U.S. DEPARTMENT OF ENERGY

EHSS
Office of Environment, Health, Safety and Security

Analytical Services Program

Department of Energy Consolidated Audit Program

MAPEP

SPADAT

Fiscal Year 2015 Report

U.S. Department of Energy
Office of Environment, Health, Safety and Security

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ACRONYMS

ANSI	American National Standards Institute
ASP	Analytical Services Program
ASQ	American Society for Quality
AU	Office of Environment, Health, Safety and Security
COMPASS	Computerization of MARSSIM for Planning and Assessing Site Surveys
Department	U.S. Department of Energy
DOE	U.S. Department of Energy
DOECAP	U.S. Department of Energy Consolidated Audit Program
EDS	Electronic Data System
EM	Office of Environmental Management
EPA	U.S. Environmental Protection Agency
ESU	Energy*Solutions*, LLC in Clive, Utah
FY	Fiscal Year
MAPEP	Mixed Analyte Performance Evaluation Program
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
NNSA	National Nuclear Security Administration
PNNL	Pacific Northwest National Laboratory
Program	U.S. Department of Energy Consolidated Audit Program
PT	proficiency testing
RESL	Radiological and Environmental Sciences Laboratory
RMCC	Radiation Measurements Cross-Calibration (Project)
TNI	The NELAC Institute
TSDF	treatment, storage, and disposal facility
U.S.	United States
VSP	Visual Sample Plan

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1.0 ANALYTICAL SERVICES PROGRAM (ASP)

This report provides an overview of the ASP's activities for Fiscal Year (FY) 2015 for the United States (U.S.) Department of Energy (DOE or Department), including the National Nuclear Security Administration (NNSA). The ASP is managed by the Office of Environment, Health, Safety and Security (AU), Office of Sustainable Environmental Stewardship. The ASP fiscal year reports supplement the *ASP Program Description*, March 2016, which provides more details on the activities and objectives of the ASP's component programs that are:

- DOE Consolidated Audit Program (DOECAP or Program)
- Mixed Analyte Performance Evaluation Program (MAPEP)
- Systematic Planning and Data Assessment Tools Program – Visual Sample Plan (VSP)

These auditing, proficiency testing (PT), and sample planning activities are essential to mission-critical DOE operations, such as ongoing environmental monitoring, environmental remediation, and long-term legacy management and surveillance. The ASP's component programs reduce DOE's risks and liabilities by providing quality environmental data as the basis for sound decision-making and by ensuring compliant disposition of waste. Supporting requirements from DOE directives are applicable to the Department's use of commercial environmental analytical laboratories and waste treatment, storage, and disposal facilities (TSDF), including DOE Order 435.1, *Radioactive Waste Management*; DOE Manual 435.1-1, *Radioactive Waste Management Manual*; and DOE Order 414.1D, *Quality Assurance*.

2.0 U.S. Department of Energy Consolidated Audit Program (DOECAP)

2.1 INTRODUCTION

DOECAP is an auditing program for commercial environmental analytical laboratories and TSDFs. The Program has a clearly defined mission to improve the quality of environmental and industrial hygiene analytical data provided to DOE by commercial laboratories and to ensure compliant waste management services are provided by commercial TSDFs. Figure 1 illustrates the components that rise DOECAP, each of which is vital to the success of the Program.

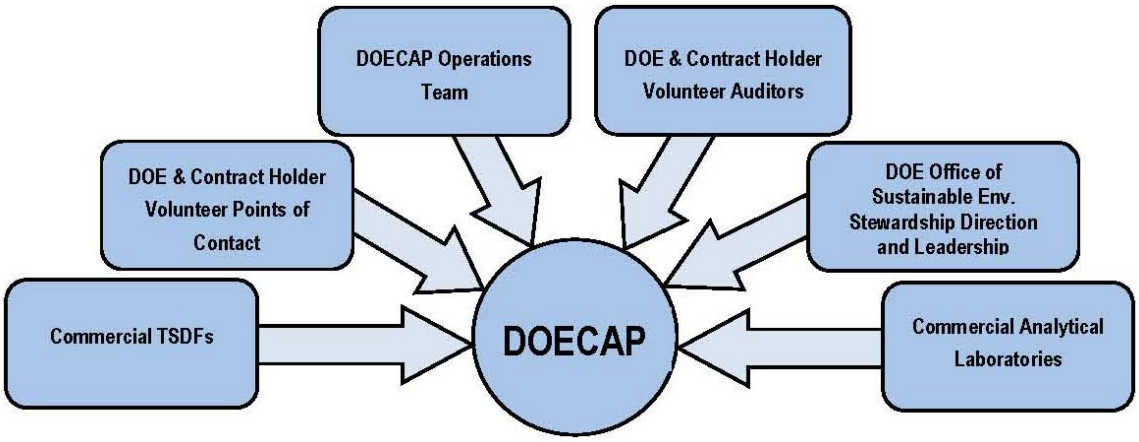

Figure 1. DOECAP components

2.2 DOECAP FISCAL YEAR 2015 ACCOMPLISHMENTS

2.2.1 DOECAP Audits in FY 2015

DOECAP's primary purpose is to conduct audits and ensure that the audited facilities develop effective corrective action plans and processes to foster performance improvement. During FY 2015, the Program conducted 28 audits, which included 18 laboratory audits, 9 TSDF audits, and 1 TSDF surveillance audit. A surveillance audit is a limited-scope audit conducted prior to the next scheduled DOECAP audit. Figure 2 is a U.S. map showing the locations of the FY 2015 DOECAP audits. A list of the audited facilities is provided in Appendix A.

