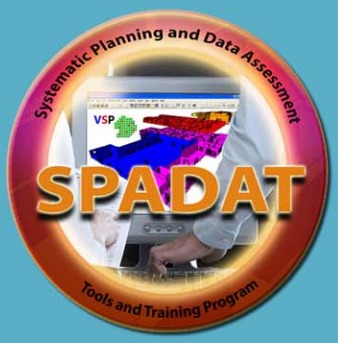
HSS
Office of Health, Safety and Security

U.S. DEPARTMENT OF ENERGY

Analytical Services Program Fiscal Year 2008 Report



MAPEP

U.S. Department of Energy
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Acronyms

AMESH	Assistant Manager for Environment, Safety and Health
ASP	Analytical Services Program
CAP	Corrective Action Plan
CDC	Center for Disease Control
DHS	Department of Homeland Security
DoD	Department of Defense
DOE	Department of Energy
DOECAP	Department of Energy Consolidated Audit Program
DQO	Data Quality Objectives
EDS	Electronic Data System
EM	Environmental Management
EMCBC	Environmental Management Consolidate Business Center
EPA	Environmental Protection Agency
FY	Fiscal Year

HSS	Office of Health, Safety and Security
ILAC	International Conference on Accreditation of Laboratories
LM	Office of Legacy Management
MAPEP	Mixed Analyte Performance Evaluation Program
NELAC	National Environmental Laboratory Accreditation Conference
NIST	National Institute of standards and technology
ORO	Oak Ridge Office
POC	Point of Contact
PT	Performance Testing
QSAS	Quality Systems for Analytical Services
RESL	Radiological and Environmental Sciences Laboratory
RTP	Radiological Traceability Program
SOP	Standard Operating Procedure
SPADAT	Systematic Planning and Data Assessment Tools and Training
TNI	The NELAC Institute
TSDF	Treatment, Storage and Disposal Facilities
US	United States
VSP	Visual Sample Plan

Executive Summary

This report provides an overview of the Department of Energy (DOE) Analytical Services Program (ASP) activities for Fiscal Year (FY) 2008. The ASP is managed through the Office of Health, Safety and Security (HSS), 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.

These Programs provide integral support to DOE programmatic and operational efforts throughout the nation. Defensibility of chemical and radiochemical data, including the data collection strategy, the integrity of the analyses, and the documentation and use of the results is critical to all DOE operations. These planning, auditing, and proficiency testing activities are primary vehicles for assuring quality and reliable data are available for decision-making to support on-going mission critical operations and functions; environmental remediation; clean-up projects; and long term legacy management surveillance. Auditing of commercial waste vendors assures increased accountability for the disposition of radioactive and chemical waste from DOE sites under the requirements of DOE Order 435.1, Radiological Waste Operations. The following attributes enhanced effective implementation of the ASP components and are value added to the Department and its field sites:

In FY08, a total of 38 DOECAP audits were conducted at analytical environmental laboratories and commercial waste treatment, storage and disposal facilities (TSDF). The audits of analytical laboratories identified five Priority I findings involving two or more consecutive failed proficiency tests for specific analytes of concern. As a result of these audits and follow-up actions, laboratories are now back in compliance and providing field contract holders quality data results that field managers can rely on with confidence to make defensible decisions. One laboratory was removed from the program and its DOE site contracts were closed when it failed to remedy numerous significant findings from the previous fiscal year. The FY08 audits also validated closure for over 84% of all open findings from FY07 and documented improved performance by the laboratories and waste

facilities; increased confidence in analytical data quality; increased regulatory compliance for waste disposal, accountability, and tracking; and improved compliance with ASP and national standards. In addition, several DOE field sites have added specific new language into their contract agreements including participation in the DOECAP as the vehicle for assessing laboratory performance.

Continuing programmatic challenges encompass the need to expand the number of Federal auditors participating in DOECAP audits and increase the overall cadre of auditors and lead auditors involved in the program. Program line support is in need of improvement commensurate with use of laboratories and commercial waste vendors. Similarly, efforts will continue in FY09 to encourage DOE sites and contractors to increase participation in the DOECAP at all levels, and to recognize the intrinsic contributions and benefits of this program to achieve their goals to investigate, remediate, dispose, and monitor current and legacy issues within the Complex. As a result of DOECAP FY08 consolidated activities, the necessity for approximately twice the number of independent audits was eliminated. This resulted in an estimated annual cost savings in excess of $2.4M to the government along with additional savings to the audited facilities.

The MAPEP provides important quality assurance oversight for environmental analytical services under contract with DOE by performing semiannual performance testing (PT) 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. Field managers receive the assurance that environmental data results are valid and reliable. This translates into more confident decision-making relative to environmental remediation, clean-up projects, and regulatory compliance.

Performance data for all matrices from a MAPEP test session (i.e., Series) are also reported to DOECAP, Headquarters' Program Line Management, DOE Field Offices, Sample Management Offices or contractors, participating laboratories, and audit personnel to support quality assurance oversight and quality improvement.

Over the year MAPEP distributed performance test samples to more than 120 participating laboratories which resulted in over 25,000 analyses being reported and evaluated. A more proactive approach has been established to notify analytical laboratories and DOE contract holders of failed proficiency testing in order to improve performance between test sessions and on-site DOECAP audits.

With over 5000 users, the SPADAT Visual Sample Plan (VSP) software tool continues to be widely recognized as the tool of choice for Systematic Planning and Data Quality Objectives (DQO) process implementation. VSP is currently focused on design and analysis for the following applications:

- Environmental characterization and remediation;
- Environmental monitoring and stewardship;
- Response and recovery of chemical/biological/radiation terrorist events;

- Footprint reduction and remediation of unexploded ordnance sites; and
- Sampling of soils, buildings, groundwater, sediments, surface waters, and subsurface layers.

DOE leverages investments made by the United States (US) Environmental Protection Agency (EPA), Department of Defense (DoD), Department of Homeland Security (DHS), United Kingdom Atomic Weapons Establishment, and Center for Disease Control (CDC) to develop the VSP software to support statistical sampling design and data decision assessments. The DOE Office of Legacy Management (LM) has also partnered with HSS to jointly sponsor several VSP additions focused on trend modeling, well redundancy evaluations, analyte redundancy assessments, and geospatial plume modeling and mapping. However, the value and use of the VSP toolkits has not been fully realized beyond its environmental capabilities, and extension of this asset to applications such as security management and facility design are possibilities. Additional HSS, DOE field site and intergovernmental cost sharing VSP training opportunities are being planned for the coming year.

Conclusion

Ensuring confident decisions that affect the health and safety of DOE workers, the public, the environment, and our national security assets is a priority for HSS. Confident risk management must be supported by data that are the right type, quality, and quantity. Thus, DOE must not only ensure that the analytical laboratories are producing high quality results, but also that data gathering and analysis process employs statistically rigorous methods that account for inherent uncertainties in data. DOECAP, MAPEP and SPADAT help site personnel establish: data confidence; statistically defensible sampling; optimally planned data gathering efforts; and whether the data gathered meets DQOs to support confident decisions and meet regulatory acceptance.

In 2008, ASP activities continued to effectively support all Departmental elements with a corporate approach that provides environmental data quality assurance in a cost-effective manner. Issues identified during audits and performance tests were itemized for corrective action. In coordination with several other Federal agencies, the ASP continued to: develop software toolkits supporting sampling plans and data assessment; participate on national standards laboratory accreditation committees, interagency task forces, and intergovernmental audits; provide input from DOE to national consensus standards for auditing analytical laboratories; and strengthening the Program's recognition and credibility throughout the Nation.

To sustain an even greater capability for the DOECAP, MAPEP and SPADAT, three key initiatives are planned for FY09. First, creating expanded incentives and leverage to support consolidated audits and proficiency testing as vehicles of choice would be beneficial in gaining increased program line and field endorsement and usage. Second, applying the successes of consolidated audits of laboratories and commercial radiological waste vendors can be expanded to non-radiological treatment, storage and

disposal facilities. As non-radiological facility operations carry their own risks and liabilities for Departmental waste disposition, two pilot audits of non-radiological TSDF's used by multiple DOE field sites are planned in the coming year. Third, new opportunities for the use of VSP toolkits will be expanded to include additional program line organization utilization.

The HSS will continue to support this corporate approach to the ASP in close partnership with program offices and field elements.

1.0 Department of Energy Consolidated Audit Program (DOECAP)

The DOECAP conducts annual audits of analytical laboratories and commercial waste 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://doecap.oro.doe.gov/.**

A Federal Analytical Services Program (ASP) Manager within the HSS provides overall policy direction, guidance, funding, and DOECAP leadership. The DOE Oak Ridge Office (ORO), Office of the Assistant Manager for Environment, Safety and Health (AMESH) provides Federal management of the Program and oversight of the contractor DOECAP Operations Team and contracted EDS Management through a designated DOECAP Manager in Oak Ridge, Tennessee. The DOECAP Operations Team is responsible for program administration and implementation and conducts audit scheduling, coordination of auditors, report documentation, and records tracking through closure of corrective actions. In addition, DOECAP Operations Team members maintain qualification as DOECAP auditors and lead auditors. The EDS provides audit implementation and related auditor training, scheduling, planning, corrective action plan (CAP) tracking, and document report storage.

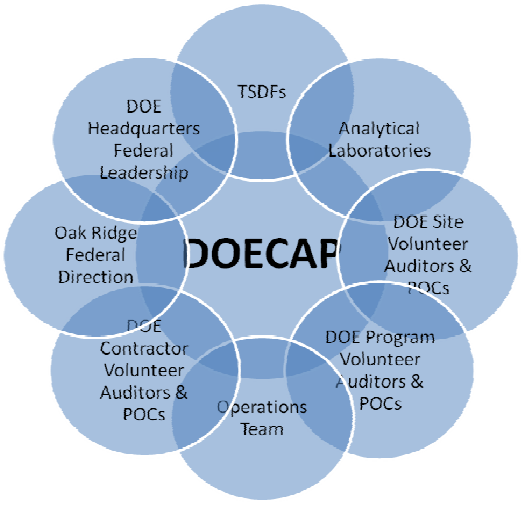


Figure 1.1 DOECAP An Integrated Participatory Program

The DOECAP core organization comprises the ASP Manager, DOECAP Manager, and DOECAP Operations Team. Beyond the DOECAP core organization, the Program relies on an extensive system of complex-wide DOECAP lead auditors and auditors, as well as personnel associated with the Program as Federal points-of-contact (POC) and contractor POCs. DOE Program Offices and sites (i.e., laboratory and TSDF contract holders) participate voluntarily in the DOECAP and are motivated by the historically demonstrated benefits of participation and providing lead auditors, auditors, and others to support the Program. This voluntary participation continues to be vital to the success and viability of the Program.

The cost incurred to participate in DOECAP audits is a prudent investment compared to costs that would otherwise be incurred by sites performing independent laboratory and TSDF qualification audits. The return on investment is further compounded for the Department and the taxpayer by eliminating redundant audits of the same laboratories and TSDFs performed by multiple independent sites. Therefore, the government receives 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. The Inspector General's 1995 review reported over 200 separate independent laboratory audits were being performed by DOE and its contractors. As a result of DOECAP FY08 activities, the necessity for approximately twice the number of audits (i.e., over 40 additional annual audits) throughout the DOE complex was eliminated. This resulted in an estimated annual cost savings in excess of $2.4M to the government along with additional savings to the audited facilities.

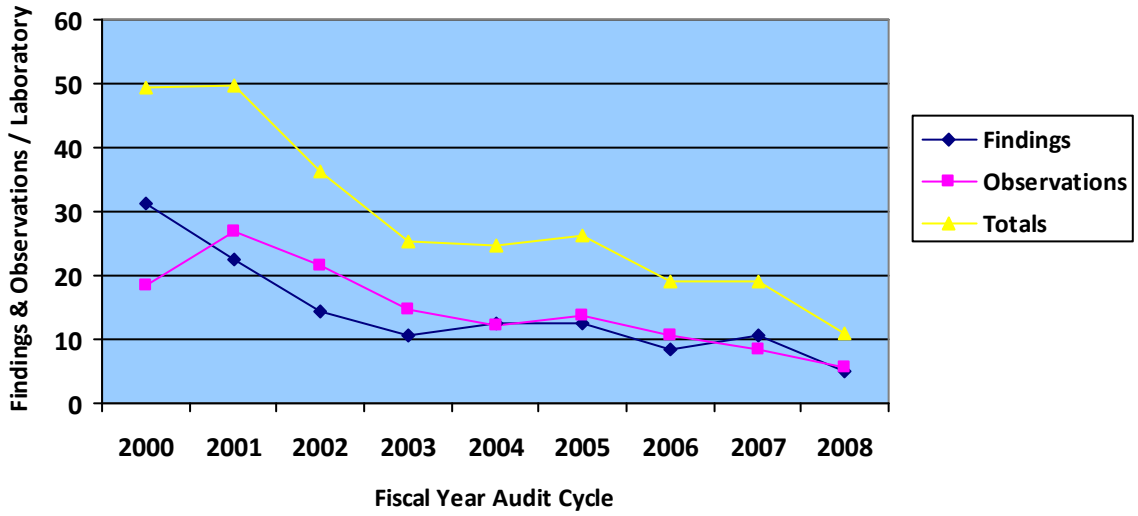


Figure 1.2 - Laboratory Audit Performance Statistics

The result of implementing a consistent auditing program in conjunction with consistent quality requirements is demonstrated through years of implementation. Figure 1.2 illustrates the overall improvement of the participating laboratories ability to implement quality systems. A reduction in overall total finding and observation rates from 49.5 per laboratory in 2000-2001 to 14.9 per laboratory in 2007-2008 is noted.

Similarly, TSDF rates have decreased from 26.7 per TSDF in 2001-2002 to 17.0 per TSDF in 2007-2008 (refer to the illustration in Figure 1.3 on the next page). This reflects the Program's ability to achieve process improvement in the services being provided.

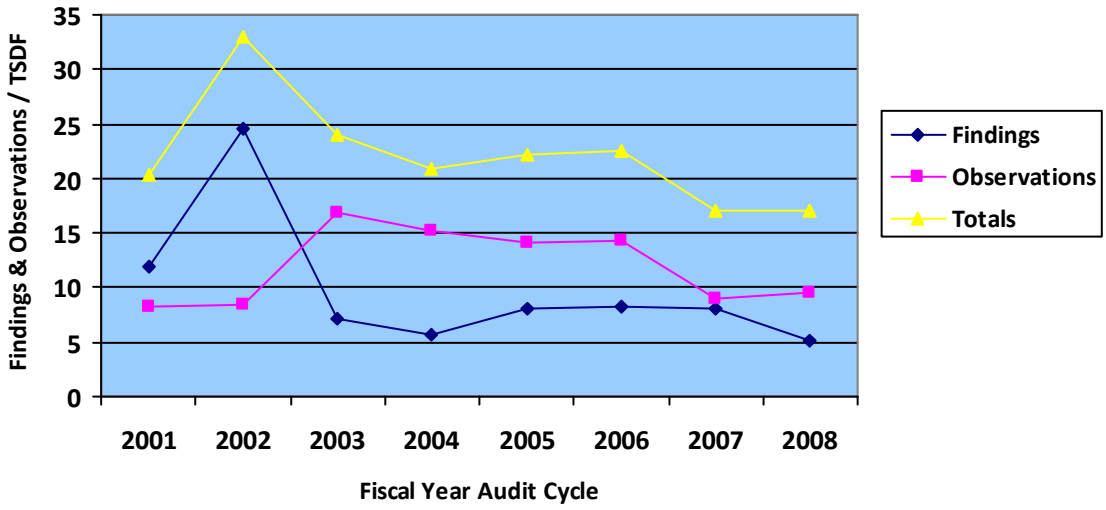


Figure 1.3 - TSDF Audit Performance Statistics

This intensive annual audit motivates the laboratories and TSDFs to maintain an awareness of the requirements, redouble their efforts to meet the regulatory and programmatic requirements, and ensure data quality and competently treat and dispose of DOE waste. DOE environmental and waste managers gain a higher confidence that the work completed is accurate; reduces risk and liability; and improves regulator acceptability.

