria for radionuclides in environmental performance testing programs,
- Complete RESL accreditation for Proficiency Testing Providers according to ISO 43 as accredited by A2LA, and
- Expand the MAPEP chemists program for providing additional technical assistance to participating laboratories.

The MAPEP team is committed to better define participating laboratories' affiliation with DOE to adequately substantiate which DOE programs are utilizing the MAPEP, including identification of Federal and contractor organizations responsible for reviewing MAPEP results. In order to manage personnel and resources more efficiently, the MAPEP will re-evaluate distribution times for MAPEP samples from the January-July timeframe to a March-September timeframe. The MAPEP will continue to explore opportunities to promote the MAPEP and its importance to the present and future needs of the DOE complex in documenting and assuring the quality of environmental analyses. The MAPEP will seek further expansion and promotional opportunities by attending international and national conferences, interfacing with DOECAP participants on bi-monthly calls and at the annual meeting, and interacting with DOE HQ Programs, and DOE Field Offices.

3.0 Systematic Planning and Data Assessment Tools and Training (SPADAT) Program

In an effort to make decisions right the first time, systematic planning and statistical data assessment tools are being developed and deployed across the entire DOE complex through the SPADAT Program. Understanding and controlling uncertainties and inherent variations in data used to support key decisions is critical to ensure confident decisions. DOE is supporting the development of Data Quality Objectives (DQO) based methods and tools and providing training to facilitate better, faster, and cheaper approaches to meet regulator requirements while minimizing data gathering and assessment burdens for DOE site applications including accelerated cleanup, facility decommissioning, and legacy management.

3.1 Background and Scope

Data collection and analysis are key elements in DOE's data-driven decision making. It is vital that data obtained in support of these decisions is the right type, quality, and quantity to support defensible, confident decisions. DOE has embraced the concept of systematic planning for data gathering efforts prior to sampling to ensure the data will support the decisions that must be made with sufficient confidence. Moreover, DOE recognizes the need to account for all inherent sampling and analytical uncertainties using valid statistical techniques when evaluating sample results.

The SPADAT Program develops and deploys expert, user-friendly software that employs sophisticated statistical methods for designing and communicating defensible sampling plans and performing statistical analyses and transfers this technology through training. Tools from the SPADAT Program are being employed at nearly every DOE site.

3.1.1 Visual Sample Plan (VSP)

VSP is a sampling design and statistical assessment software tool that helps the more than 5000 world-wide users determine the number and location of samples required to be taken to support a variety of data-driven decisions. Based on the DQO and Systematic Planning philosophy, VSP provides DOE sites with statistically defensible approaches to data gathering and assessment. Leveraging off VSP acceptance and investments by EPA, DoD, Department of Homeland Security (DHS), Centers for Disease Control and Prevention (CDC), and others, DOE is supporting VSP development focused on accelerated cleanup, legacy management, and decommissioning.

VSP interfaces with Geographical Information Systems (GIS) and AutoCAD systems such that maps, floor plans, or high-resolution images can be imported into VSP and sampling

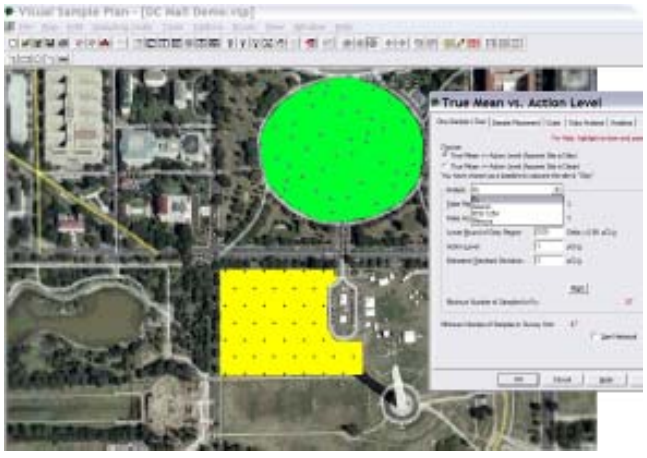

Figure 3.1. VSP Screen Shot Illustrating Example of Multiple Sample Plans for Washington Mall Areas

locations visualized. VSP supports a variety of statistical sampling approaches including simple random, systematic, sequential, stratified, rank-set, collaborative, adaptive cluster, transects, and judgmental. Decisions based on mean results or individual measurements and trends are supported.

Photo 3.1. VSP Expert Class Participants Working Through VSP Case Studies on Their Own Laptops

3.1.2 Visual Sample Size (VSS)

VSS is a significant improvement to the visual tools for DQO training class presentations on statistical sample design and data evaluation. VSS is unique; it provides a two-way, graph-based interactive user-interface to Monte Carlo simulations of environmental clean-up problems. VSS visually enables and enhances environmental sampling design and data evaluation.