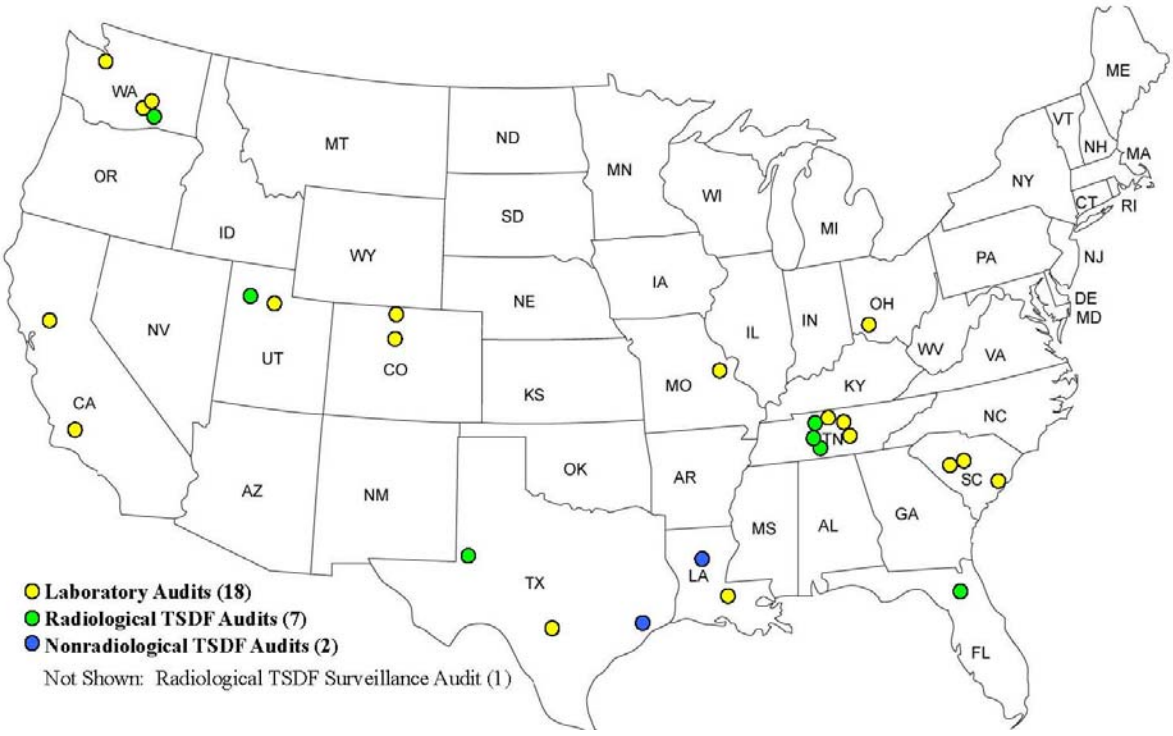

Figure 2. U.S. Map Showing the Locations of the DOECAP Audits Conducted in FY 2015

DOECAP rarely issues Priority I findings to TSDFs. However, a Priority I finding was issued in FY 2015 when a DOECAP audit team identified a situation at a TSDF facility. The site's security personnel was unaware an access gate had failed in the open position due to a mechanical problem with perceived damage caused by severe winter weather. The gate failure opened an uncontrolled access point to the area where DOE's radioactive waste is stored. The DOECAP lead auditor immediately notified the TSDF's management of the situation, and the TSDF responded appropriately. Security guards were immediately posted at the access point until the gate was repaired, and the TSDF installed a new, upgraded gate shortly thereafter. Also as a result of the Priority I finding, the TSDF reviewed and revised the security plan for the facility and made numerous safeguards and security infrastructure upgrades. The FY 2015 TSDF surveillance audit was conducted to confirm closure of the DOECAP Priority I finding.

2.2.2 FY 2015 Positive Results from DOECAP Audits

DOECAP streamlined the review and audit process by eliminating more than 170 redundant audits, with a realized cost saving to the DOE Program Offices/sites of $7.2 million. Additional cost savings are realized in time and expense associated with hosting such a large number of audit teams. Most importantly, the Program has resulted in performance improvements and better compliance with DOE contractual requirements and regulatory requirements. Following are some examples of these improvements.

- **Laboratory Improvements**
  - ✓ Instrument calibration and recordkeeping
  - ✓ Sample chain of custody
  - ✓ More accurate tracking of the opening and expiration dates for reagents and solvents
  - ✓ Procedures to ensure compliance with thermal preservation requirements for volatile organic samples
  - ✓ Timeliness and quality of the analytical data reported to the DOE sites
- **Laboratory and TSDF Improvements**
  - ✓ Worker safety and health program compliance
  - ✓ Waste management program compliance, particularly with the requirements for storage of incompatible chemicals/waste and the length of time that waste can be stored

2.2.3 DOECAP Laboratory and TSDF Auditor Cadres

DOECAP's success depends on each of the participants (DOE Program offices, site/field offices, and contractors) providing a fair share of auditor resources to conduct the audits. Serving on DOECAP audits benefits the auditors and their employers by enhancing the auditors' skills (e.g., conducting audits, completing audit checklists, and reviewing corrective actions for adequacy) and providing them with valuable experience that can be put to use at their home sites.

Table 1. Staffing of the DOECAP Laboratory and TSDF Auditor Cadres from FY 2010 through FY 2015

Fiscal Year	Laboratory Auditors	TSDF Auditors
2010	53	54
2011	61	66
2012	57	65
2013	61	74
2014	57	75
2015	58	66

Maintaining the staffing level of the DOECAP auditor cadres is one of the Program's major challenges. At the end of FY 2015, DOECAP had 58 laboratory auditors and 66 TSDF auditors. As shown in Table 1, these numbers represent a small increase for the laboratory cadre and a significant decrease for the TSDF cadre. DOECAP will need to identify new auditors among the Program participants to stay ahead of losses in FY 2016 due to retirement and job changes. Thirty-five DOE Program Offices and site/field offices participated in DOECAP during FY 2015, and they are listed in Table 2 on the following page.