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, redundancy, and ineffectiveness regarding audits of analytical laboratories conducted by the Department. The reports were critical of using funds from individual DOE field elements to perform redundant audits of the same laboratories, employing disparate audit protocol and criteria, and not disseminating lessons learned.

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

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

- Provide a mechanism for dissemination of lessons learned information.

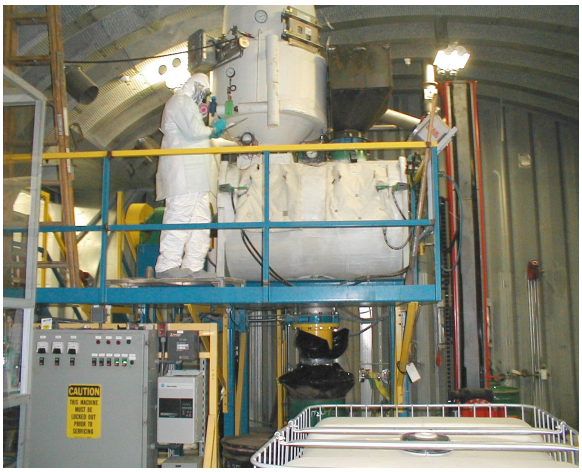


Photo 1.1 – DOECAP TSDF Audit

Since that time, audits of TSDFs accepting low-level and mixed radioactive waste 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 and then to HSS in early FY07 to provide a broader corporate Departmental perspective. The Program continues to provide DOE beneficial services through:

- Consolidated audit planning, scheduling, and coordination to achieve cost savings for the Department and taxpayers, as well as minimize impact to contractor laboratories and TSDFs;
- Development and maintenance of standard audit procedures, including standardized audit reports;
- Implementation of standard auditor qualification requirements, and establishment of a pool of DOECAP-qualified auditors and lead auditors from across the complex supporting audits of both laboratories and TSDFs;
- Coordinated 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, engaged in bi-weekly teleconferences to update participants on all 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., The National Environmental Laboratory Accreditation Conference (NELAC) Institute (TNI), Interagency Data Quality Task Force, DoD, US EPA].

Specific cross-cutting value added 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. DOECAP TSDF audits also provide 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 $2.4M annually derived through audit consolidation and eliminating the need to conduct approximately twice the number of audits throughout the DOE complex. Additional cost savings are realized by the audited facilities through the reduced number of audits to which they are subjected.

- 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. Increased efficiency is also realized by the audited facilities that have more time to focus on performing requested analyses.

- 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.

- Safety – Enhanced safety regarding the handling of DOE environmental 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 FY08 Activities and Accomplishments

1.2.1 Program Metrics

Audit Performance

Audits were performed following a standardized process. Audit teams comprising a DOECAP qualified lead auditor and an appropriate number of DOECAP qualified auditors were based on the audit scope, complexity, personnel availability, and individual site interests. DOECAP standardized checklists were used to assist auditors through each area of the audit. The six standard and four special DOECAP laboratory audit areas and associated checklists are identified below.

- Quality Assurance Management Systems and General Laboratory Practices
- Data Quality for Organic Analyses
- Data Quality for Inorganic and Wet Chemistry Analyses
- Data Quality for Radiochemistry Analyses
- Laboratory Information Management Systems and Electronic Data Management
- Hazardous and Radioactive Materials Management
- Special Geochemical/Geotechnical Analyses
- Special Biological Assay, Aquatic Toxicity

- Special Non-Destructive Assay (NDA)
- Laboratory Closure Audit

The auditors perform each evaluation using the previous DOECAP audit report and associated CAP to determine finding closures. The eight DOECAP TSDF audit areas and associated checklists are identified below. As part of each DOECAP TSDF audit, a review of pertinent issues and concerns is conducted with the relevant regulatory agency(ies).

- Quality Assurance Management Systems
- Sampling and Analytical Data Quality
- Waste Operations
- Environmental Compliance/Permitting
- Radiological Control
- Industrial and Chemical Safety
- Agency Review

In FY08, a total of 38 DOECAP audits were conducted: 27 at commercial analytical laboratories; 4 at government-owned-contractor-operated laboratories located at DOE field sites; and 7 at commercial TSDFs accepting DOE mixed and low-level radioactive waste and chemical waste. While these audits were primarily initial and continuing qualification audits, one was conducted as surveillance for verification and acceptance of corrective actions and one was conducted as a closure audit to remove a laboratory from further DOECAP audits. In addition to these audits, a preliminary scoping visit was made to a non-radiological TSDF in an effort to assess expansion of the Program into this arena.

The 31 FY08 DOECAP laboratory audits were conducted by teams comprising a total of 116 DOECAP auditors, provided by 8 different DOE sites, for a total of 370 auditor-days on site at the audited laboratories. The seven FY08 DOECAP TSDF audits were conducted by teams comprising a total of 60 DOECAP auditors, provided by 10 different DOE sites, for a total of 180 auditor-days on site at the audited TSDFs. The participation of these auditors in the DOECAP, primarily volunteers, and the elimination of redundant audits conducted otherwise independently by the field, meant a substantial cost savings for the Department. A listing of laboratories and TSDFs audited by the DOECAP in FY08 is provided in Appendix A of this report.

The current goal for finalizing audits reports is 100 days after the conclusion of the on-site audit. The achieved completion average for FY08 was 90 days, with 89% of all reports completed on-time. Figure 1.4 on the next page illustrates the progress made to reach this goal over the past several years. Multiple factors impact the timeliness of completing the post-audit process, however; during FY08 the Operations team has been successful in pulling all the participants and elements together to achieve the targeted goal. Performance will continue to be monitored and consideration will be given to adjusting targeted completion times based on the achievements of this year.

A concerted effort to improve the overall quality of DOECAP audit reports continued in FY08. Specific focus was placed on composing clear and concise findings followed by accurate and detailed narrative backup, including accurate requirement citations (i.e., regulatory or programmatic bases). All DOECAP participants (auditors, laboratories, and TSDFs) are continually reminded to focus on documenting corrective action completion, audit report quality and timeliness.

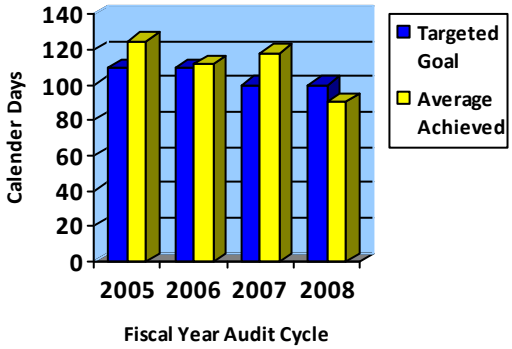


Figure 1.4 DOECAP Post-Audit Timeliness

Program Participation and Support

Figure 1.5 identifies contributing sites and numbers of qualified auditors from across the DOE complex that supported FY08 DOECAP audits. The fundamental DOECAP premise is that DOE sites will qualify and provide auditors to meet their needs, and the DOECAP will coordinate these resources to build

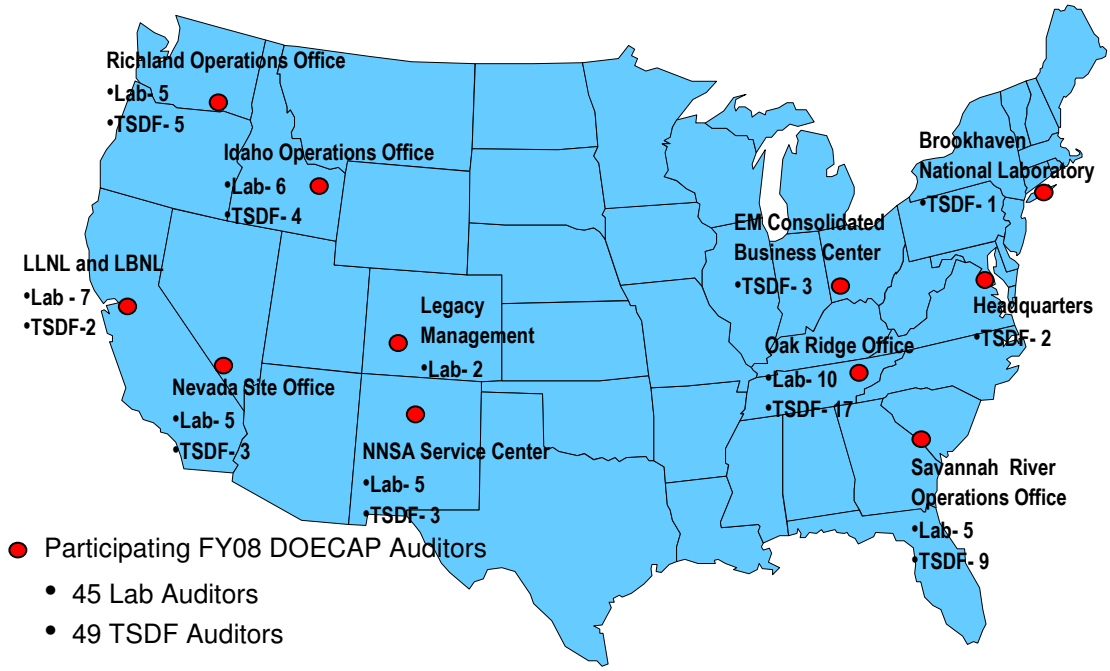


Figure 1.5 – FY08 Participating DOECAP Laboratory and TSDF Auditors

complex-wide teams to execute combined laboratory and TSDF audits. This overall consolidation lowers cost to any given site, as well as to the Department and taxpayer. Past Program success has been enhanced by sites designating appropriate POCs and submitting technically qualified personnel for qualification as DOECAP auditors.

All DOE site organizations are encouraged to contribute auditor resources on a proportionate basis commensurate with their laboratory and disposal facility usage. HSS continues its efforts to promote the benefits and values of the DOECAP and encourage site participation to promote a more equal sharing of auditor responsibilities and resources. Figure 1.6 displays the FY09 projected number of DOECAP audited facilities being utilized by DOE sites, while Figures 1.7 and 1.8 on the next page illustrate DOE site participation in DOECAP audits of laboratories and TSDFs, respectively, for the past 3 years.

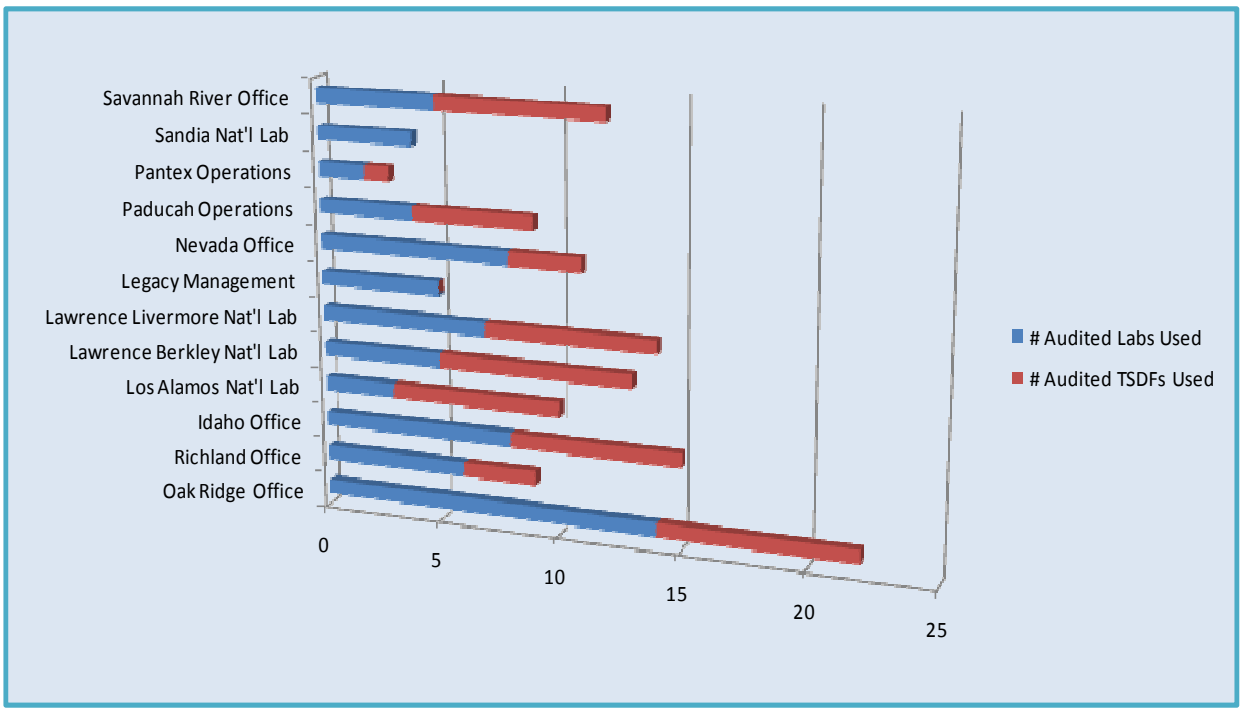


Figure 1.6 – Projected FY09 DOECAP Audited Facilities Utilized by Each DOE Site

Auditor Qualification and Training

Prospective DOECAP auditors and lead auditors are recommended for qualification by DOE sites in a particular audit area or areas. DOECAP Procedure AD-1, *DOECAP Policies and Practices*, establishes the requirements for auditor qualification documentation, evaluation and approval. Continuing certification is maintained by completing at least one DOECAP audit every two years and completing annual online required training.