Many programs provide graphics for statistical results. Some programs also provide graphics with components that can be interactively manipulated in various ways. VSS provides a unique two-way interactive graphics initial user-interface. These graphs are two-way interactive in that changes to parameters made on the graphs simultaneously change the default parameters in the dialog input boxes. Similarly, changes made to parameters in the dialog input boxes simultaneously upgrade the relevant graphics.

The VSS two-way interactive interface allows the user to visually interact with complex statistical simulations of clean-up problems. For example, a recent request from the field related to simulating the complex Washington State Three-Step Test (State Test) to determine whether a site has met cleanup standards under the Washington State Model Toxics Control Act. The following screen shot (Figure 3.2) illustrates the initial two-way interactive graphical user-interface with an optional yellow line at twice the Action Level and optional upper-tail area information.

Changing the true mean of the contaminant population provides a simple example of two-way interactive input. The user can simply drag the black line with the arrow on the x-axis and the true mean of the illustrated lognormal distribution will change as shown below.

Furthermore, the button face for the true mean dialog box has also changed and the default input in the dialog box has changed as well. This two-way interactive feature applies to other parameters of the problem such as the standard deviation, the Lower Bound of the Gray Region (LBGR), and the Action Level (AL).

3.1.3 DQO, DQA, and VSP Training at DOE Sites

Several training courses have been developed in support of DOE sites making defensible

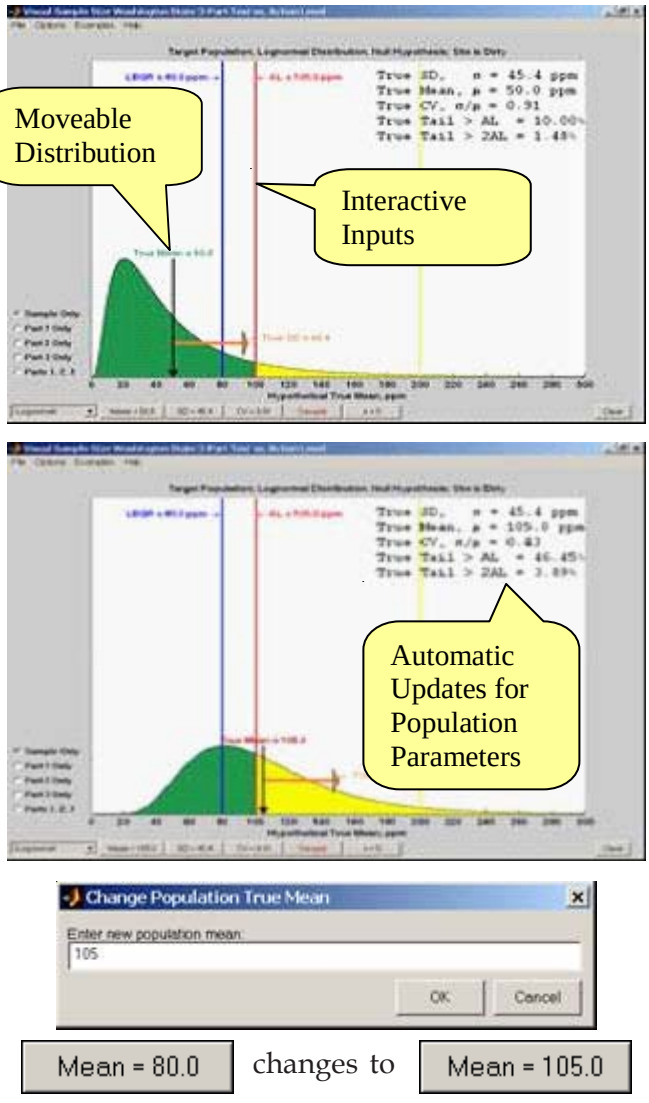

Figure 3.2. VSS Initial Interface for the Washington State Three-Part State Test

decisions by managing uncertainty via systematic planning. The objective is to institutionalize systematic planning for environmental decision-making by adopting the EPA's 7-Step Data Quality Objectives Process throughout the DOE complex. The five courses offered are:

- Managing Uncertainty with Systematic Planning for Environmental Decision-Making,
- Data Quality Objectives Applications,
- Data Quality Assessment,
- Visual Sample Plan Primer, and
- Visual Sample Plan Expert.

These training courses have been provided at most major DOE sites and have been very well received. The courses are providing site personnel with the approaches and tools necessary to develop optimal sampling and analysis plans which are easily communicated to and readily agreed to by regulators and other stakeholders.

3.2 FY06 SPADAT Program Activities and Accomplishments

3.2.1 VSP New Developments

In FY06 the SPADAT Program supported the addition of several new methods and enhancements to VSP. These additions were in response to items identified by DOE users as their high priority wish-list for future VSP developments. These new developments include the following:

- **Simultaneous Multiple Constituents**

In previous VSP versions, a separate design was required for each analyte of concern. New capabilities were added to allow users to design and analyze for many analytes simultaneously. Separate DQOs for each analyte can be entered, and the recommended sample size is adequate for all analytes.