Table 2. DOE Program Offices and Field/Site Offices that Participated in DOECAP in FY 2015

Headquarters Program Offices	
Office of Environment, Health, Safety and Security (AU)	Office of Energy Efficiency and Renewable Energy
Office of Environmental Management (EM)	National Nuclear Security Administration (NNSA)
Office of Fossil Energy	Office of Nuclear Energy
Office of Legacy Management	Office of Science
Field and Site Offices	
Argonne National Laboratory Argonne Site Office	Brookhaven National Laboratory Brookhaven Site Office
Fermi National Accelerator Laboratory Fermi Site Office	Hanford Site Office of River Protection
Hanford Site Richland Operations Office	Idaho National Laboratory Idaho Operations Office
Lawrence Berkeley National Laboratory Berkeley Site Office	Lawrence Livermore National Laboratory Livermore Field Office
Los Alamos National Laboratory NNSA Los Alamos Field Office	Los Alamos National Laboratory EM Los Alamos Site Office
National Renewable Energy Laboratory Golden Field Office	Nevada National Security Site Nevada Field Office
Oak Ridge National Laboratory Oak Ridge National Laboratory Site Office	Oak Ridge Reservation Oak Ridge EM
Oak Ridge Office Integrated Support Center	Pacific Northwest National Laboratory Pacific Northwest Site Office
Paducah Site Portsmouth/Paducah Project Office	Pantex Plant NNSA Production Office
Portsmouth Site Portsmouth/Paducah Project Office	Sandia National Laboratories Sandia Field Office
Savannah River Site Savannah River Operations Office	Separations Process Research Unit EM Consolidated Business Center
SLAC National Accelerator Laboratory SLAC Site Office	Thomas Jefferson National Accelerator Facility, Thomas Jefferson Site Office
Transuranic Waste Processing Center Oak Ridge EM	West Valley Demonstration Project EM Consolidated Business Center
Y-12 National Security complex NNSA Production Office	

2.2.4 DOECAP Phased Audits

In 2014, DOECAP initiated a voluntary phased audit approach for TSDFs. The intent of this change was to: (1) take advantage of the savings from reduced auditor travel costs and, (2) use

the operational efficiencies gained from this approach to increase the number of facilities that DOECAP audits each year. The phased audit approach is designed to prepare facilities that consistently perform well on DOCAP audits for an audit schedule that alternates a full DOECAP audit one year with a desktop audit the next year as long as the facility maintains good performance. DOECAP considers good performance to include a robust self-assessment program and a mature issues management program, which are demonstrated when the facility: (1) incorporates the DOECAP audit checklist lines of inquiry into its operational activities and its assessment, audit, and surveillance programs and, (2) implements meaningful corrective actions that address the root cause(s) and extent of condition associated with findings. A facility's performance on DOECAP audits determines its progress from one phase to the next. DOECAP plans to expand the phased audit approach to include laboratories in FY 2016.

In FY 2014, Energy*Solutions*, LLC in Clive, Utah, (ESU) was the first facility to volunteer to participate in a phased audit, and the ESU Phase I audit was a successful effort. During FY 2015, ESU completed a Phase II audit, and DOECAP plans to perform a desktop audit of ESU in FY 2016. Three other TSDFs volunteered in FY 2015 and participated in Phase I audits.

2.2.5 National Consensus Standards Development and Revision

DOECAP Operations Team members and the ASP Manager participate in committees sponsored by The NELAC Institute (TNI) to revise the TNI standards that are of interest to the Department (e.g., EL-V1-2012, *Quality Systems for Radiochemical Testing*, Module 6; EL-V3-2011, *General Requirements for Environmental Proficiency Test Providers*; and EL-V4-2009, *General Requirements for an Accreditation of Environmental Proficiency Test Providers*). During FY 2015, this participation in the TNI committees:

- Continued to successfully promote the concept of semiannual testing for commercial laboratories rather than annual testing.
- Advanced the completion of EL-V1-2012, *Quality Systems for Radiochemical Testing*, Module 6, which, when published, will be used to revise the DOECAP radiochemistry audit criteria for laboratories.
- Provided input on auditor training and qualification requirements in the relevant section of the TNI standard on quality assurance.
- Provided guidance for development of limit of quantization and limit of detection requirements.

2.2.6 2015 ASP Workshop

The 2015 ASP Workshop held on September 14–17, 2015, in Charleston, South Carolina, provided training and information sharing to support continuous improvement of the ASP. Attendance at this year's annual workshop was higher than the past three workshops, with 108 attendees and a daily average of 65 attendees via the webinar link.

The 2015 ASP Workshop included presentations on MAPEP PT results and trends, VSP field applications, changes to relevant national consensus standards (i.e., TNI EL-VI-2012, Module 6, and American Society of Mechanical Engineers NQA-1-2015, *Quality Assurance Requirements for Nuclear Facility Applications*), climate change and DOE operations, the DOE National Analytical Management Program, and mercury speciation, as well as intergovernmental presentations from the U.S. Department of Defense and the U.S. Environmental Protection Agency (EPA). DOECAP provided five training sessions for lead auditors and auditors. The agenda also provided multiple feedback sessions, with two roundtables and four formal feedback sessions to foster continuous improvement of the ASP.

2.2.7 SharePoint Electronic Data System (EDS)

The EDS provides DOECAP's document control and record archive capabilities. In March 2015, DOE moved the EDS to a Microsoft SharePoint platform to improve the system's stability. When SharePoint EDS was fully implemented and ready for use, DOECAP participants were provided with the new Internet link and training on how to access and use it. Training was also provided at the 2015 ASP Workshop.

2.2.8 DOECAP External Website for Public Access

In September 2015, DOECAP set up a new external website (http://www.p2s.com/?page_id=1526) that provides access to the publicly available Program documents, including the joint U.S. Department of Defense/DOE *Consolidated Quality Systems Manual (QSM) for Environmental Laboratories*, blank audit checklists, and presentations from the most recent ASP Workshop.

3.0 MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)

3.1 INTRODUCTION

The DOE Radiological and Environmental Sciences Laboratory (RESL) manages MAPEP, a semiannual PT program for environmental analytical laboratories. RESL is accredited by the American National Standards Institute-American Society for Quality (ANSI-ASQ) National Accreditation Board as a PT provider and certified reference material provider. During FY 2015, 89 U.S. analytical laboratories and 47 international laboratories participated in MAPEP. The U.S. laboratories directly or indirectly support the Department's missions and interests or other agency missions. International participation in MAPEP supports the U.S. Government's relationships with other nations via scientific exchange and improved analytical measurements. The U.S. and international laboratories that participated in MAPEP during FY 2015 are identified in Appendices B and C.