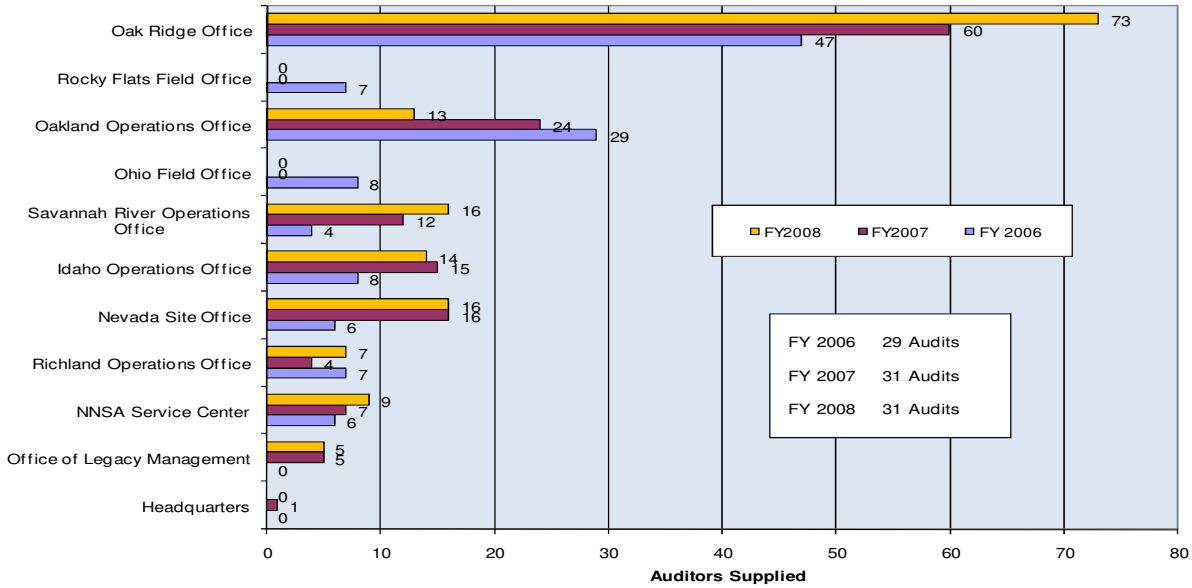


Figure 1.7 - DOECAP Laboratory Audit Participation for the Past Three Years

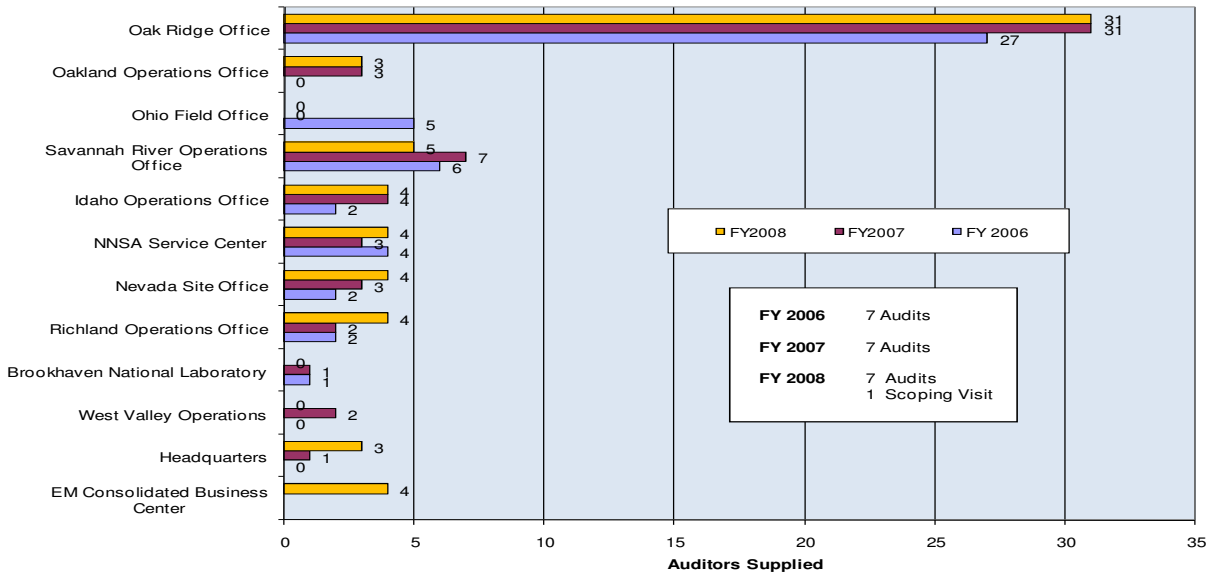


Figure 1.8 - DOECAP TSDF Audit Participation for the Past Three Years

As illustrated in Table 1.1, the qualified DOECAP laboratory auditor pool remained stable during FY08, while the TSDF auditor pool increased slightly. Auditors added during the year from several DOE sites [specifically the Environmental Management Consolidate Business Center (EMCBC)] were able to offset losses incurred by site closures and other factors (e.g., reductions in force at other participating sites). Laboratory and TSDF lead auditor numbers remained basically steady for the year.

	Lab	TSDF
Lead Auditors start of FY08	9	3
Lead Auditors ending FY08	8	4
Auditors start of FY08	46	44
Auditors ending FY08	45	49

Table 1.1 - FY08 DOECAP Lead Auditor and Auditor Qualification Status

DOECAP TSDF audits are led by Federal employees due to the sensitivity and need to account for low-level and mixed radioactive waste from DOE sites. As has been the case in previous years, DOE-ORO provided all FY08 DOECAP TSDF lead auditors. However, the Program will be introducing one new team lead from EM Headquarters' during FY09 and will have the opportunity to train at least two additional TSDF team leads during the FY09 audit cycle that will be available to lead audits in FY10. A DOECAP auditor may be qualified in multiple audit areas. Table 1.2 illustrates the distribution of qualified DOECAP auditors at the end of FY08 per audit area. Even with this distribution, the Program finds it difficult to adequately staff the number of audits being scheduled.

DOECAP Laboratory Audit Area	Auditors Qualified as of 9/30/08	DOECAP TSDF Audit Area	Auditors Qualified as of 9/30/08
Lead Auditors	8	Lead Auditors	4
Quality Assurance Management Systems and General Laboratory Practices	26	Quality Assurance Management Systems	14
Data Quality for Organic Analyses	17	Sampling and Analytical Data Quality	12
Data Quality for Inorganic and Wet Chemistry Analyses	20	Waste Operations	13
Data Quality for Radiochemistry Analyses	16	Environmental Compliance/Permitting	14
Laboratory Information Management Systems and Electronic Data Management	5	Radiological Control	9
Hazardous and Radioactive Materials Management	9	Industrial and Chemical Safety	10
		Transportation Management	11

Table 1.2 - FY08 DOECAP Distribution per Audit Area

Sites are continually 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; Hazardous and Radioactive Materials Management; and Lead Auditor positions. Specific TSDF audit areas requiring additional qualified auditors include Radiological Control and Industrial and Chemical Safety. The Program needs more Federal employees participating as team leaders and auditors; thereby, requiring increased program line and field support. Oak Ridge has had to bear the primary responsibility of providing the majority of the Federal team leaders. Other program line and field organizations are not participating on an equally shared basis commensurate with their waste shipments and usage of TSDFs. Increased support is needed for Federal team leaders, beyond the DOE ORO community, who also bear responsibility for participating in the Department's corporate program.

Electronic Data System Usage

The major mechanism 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. Individuals are required to sign a confidentiality agreement stipulating conditions for only 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, documents, contractual information, and Program contact information. The unprotected portion of the EDS may be accessed at https://www.doecap.oro.doe.gov. In FY08, the protected section of the EDS was accessed in excess of 6,300 times.

Proposed FY08 Audit Schedule

The DOECAP pre-audit process begins with the DOECAP Operations Team conducting a facility usage query. DOE sites are contacted and requested to identify all current and projected analytical laboratory and TSDF contracted services, including 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 be met:

- Usage by more than one DOE site;
- Ability to staff an audit team with personnel from sites using the laboratory or TSDF, augmented by auditors from other DOECAP participating sites.

Exceptions to these criteria 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 FY09 facility usage query, completed in the fourth quarter of FY08, developed the tentative FY09 audit schedule covering 30 laboratories, seven radiological TSDFs, and two pilot audits of non-radiological TSDFs. While some DOE site closures (Rocky Flats, Mound, and Fernald) have decreased needs, other DOE activities such as Legacy Management have increased needs.

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 deficiency regarding key management, programmatic, or technical control, 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 or expedited corrective action(s). The DOECAP issued five Priority I findings in FY08 to five analytical laboratories. All Priority I findings demonstrated these facilities inability to maintain acceptable performance on PT samples supplied through independent accredited testing programs (i.e., MAPEP, Water Supply, Water Pollution, etc.). Each finding focused on multiple failures in performance for specific analytes (Uranium, Antimony, Tetryl, and Organochlorine Pesticides). One of these findings was subsequently corrected when the laboratory discovered it had utilized an ineffective sample digestion preparation procedure. Development and implementation of an improved procedure allowed the laboratory to achieve accurate and acceptable results. A follow-up on-site review by a DOECAP team confirmed corrective actions were complete and acceptable. As of the end of FY08, the other four findings are still open until remedial PT sample analyses are completed and confirmation of acceptable closure can be obtained.

In addition, the Lawrence Berkeley National Laboratory, and the Lawrence Livermore National Laboratory decided to terminate their contract agreements for analytical services with the one laboratory. This decision was based upon past poor laboratory performance; non-responsive corrective actions regarding past DOECAP audit findings; a FY07 Priority I finding remaining open; and twenty-five new Priority II findings identified during the FY08 audit.

A Priority II finding represents a deficiency that does not represent a concern of sufficient magnitude to render the audited facility unacceptable to provide services to the DOE. A total of 211 Priority II audit findings were issued; 158 Priority II findings were issued from DOECAP laboratory audits and 53 findings were issued from DOECAP TSDF audits. Also in FY08, 83 percent of previously issued DOECAP laboratory Priority II findings were closed or became inactive, as were 86 percent of previously issued TSDF Priority II findings. Figure 1.9 on the next page illustrates the percent distribution of FY08 Priority II findings by audit area for laboratories and TSDF.

All active facilities in the Program have demonstrated acceptable performance and have quality systems to support DOE site activities and needs. However, the following reviews generalized audit findings to illustrate the continuing effort required by all participants to strive for continuous improvement.

TSDF **LABORATORY**

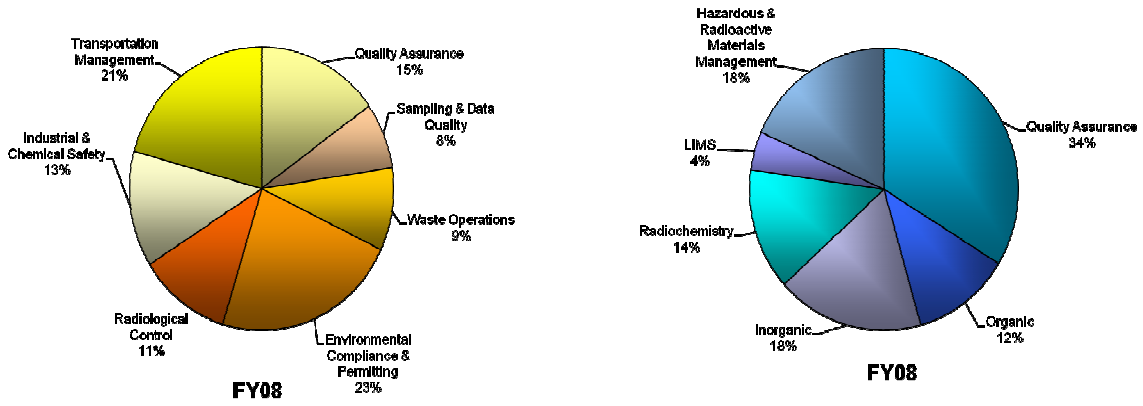


Figure 1.9 - Percent Distribution of FY08 TSDF and Laboratory Priority II Findings per Audit Area

Common TSDF Findings

Evaluation of Priority II findings issued to TSDFs in FY08 did identify some common deficiencies in audit areas. The following provides a brief overview of these issues.

- Quality Assurance

Facilities tend not to follow-up on corrective action activities in a consistent and timely manner. Personnel training records are not complete and in some cases document control is considered inadequate. In addition, review and revision of standard operating procedures (SOPs) are not kept current.

- Sampling and Analytical data Quality

Discrepancies between waste analysis plans and the analysis being conducted were observed and in several instances there was a lack of complete and acceptable SOPs.

- Environmental Compliance

Some inspection documentation proved to be inadequate and in a few cases PCB waste receipt verification was found to be incomplete. Container labeling and aisle spacing were not being performed per regulatory and permitting requirements.

- Waste Operations

Excessive quantities of aged waste were being held indefinitely on-site, and several work practices were inconsistent with facility SOPs and Work Plans.

- Radiological Control

In some instances radiological work permit briefings and training were considered inadequate, and visitor monitoring and training were deficient. A few cases were noticed where posting and signage required correction or clarification.

- Industrial and Chemical Safety

Health and Safety Plans required timely review and upgrading. Confined space postings were not being maintained and were incomplete. Incompatible chemical storage conditions were observed and chemical labeling was found to be incomplete.

- Transportation Management

All documents were not being incorporated into facility records management systems. There were cases where, due to a lack of proper training, incomplete shipping and receiving documentation was being maintained. Sub-tier contractor evaluations were found to be incomplete.

Common Laboratory Findings

Evaluation of laboratory Priority II findings issued or left open in FY08 reveals several common deficiencies across the facilities. 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 document review or document control. Document reviews were not being performed within the required time frames; documents were not being properly identified and controlled physically; and/or documentation was not complete and adequate. Training issues were the second most cited finding in this area, particularly associated demonstration of capability training. This typically related to the lack of training or the incomplete or deficient documentation of training,.

- Data Quality for Organic Analyses

Findings were frequently associated with inadequate SOPs or differences between actual laboratory practices and SOP requirements. In addition, several deficiencies involved PT failures, method blank or refrigerator blank monitoring, and inadequate temperature monitoring programs.

- Data Quality for Inorganic and Wet Chemistry Analyses

Findings were related to discrepancies between SOP direction and actual laboratory bench practices. Maintaining appropriate instrument control documentation and failed PT results also proved to be significant deficiencies in this area.

- Data Quality for Radiochemistry Analyses

Deficiencies cited most commonly were inadequate SOPs. Information was often missing or incorrect regarding formulas and calculations. SOPs often did not contain information necessary to properly perform the analysis. The second most common deficiency cited was incorrect equipment and instrument calibration or inadequate calibration documentation. Several findings related to background determinations and combined standard uncertainties were also issued. In addition, deficiencies were noted for PT failures.

- Laboratory Information Management Systems and Electronic Data Management

Adequate systems control in regard to passwords and calculation spreadsheet write protection were common deficiencies. The second most common deficiency noted was inadequate or incomplete SOPs, specifically related to data entry, data changes, and software change control.

- Hazardous and Radioactive Materials Management

Findings were related to incorrect waste labeling, improper waste storage, lack of secondary containment, and generally poor waste management practices. In addition, deficiencies were noted in SOP content and discrepancies between SOP requirement and actual laboratory practices. Finally there were deficiencies identified related to training and training records documentation.

1.2.3 Program Document Revision/Development

The following DOECAP documents and audit tools were revised during FY08:

DOE Quality Systems for Analytical Services Document (QSAS)

The QSAS, developed by the DOECAP to implement laboratory auditing criteria and requirements, establishes a single, integrated Quality Assurance program for analytical laboratories supporting the DOE, and allows laboratories to apply 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 DoD and EPA. In fact, the QSAS is primarily based on the NELAC Chapter 5 – Quality System, ISO 17025 – General Requirements for the Competence of Testing and Calibration Laboratories, and 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, particularly in the areas of radiochemical analyses, waste handling, radiological controls, and safety.

Revision 2.3 of the QSAS was completed in October 2007 prior to the FY08 audit cycle. In keeping with the intent for the QSAS to be a "living document," technical issues and potential QSAS enhancements were identified and discussed by the laboratory community during the year and at the ASP - DOECAP 2008 annual meeting in September. Those discussions will lead to continuing improvements in the document and will result in the finalization of Revision 2.4 of the QSAS in early FY09 prior to commencement of the FY09 DOECAP laboratory audit cycle.

DOECAP Audit Checklists

DOECAP audit checklists are used to implement the audit process, ensure consistency and enhance efficiency. These checklists, which have been developed for each of the audit disciplines, are commonly updated on an annual basis through inputs from the DOECAP auditors, as well as feedback from audited laboratories and TSDFs quality assurance and other facility personnel. See sub-section 1.2.1 entitled Audit Performance for more information regarding DOECAP checklists.

The process to maintain, revise and enhance DOECAP TSDF audit checklists was completed on schedule in early FY08 prior to commencement of the FY08 DOECAP TSDF audit cycle. The primary changes involved environmental compliance and waste management updates to comply with new regulations and processes.

The process to revise and enhance DOECAP laboratory audit checklists paralleled revisions to the QSAS and was completed on schedule in early FY08 prior to commencement of the FY08 DOECAP laboratory audit cycle. The changes involved revisions to maintain consistency with QSAS Revision 2.3.

DOECAP Auditor Training Modules

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. Revised online training was installed on the EDS and fully functional in early FY08, making it possible for all DOECAP auditors to complete re-training prior to commencement of the FY08 DOECAP audit cycle.

DOECAP Procedure AD-1, Policies and Practices

This primary DOECAP operational procedure addresses policies and practices for all Program participants. During FY08 the procedure was thoroughly reviewed and revised to clarify defined roles, responsibilities and processes within the Program. This activity constituted a major effort on the part of the Operations Team, the DOE Oak Ridge leadership and the DOE Headquarters leadership. A

comprehensive revision to the document was successfully completed through the integration and coordination of the various views and components of the Program.

1.2.4 Electronic Data System Enhancements

The EDS, a screenshot of which is provided in Figure 1.10, is the web-based system providing the information sharing tool and repository for the DOECAP. This site is currently maintained within the scope of the DOE-ORO information technology contractor. EDS password-protected information (i.e., audit schedules, team information, audit reports, accepted CAPs, 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://doecap.oro.doe.gov.