- **Concurrent Hotspot/Mean Designs**

This addition allows the user to derive a sampling plan that supports multiple decision objectives. Often users want to compare a mean against a threshold but also want to ensure no hotspots.

- **Data Quality Assessment and Statistical Analysis Modules**

In FY06, DQA and Statistical Analysis functions were completed for all VSP modules supported by DOE. Now data can be evaluated against designed DQOs and statistical tests performed to test hypotheses and develop confidence intervals.

- **Less-Than-Detect Methods**

Methods for appropriately handling less than detection values in statistical analyses are being added.

- **Composite Sampling**

Composite sampling is an excellent way of increasing hotspot detection probability. New methods are being added to VSP to support composite sampling for some of the design options.

- **Long-Term Trend Monitoring**

The DOE Office of Legacy Management (LM) requires monitoring of many groundwater wells and sites to detect and estimate upward or downward trends over time. New methods have been added to statistically estimate and test for significant upward or downward trends in groundwater contamination. A workshop was held in April 2006 with DOE's Grand Junction Office to coordinate SPADAT Program efforts with LM needs. Figure 3.3 shows some of the output under the VSP trend monitoring module.

- **Hotspot Designs with Uncertainty**

Hotspot detection algorithms in VSP currently ignore false negative measurement errors. New methods are being added that account for these inherent measurement uncertainties.

- **Geostatistical Kriging Methods**

This addition will support spatial analysis in the form of kriging, which will allow contour mapping assuming some spatial correlation model. VSP 4.5 can be downloaded from http://dqo.pnl.gov/vsp.

3.2.2 VSS Development

In FY06 a series of beta versions (i.e., test versions 2 through 9) were rapidly developed in response to requests, concerns, and needs from the field. The primary needs in FY06 related to simulating and helping to develop and communicate multi-increment sampling as an alternative to the complex Washington State Test. The State Test provides an example of how VSS can simplify a complex, multi-faceted test.

Each of the three parts of the State Test can be individually simulated and displayed. However, the final decision depends on the results of all three tests. Figure 3.4 shows the complete State Test results of 10,000 trials for a lognormal distribution with a true mean of 50 ppm and a true standard deviation of 45.4 ppm. Note that the individual results of Part 1, Part 2, and Part 3 are shown, as well as the final results.