3.2 MAPEP FISCAL YEAR 2015 ACLISHMENTS

3.2.1 MAPEP Series 32 and 33

In April and September 2015, RESL distributed MAPEP PT samples for Series 32 and 33, respectively. The laboratories had 60 days to analyze the samples and provide their results to RESL. Approximately one month later, RESL posted the results on the secure MAPEP website. The MAPEP website has public section located at http://www.id.energy.gov/resl/mapep/mapep.html and a secure, password-protected section located at https://mapep.inl.gov.

3.2.2 FY 2015 Participation in MAPEP Improved the Laboratories' Performance

One of the RESL staff's favorite sayings is, "Participation improves performance," and a review of the MAPEP results for the past several years illustrates this point. RESL includes a new PT test with each MAPEP series. Some of the laboratories may have difficulty with the new challenge, but as shown by the results discussed below, the laboratories research the issue, ask for technical assistance from RESL when they need it, and improve their performance in subsequent MAPEP series.

False Positive Tests in MAPEP Series 31 and 32

RESL has been including false positive test samples in the MAPEP series for several years. Figure 3 illustrates the improvement in the laboratories' performance between MAPEP Series 31 and Series 32 on a false positive test for antimony in water.

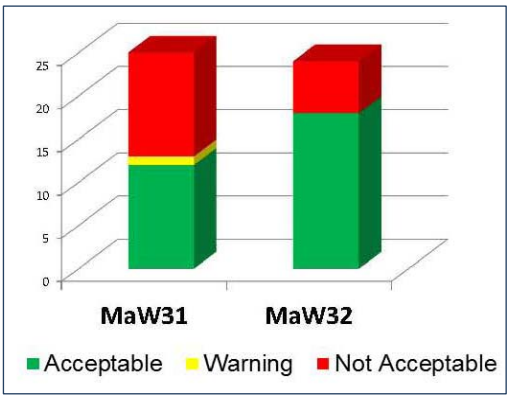

Figure 3. Summary of the MAPEP Series 31 and 32 Results on False Positive Tests for Antimony in Water

Determination of Strontium-89/90 in Soil for MAPEP Series 31 and 32

RESL included a sample for determination of strontium-89/90 in MAPEP Series 31 and Series 32, although the activity ratio was different for each series (i.e., it was 12 in Series 31 and 45 in Series 32). As shown in Figure 4, fewer laboratories participated in this test for MAPEP Series 32, but the laboratories' that participated maintained their success rate at nearly 93% for strontium-89 and increased it to 80% for strontium-90.

Determination of Uranium-234/233 in Soil for MAPEP Series 30 through Series 32

For MAPEP Series 30, RESL included a soil sample with a relatively high percentage of a more insoluble form of uranium for determination of uranium-234/233 in soil. Approximately 70% of the participating laboratories received a "Not Acceptable" performance flag for the uranium isotope due to incomplete sample dissolution from using acid leaching techniques. Although the laboratories' performance for determination of uranium by alpha spectrometry has improved over time, the improvement is mainly due to the addition of more soluble forms of uranium in the samples. To assist the laboratories, RESL posted a white paper on total dissolution of uranium in soil on the MAPEP website in 2014, which can be viewed or downloaded at 2014 MAPEP Series 30 White Paper.

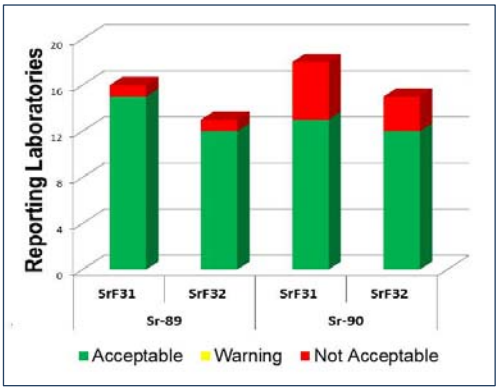

Figure 4. Summary of the MAPEP Series 31 and 32 Results for Determination of Strontium-89/90

After MAPEP Series 30, a number of laboratories asked RESL for technical assistance with sample dissolution techniques. Table 3 illustrates the progress made by seven of these laboratories and shows that they significantly reduced the unacceptable bias of their results for determination of uranium-234 for MAPEP Series 31.

Table 3. Comparison of Bias Results for Determination of Uranium-234 for MAPEP Series 30 and 31

MAPEP	Lab 1	Lab 2	Lab 3	Lab 4	Lab 5	Lab 6	Lab 7
Series 30	-63%	-62%	-64%	-68%	-62%	-65%	-61%
Series 31	-3.8%	4.9%	-25.9%	-7.6%	1.7%	-13.1%	-0.8%

RESL included an insert stressing the importance of complete sample dissolution with the MAPEP Series 33 PT samples shipped in September 2015. The insert can be viewed or downloaded at MAPEP Series 33 Sample Dissolution Insert.

MAPEP Series 33 Special Radiological Matrix

For MAPEP Series 33, RESL offered the laboratories a unique challenge in the form of a special radiological matrix. RESL asked the laboratories to report the activity and associated uncertainty of the matrix. The matrix was offered as a way to promote increased scientific capabilities, since RESL designed it to test the participating laboratories' full analytical capabilities. RESL will not penalize the laboratories for participating (i.e., no warning flags will be set on the MAPEP website and no Letters of Concern will be issued). Thirty-eight laboratories accepted the challenge, and 27 of them reported their results to RESL.

3.2.3 MAPEP Handbook, Revision 15, Issued January 2015

In January 2015, RESL published Revision 15 of the MAPEP handbook, which describes the RESL *Customer Export Control Agreement* and the MAPEP preparation, distribution, and evaluation processes, including the MAPEP Letters of Concern.