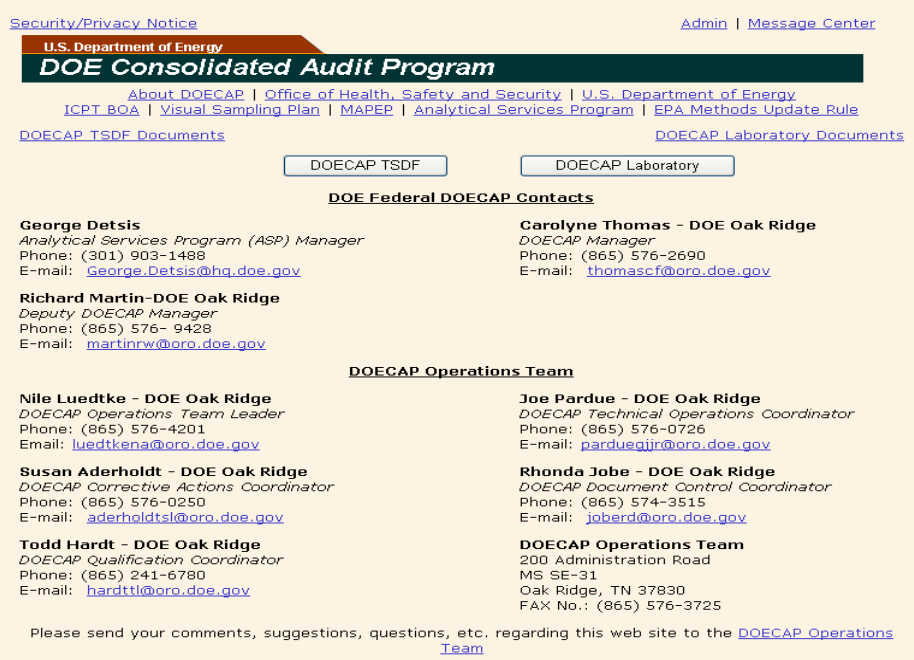


Figure 1.10 - DOECAP EDS Home Page

The following identify certain key improvements and enhancements made to the EDS during FY08.

- Completing the Search Function that was begun in FY07. This is continuing to be upgraded to include increased functionality and easier use.
- Creating a Drop Box function allows each facility to directly upload pre-audit information and documentation to the EDS. This enables the DOECAP Operations Team to retrieve the information

and load it to the Pre-Audit Package Section on the EDS for auditor retrieval providing significant time savings.
- Modifying the Training Documents and required reading section to support the Auditor-In-Training.
- Modifying the Revised Documents Module to add categories and headers for storage of both internal and external documents including an archive location, and adding a feature to reorder documents.
- Adding new audit category information for Special Geochemical/Geotechnical Analyses, Special Biological Assay Aquatic Toxicity, Non-Destructive Assay, and Laboratory Closure to expand the utility of the database.

1.2.5 Internal Assessment

During FY08, the DOECAP Operations Team, the DOECAP Manager and the ASP Manager evaluated the results of the Internal Assessment, formulated a CAP, and proceeded to implement corrective actions to address the items and deficiencies identified in the assessment. Key improvements included clarification of the roles and responsibilities between HSS and DOE-ORO, definition of the duties of the DOECAP and ASP Managers, establishing a formal process for approving the QSAS and associated audit checklists, and improvements in the maintenance and control of auditor qualifications records. In addition, a comprehensive revision of DOECAP Procedure AD-1 was completed.

1.2.6 Program Oversight

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

The DOECAP programmatic and budgetary reviews were conducted in April 2008 at the Federal Building in Oak Ridge, Tennessee, between the ASP Manager, DOECAP Manager, and DOECAP Operations Team personnel. Opportunities for improvement and potential barriers to continued DOECAP success were the focus of the review and discussions. The status of established FY08 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 to acknowledge DOECAP support and promote additional participation.

The ASP Manager attended five DOECAP laboratory audits (GPL, Paragon Analytics, Test America Arvada, Test America Richland, and CEBAM) during FY08 to observe implementation of the DOECAP audit process and conduct of DOECAP audit teams. The ASP Manager actively participated in one DOECAP TSDF audit (Energy Solutions Utah) during FY08 as an Environmental Compliance auditor and attended one TSDF audit (Perma-Fix Environmental Services Northwest) to observe implementation of the audit process. Based on this oversight and participation a number of enhancements were identified and initiated. These included:

- Revision of audit reports (e.g., including an executive summary, increasing consistency in audit area summaries, emphasizing defensible findings, improving finding discussions, and documenting supporting evidence);
- Increasing emphasis to address root cause in CAPs and prevent finding reoccurrences;
- Identification during weekly DOECAP conference calls of DOE contract holders associated with analytical laboratories and waste vendor facilities scheduled for audits; and
- Encouraging detailed audit result briefings by team leaders during weekly DOECAP conference calls to foster lessons learned relative to applicable on-going missions and functions.

1.2.7 TNI Participation

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

In FY08 the ASP Manager and the DOECAP Operations Team Technical Operations Coordinator and Team Lead supported TNI standards development activities by participating in the NELAC interim and full meetings. The DOECAP Technical Operations Coordinator is a member of the TNI Environmental Laboratory Advisory Board and is serving on the Measurement and Technology Workgroup. The ASP Manager is on the TNI Board of Directors as an ex-officio member and on the TNI Laboratory Accreditation Systems Committee.

The TNI Executive Director attended the ASP - DOECAP 2008 annual meeting and gave a presentation regarding TNI current status, ongoing initiatives, and interfaces with the ASP.

1.2.8 Program Promotion

The ASP participated in various conferences, workshops and meetings in FY08 to help improve various component elements (DOECAP, MAPEP, and SPADAT) by seeking cooperation and sharing lessons learned with other governmental agencies. In April 2008, the ASP attended and delivered a presentation on the DOECAP auditing activities at the Annual DoD Environmental Monitoring and Data Quality Workshop held in Atlanta, Georgia. The workshop brought together Federal and commercial analytical laboratory representatives to discuss auditing methodologies, policies and procedures. In addition, DOECAP invited Navy participation on a laboratory audit during the FY08 audit cycle. Navy personnel participated in the audit, and accepted the audit process and results as part of their overall program effort. Lastly, to further understanding of waste disposal operations and challenges during TSDFs audits by the DOECAP, the ASP Manager and the DOECAP Manager attended the Annual RadWaste Summit held in Las Vegas, Nevada (September 2008). Common DOECAP TSDF audit findings were delivered at the meeting.

1.2.9 Review of FY08 Goals

The following provides a brief summary of FY08 DOECAP goals.

- Program Participation – Increase DOECAP participation throughout the DOE Complex through coordination with the points of contact, auditors, and a presentation before the DOE field managers meeting requesting the need for additional auditors.

Photo 1.2 - DOECAP Lab Audit

Promoting active DOECAP participation throughout the complex was a continuing focus and continued to be a challenge due in part to budgetary and travel restrictions. The best assessment of this perennial goal is defined by the continued viability of the Program. Continued support from the DOE sites including audit participation, conference call participation and annual meeting participation has remained constant even though major DOE sites have been closed and other site budgets have diminished. The major increase in participation this year came from the EMCBC in Cincinnati, Ohio. The Program filled 95% of the laboratory audit positions and 98% of the TSDF audit position during the course of the audit cycle. Sixteen new auditors were added to the list of individuals qualified to participate in audits. Current program participation is viable, although initiatives will continue to promote participation throughout FY09.

- 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. At least, two new Federal auditors are needed to lead TSDF audits, as well as lead one and possibly two pilot non-radiological TSDF audits in the coming year.

  Similar to the goal to promote Program participation, this effort continues to be a challenge. These initiatives are impacted by subcontractor contractual changes at individual sites, personnel changes, retirements, and individual availability; thereby, translating in an overall loss of experienced auditors. In the face of these continuing challenges, the attainment of a steady-state zero-change overall pool of auditors is considered a success. The number of DOECAP qualified laboratory auditors and lead auditors remained constant and the number of TSDF auditors increased slightly over the course of FY08. The goal to recruit additional Federal staff to serve as DOECAP lead auditors was achieved in FY08 with the addition of two new Federal TSDF lead auditors (i.e., from DOE-ORO and EM-21).

In addition, progress was made to increase the breadth of expertise through inclusion of new auditors from the Richland Office and the EMCBC.

- DOECAP Internal Assessment – Implement corrective actions for all issues identified through the DOECAP FY07 Internal Assessment.

  This goal was met through the development of a CAP and through implementation of that plan. Final documentation and acceptance for these efforts is anticipated to be finalized by the end of January 2009.

- QSAS Revision 2.3 – Resolve remaining open technical items from QSAS Revision 2.2 and issue QSAS Revision 2.3 for use commencing with the first FY08 DOECAP laboratory audit.

  As discussed in section 1.2.3 of this report, this goal was met with the issuance of QSAS Revision 2.3. All technical issues remaining open at the time of QSAS Revision 2.3 issue were discussed at ASP - DOECAP 2008, and a path forward for resolution established. QSAS Revision 2.4, to be issued prior to commencement of the FY09 DOECAP laboratory audit cycle, will incorporate resolution of all open technical issues.

- Audit Checklists – Revise and issue laboratory and TSDF audit checklists incorporating the accepted comments and improvements submitted by participants throughout FY07, and including the necessary changes reflecting QSAS Revision 2.3. As discussed in section 1.2.3 of this report, this goal was met.

- EDS Improvements – FY08 goals to upgrade and enhance EDS capabilities and processes were achieved. Refer to section 1.2.4 of this report for the items list of accomplishments.

- Interagency Cooperation – FY08 goals to promote interaction with other governmental agencies were achieved. Refer to section 1.2.9 of this report for the success in this area.

DOECAP Fiscal Year 2008 Goal	Achieved	Partially Achieved	Not Achieved
Promotion of Increased Program Participation		✓	
Increase Number of Lead Auditors		✓	
Internal Assessment Corrective Action Closures	✓		
Completion of QSAS Revision 2.3	✓		
Completion of 2008 Audit Checklist Revisions	✓		
Completion of EDS Updates and Upgrades	✓		
Intergovernmental Cooperation and Interaction	✓		
Performance of a Non-Radiological TSDF Pilot Audit			✓

- Non-Radiological TSDF Audits – The FY08 goal to perform at least one pilot-audit of a non-radiological TSDF was not achieved. A facility in this category was identified, contacted, and visited during the year. The circumstances and situation were not appropriate to enact a programmatic pilot-audit of the facility due to a Notice of Violation being issued by the State of Utah identifying numerous non-compliances and our own observations during the scoping visit. Current TSDF audit checklists were determined to be acceptable as preliminary audit checklists for this extension of the Program.

1.3 FY09 Goals and Challenges

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

1.3.1 Program Participation and Implementation

Potential 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.

Proposed FY09 actions and goals will continue to promote DOECAP participation throughout the DOE complex, encourage complex-wide involvement, and will include initiatives to:

- Increase participation within PSOs beyond EM, with special emphasis on NNSA, SC, and LM;
- Brief the Field Management's Committee meeting on DOECAP attributes and values;
- Increase field site visits to key field managers by HSS to discuss audit results and the need for increased auditor participation;
- Increase participation of POCs (Federal and contractor) by identifying individuals who are not actively promoting the Program, encouraging them to become more involved, and if necessary requesting their replacement with a more active participant;
- Increase active participation by sites through teleconferences and the 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 previously discussed in this report, while progress was made to add DOECAP qualified auditors and lead auditors in FY08, attrition of qualified personnel will continue to occur. Accordingly, specific FY09 goals include:

- Soliciting and qualifying additional DOECAP auditors throughout the year;
- Identifying and qualifying at least two additional Radiological Control auditors and two additional Industrial and Chemical Safety auditors for TSDF audits during the year;

- Identifying and qualifying at least two additional Hazardous and Radioactive Materials Management auditors and two additional Laboratory Information Management Systems auditors for laboratory audits during the year;
- Identifying and qualifying two additional TSDF Lead auditors (outside of the Oak Ridge Site DOE community) during the year; and
- Identifying and qualifying three additional Laboratory Lead auditors during the year based on their level of experience and successful participation in the program.

1.3.3 DOECAP Internal Assessment

The FY09 goal is to confirm the effectiveness of the corrective actions implemented in response to the prior internal self assessment, and determine if any additional actions may be warranted.

1.3.4 QSAS Revision 2.4

A FY09 goal is established to resolve any remaining technical items from QSAS Revision 2.3, and issue QSAS Revision 2.4 for use commencing with the first FY09 DOECAP laboratory audit. These may include technical method changes, instrumentation updates, or procedural practices.

1.3.5 Audit Checklists

A FY09 goal is established to issue revised laboratory and TSDF audit checklists incorporating accepted comments submitted by DOECAP auditors and other Program participants throughout FY08 and include necessary changes reflecting QSAS Revision 2.4. These would reflect possible new transportation management requirements, environmental compliance and permitting revisions, or computer security upgrade initiatives.

1.3.6 Electronic Data System

EDS goals for FY09 are to monitor the performance of the multiple enhancements that have been made over the past several years; determine their operational status and effectiveness; make alterations as necessary; and determine the type and number of proposed new enhancements for development and introduction in FY10.

1.3.7 Interagency Cooperation

The FY09 goal is to continue promotion of interaction with other governmental agencies and departments. Specifically, this will be accomplished through attendance at TNI national meetings, DoD meetings, and the RadWaste Summit by the ASP Manager, the DOECAP Manager, and other members of the DOECAP Operations Team. In addition, opportunities will be explored for DOECAP Operations Team members to actively participate in one or two DoD (Navy) laboratory audits during the year.

1.3.8 Non-Radiological TSDF Audits

The FY09 goal is to re-solicit a TSDF usage query specific to gathering relevant information (site contracts, pertinent regulations, etc.) pertaining to Non-Radiological TSDFs. Current plans are to conduct two pilot audits of non-radiological TSDFs that are used by multiple DOE contract holders. These audits would be conducted within the current DOECAP budget. Conducting a first-time consolidated audit also poses new challenges as these facilities have not previously come under the rigorous scrutiny of a DOECAP audit. In addition, auditors will need to be knowledgeable and aware of chemical hazards associated with commercial non-radiological TSDFs.

1.3.9 Increase Incentives for DOECAP Involvement

To provide a broader and more inclusive incentive for field sites and offices to contribute to the conduct of DOECAP consolidated audits, HSS will initiate discussions among program line and field element sites. These discussions would encourage DOE line/field employees and contract holders to actively participate in the more cost effective corporate consolidated audit program, and not continue to conduct independent assessments and audits of laboratories and TSDFs. Information gathered will determine the appropriate vehicle and mechanism for implementing these initiatives and incentives.

2.0 Mixed-Analyte Performance Evaluation Program (MAPEP)

2.1 Background and Scope

The Mixed Analyte Performance Evaluation Program (MAPEP) is a PT program designed to help assure the quality and reliability of analytical data necessary for regulatory compliance and support to DOE's decisions. The DOE's Radiological and Environmental Sciences Laboratory (RESL) administers MAPEP under the direction and guidance of the Headquarters Office of Corporate Safety Programs (HS-31). The MAPEP is the only PT program that targets radiological and non-radiological constituents (i.e., mixed analytes) in the same sample for quantification and analytical PT 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 effectively demonstrate their proficiency in radiological, stable inorganic and organic analyses from single-blind PT samples traceable to the National Institute of Standards & Technology (NIST). MAPEP is performance-based and does not dictate the methodology to be used for the various sample analyses. Laboratories participating in the MAPEP do so voluntarily based upon their application to RESL; conducting analytical services for DOE field sites; knowing that the Department offers the proficiency testing service free-of-charge; and a desire to produce high quality analytical data results for the field sites. Thereby promoting possible additional work for themselves through MAPEP recognition.