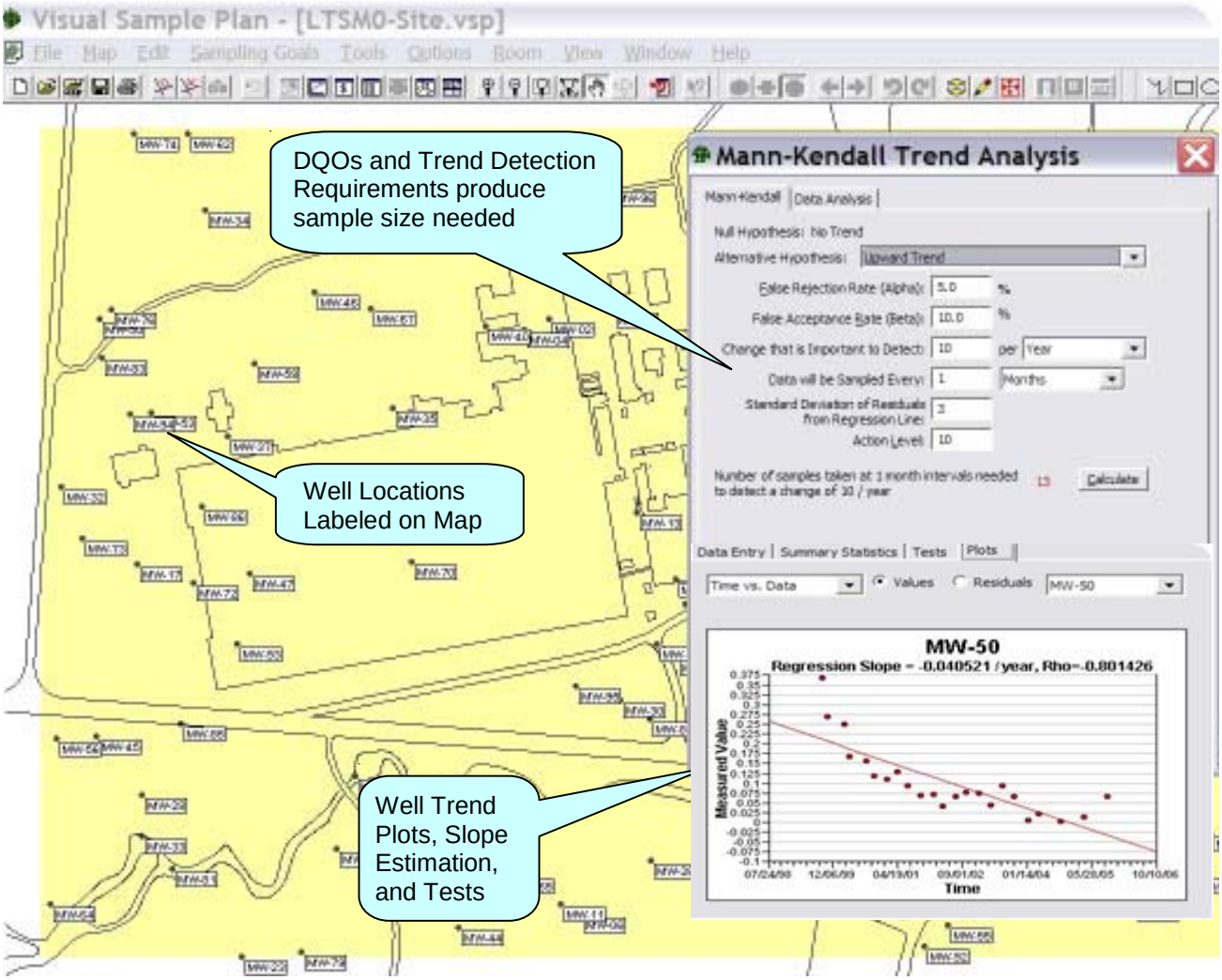

Figure 3.3 – VSP Long-Term Trend Monitoring Module Showing Map and User Dialog Box

VSS has been enthusiastically received in the field and the state of Washington has indicated definite interest in the program through their consultant for the Hanford Project.

3.2.3 Training at DOE Sites

Several training activities sponsored by the SPADAT Program were accomplished during FY06. Following is a summary of courses conducted at various DOE sites, as well as other available courses.

Managing Uncertainty with Systematic Planning for Environmental Decision-Making

This 3-day training course, developed by DOE in cooperation with the EPA Office of Solid Waste and Emergency Response (OSWER), provides instruction on the practical management and implementation of the EPA 7-Step DQO Process. The target audience is DOE project managers and technical support

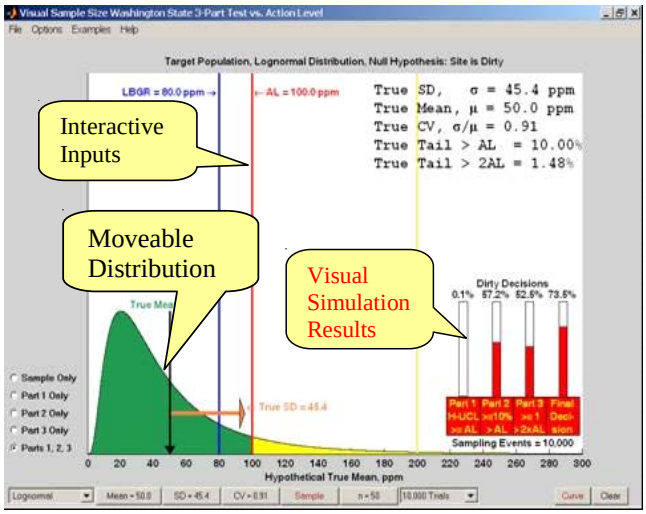

Figure 3.4. Multiple Thermometers Illustrate the Three Parts of the State Test and the Final Decision

staff (i.e., CERCLA, RCRA, CWA, CAA); DOE contractors; state regulators and their contractors; EPA Remedial Project Managers (RPMs) and technical support staff, their contractor project managers/engineers, and their technical support staff; as well as Federal, state, and local stakeholders. The first day of the course explains the big picture and presents the many free tools available on the DOE Hanford DQO website, while the last two days provide details regarding implementation of the 7-Step DQO Process including a case study. The focus is to streamline and document the process and provide a standard approach to systematic planning for environmental decision-making.

The course also presents the concepts of Gy's Multi-Increment Sampling (MIS) which has the potential of assisting DOE in defensibly closing out waste sites and realizing major cost savings. MIS is the state-of-the-science statistical sampling method and provides the greatest assurance of cleaning up a dirty site while minimizing the risk of cleaning up a clean site. It provides the most technically defensible site closure sample design while balancing sampling costs and remediation costs. VSS is used during the training classes to show the DOE project managers how MIS can be used effectively.

Since 1999, the course has been presented to more than 2,000 professionals at over 75 locations throughout the U.S. and the United Kingdom (UK). Most recently in FY06, the course has been presented to DOE management, staff, and contractors as well as EPA and State regulators at Oak Ridge National Laboratory (ORNL), Savannah River Site (SRS), and Los Alamos National Laboratory (LANL). The course was also presented in FY06 at the State of Alabama Department of Environmental Management and the Atomic Weapons Establishment in Aldermaston, UK.

The importance, value, and utility of DQO training to DOE is evident in comments from various users, available on the DOE Hanford DQO web page at: http://www.hanford.gov/dqo/training/evaluations.html.