3.2.4 DOE Technical Standard on PT Providers and PT Samples

The DOE Office of Sustainable Environmental Stewardship determined that the existing national consensus standards (i.e., Organization for Standardization/ International Electrotechnical Commission 17025:2005, *General Requirements for the competence of Testing and Calibration Laboratories*, and TNI EL-VI-2009, *Management and Technical Requirements for Laboratories Performing Environmental Analysis*) do not adequately address analysis of complex environmental samples like those collected at DOE sites and facilities. As a result, development is in progress on a DOE Technical Standard for PT providers, which is tentatively titled, "Requirements for Proficiency Testing and Evaluation of Environmental Analytical Laboratories." The DOE Technical Standard is intended to provide consistent guidance to DOE Program Offices, site/field office managers, and contracting officers by offering requirements for PT providers and for formulation of PT samples. The draft DOE Technical Standard recommends that commercial laboratories which provide analytical services to DOE be required to participate in

MAPEP or an equivalent PT program. The draft DOE Technical Standard was reviewed in detail during a roundtable session at the 2015 ASP Workshop.

3.2.5 MAPEP Link to DOECAP

When RESL posts the results for a MAPEP test series, the performance of the DOECAP-audited laboratories is reviewed. If a laboratory's performance is not satisfactory, DOECAP issues an interim Priority I or Priority II finding, as appropriate. The priority level of the finding is based on the severity of the problem. During FY 2015, DOECAP issued ten MAPEP-related findings (five Priority I findings and five Priority II findings). In response to a DOECAP finding, the laboratory is required to develop a corrective action plan, which is tracked to closure. The DOECAP Operations Team is authorized to ask RESL to issue remedial MAPEP PT samples to DOECAP-audited laboratories as part of the corrective action implementation process.

3.3 INTERNATIONAL PARTICIPATION IN MAPEP

There is a continuing concern in the Middle East and North Africa about improving the radiological and inorganic analytical capabilities of the region's laboratories. With Iran recently bringing a nuclear power plant on line, and several other countries in this region developing or planning to develop nuclear power reactors and/or research reactors, there is a strong need for reliable, defensible baseline radiological data, as well as data on inorganic contaminants, such as metals, that could enter the food chain.

The Radiation Measurements Cross-Calibration (RMCC) Project, which is coordinated by the Middle East Scientific Institute for Security in Amman, Jordan, strives to improve performance and develop standards for laboratory analytical measurement capabilities. The RMCC Project encourages all of the nations in the Middle East and North Africa to stress participation in MAPEP to their laboratories as a way to improve performance. The U.S. participates in the RMCC Project via sponsorship from the NNSA Office of International Nuclear Safeguards and Engagement.

The RMCC Project conducts annual workshops to provide training on relevant topics, such as laboratory management, quality assurance, radiochemistry, mass spectrometry, and gamma spectroscopy. The RMCC X Workshop was held at the Khalifa University in Abu Dhabi, United Arab Emirates. The ASP Manager's presentation at this workshop focused on fostering improved analytical laboratory data quality. His presentation included a discussion of the results for the two most recent MAPEP Series and the common DOECAP laboratory findings for FY 2015. This information is useful to the laboratories in the RMCC Project's member nations because many of them may have similar applications. In addition, the ASP Manager provided the DOECAP laboratory audit checklists and the most recent ASP annual report to be added to the RMCC Project's website at *http://rmccnetwork.net/en*.

4.0 VISUAL SAMPLE PLAN (VSP)

4.1 INTRODUCTION

Sampling occurs on all DOE sites for a variety of purposes, and the DOE Systematic Planning and Data Assessment Tools Program's VSP software tool is an easy-to-use program that supports development of defensible sampling plans that are based on statistical sampling theory and data quality objectives.

VSP also provides statistical analysis of the results to support confident decision-making. VSP couples site, building, and sample location graphics with optimal sampling design and statistical analysis strategies to help users ensure that they collect the right type, quantity, and quality of data. VSP is available for free download at http://vsp.pnnl.gov.

4.2 VSP FISCAL YEAR 2015 ACLISHMENTS

4.2.1 Release of VSP, Version 7.4

The Pacific Northwest National Laboratory (PNNL) manages VSP. PNNL released Version 7.4 of VSP in June 2015, and it focuses on design and analysis for environmental characterization and remediation, environmental monitoring and stewardship, response and recovery from a chemical/biological/radiological terrorist event, footprint reduction and remediation of unexploded ordnance sites, and development of sampling plans for soil, buildings, groundwater, sediment, surface water, and subsurface layers.

4.2.2 New Features in VSP, Version 7.4

- **Computerization of the *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM) for Planning and Assessing Site Surveys (COMPASS) Capabilities:** Version 7.4 integrated the COMPASS software capabilities, which are needed by MARSSIM users. The new features include: (1) gross activity calculations, (2) elevated measurement comparison, (3) individual radionuclide or series selection, and (4) support for building surfaces and surface soil.

- **Worksheets for the Unified Federal Policy Quality Assurance Project Plans:** Version 7.4 added Worksheets 11, 15, 17, 18, and 20, and where appropriate, VSP fills in sections of the worksheets with text, tables, and graphics.

- **New Feature Added for Implementation of the MARSSIM:** The MARSSIM guidance stipulates the maximum surface area based on class (e.g., Class 1 areas within buildings are equal to or less than 100 square meters). To assist MARSSIM users, PNNL added sample area/room partitioning based on size. This new VSP feature can automatically partition rooms or sample areas based on either maximum size or minimum number of partitions, and the user can specify the angle of division and shape of the partitions. Figure 5 illustrates two aspects of VSP's room and furniture design feature.