Photo 2.1 – MAPEP Performance Testing Standards

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 PT samples is reported by RESL as "Acceptable" (A), "Acceptable with Warning" (W), and "Not Acceptable" (N) according to criteria described in the MAPEP Handbook, 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, HSS, and other MAPEP stakeholders. MAPEP also provides a forum in which analytical deficiencies and areas for improvement can be identified, technical assistance can be requested, and various methodologies can be compared. Auditors from the DOE Consolidated Audit Program (DOECAP) use the MAPEP PTs when conducting laboratory audits.

In addition, during FY08, RESL successfully completed an A-76 Study and negotiated a Memorandum of Understanding (MOU) between the Office of Nuclear Energy and HSS. This MOU defines the roles and responsibilities between the two organizations regarding RESL's support for the MAPEP and the DOE Laboratory Accreditation Program for radiation worker dosimetry.

2.2 FY08 Activities & 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 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 indicates the increase in total PT sample distribution by the MAPEP and analyses performed by participating laboratories. Figure 2.1 on the next page illustrates the distribution of PT samples to participating laboratories from MAPEP Series 15 through projections for Series 20 by sample matrix.

Fiscal Year	Series	Number of MAPEP Samples	# of Analyses by Laboratories
FY06	15 & 16	1098	13628
FY07	17 & 18	1136	13605
FY08	19 & 20*	1164	14000

*Includes an estimated 5% increase for Series 20

Table 2.1 – Increase in Samples Distributed and Analyses by Laboratories

The 588 samples for the MAPEP Series 19 test session were distributed to 124 laboratories in August 2008 (see Table 2.2). Appendix B lists the participating laboratories in Series 19, including 17 foreign laboratories.

MAPEP Matrix Series 19	Matrix Id.	Total Samples	Foreign Labs
Mixed-Analyte Soil	MaS	113	16
Mixed-Analyte Water	MaW	133	17
Semi-volatile Organic Water	OrW	38	0
Radiological Vegetation	RdV	70	15
Radiological Air Filters	RdF	87	13
Gross alpha/beta Water	GrW	72	11
Gross alpha/beta Filter	GrF	75	8

Table 2.2 – Samples Distributed to Participating Laboratories, MAPEP Series 19 (2008)

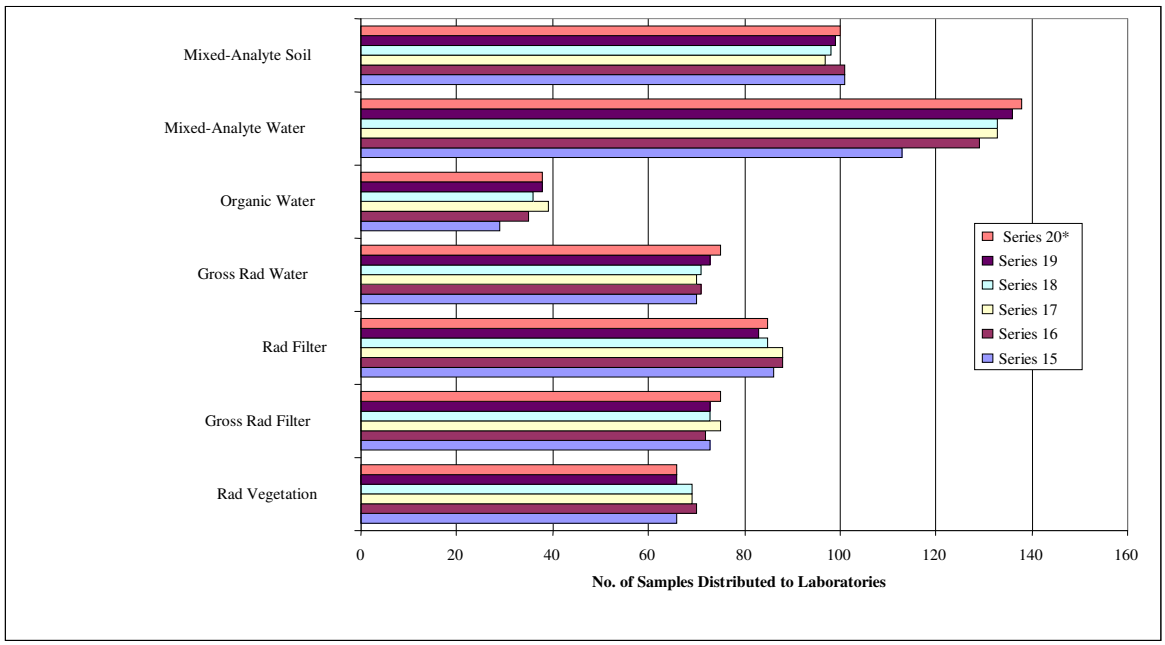


Figure 2.1 – MAPEP Distribution 2006 - 2008

Most foreign laboratories are participating in MAPEP as the PT program for the DOE-sponsored Radiation Measurements Cross-Calibration Project in the Middle East. This project is being facilitated by Sandia National Laboratories and the International Atomic Energy Agency. Other foreign laboratories participate in MAPEP when a DOE, or National security connection can be provided (e.g., Nuclear Test Band Treaty participants, Western Europe air monitoring in response to the Chernobyl Accident and other potential radiological sources, etc.). Foreign laboratories are using MAPEP to establish quality assurance and cross calibration of radiological measurements crucial to:

- 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 participating in the MAPEP are continually reviewed and evaluated for their historical performance. Performance is evaluated over the past two or three Series and across the matrices within the MAPEP. Series are evaluated for non-reporting of analytes during a false positive test or sensitivity evaluation. Upon identification of a potential analytical data quality problem, RESL issues a Letter of Concern to the participating laboratory in order to help participants identify, investigate, and resolve

potential quality issues. For example, if a laboratory reported results for Pu-239, but not for Pu-238, they would receive a "Not Acceptable" flag for Pu-238, since by reporting Pu-239, they also demonstrate the capability to 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 repeatedly informed they must report a result for radionuclides that they routinely analyze or readily have the capability to analyze for DOE.

Photo 2.2 – Chemist Preparing MAPEP PT Samples by Fusion for Actinide Analyses

Forty-five laboratories after Series 18 and forty-six laboratories after Series 17 were sent Letters of Concern (LOCs). These letters represent a small fraction of all the analyses performed by MAPEP laboratories during these timeframes. The actual percentage of Quality Concerns based on letters per number of analyses was consistent for both Series 17 and Series 18. Series 18 had 45 letters per 13,605 analyses or 0.3%, while Series 17 experienced 46 letters out of a total 13,628 analyses representing 0.3%. The demonstrated laboratory performance on these test samples has reached an exceptional level. HSS, DOE Field Offices, and the appropriate site contractor personnel were sent copies of these letters in an effort to ensure all stakeholders were aware of the PTs. Letters of Concern specifically address areas of significance to the DOECAP, as laboratory participation in performance evaluation (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. The following paragraphs summarize the important quality issues identified by MAPEP during the Series 16 through 18 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 false-positive results. The MAPEP program 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. Table 2.3 on the next page provides the results of false positive and sensitivity tests that were included in MAPEP Series 18 and 19.

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 the 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. For example, if the laboratory fails sensitivity evaluations for two or more testing sessions, a Letter of Concern is forwarded to the laboratory.

Series 18 Matrix	False Positive Test	Sensitivity Test
Soil	Hg, Tl, Zn-65	Co-60
Water	As, Hg, V, Zn, Cs-134, Cs-137	Pu-239/240
Air Filter	Mn-54	None
Veg.	None	None

Series 19 Matrix	False Positive Test	Sensitivity Test
Soil	Pu-238, Sr-90, Zn-65	Cs-137
Water	Be, Pb, Am-241, Co-57, Ni-63, Pu-239/240	None
Air Filter	Am-241, Cs-137, Co-60	None
Veg.	Am-241, Cs-137, Pu-238	None
Air Filter	Gross Alphas Statistical Zero	None
Water	EPA Action Levels Testing 40CFR141	

Table 2.3 – False-positive and Sensitivity Tests Included in MAPEP Series 18 and 19

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 under-estimating or over-inflating their total uncertainties. False-positive tests in earlier MAPEP test sessions sometimes showed as many as 50 percent 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. Figure 2.2 on the next page graphically displays Series 18 False Positive Test results. Results are designated as "Acceptable" (A), "Acceptable with Warning" (W), or "Not Acceptable" (N). Matrices are identified as "MaS" for soil, MaW for water and "MaF" for air filter. The laboratories show improvement over earlier performance for false-positive and sensitivity tests. This improvement can be noted for laboratories testing for plutonium in water. At one time close to 50% of these facilities reported false positive results, while now these same laboratories rarely report false positives for plutonium in water.

Antimony Analysis in Soil

The MAPEP has identified an area of concern for most laboratories that analyze antimony in soil. NIST-traceable antimony standards have been spiked into MAPEP soil standards starting with Series 10. The diluent soil contains negligible amounts of antimony so there is essentially no background contribution.

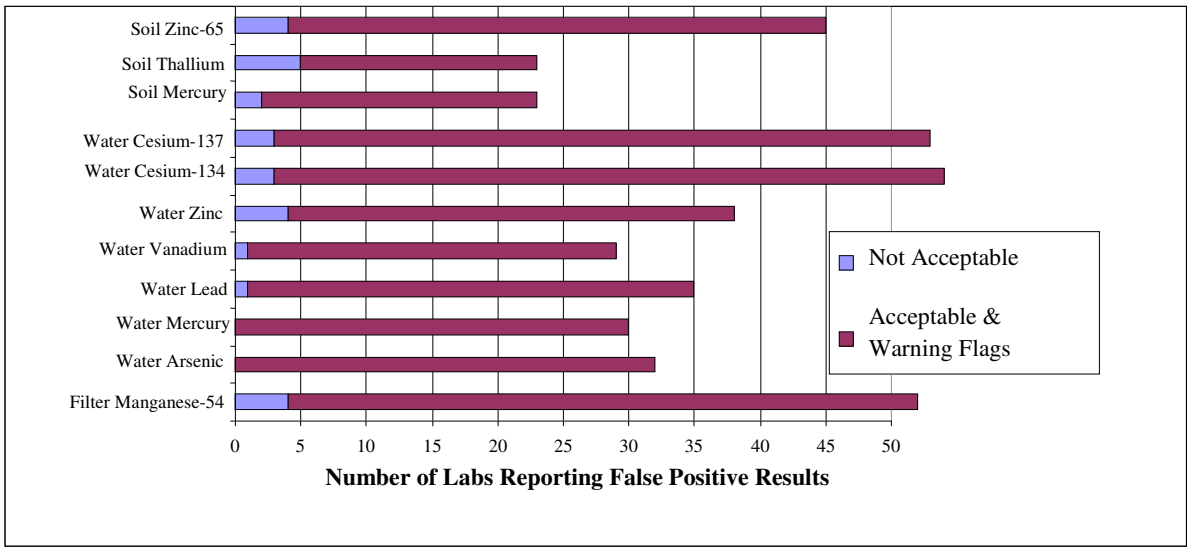


Figure 2.2 – Summary of False-positive Tests in MAPEP Series 18

In earlier test sessions, only 3 of 24 labs (Series 10), 2 of 23 labs (Series 12), and 6 of 23 labs (Series 13) showed "Acceptable" or "Acceptable with Warning" performance for antimony. This was improved to 18 of 26 labs (Series 14) and 18 of 28 labs (Series 15). Recent Series have shown similar laboratory performance, with "Acceptable" performance for antimony at 14 of 24 labs (Series 16), 20 of 26 labs (Series 17) and 14 out of 23 (Series 18). Laboratories that have received consistent "Not Acceptable" evaluations for their antimony results in soil have been sent Letters of Concern. Figure 2.3 details the recent improved performance in the determination of antimony in soil compared to earlier test sessions.

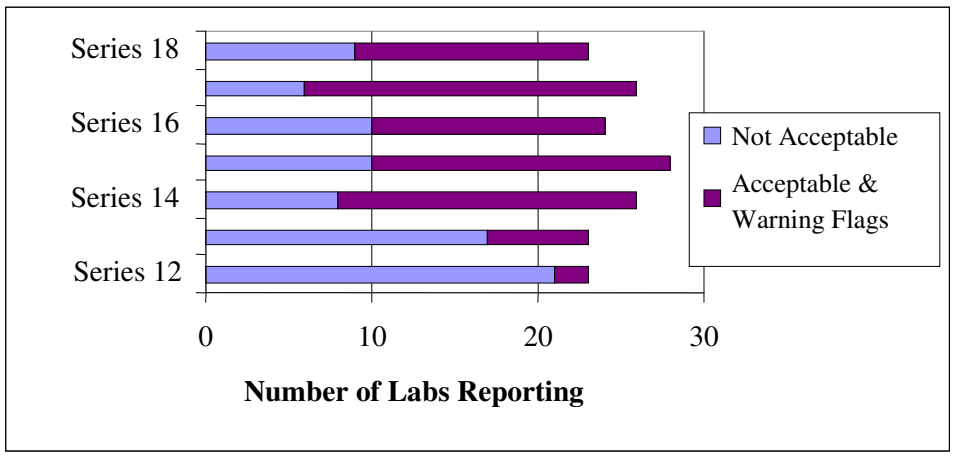


Figure 2.3 - Antimony Results for Soil Studies Series 12 - 18

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) use 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 regarding which sample preparation technique should be used. However the method states:

> *Section 7.5 may be used to improve the solubility 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

An 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 quantification 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. Thereby, indicating that for the most part laboratories are properly identifying component compounds for proficiency tests.

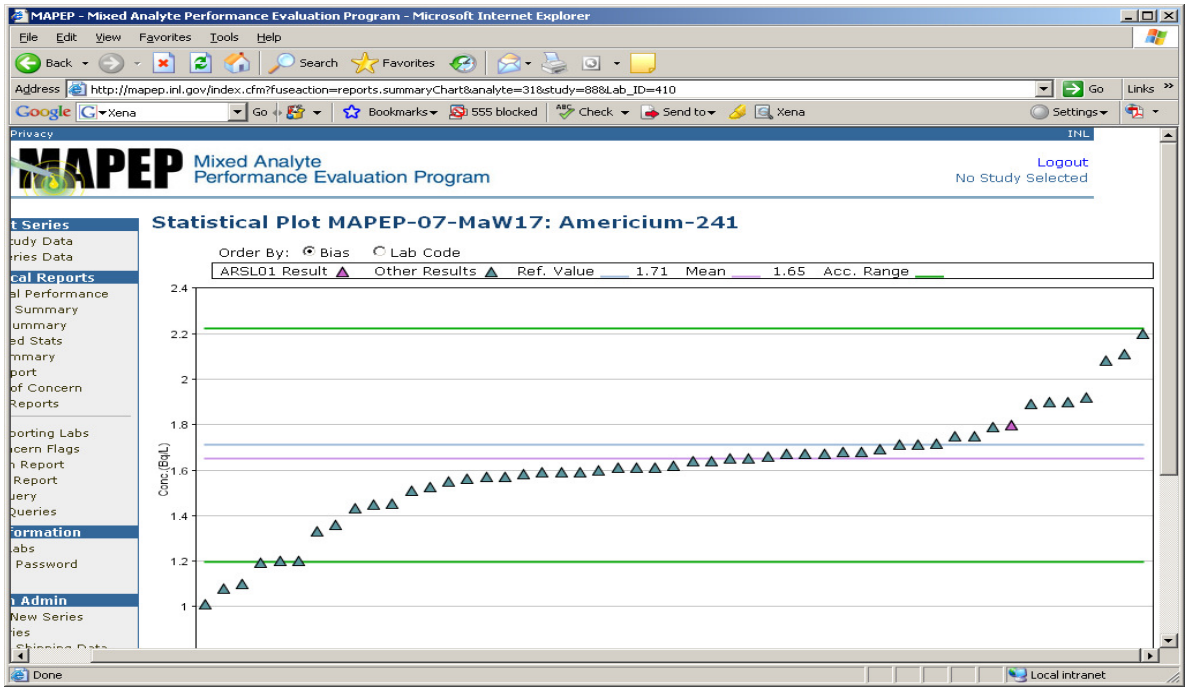


Figure 2.4 – Example of MAPEP Web-Based Reporting and Query System On Line Graphics

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 at http://mapep.inl.gov. Changes in the MAPEP system from last year have been fully implemented to automate the MAPEP data reporting, data evaluation and customer reports portions of the MAPEP system. Figure 2.4 on the previous page illustrates one of the many query and graphic options available within the MAPEP Web Based System. MAPEP has created a fully automated data handling system for the administration of the program as well as for the reporting of customer data, customer reports and review of laboratory information for auditors.