DQO Applications

After attending the 3-day DQO training class (i.e., Managing Uncertainty with Systematic Planning for Environmental Decision-Making), the DQO Trainer meets the following week with individual project teams to take them through the EPA 7-Step DQO Process as it applies to their site. Site-specific background information gathered by the Project RPM is used during the DQO Applications meeting, during which the DQO Trainer questions project team members to develop information necessary to implement the 7-Step DQO Process for that project. The goal is to have

project team members learn how to apply the EPA 7-Step DQO Process to future projects.

Data Quality Assessment for Environmental Decision-Making Training

The Data Quality Assessment (DQA) process seeks to determine whether the type, quantity, and quality of environmental data needed to support a decision has been achieved. This one-day course, which follows EPA Guidance for Data Quality Objectives (QA/G9) introduces environmental professionals to the 5-Step DQA process using a combination of lectures, instructor-led exercises, and computer simulations, based on Visual Sample Size software. This course was developed in FY06 and has been presented at two locations.

Visual Sample Plan Training: Primer Course

This 3-hour course provides practical, hands-on training in the use of the VSP software in the context of the DQO approach. After a short introduction, students are given a course handout containing several in-class exercises which they complete at their own pace. The course consists of a short instructor-led overview of the VSP software menu structure, a demonstration of key tasks required to use VSP, and a set of self-guided Introductory Exercises that take the student on a step-by-step tour of many VSP key features. By using VSP, site managers working with regulators can quickly evaluate tradeoffs between sampling designs and together develop optimal, acceptable approaches. This 3-hour course has been presented to more than 2000 students since its inception at more than 75 locations, and serves as a primer to the 20-hour Advanced VSP course offered by Pacific Northwest National Laboratory. In FY06 this VSP primer course was presented at DOE-ORO, LANL and SRS.

More information regarding these four DOE sponsored courses is available on the DOE Hanford DQO web page at: http://www.hanford.gov/dqo.

VSP Expert Training Course

With the many leveraged enhancements supported by DOE, EPA, DoD, DHS, and CDC, to become truly proficient in VSP, DOE offers a 2.5 day VSP training course. This training has been conducted at Oak Ridge, LANL, Sandia, Hanford, Pantex, Las Vegas, Mound and is planned for Grand Junction, Livermore, Savannah River, INL, and other DOE sites.

Course evaluations have been extremely positive with many participants stating this has been the best, most useful training they have received in some time. Site personnel are armed with tools that can help them produce timely, defensible sampling designs and to perform statistical assessments. The courses involve not only DOE staff and contractors, but also regulators and tribes. After completing the Mound course and using VSP to support Mound closure activities, one user stated that they "never could have done it without VSP."

The hands-on VSP Expert course provides the participants an opportunity to work through over 18 case studies using various VSP modules and gives them experience in manipulating and visualizing results. By using VSP, site managers working with regulators can quickly evaluate tradeoffs between sampling designs and together develop optimal, defensible approaches.

3.3 FY07 SPADAT Program Goals and Challenges

The following provides a summary of opportunities for SPADAT Program improvement.

3.3.1 VSP Additions and Appropriate Use of Software Tools

At each of the VSP Expert training courses, a wish-list is generated by all the DOE and regulator participants. This wish-list outlines the statistical methods and VSP enhancements that DOE sites feel would be most valuable to add in the future to help them meet their site needs. DOE plans to support development of some of those VSP methods and enhancements in FY07 and the out-years.

3.3.2 Expand Training

Although use of VSP is widespread across the DOE complex, the number of sophisticated, trained users is limited. Some users still don't completely understand the implications of parameter specifications, and few are familiar with some of the more extensive and often more cost effective VSP procedures. Efforts to conduct more widespread 2½-day VSP Expert training courses will help this situation. The addition of an expert system to guide the user through the appropriate selection of a statistical sampling design approach and optimal parameter settings will also help ensure that DOE gets the most out of this investment. Continued training and VSP development should be pursued.

3.3.3 Implementing Systematic Planning

It is evident that some DOE projects continue to struggle with taking a systematic approach to determining how many samples must be obtained to ensure confident decisions. The training provided in the Managing Uncertainty with Systematic Planning for Environmental Decision-Making course will assist DOE managers in making sound and defensible environmental decisions. The concept of Multi-Increment sampling is taking hold at DOE Sites due in part to the exposure given to MIS in these training courses. Continued training and development of tools for strengthening systematic planning efforts should be supported.

Photo 3.2 – VSP Expert Training Gives Users Experience With Many VSP Features and Modules