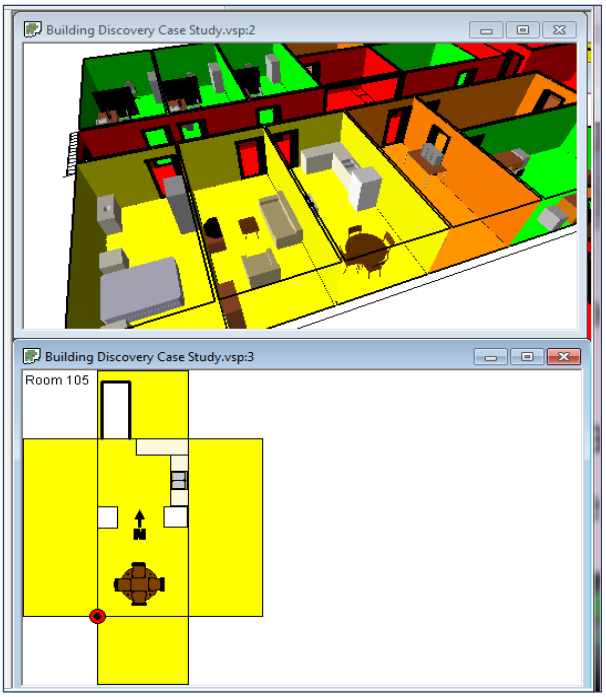

Figure 5. Examples of VSP's Room and Furniture Design Feature

- **Improved Reports:** Previously, when a new design was applied to a project in VSP, all of the previous designs were over-written and lost. Version7.4 added a new Report Manager that enables users to save multiple design reports in a single project file. The stored design reports can be displayed, copied to the clipboard, printed, or saved to a file.

4.2.3 VSP on Social Media (YouTube, LinkedIn, and Facebook)

PNNL introduced VSP into social media during FY 2015 by setting up VSP pages on YouTube, LinkedIn, and Facebook. VSP provides training videos on YouTube, and the LinkedIn and Facebook pages enable VSP users to easily obtain information about upcoming enhancements and new modules, provide feedback, and ask questions. PNNL posted 19 step-by-step VSP instructional videos on YouTube during FY 2015, and complete list of the videos is provided in Appendix D.

4.3 EXAMPLES OF DOE'S USE OF VSP DURING FISCAL YEAR 2015

- DOE-HDK-1216-2015, *Environmental Radiological Effluent Monitoring and Environmental Surveillance*, was issued on March 19, 2015, and it contains a chapter on design and implementation of data analysis and statistical treatment of environmental monitoring program data. A section of this chapter covers computational tools, and VSP is first on the list, with the statement that the tools "were selected based on their wide use, regulatory acceptance, and availability."

- The Office of Legacy Management used VSP to design the groundwater sampling plan for the former Rocky Flats Site. The sampling results were published in the *Annual Report of Site Surveillance and Maintenance Activities at the Rocky Flats, Colorado, Site – Calendar Year 2014*, which was issued in April 2015.

- PNNL performed a pilot study to determine pesticide use in the orchards near the DOE Hanford Site prior to the Manhattan Project so that the pesticide contamination (lead and arsenic) can be adequately addressed. PNNL used VSP to develop the sampling plan.

- DOE sites implement the MARSSIM, and DOE funding helped pay for enhancements to VSP that facilitate MARSSIM implementation. According to the MARSSIM Tools webpage, "Visual Sample Plan (Pacific Northwest National Laboratory) is a simple, defensible tool for defining an optimal, technically defensible sampling scheme for site characterization. VSP is applicable for any two-dimensional sampling plan including surface soil, building surfaces, water bodies, or other similar applications."

5.0 ASP CHALLENGES FOR FISCAL YEAR 2016

The key challenge facing all three of the ASP's component programs in FY 2016 is the need for sufficient resources to continue providing the highest level of service. In addition, each program faces one or more unique challenges in the coming year:

- **DOECAP:**
  - ✓ Promoting greater DOECAP participation throughout the DOE complex, particularly with regard to providing auditor resources. Without the auditors provided by the DOECAP participants, the Program's primary objective of conducting consolidated audits cannot be achieved.
  - ✓ Offering selected analytical laboratories the opportunity to participate in the phased audit process based on their past performance on DOECAP audits and their identification and implementation of effective corrective actions for findings.

- ✓ Updating the DOECAP administrative policies and procedures.
- ✓ Revising the joint U.S. Department of Defense/DOE *Consolidated Quality Systems Manual (QSM) for Environmental Laboratories*.

♦ **MAPEP:**

- ✓ Maintaining RESL's accreditations which come up for renewal in FY 2016.
- ✓ Pursuing approval of a DOE Technical Standard for PT providers, and increasing awareness throughout the DOE complex of the benefits to DOE from laboratories' participation in MAPEP.
- ✓ Staying within the current budget limitations while striving to meet new PT requests from the DOE line and field to support decontamination and decommissioning activities.

♦ **VSP:**

- ✓ Increasing awareness and support for VSP from other DOE Program Offices in addition to the AU.

♦ **PROGRAM OUTREACH:**

- ✓ Promoting incorporation of the Department's policies and procedures into national consensus standards in the areas of auditing, proficiency testing, and field data collection.
- ✓ Promoting the U.S. Government's interests with other nations through collaboration with regard to scientific endeavors for improving radiological and inorganic measurement capabilities.

APPENDIX A
DOECAP-AUDITED LABORATORIES AND TREATMENT, STORAGE, AND DISPOSAL FACILITIES FOR FISCAL YEAR 2015

Fiscal Year 2015 DOECAP-Audited Laboratories	
ALS Laboratory Group Fort Collins, Colorado	ALS Laboratory Group Cincinnati, Ohio
ALS Laboratory Group Salt Lake City, Utah	ARS International, LLC Port Allen, Louisiana
BC Laboratories, Inc. Bakersfield, California	Brooks Rand Labs, LLC Seattle, Washington
Columbia Basin Analytical Laboratories Pasco, Washington	Eberline Analytical Corporation Oak Ridge, Tennessee
GEL Laboratories, LLC Charleston, South Carolina	Materials and Chemistry Laboratory, Inc. Oak Ridge, Tennessee
Shealy Consulting, LLC Lexington, South Carolina	Shealy Environmental Services, Inc. West Columbia, South Carolina
Southwest Research Institute San Antonio, Texas	TestAmerica, Inc. Arvada, Colorado
TestAmerica, Inc. Earth City, Missouri	TestAmerica, Inc. Knoxville, Tennessee
TestAmerica, Inc. Richland, Washington	TestAmerica, Inc. West Sacramento, California
Fiscal Year 2015 DOECAP-Audited TSDFs	
Clean Harbors Colfax, LLC Colfax, Louisiana (Nonradiological)	Clean Harbors Deer Park, LLC La Porte, Texas (Nonradiological)
Diversified Scientific Services, Inc. Kingston, Tennessee	Energy*Solutions*, LLC Clive, Utah
Energy*Solutions*, LLC Oak Ridge, Tennessee	Materials and Energy Corporation Oak Ridge, Tennessee
Perma-Fix of Florida, Inc. Gainesville, Florida	Perma-Fix Northwest, Inc. Richland, Washington
Waste Control Specialists LLC Andrews, Texas	