2.3 Management and Program Highlights

MAPEP Remedial Samples Policy

The DOECAP has issued five (5) Priority I findings in FY08 for two (2) or more successive failures in the audited laboratories participation in MAPEP. RESL has issued a Remedial MAPEP Samples Policy for laboratories to facilitate the identified laboratories' CAP to pass the MAPEP evaluation between designated distributions.

Photo 2.3 – Chemist Analyzing MAPEP Sample for Strontium-90

In the event of multiple failures that result in the issuance of a DOECAP Priority I finding, the laboratory should identify the root cause of the failure using a sample from a previous MAPEP study or the laboratory can request that DOECAP contact RESL to provide a sample from previous MAPEP studies. The previous study samples are to be used to aide in the determination of the root cause of the unacceptable result(s). The samples from a previous round of testing will not be scored by MAPEP.

Once a laboratory has demonstrated that they can achieve acceptable results, based on the previously determined limits of the test session, DOECAP will contact RESL to provide one new remedial PT sample to the laboratory for analysis. The laboratory will provide the results of the remedial study to RESL and the results will be evaluated using the same evaluation criteria that are used for the normal MAPEP studies. If the results are acceptable, the Priority I finding can be evaluated for closure by DOECAP based on the documentation provided. If the results are not acceptable, the laboratory will be encouraged to continue resolution of any technical problems and will not be provided a second remedial PT sample. The requests for remedial PT samples will be made solely at the request of DOECAP and not from the participating laboratories. The ultimate objective is to establish the laboratory's capability to correctly determine the analyte of concern in the

specific matrix and provide defensible analytical data. In these cases where repeat testing failures have occurred, an on-site follow-up surveillance may be made to document closure of the resulting DOECAP issued Priority I finding.

RESL Reorganization

RESL reorganized the management and staffing structure as part of the successful bidding process within the A-76 Competition. Transition to the new more efficient organization was accomplished between March and June 2008. A MOU was approved in October 2008 between Nuclear Energy and HSS defining the roles and responsibilities of the organizations for implementing MAPEP. Impacts to the normal RESL Program operations were minimized; however, there was some delay in the distribution of the spring MAPEP Series.

ISO 17025 Accreditation & Proficiency Testing Provider Accreditation (ILAC G13 and ISO Guide 43)

RESL has completed updating the RESL and MAPEP quality systems/procedures in accordance with the ISO 43 *Proficiency Testing by Interlaboratory Comparisons* as detailed in the International Conference on Accreditation of Laboratories (ILAC) Guide 13:2007 and ISO 17025:2005. Re-Accreditation was granted for both ISO 17025:2005 and ILAC G13:2007 by the American Association for Laboratory Accreditation on August 29, 2008.

Traceability of RESL to the National Institute of Standards & Technology

RESL currently is designated by DOE HS-31 as the reference laboratory for 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 (soil, water, air filter, vegetation, synthetic urine, and synthetic fecal). It 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. PT standards are prepared by NIST, sent to RESL and analyzed by RESL for subsequent evaluation by NIST. RESL also sends prepared PT standards to NIST for verification of the known reference values. This assures that the preparation and measurement processes at RESL are traceable to NIST. The two year cycle for the RTP traceability of MAPEP radionuclides and matrices to NIST will be completed by the end of the calendar year 2008.

MAPEP Presentations at the ASP - DOECAP Annual Meeting 2008

The MAPEP maintains a close working relationship with the DOECAP. The MAPEP Team prepared and presented site updates, program updates and PT topics at the ASP - DOECAP 2008 meeting in September 2008. The MAPEP Team continues working with the DOECAP by participating in the bi-monthly conference calls and interacting with the DOECAP participants and laboratories throughout the year and at the annual meetings.

2.4 FY09 Goals and Challenges

The following provides a summary of the goals and opportunities for improvement for the MAPEP in the coming year.

2.4.1 Increase Incentives for MAPEP Involvement

To provide a broader and more inclusive incentive for laboratories to participate in MAPEP Test Series, HSS will initiate discussions among DOE program line and field element sites. These discussions would encourage DOE line/field employees and field contract holders to recognize the importance and utility of these performance tests and the need to include them in contractual requirements to subcontracted analytical laboratories. Information gathered during these interactions will determine the appropriate vehicle and mechanism for implementing possible initiatives and incentives.

2.4.2 Letters of Concern

Coordinate with HSS Program Manager in updating Letters of Concern to emphasize the importance of producing quality data, developing timely corrective actions for failed proficiency tests, and promoting RESL technical assistance to help resolve PT issues and concerns. Laboratories having two consecutive failed test sessions for an analyte in a given matrix will also receive a Letter of Concern from HSS.

2.4.3 Program Promotion/Technical Assistance

Explore opportunities and actions to promote MAPEP and demonstrate its importance to present and future needs of the DOE Complex through documenting and assuring the quality of environmental data and promoting other intergovernmental interface opportunities. Additionally, provide technical assistance to participating laboratories to foster improved performance levels and meet Departmental expectations for quality data.

2.4.4 Distribution of MAPEP PT Samples

Complete the change in distribution times for MAPEP Test Series from the January-July timeframe to a March-September timeframe, thereby accommodating holiday seasons' and corresponding better with laboratory analytical sample work load peaks.

2.4.5 Increase Laboratory Participation

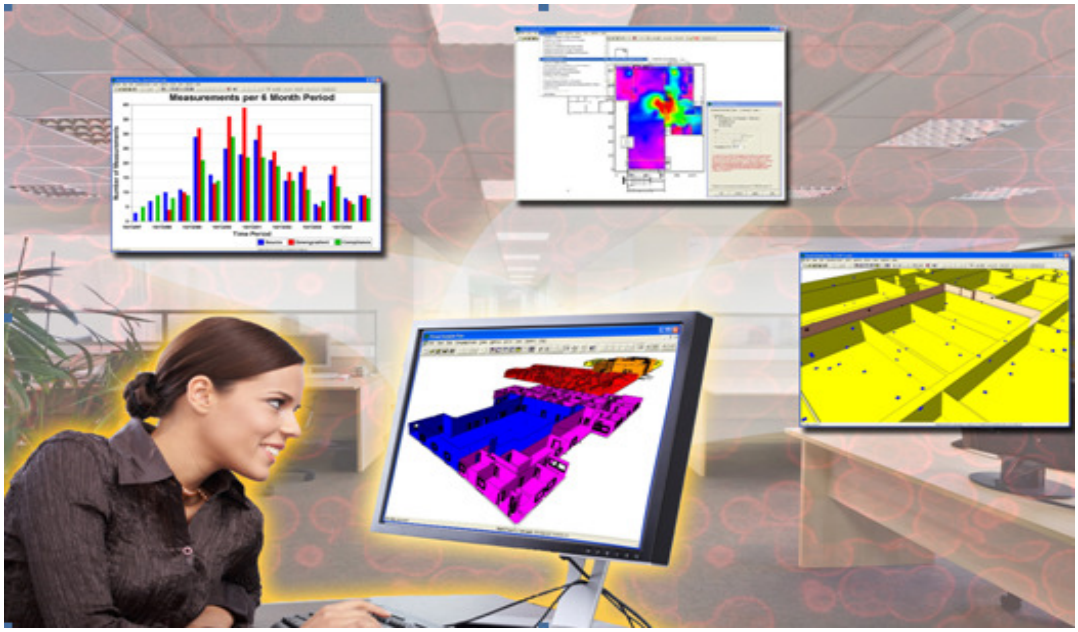
Continue developing strategies for increasing participation by domestic and international laboratories through attendance of conferences and workshops, presentations, and development of professional papers for journals.

2.4.6 External Outreach

Continue to identify opportunities to offer technical assistance to other national and international organizations.

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

Before data are gathered and analyzed, it is imperative that a systematic planning process be employed to ensure that high quality data are obtained to support confident decisions. After data gathering, statistically rigorous data analyses must be performed to assess quality and decision confidence. Too often the right quality and quantity of data are not obtained the first time resulting in significant cost increases and time delays. In an effort to make decisions right the first time and streamline the design and analysis process, systematic planning and statistical data assessment tools are being developed and deployed across the entire DOE Complex through the SPADAT Program. DOE is supporting the development of 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.

Easy to use, defensible sample design and data analysis tools are needed to support many DOE program objectives. The SPADAT Program develops and deploys expert, user-friendly software that employs sophisticated statistical methods for designing defensible sampling plans and performing statistical analyses in a visually appealing environment. Design and analysis tasks that often took weeks or months are now accomplished in hours or days. This technology is transferred throughout DOE through intensive hands-on training sessions. Tools from the SPADAT Program are being employed at every major DOE site.

3.1.1 Visual Sample Plan (VSP)

VSP is a sampling design and decision support software tool that helps the more than 5000 world-wide users determine the number and location of samples required to support a variety of data-driven decisions. Once data are gathered, VSP is used to perform data quality assessments and statistical tests to determine whether decisions can be supported with required levels of confidence. Based on the DQO and Systematic Planning philosophy, VSP provides DOE sites with statistically defensible approaches to data gathering and assessment.

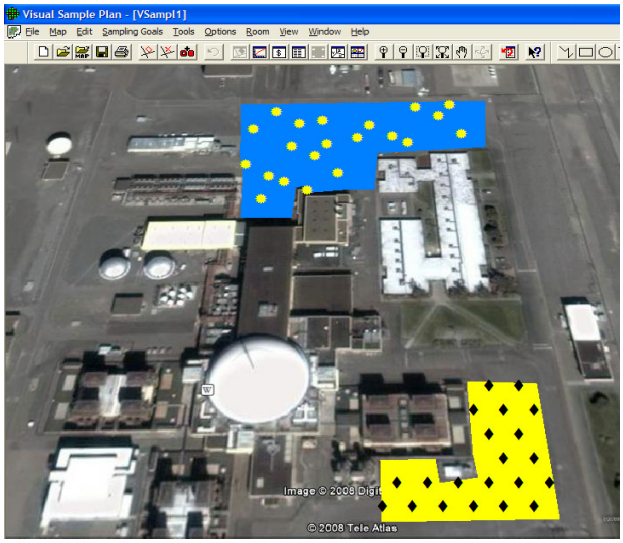


Figure 3.1 – VSP Screen Shot Illustrating Example of Multiple Sample Plan Options

Leveraging VSP acceptance and significant investments by EPA, DoD, DHS, United Kingdom Atomic Weapons Establishment, CDC, and others, DOE is supporting VSP development focused on accelerated cleanup, legacy management, and decommissioning.

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

One specific illustration of how VSP is being used on DOE sites is a hotspot sampling approach for an area at the DOE Mound Site (Figure 3.2, next page). Many other applications exist including within building surface sampling for decontamination and decommissioning, sampling of soils, surface water, sediments, groundwater, and streams. VSP is being used on many DOE sites for virtually all of these types of applications.

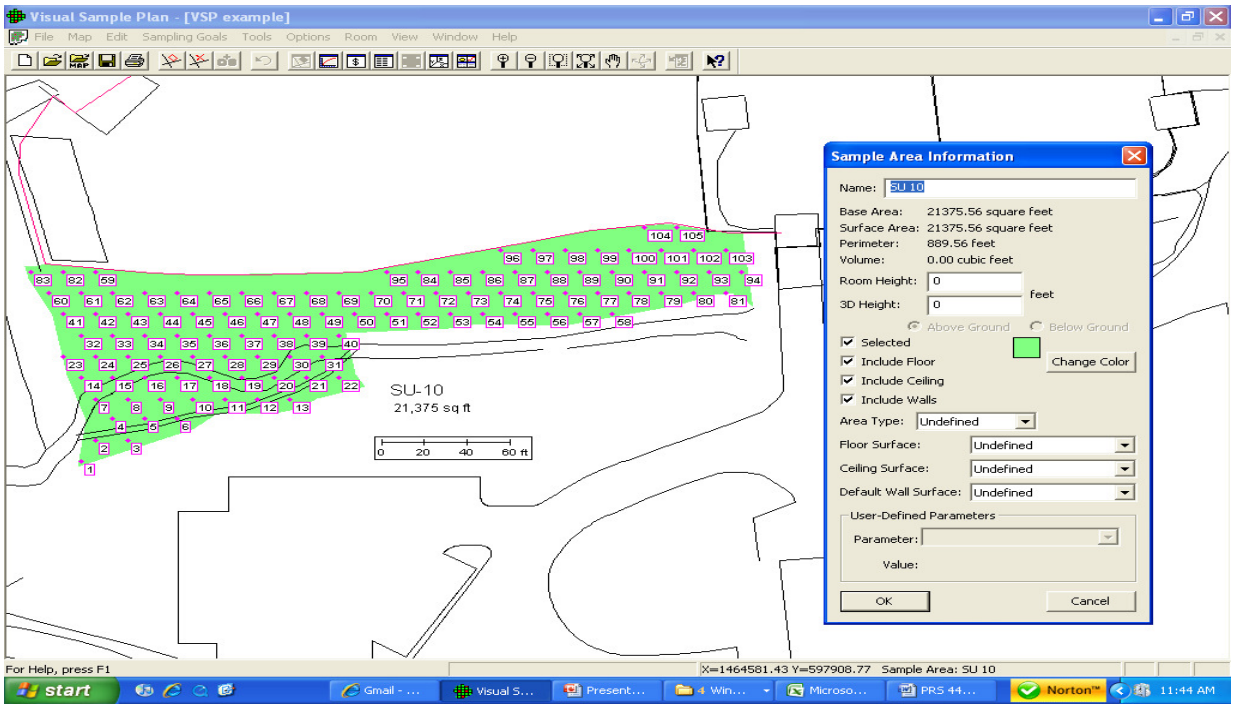


Figure 3.2 – Hotspot Sampling Design for Soil Sampling at DOE Mound Site

3.1.2 Training at DOE Sites

Several training courses have been developed and provided to support DOE's efforts to ensure that data gathered substantiate defensible decisions. The objective is to institutionalize systematic planning for environmental decision-making and provide the tools necessary to support all aspects of systematic planning and the DQO Process. Through a joint DOE/EPA effort, a new training course was developed and introduced. Due to the many new VSP methods recently added, this 3.5 day course now consists of 2 days general training followed by an advanced 1.5 day segment. Courses are very hands-on with all participants working on laptops through multiple realistic case studies (refer to Section 3.2.3 for further details).

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

3.1.3 DOE Site Feedback

VSP is being used across the majority of DOE sites. Feedback was solicited on how VSP is being used on DOE sites and what, if any, benefits were achieved. A sampling of that feedback from DOE site users is briefly summarized in Table 3.1 on the next page.