Appendix A
FY06 DOECAP Audited Laboratories and TSDFs

DOECAP Audited Laboratories	
ACC - Acura Laboratories, Inc. Norcross, GA (surveillance only in FY06)	ACO - BWXT ACO at Y-12, Oak Ridge, TN
ARS - American Radiation Services, Inc., Port Allen, LA	BCL - BC Labs, Inc., Bakersfield, CA
CAL - Caltest Analytical Laboratory, Napa, CA	CAI - CEBAM Analytical, Inc., Seattle, WA
DCS - DataChem Laboratories, Inc., Salt Lake City, UT	EMAX - EMAX Laboratories, Inc., Torrance, CA
ESO - Eberline Services, Inc., Oak Ridge, TN (audit plus a follow-up surveillance)	ESR - Eberline Services, Inc., Richmond, CA
FGL - FGL Environmental Laboratory, Santa Paula, CA	GEL - General Engineering Laboratories, LLC, Charleston, SC
LLI - Lionville Laboratory, Inc., Lionville, PA	MCL - Materials and Chemistry Laboratory, Oak Ridge, TN
PAL - USEC Paducah Analytical Laboratory, Paducah, KY	PAR - Paragon Analytics, Inc, Fort Collins, CO (audit plus a follow-up surveillance)
PORTS - USEC Portsmouth Analytical Laboratory, Piketon, OH	RMAL - ORNL, RMAL, Oak Ridge, TN
SEI - Shaw Environmental and Infrastructure, Kingston, TN	SEQ - Sequoia Analytical, Morgan Hill, CA (audit plus a follow-up surveillance)
SRI - Southwest Research Institute, San Antonio, TX	STA - Severn Trent Laboratories, Inc. - Colorado, Arvada CO
STB - Severn Trent Laboratories, Inc. - Buffalo, Amherst, NY	STK - Severn Trent Laboratories, Inc. - Knoxville, Knoxville, TN
STR - Severn Trent Laboratories, Inc. - Richland, Richland, WA	STS - Severn Trent Laboratories, Inc. - St. Louis, Earth City, MO
DOECAP Audited TSDFs	
DSSI - Diversified Scientific Services, Inc., Oak Ridge, TN	PEC - Pacific EcoSolutions LLC, Richland, WA
DUR - Duratek, Inc., Oak Ridge, TN	PFF - Perma-Fix of Florida, Gainesville, FL
M&EC - Materials and Energy Corporation, Oak Ridge, TN	WCS - Waste Control Specialists, LLC, Andrews, TX
ESU - Energy Solutions of Utah, Clive, UT	

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Appendix B
MAPEP Series 16 Participating Laboratories

U.S. Laboratories		
222-S Laboratory	Richland	WA
Accura Analytical Laboratory, Inc.	Norcross	GA
AFIOH/SDRR	Brooks City - Base	TX
Alabama Department of Environmental Management	Montgomery	AL
American Radiation Services, Inc.	Port Allen	LA
Analytical Support Operations - Radiochemical Processing Lab	Richland	WA
AREVA NP Environmental Laboratory	Westboro	MA
Argonne National Laboratory	Argonne	IL
Argonne National Laboratory - Analytical Chemistry Lab	Argonne	IL
Assaigai Analytical Laboratories	Albuquerque	NM
ATL International, Inc.	Germantown	MD
BC Laboratories, Inc.	Bakersfield	CA
BWXT Pantex - D&RMG	Amarillo	TX
BWXT Services - Radioisotope and Analytical Chemistry Laboratory	Lynchburg	VA
BWXT Y-12, Analytical Chemistry Organization Laboratory	Oak Ridge	TN
California Department of Health Services	Richmond	CA
Caltest Analytical Laboratory	Napa	CA
Carlsbad Environmental Monitoring and Research Center	Carlsbad	NM
CH2MHILL Mound Inc., Mound, Environmental Monitoring	Miamisburg	OH
Connecticut Yankee Atomic Power Company (CYAPCo)	East Hampton	CT
Davis & Floyd, Inc.	Greenwood	SC
Department of Environmental Health and Safety	Raleigh	NC
Direct Push Analytical	Findlay	OH
Duratek, Inc. - Bear Creek Lab	Oak Ridge	TN

U.S. Laboratories (cont'd.)		
Eberline Services	Richmond	CA
Eberline Services Oak Ridge Laboratory	Oak Ridge	TN
Eberline Services, Inc.	Albuquerque	NM
EMAX Laboratories, Inc.	Torrance	CA
Energy Northwest Environmental Services	Richland	WA
Envirocare of Utah, LLC	Clive	UT
Environmental Radiation Laboratory	Atlanta	GA
Environmental Science Lab PNNL/ESL	Richland	WA
Environmental, Inc., Midwest Lab	Northbrook	IL
ETTP	Oak Ridge	TN
Fermi National Accelerator Laboratory (FermiLab)	Batavia	IL
FGL Environmental	Santa Paula	CA
Florida Department of Health Environmental Laboratory	Orlando	FL
Florida Department of Health Mobile Environmental Radiological Lab	Orlando	FL
Fluor Fernald	Cincinnati	OH
Framatome ANP Environmental Laboratory	Westboro	MA
FUSRAP	Berkeley	MO
GEL Laboratories of Ohio, LLC	Cincinnati	OH
General Engineering Laboratories, LLC	Charleston	SC
Georgia Power Company Environmental Laboratory	Smyrna	GA
GPL Laboratories, LLC	Frederick	MD
Hazards Control Analytical Lab	Livermore	CA
ICP Analytical Laboratories Department	Idaho Falls	ID
Idaho National Laboratory	Idaho Falls	ID
ISU - Department of Physics/Health Physics/EAL	Pocatello	ID