APPENDIX B
U.S. LABORATORY PARTICIPATION IN MAPEP FOR FISCAL YEAR 2015

Laboratory Name	State
Alabama Department of Environmental Management	Alabama
EPA Mobile Environmental Response Laboratory	Alabama
EPA National Analytical Radiation Environmental Laboratory	Alabama
U.S. Army Yuma Proving Ground, Material Analysis Laboratory	Arizona
BC Laboratories, Inc.	California
California Department of Public Health	California
DLE Associates	California
EMAX Laboratories, Inc.	California
Lawrence Berkeley National Laboratory	California
Lawrence Livermore National Laboratory	California
Lawrence Livermore National Laboratory, Environmental Monitoring Radiological Laboratory	California
Lawrence Livermore National Laboratory, Environmental Radiological Assistance Directory	California
SLAC National Accelerator Laboratory	California
TestAmerica, Inc. – West Sacramento	California
ACZ Laboratories, Inc.	Colorado
ALS Laboratory Group – Fort Collins	Colorado
Colorado Department of Public Health & Environment, Laboratory	Colorado
TestAmerica, Inc. – Denver	Colorado
RSA Laboratories, Inc.	Connecticut
Florida Department of Health, Environmental Laboratory	Florida
Florida Department of Health, Mobile Environmental Radiological	Florida
Kennedy Space Center, Health Physics Laboratory	Florida
U.S. Centers for Disease Control and Prevention, Inorganic and Radiation Analytical Toxicology Branch	Georgia
Georgia Power any, Environmental Laboratory	Georgia
Advanced Test Reactor complex, Radioanalytical	Idaho
Analytical Chemistry Laboratory	Idaho
Idaho National Laboratory	Idaho
Idaho State University, Department of Physics, Environmental Assessment Laboratory	Idaho
Idaho State University, Environmental Monitoring Laboratory	Idaho

APPENDIX B
U.S. LABORATORY PARTICIPATION IN MAPEP FOR FISCAL YEAR 2015 (CONTINUED)

Laboratory Name	State
Argonne National Laboratory, Analytical Chemistry Laboratory	Illinois
ATI Environmental, Inc. – Midwest Laboratory	Illinois
Kansas Department of Health & Environment	Kansas
U.S. Enrichment Corporation	Kentucky
ARS International, LLC	Louisiana
Massachusetts Department of Public Health, Radiation Control Program	Massachusetts
Mississippi State Department of Health	Mississippi
TestAmerica, Inc. – Earth City	Missouri
EPA Office of Radiation and Indoor Air, National Center for Radiation Field Operations	Nevada
University of Nevada – Las Vegas, Radioanalytical Services	Nevada
New Jersey Department of Health, Public Health and Environmental Laboratories, Environmental and Chemical Laboratory Services	New Jersey
Carlsbad Environmental Monitoring and Research Center	New Mexico
Hall Environmental Analysis Laboratory	New Mexico
Los Alamos National Laboratory	New Mexico
Sandia National Laboratories, Radiation Protection	New Mexico
Waste Isolation Pilot Plant Laboratories	New Mexico
West Valley Demonstration Project, Environmental Laboratory	New York
Department of Environmental Health & Safety	North Carolina
U.S. Air Force, School of Aerospace Medicine	Ohio
Fernald Project	Ohio
Fluor-B&W Portsmouth, LLC Analytical Laboratory	Ohio
Microbac Laboratories, Inc.	Ohio
Ohio Department of Health Laboratory	Ohio
S&S Onsite Analytical, Ltd.	Ohio
Outreach Technologies, Inc.	Oklahoma
PACE Analytical Services – Pittsburgh	Pennsylvania
GEL Laboratories, LLC	South Carolina
Savannah River Nuclear Solutions, LLC	South Carolina
Savannah River Site, Environmental Monitoring Laboratory	South Carolina
South Carolina Department of Health and Environmental Control, Radiological	South Carolina

APPENDIX B
U.S. LABORATORY PARTICIPATION IN MAPEP FOR FISCAL YEAR 2015 (CONTINUED)

Laboratory Name	State
South Carolina Department of Health and Environmental Control, Region 5, Environmental Quality Control Tritium Laboratory	South Carolina
UniTech-235	South Carolina
Consolidated Nuclear Security, LLC at Y-12 National Security complex, Analytical Chemistry Laboratory	Tennessee
Eberline Analytical Corporation – Oak Ridge	Tennessee
Hall Research Group	Tennessee
Materials and Chemistry Laboratory, Inc.	Tennessee
Oak Ridge Institute of Science and Education, Independent Environmental Assessment and Verification	Tennessee
Oak Ridge National Laboratory, Internal Dosimetry Group	Tennessee
Radioactive Material Analysis Laboratory	Tennessee
Teledyne Brown Engineering	Tennessee
TestAmerica, Inc. – Knoxville	Tennessee
Consolidated Nuclear Security, LLC at Pantex Plant, D&RMG	Texas
Energy Labs – College Station	Texas
Southwest Research Institute	Texas
Texas Department of State, Health Services Laboratory	Texas
Energy*Solutions*, LLC	Utah
AREVA Chemistry and Materials Center	Virginia
B&W Technical Services, Radioisotope & Analytical	Virginia
Thomas Jefferson National Accelerator Facility, Jefferson Laboratory	Virginia
Analytical Support Operations – Radiochemical Processing	Washington
ATL International, Inc., Training & Technology Center	Washington
Brooks Rand Labs, LLC	Washington
CEBAM Analytical, Inc.	Washington
Hanford Site, 222-S Laboratory	Washington
RJ Lee Group Columbia Basin Analytical Laboratories	Washington
TestAmerica, Inc. – Richland	Washington
Washington Closure Hanford, LLC	Washington
Washington State Public Health Laboratories	Washington
Wisconsin State Laboratory of Hygiene	Wisconsin
Energy Laboratories, Inc.	Wyoming