Site	Application	Comments
Rocky Flats	Vegetation Monitoring	saved a great deal of time
Oak Ridge	Scrap Metal Recycling Facility	greatly accelerated the process
Pantex	Railroad ballast material on site compared to background	allowed us to collect useful data and communicate uncertainty to the DOE
Hanford	Radiological Surveys	extremely useful as a time and money saver
ORNL	Beryllium Facility Characterization	great time saver; useful for industrial hygiene as well as environmental applications
LANL	Many Environmental Restoration Sites	allows us to pinpoint (GPS) every sample and place it on map with ease
ORAU/ORISE	D&D Independent Verification	invaluable tool for planning our survey; saves us many hours
INL and Hanford	Burial Ground Characterization	has become "part of the culture"
Paducah	Subsurface Soils	proven to be an instructive tool
Oak Ridge Y12	D&D Building Surveys	provides greater defensibility; excellent tools to document and communicate; saves time and money
Nevada Test Site	Atmospheric Test Site	Useful for both the front end of the DQO process (planning) as well as the back end
Hanford	50-75 Waste Closeout Sites	easy to use and results in substantial savings; regulators very supportive of VSP use

Table 3.1 – DOE Site VSP User Feedback

Training courses have been provided across the DOE complex and have been well received and attended to full capacity. 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 FY08 SPADAT Program Activities and Accomplishments

3.2.1 VSP New Developments

In FY08 the SPADAT Program included new VSP method developments, VSP enhancements, and training course development. The added methods and enhancements were in response to items identified by DOE users as high priority items. Each of these new developments are outlined and illustrated below.

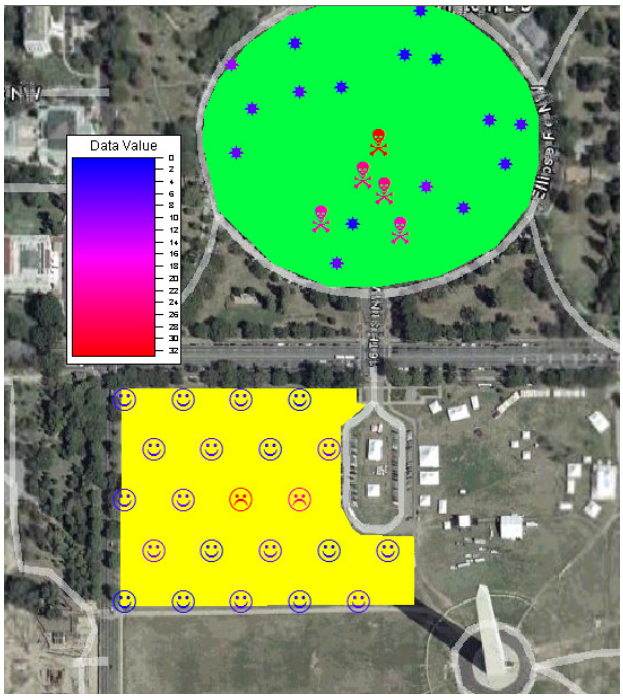
Figure 3.3 - Hotspot Design Using Existing Data

- Hotspot Sampling Using Existing Data

VSP users often have existing spatially distributed site data and they want to augment that data with additional samples to ensure detection of a hotspot of concern. Using the currently available "Locate largest un-sampled area" function in VSP, users can iteratively place samples to cover these areas. With the new method, VSP may also automatically place iterative samples in the largest un-sampled areas until no area is larger than the hotspot size of concern. Figure 3.3 shows one step of this iterative process.

- Composite Sampling for Hotspots

Composite sampling can significantly improve sample representativeness. However, it is often criticized because hotspots can be averaged out and go undetected. The mathematics for a new method to strategically composite samples without losing the hotspot location information was developed under this program in FY08. The general concept involves compositing samples across rows and columns to maintain the ability to determine exact locations of hotspots when they exist with a fraction of the analytical burden. These methods will be incorporated into VSP in FY09.



- Sample Display Fonts and Symbols

The visualization behind VSP is a powerful tool for communicating sampling approaches and analysis results. The ability to choose from a very large variety of sample symbols and sizes was added to facilitate communication and presentation of various sampling schemes. Figure 3.4 shows how different symbols can be used to represent types of samples and sample values.

Figure 3.4 - Sample Symbols and Color-by-Value Options Illustrated In VSP

3.2.2 DOE LM Partnership

In FY07-08, a partnership between DOE-HS and the DOE-LM developed to support enhancements to VSP focusing on legacy management objectives. DOE-LM was already using VSP on several of its sites and recognized the significant cost savings, streamlined acceptance by regulators, and time savings that this SPADAT program had to offer. DOE-LM provided additional funding to support specific tasks that would benefit LM directly as well as other DOE sites. The resulting FY08 additions are listed below.

- Well Redundancy and Geostatistical Modeling Help and Advise

DOE-LM sites and other DOE sites have extensive well monitoring networks. Significant cost savings may be achieved if wells that were determined to be redundant could be removed from service or sampled less frequently. A new well redundancy evaluation module was added to VSP in FY07 patterned after similar analyses performed on Hanford's well network. This method explores the spatial relationships between wells relative to contaminant concentration data and helps the user determine whether wells might be eliminated while preserving important plume information. Figure 3.5 on the next page shows VSP output from the well redundancy evaluation module. Because the geostatistical models in this VSP module are complicated, several help and guidance features were added.

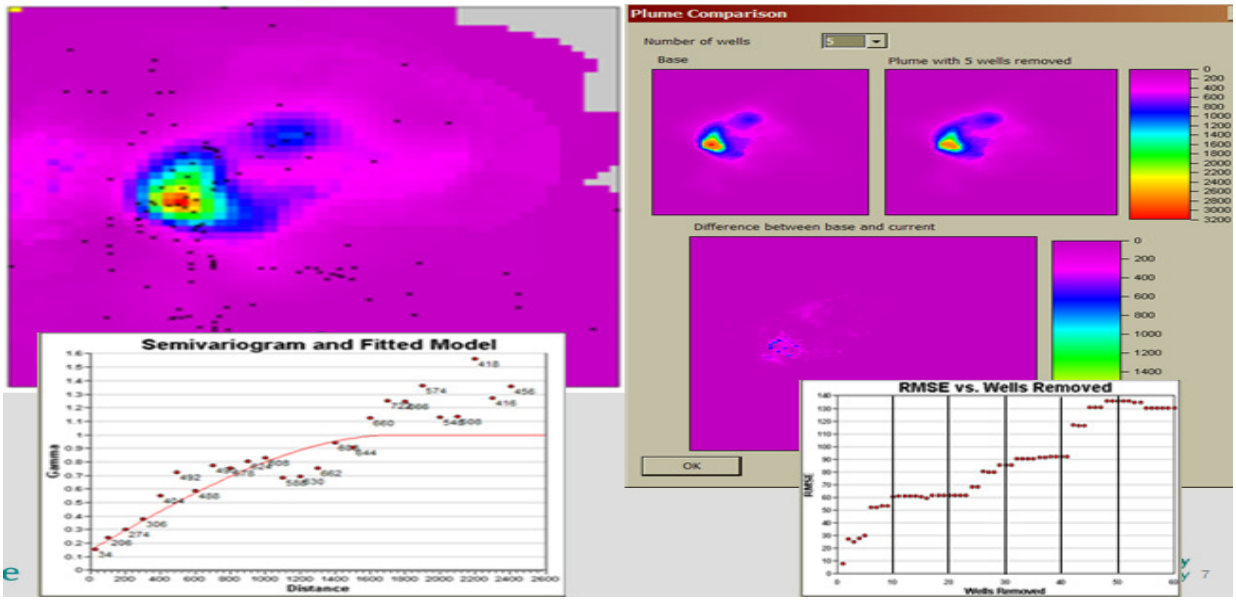


Figure 3.5 - Well redundancy module showing plume maps before and after removal, uncertainty effects, and semivariogram

- Upgradient/Downgradient Well Comparisons

VSP has the ability to group wells or sample locations into any type of user defined groupings and to evaluate summary statistics within each group. In FY08, statistical methods were added to allow for more formal statistical comparisons between the different groups. Analysis of Variance capability was added to allow statistical comparisons of means and trends between groups.

- Seasonality Consistency Tests

Seasonal effects can often obscure trends in data. VSP has a Seasonal Kendall test to account for seasonal effects and test for trends over time. However, if the seasonal effect is inconsistent for different seasons or across sample locations, the seasonal Kendall test may be misleading. A new set of methods were added in FY08 to statistically test for seasonality consistency.

- Temporal Redundancy Evaluations

Significant cost savings can be achieved by justifying reductions in sampling frequency, especially for sites where long term monitoring is required. Geostatistical methods have been adapted to support temporal sampling redundancy evaluations instead of spatial redundancy. Individual variogram, composite variogram, and iterative thinning algorithms are being added to VSP for temporal redundancy analysis.

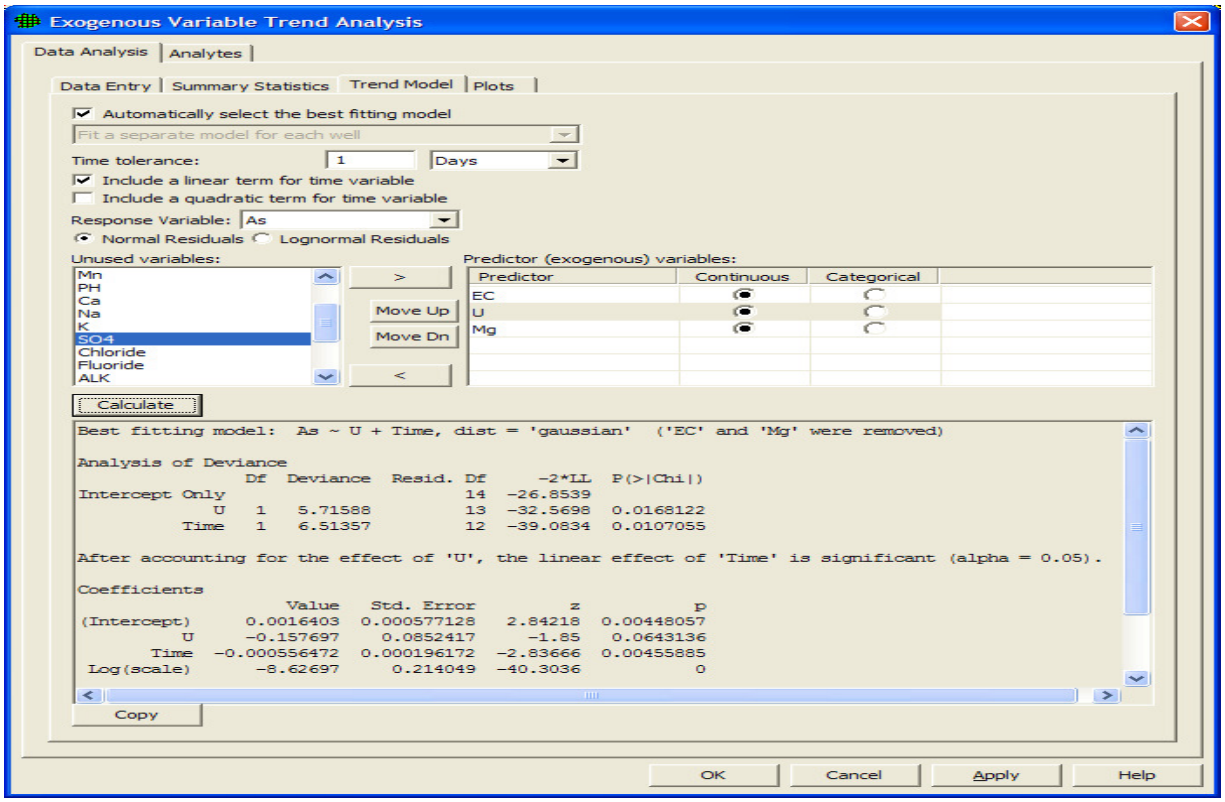


Figure 3.6 - Exogenous Variables Trend Modeling VSP User Dialog Box

- Exogenous Variables Modeling

When monitoring trends over time for a particular analyte, other variables can sometimes mask the trend if not appropriately accounted for. The effect of these exogenous variables (i.e., rainfall, runoff, river level, etc.) should be extracted from the analyte trends of interest in order to see the true underlying trend. A new module was added in FY08 to allow for multiple linear and quadratic regression to support this objective. Figure 3.6 shows the VSP user dialog for this module.

- Trend Tests in Presence of Non-Detects

In FY06-07, linear and exponential trend tests, both parametric and nonparametric, were added to VSP. These methods allowed monitoring for upward or downward trends over time. However, none were able to appropriately deal with non-detect data. In FY08, these methods were modified to handle non-detect data.

- Probability and Uncertainty Spatial Maps

Geostatistical spatial models can sometimes be misleading if uncertainties are not well understood and visualized. Uncertainty maps are being added to address this concern. Probability maps are also being

added to support quick evaluations of site areas where the probability of exceeding some threshold of concern or regulatory limit is high. Figure 3.7 shows a probability map where the probability of exceeding some cadmium threshold is color coded. These maps integrate the concept of confidence into spatial estimates.

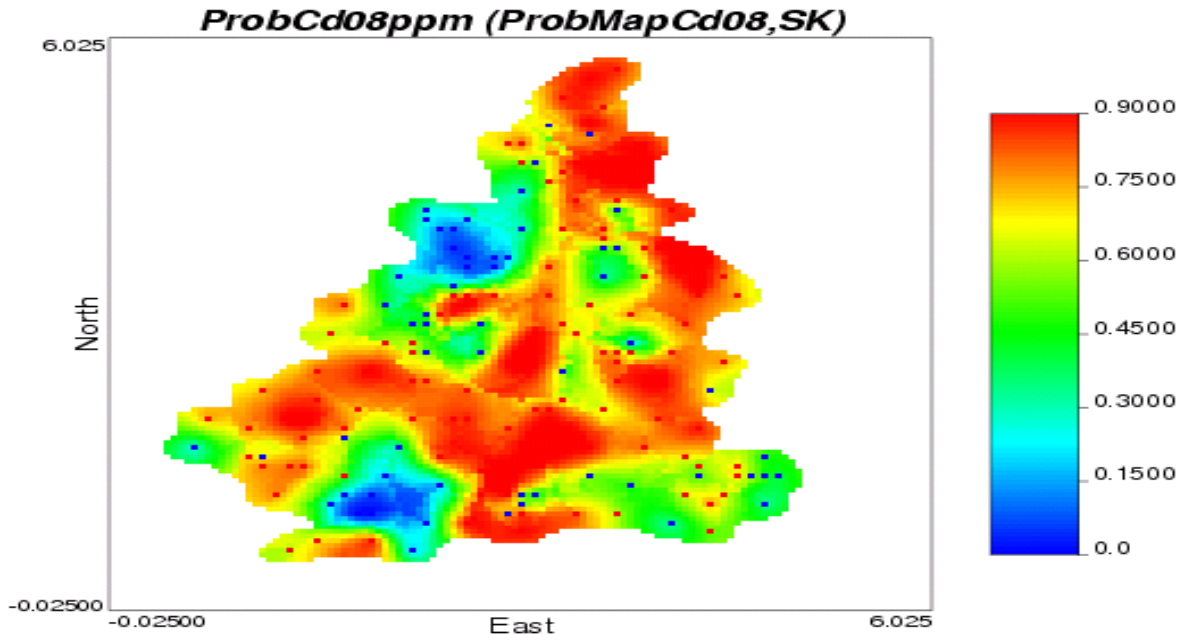


Figure 3.7 - Probability Map Showing Probability of Exceeding Some Cadmium Limit

3.2.3 Training at DOE Sites

In FY08 the VSP training course was completely revamped. The previously administered 2.5 day course is now a 3.5 day course consisting of 2 days of general VSP training followed by 1.5 days of advanced training. The advanced training focuses on many of the more complicated methods that have been added in the past 3 years.

Several training activities sponsored by the SPADAT Program were accomplished during FY08. The 2.5 day training was conducted previously at Oak Ridge, Los Alamos National Laboratory, Sandia, Lawrence Livermore National Laboratory, Hanford, Pantex, Las Vegas, Grand Junction, SRS, and Mound. In FY08, this course was conducted for DOE site personnel and affiliated regulators at Idaho National Laboratory, Paducah/Portsmouth, and Hanford with upcoming training scheduled for Oak Ridge.

Course evaluations continue to be 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.