U.S. Laboratories (cont'd.)		
Jefferson Laboratory	Newport News	VA
Kennedy Space Center HP Laboratory	Kennedy Space Ctr	FL
Lawrence Berkeley National Laboratory	Berkeley	CA
Lawrence Livermore National Laboratory	LIvermore	CA
Lawrence Livermore National Laboratory - EMRL	Livermore	CA
Lawrence Livermore National Laboratory - HWRL	Livermore	CA
Lawrence Livermore National Laboratory - ERAD	Livermore	CA
Life Science Laboratories, Inc.	East Syracuse	NY
Lionville Laboratory, Incorporated	Exton	PA
Los Alamos National Laboratory	Los Alamos	NM
MDPH - Radiation Control Program	Jamaica Plain	MA
NASA Plum Brook Reactor Facility Lab	Sandusky	OH
National Air and Radiation Environmental Laboratory	Montgomery	AL
New Jersey Department of Health and Senior Services, PHEL, ECLS	Trenton	NJ
Northeast Laboratory Services, Inc.	Waterville	ME
Nuclear Technology Services, Inc.	Roswell	GA
Oak Ridge National Laboratory - Internal Dosimetry Group	Oak Ridge	TN
Ohio Department of Health Laboratory	Columbus	OH
ORISE/ESSAP	Oak Ridge	TN
Outreach Technologies, Inc.	Broken Arrow	OK
Pace Analytical Services Waltz Mill Site	Madison	PA
Paragon Analytics - a Division of DataChem Laboratories, Inc.	Fort Collins	CO
Public Health Laboratories	Shoreline	WA
Radioactive Material Analysis Laboratory	Oak Ridge	TN
Reactor Technology Complex (RTC) Radioanalytical Laboratory	Scoville	ID
Region 5 EQC Tritium Laboratory	Aiken	SC
RSA Laboratories, Inc.	Hebron	CT

U.S. Laboratories (cont'd.)		
SAIC On-Site Laboratory	Denver	CO
Sandia National Laboratories - Industrial Hygiene Anal Chem Lab	Albuquerque	NM
Sandia National Laboratories, Radiation Protection Sample Diag	Albuquerque	NM
Sanford Cohen and Associates, Inc.	Montgomery	AL
Santa Susana Field Laboratory	near Chatsworth	CA
SC Department of Health and Environmental Control Rad Lab	Columbia	SC
Scientific Laboratory Division	Albuquerque	NM
SECRA 3005 Count Lab - ORNL	Oak Ridge	TN
Sequoia Analytical	Morgan Hill	CA
Severn Trent Laboratories Richland	Richland	WA
Stanford Linear Accelerator Laboratory	Menlo Park	CA
Southwest Research Institute	San Antonio	TX
SRS Environmental Monitoring Laboratory	Aiken	SC
STL Denver	Arvada	CO
STL Knoxville	Knoxville	TN
STL St. Louis	Earth City	MO
Teledyne Brown Engineering - Environmental Services	Knoxville	TN
Texas Department of State Health Services Laboratory	Austin	TX
U.S. EPA Office of Radiation and Indoor Air	Las Vegas	NV
UniTech Services Group	Springfield	MA
United States Enrichment Corporation	Paducah	KY
U.S. Army Yuma Proving Ground Material Analysis Laboratory	Yuma	AZ
USEC, Inc.	Piketon	OH
Washington Closure Hanford	Richland	WA
Waste Sampling and Characterization Facility	Richland	WA
West Valley Nuclear Services	West Valley	NY
Wisconsin Dept. of Public Health, Radiation Protection Sect.	Madison	WI

U.S. Laboratories (cont'd.)		
WIPP Laboratories	Carlsbad	NM
Wisconsin State Laboratory of Hygiene	Madison	WI
WSRC/Savannah River National Laboratory/ADS	Aiken	SC
WVDP Environmental Laboratory	West Valley	NY
WVDP Radiation Protection Laboratory	West Valley	NY

International Laboratories		
Chemical Analysis Laboratory	Al-Jaubaiha	Jordan
Environmental Radiation Protection Division	Sharq	Kuwait
Environmental Studies Laboratory	Riyadh	Saudi Arabia
Food and Environment Monitoring Center	Muscat	Oman
Instituto de Radioprotecao e Dosimetria	Rio de Janeiro	Brazil
International Atomic Energy Agency	Seibersdorf	Austria
National Radiation Laboratory	Christchurch	New Zealand
Qatar University - Nuclear Physics Laboratory	Doha	Qatar
Radiation Measurements Laboratory	Amman	Jordan
Radiation Protection Bureau ERHD NMS	Ottawa	Ontario
Radiation Protection Service	Weston	Ontario
Radioecology	Al-Jadria	Iraq
Royal Scientific Society - Radiation Measurements Laboratory	Al-Jubaiha	Jordan
Soreq NRC	Yavne	Israel
The Supreme Council for the Environment and Natural Resources	Doha	Qatar

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Appendix C
Memo Detailing Criteria for the MAPEP Letters of Concern

The following provides a brief overview of the policies and processes associated with issuing and responding to a Mixed Analyte Performance Evaluation Program (MAPEP) Letter of Concern, and its significance to the Department of Energy's Consolidated Audit Program (DOECAP).