APPENDIX C
INTERNATIONAL LABORATORY PARTICIPATION IN MAPEP FOR FISCAL YEAR 2015

Laboratory Name	Country
Health Services Support Agency, Forensic and Scientific Services	Australia
International Atomic Energy Commission	Austria
Supreme Council for Environment	Bahrain
Instituto de Radioprotecao e Dosimetria – Comissão Nacional de Energia Nuclear	Brazil
Radiation Protection Bureau RSD NMS	Canada
Radiation Protection Service	Canada
Laboratorio de Vigilancia Ambiental Radiactiva	Ecuador
Radiation Laboratory	Egypt
Soreq Nuclear Research Center	Israel
Chemical and Physical Analysis Laboratories Directorate	Jordan
Energy and Mineral Regulatory Commission	Jordan
Research Laboratories and Information Directorate	Jordan
Royal Scientific Society, Radiation Protection Laboratory	Jordan
Ministry of Health, Radiation Protection Department Laboratory	Kuwait
Physics Department Radiological Laboratory	Kuwait
Lebanese Atomic Energy Commission – Environmental Radiation	Lebanon
Asia Lab (Malaysia) Sdn Bhd	Malaysia
National Center for Nuclear Energy, Sciences and Techniques	Morocco
UniTech Services B.V.	Netherlands
Environmental Radioactivity – National Centre for Radiation Science	New Zealand
Foods and Water Laboratories Center	Oman
Qatar University, Nuclear Physics Laboratory	Qatar
South Africa Nuclear Energy Corporation, RadioAnalysis	Republic of South Africa
Babcock Marine Rosyth, Ltd.	Scotland
ZVD Institute of Occupational Safety	Slovenia
CIEMAT Research Institute, Radiation Protection Laboratory	Spain
Departamento Ingeniería Nuclear y Mecánica de Fluidos	Spain
Laboratori de Radiologia Ambiental – Universitat de Barcelona	Spain
Laboratorio de Radiactividad Ambiental de la Universidad Politecnica de Valencia	Spain
Radiactividad Ambiental y Vigilancia Radiologica	Spain

APPENDIX C
INTERNATIONAL LABORATORY PARTICIPATION IN MAPEP FOR FISCAL YEAR 2015 (CONTINUED)

Laboratory Name	Country
Research Centre in Energy, Environment and Technology, Radiation Protection Laboratory	Spain
University of La Laguna Laboratorio de Fisica Medica	Spain
Radioanalytical Laboratory	Tunisia
Istanbul University, Faculty of Science, Department of Biology, Radioecology Laboratory	Turkey
Abu Dhabi Quality and Conformity Council – Central Testing Laboratory	United Arab Emirates
Cavendish Nuclear Limited	United Kingdom
Centre for Ecology and Hydrology	United Kingdom
Centre for Radiation, Chemical and Environmental Hazards	United Kingdom
Chemistry Support Services	United Kingdom
Environmental Scientifics Group	United Kingdom
Glasgow Scientific Services	United Kingdom
LGC, Ltd.	United Kingdom
Materials Assessment and Health Physics Group	United Kingdom
NAS Radiochemistry Group	United Kingdom
National Oceanography Centre, Southampton	United Kingdom
Public Health England, Centre for Radiation, Chemical and Environmental Hazards – Scotland	United Kingdom
UniTech Services Group, Ltd.	United Kingdom

APPENDIX D
VSP TRAINING VIDEOS POSTED ON YOUTUBE IN FISCAL YEAR 2015

Course	Title	Description
EA100	*Creating Sample Areas*	The basics of creating and working with sample areas.
EA300	*MARSSIM Support Features*	Dividing sample areas based on size constraints and automatic creation of user-defined MARSSIM class parameters.
EA400	*Area User-Defined Parameters*	User-defined parameters in VSP can be used to store additional information about rooms and sample areas, and the sample areas can be assigned colors according to their user-defined parameters.
F100	*Adding Furniture to Rooms*	Loading the default VSP furniture objects into a room to make sampling designs more realistic.
M100	*Loading a Map File*	Loading a map file and explains the basics of working with a map file in VSP.
M110	*Importing Multiple Maps*	Did you try to load a map file into VSP only to have everything disappear? This video explains why and what to do.
M200	*Coordinate Systems in VSP*	The basics of projected coordinate systems and how to correctly specify a map's coordinate system in VSP.
M310	*Editing Map Lines*	Selecting and editing map lines in VSP.
M400	*Creating Multi-Building Projects*	Managing and displaying multiple building files in a single VSP project.
M500	*Quick Map from Web*	Using the Lookup Starting Location feature to load imagery for any place in the world.
MB200	*Map Tile Server*	Setting up and displaying background images from a tile server.
R100	*Setting up Rooms*	The basics of creating and working with rooms.
R200	*Doors, Windows, and Overlays*	Setting up doors, windows, and surface overlays in rooms that you create in VSP.
S400	*Multiple Analytes*	How to handle multiple analytes in the sample design.
SA500	*MARSSIM Sign Test Design*	Using VSP to set up a sampling design to perform the MARSSIM Sign Test on a site.
SA510	*MARSSIM Sign Test Analysis*	Using VSP to perform the MARSSIM Sign Test.
SH100	*Sample Designs for Hypothesis Tests*	VSP's terminology and practices for hypothesis test designs (e.g., comparing an average to a fixed threshold).
SR300	*MARSSIM WRS Test Design*	Using VSP to set up the MARSSIM Wilcoxon Rank Sum Test sampling design.
SR310	*MARSSIM WRS Test Analysis*	Using VSP to test sample results using the MARSSIM Wilcoxon Rank Sum Test.