The hands-on VSP course provides the participants an opportunity to work through over 30+ 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 FY09 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 training courses, feedback regarding additional VSP needs was generated in the form of a "wish-list" by all the DOE and regulator participants. This wish-list outlines the statistical methods and VSP enhancements that DOE field sites believe would be most valuable to add in the future to help them meet their site needs. HSS plans to support development of some of those VSP methods and enhancements in FY09 and the out-years based on available funding. Some of these improvements include:

- Radiological Transect Survey Design and Analysis
- Redesign all dialogs to be in sentence form for ease of use
- Trend Change Detection Methods Added
- Quasi/random/adaptive fill/systematic options added to all sample placement tabs
- Google Earth Translation and Un-Combine Tool
- 3-D Hotspot Sampling Options Added
- Stream Sampling Option Added
- Sequential and Collaborative Sampling Module Improvements
- Compare Average to Background Nonparametric Unequal Sample Size Module Added
- Construct Conf Interval; Nonparametric Method Added and Data Analysis
- Multiple Increment Hotspot Sampling
- Spatial Correlations Adjustments for Classical Statistical Tests
- Nonparametric UTL Calculations
- Remediation Volume/Cost Estimation

3.3.2 Additional VSP Training Courses

The new 3.5 day VSP training has only been offered at a few DOE sites. There are many new VSP users as well as some long-time VSP users who have become very proficient with the basic VSP functions. There continues to be a significant need for both the general and the advanced training sessions. These

VSP courses continue to be in high demand. For example, the January 2009 Oak Ridge course was announced on a Thursday and by Friday, the course was completely full, with enough people turned away to fill a second course.

In FY09, the 3.5 day VSP course will be offered at three DOE site locations. Two locations currently under consideration are Albuquerque, New Mexico and Chicago, Illinois. Cost sharing options with some of the benefiting DOE program offices, as well as other governmental agencies, is being explored through communication with both line management, field site management and various federal agencies (e.g., EPA, DoD, etc.). This cost sharing training option could also help to support a redistribution of HSS funds by making available additional funds to promote the value of the VSP throughout the Complex on a broader scale for data collection applications. This would be especially useful to other potential program line and field sites beyond those currently underway with the LM. . Courses sponsored by EPA and the United Kingdom are also planned in FY09.

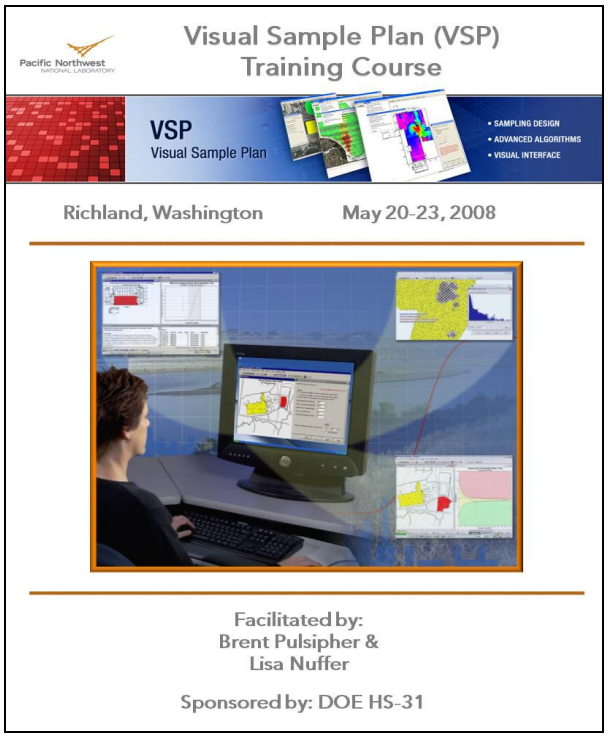


Figure 3.8 - Cover of VSP Training Manual for Hanford Course

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Appendix A

FY08 Analytical Services Program Annual Meeting

The Analytical Services Program annual meeting (ASP – DOECAP 2008) was held September 7-11, 2008 as a means of sharing information and seeking feedback from auditors and facility personnel to improve ASP program components. This resulted in updating auditing checklists; coordinating forthcoming auditing schedules and initiatives; presenting revision updates to the QSAS; and seeking inputs from other governmental agencies and private sector participants for Program improvements. The meeting was attended by over 140 individuals, and brought together DOECAP auditors, Headquarters and field DOECAP POCs, analytical laboratory and TSDF representatives, senior DOE management, representatives from MAPEP and SPADAT, and representatives from other Federal agencies.

The keynote speaker at the meeting was Gerald Boyd (Manager ORO) with session presentations being made by DOECAP representatives and participants on individual site Program status, challenges and opportunities; DOE sites involvement related to FY08 DOECAP activities and projected FY09 DOECAP participation; and the status of various DOE sites relative to environmental actions and closures.

Working sessions included continuing resolution of QSAS technical issues, laboratory and TSDF checklist comments, the FY09 DOECAP audit schedule, and feedback on DOECAP operations and implementation from both Program participants, audited laboratories and audited TSDFs. Overall Program updates of online DOECAP training, DOECAP EDS improvements and the Integrated Contractor Procurement Team (ICPT) Basic Ordering Agreement (BOA) document status were provided.

Photo A.1 – Award Presentation at ASP – DOECAP 2008 Annual Meeting

This year's meeting featured half-day sessions containing presentations from the MAPEP and the SPADAT elements of the ASP. Consistent with previous meetings, the program continued to include presentations from laboratory and TSDF senior management with specific attention to their DOECAP interaction and implementation from the audited facility perspective. Presentations were also made on topics of general interest to ASP participants and facilities by representatives from the EPA Office of the Inspector General, the US Navy Laboratory Quality & Accreditation Office, and TNI. The presentations were informative and well received. Copies of meeting presentations are available on the DOECAP EDS.

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Appendix B

FY08 DOECAP Audited Laboratories and TSDFs

FY08 DOECAP AUDITED LABORATORIES	
AAL – Assaigai Analytical Laboratories, Inc., Albuquerque, NM	ACO - BWXT ACO at Y-12, Oak Ridge, TN
ARS - American Radiation Services, Inc., Port Allen, LA	BCL - BC Laboratories, Inc., Bakersfield, CA
CAL - Caltest Analytical Laboratory, Napa, CA	CAI - CEBAM Analytical, Inc., Seattle, WA
DCS - DataChem Laboratories, Inc., Salt Lake City, UT	DFL - Davis and Floyd, Inc., Greenwood, SC
EMAX - EMAX Laboratories, Inc., Torrance, CA	ESO - Eberline Services, Inc., Oak Ridge, TN
ESR - Eberline Services, Inc., Richmond, CA	FGL - FGL Environmental Laboratory, Santa Paula, CA (Close-out Audit)
GEL - General Engineering Laboratories, LLC, Charleston, SC	GPL – GPL Laboratory, Frederick, MD
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
PORTS - USEC Portsmouth Analytical Laboratory, Piketon, OH (Audit plus a follow-up surveillance)	RMAL – Radioactive Material Analysis Laboratory ORNL, Oak Ridge, TN
RACL – Radioisotope and Analytical Chemistry Laboratory, BWXT, Lynchburg, VA	S&ME, Inc., Knoxville, TN
SEI - Shaw Environmental and Infrastructure, Oak Ridge, TN	SES – Shealy Environmental Services, Inc., Cayce, SC
SRI - Southwest Research Institute, San Antonio, TX	TAA – Test America, Inc. -, Arvada, CO
TAR – Test America, Inc.,-, Richland, WA	TAS – Test America, Inc. - St. Louis, Earth City, MO
TAK – Test America, Inc.-, Knoxville, TN	XEN – Xenco Laboratories, Norcross GA

FY08 DOECAP AUDITED TSDF	
DSSI - Diversified Scientific Services, Inc., Kingston, TN	EST - Energy Solutions, LLC, Oak Ridge, TN
ESU – Energy Solutions of Utah, Clive, Utah	M&EC - Materials and Energy Corporation, Oak Ridge, TN
PFF- Perma-Fix of Florida, Gainesville, FL	PFN – Perma-Fix Northwest, Richland, WA
WCS - Waste Control Specialists, LLC, Andrews, TX	

Appendix C

MAPEP Series 19 Laboratories, 2008

MAPEP Series 19 Domestic Laboratories		
Xenco Laboratories-Atlanta	Norcross	GA
Alabama Department of Environmental Management	Montgomery	AL
USAFSAM/SDRR	Brooks City-Base	TX
Argonne National Laboratory/Analytical Chemistry Lab.	Argonne	IL
Argonne National Laboratory	Argonne	IL
Paragon Analytics a Division of DataChem Laboratories, Inc.	Fort Collins	CO
Idaho National Laboratory	Idaho Falls	ID
Analytical Support Operations - Radiochemical Processing Lab	Richland	WA
American Radiation Services Inc.	Port Allen	LA
CH2M Hill Applied Science Laboratory	Corvallis	OR
BWXT Y-12, Analytical Chemistry Organization Laboratory	Oak Ridge	TN
BC Laboratories, Inc	Bakersfield	CA
Northeast Laboratory Services, Inc.	Waterville	ME
Caltest Analytical Laboratory	Napa	CA
California Department of Public Health	Richmond	CA
Lawrence Livermore National Laboratory - EMRL	Livermore	CA
222-S Laboratory	Richland	WA
Carlsbad Environmental Monitoring and Research Center	Carlsbad	NM
TestAmerica Denver	Arvada	CO
Davis & Floyd, Inc.	Greenwood	SC
Department of Environmental Health & Safety	Raleigh	NC
DLE Associates	Hercules	CA
S&S Onsite Analytical	Findlay	OH
BWXT Pantex - D&RMG	Amarillo	TX
EMAX Laboratories, Inc	Torrance	CA
Energy Northwest Environmental Services	Richland	WA
U. S. EPA Office of Radiation and Indoor Air	Las Vegas	NV

MAPEP Series 19 Domestic Laboratories		
Lawrence Livermore National Laboratory ERAD	Livermore	CA
Washington State Public Health Laboratories	Shoreline	WA
Environmental Radiation Laboratory	Atlanta	GA
Region 5 EQC Tritium Lab	Aiken	SC
ETTP	Oak Ridge	TN
EnergySolutions, LLC	Clive	UT
Florida Dept of Health Environmental Laboratory	Orlando	FL
Florida Dept. of Health, Mobile Environmental Radiological Lab	Orlando	FL
Fernald Project	Harrison	OH
Fermi National Accelerator Laboratory (FermiLab)	Batavia	IL
Lawrence Livermore Laboratory	Livermore	CA
GEL Laboratories, LLC	Charleston	SC
Georgia Power Company Environmental Laboratory	Smyrna	GA
GPL Laboratories, LLLP	Frederick	MD
FGL Environmental	Santa Paula	CA
Hazards Control Analytical Lab	Livermore	CA
SC Dept. Health and Environmental Control Radiological Laboratory	Columbia	SC
Washington Closure Hanford	Richland	WA
Lawrence Livermore National Laboratory - HWRL	Livermore	CA
Oak Ridge National Laboratory-Internal Dosimetry Group	Oak Ridge	TN
ISU - Department of Physics/Health Physics/EAL	Pocatello	ID
Jefferson Laboratory	Newport News	VA
Kansas Dept. of Health & Environment	Topeka	KS
Kennedy Space Center, HP Laboratory	Kennedy Space Center	FL
Los Alamos National Laboratory	Los Alamos	NM
Lawrence Berkeley National Laboratory	Berkeley	CA
Lawrence Livermore National Laboratory	Livermore	CA
ICP Analytical Services Laboratories	Idaho Falls	ID
Reactor Technology Complex (RTC) Radioanalytical Laboratory	Scoville	ID
USEC, Inc.	Piketon	OH
United States Enrichment Corporation	Paducah	KY
Radioactive Material Analysis Laboratory	Oak Ridge	TN
MDPH-Radiation Control Program	Jamaica Plain	MA

MAPEP Series 19 Domestic Laboratories		
MKM Engineers, Inc	McClellan	CA
National Air and Radiation Environmental Laboratory	Montgomery	AL
BWXT Services-Radioisotope & Analytical Chemistry Laboratory	Lynchburg	VA
New Jersey Dept. of Health & Senior Services, PHEL, ECLS	Trenton	NJ
Assaigai Analytical Laboratories, Inc.	Albuquerque	NM
Nuclear Technology Services, Inc.	Roswell	GA
Life Science Laboratories, Inc.	East Syracuse	NY
Ohio Department of Health Laboratory	Reynoldsburg	OH
ORISE/ESSAP	Oak Ridge	TN
Outreach Technologies, Inc.	Broken Arrow	OK
NASA Plum Brook Reactor Facility Lab	Sandusky	OH
Environmental Science Lab PNNL/ESL	Richland	WA
TestAmerica St. Louis	Earth City	MO
TestAmerica Knoxville	Knoxville	TN
TestAmerica	Richland	WA
CH2M Hill RadCon Program Count Room	Richland	WA
RSA Laboratories, Inc.	Hebron	CT
TestAmerica-Morgan Hill	Morgan Hill	CA
WSRC/Savannah River National Laboratory/AD	Aiken	SC
GPL Laboratories Alabama, LLC	Montgomery	AL
SECRA ETTP Count Lab	Oak Ridge	TN
SRS Environmental Monitoring Laboratory	Aiken	SC
Sandia National Lab - Industrial Hygiene Analytical Chemistry Lab	Albuquerque	NM
SLAC	Menlo Park	CA
Scientific Laboratory Division	Albuquerque	NM
Southwest Research Institute	San Antonio	TX
Sandia National Laboratories, Radiation Protection Sample Diagnostics	Albuquerque	NM
Santa Susana Field Laboratory	Canoga Park	CA
Texas Department of State Health Services Laboratory	Austin	TX
Teledyne Brown Engineering - Environmental Services	Knoxville	TN

MAPEP Series 19 Domestic Laboratories		
Environmental, Inc., Midwest Lab	Northbrook	IL
Eberline Services Oak Ridge Laboratory	Oak Ridge	TN
Eberline Services	Richmond	CA
FUSRAP	Berkeley	MO
UNLV Radioanalytical Services Laboratory	Las Vegas	NV
UniTech Services Group	Springfield	MA
Lionville Laboratory Incorporated	Exton	PA
Waste Sampling and Characterization Facility	Richland	WA
Pace Analytical Services, Pittsburgh	Greensburg	PA
WI, DPH, Radiation Protection Section	Madison	WI
WIPP Laboratories	Carlsbad	NM
Wisconsin State Laboratory of Hygiene	Madison	WI
WVDP Environmental Laboratory	West Valley	NY
West Valley Process Chemistry	West Valley	NY
WVDP Radiation Protection Lab	West Valley	NY
Durateck, Inc. - Bear Creek Lab	Oak Ridge	TN
Pacific Northwest National Laboratory	Richland	WA
AREVA NP Environmental Laboratory	Westboro	MA
US Army Yuma Proving Ground / Material Analysis Lab	Yuma	AZ

MAPEP Series 19 Foreign Laboratories		
Radiation Protection Bureau ERHD NMS	Ottawa	Ontario
Environmental Radiation Protection Division	Sharq	Kuwait
Foods and Water Laboratories Center	Muscat	Sultanate of Oman
International Atomic Energy Agency	Seibersdorf	Austria
Istanbul University, Biology Dept., Radioecology Laboratory	Vezneciler	Istanbul
Radiation Measurements Laboratory	Amman	Jordan
Chemical Analysis Laboratory	Al-Jubaiha	Amman
Radioecology	Al-Jadria	Baghdad
National Radiation Laboratory	Christchurch	Christchurch
Royal Scientific Society - Radiation Measurements Lab	Al-Jubaiha	Amman
Radiation Protection Service	Weston	Ontario
Instituto de Radioprotecao e Dosimetria	Rio de Janeiro	Bazil
Qatar University- Nuclear Physics Lab	Doha	QA
National Center for Energy, Science and Nuclear Tech.	Maamor	Morocco
Veterinary Laboratories Agency	Addlestone	Surrey
Soreq NRC	Yavne	Israel
Westlakes Science and Technology Park	Cumbria	UK