The MAPEP issues a Letter of Concern to a participating laboratory upon identification of a potential analytical data quality problem in the MAPEP results, in order to help participants identify, investigate, and resolve potential quality issues. Letters of Concern have been issued since 1996, shortly after the beginning of the MAPEP program. A copy of the Letter of Concern is also sent to DOE/contractor oversight Points of Contact (POCs), including DOE Field Office and Headquarters POCs, and contractor Sample Management POCs. Issued to be informative and not punitive, each Letter of Concern states, "*This letter is solely intended to alert your laboratory to a potential quality concern that you may wish to investigate for corrective action.*" A Letter of Concern is issued to any participating laboratory that demonstrates:

- "Not Acceptable" performance for a targeted analyte in a given sample matrix for the two most recent test sessions (e.g., Pu-238 in soil test 13 "+N" (+36% bias), Pu-238 in soil test 14 "-N" (-43% bias));
- "Not Acceptable" performance for a targeted analyte in two or more sample matrices for the current test session (e.g., Cs-137 in water test 14 "+N" (+38%), Cs-137 in soil test 14 "+N" (+45%));
- Consistent bias, either positive or negative, at the "Warning" level (greater than +/- 20% bias) for a targeted analyte in a given sample matrix for the two most recent test sessions (e.g., Sr-90 in air filter test 13 "+W" (+26%), Sr-90 in air filter test 14 "+W" (+28%));
- Quality issues (flags other than "Acceptable") that weren't identified by the above criteria for a targeted analyte in a given sample matrix over the last three test sessions (e.g., Am-241 in soil test 12 "-N"(-47%), Am-241 in soil test 13 "+W" (+24%), Am-241 in soil test 14 "-N" (-38%));
- Any other performance indicator and/or historical trending that demonstrate an obvious quality concern (e.g., consistent "False Positive" results for Pu-238 in all tested matrices over the last three test sessions).

A review period (about two weeks) is provided at the close of each MAPEP test session, prior to the release of final results to DOE stakeholders and the general public, when any laboratory may question or appeal performance evaluation results. All laboratories have the opportunity to respond to a Letter of Concern by contacting the MAPEP Coordinator, and many frequently do so. In addition, laboratories can request additional MAPEP standards at any time for verification of measurement processes, and many have utilized this option.

Letters of Concern specifically address an area of significance to the DOECAP, as laboratory participation in performance evaluation (PE) programs is typically assessed during a DOECAP audit. The DOECAP QSAS, Revision 2.1, (i.e., pages 83 and 84) identifies the corrective action and documentation required for a laboratory to address PE program failure. For two consecutive failures, the laboratory is required to develop and document corrective action(s) to address the cause(s) within 21 days. Corrective action documentation must be available for review during DOECAP audits, and the same documentation should be available for any clients or other stakeholders. If the DOECAP issues a finding in the area of PE performance, including any finding derived from or associated with a MAPEP Letter of Concern, the laboratory has the opportunity to respond and perform corrective actions through the DOECAP process.

In addition to issuing Letters of Concern, the MAPEP Team provides technical assistance whenever requested, to both MAPEP participants and DOE/contractor oversight personnel. That assistance has helped resolve many quality issues, thereby improving the quality of analytical services and ultimately reducing potential DOE liability. MAPEP Letters of Concern are instrumental in this process by providing a method of communication that focuses attention on analytical performance, and when used as intended, assists laboratories and DOE/contractor oversight personnel avoid potential quality problems and/or correct quality issues in a timely manner.

It is also important to note that the DOE field site management/personnel, and/or its DOE contractor, that enter into a contractual agreement with an analytical laboratory for field data services, have an important responsibility. They are responsible for assuring that the corrective actions needed to remedy the data discrepancy, as identified by the performance evaluation and testing of MAPEP, satisfy the Department's obligations and provide confidence in the quality, validity, and reliability of the analytical data.

Please contact Guy Marlette or Mary Verwolf for additional information.

Mary C. Verwolf
MAPEP Quality Assurance Officer
U.S. Department of Energy
Radiological and Environmental Sciences Laboratory
1955 Fremont Avenue, MS-4149
Idaho Falls, ID 83415
Phone: 208-526-7001
Fax: 208-526-2548
Email: verwolmc@id.doe.gov

Guy M. Marlette, Chemist
MAPEP Coordinator
U.S. Department of Energy
Radiological and Environmental Sciences Laboratory
1955 Fremont Avenue, MS-4149
Idaho Falls, ID 83415
Phone: 208-526-2532
Fax: 208-526-2548
Email: marletgm@id.doe.gov