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# Quality Assurance



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During 2010, responsibilities for administering the Savannah River Site (SRS) environmental quality assurance (QA) program again were divided among three groups—Environmental Monitoring Laboratory (EML), Environmental Monitoring Program (EMP), and Area Completion Projects (ACP).

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**S**RS conducts an environmental QA program to ensure the integrity of analyses performed by SRS and offsite laboratories and to ensure that quality control (QC) program requirements are met. The program's objectives are to ensure that samples are representative of the surrounding environment, and that analytical results are accurate.

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## Environmental QA Program Integration

The SRS comprehensive environmental QA program follows the QA requirements defined in the site's quality assurance procedures. Each SRS environmental organization has developed and implemented QA procedures that address these requirements. In addition, the site's independent QA organization periodically performs QA environmental program reviews and assessments to ensure compliance with site requirements. SRS environmental professionals periodically conduct QA self-assessments on specific environmental program activities. Results, improvement opportunities, and corrective actions generated by these assessments are documented in the Site Tracking, Analysis and Reporting (STAR) system. Site management participates in the Management Field Observation process, and the results from these reviews also are documented in STAR. The focus of this chapter is on environmental laboratory QA.

## Program Samples Quality Assurance Program

EML, EMP, and ACP have documented QA programs that meet SRS and DOE requirements [SRNS, 2009]. Based on inspections of instrument records and on data reviews, no corrective actions were identified during 2010.

For onsite laboratories, analytical methods and instrumentation include pH, biological oxygen demand, fecal coliform, total residual chlorine, temperature, liquid scintillation and gas flow proportional counter, alpha and gamma spectrometry, inductively coupled plasma atomic emission spectrometry (ICP–AES), inductively coupled plasma mass spectrometry (ICP–MS), flow injection mercury system (FIMS), and gas chromatography mass spectrometry (GC–MS). Analyses include hydrogen-3 (tritium), carbon-14, nickel-63, gamma-emitting isotopes (cesium-137, cobalt-60, potassium-40, plus any other detected isotopes), iodine-129, strontium-89,90, strontium-90, americium-241, curium-244, neptunium-237, plutonium-238, plutonium-239, thorium-229, thorium-230, thorium-232, uranium-234, uranium-235, uranium-238, inorganic metals, mercury, and volatile organic compounds. Total suspended solids are determined by weight. Method and instrument performance is monitored through the use of QC standards and control charts. Analytical batch performance is measured through the use of QC samples (blanks, spikes, carriers, tracers, laboratory control samples, and laboratory duplicates). QC results that fall outside of specified limits may result in analytical batch or sample reruns. For those batches or samples that fall outside of limits—but for which the results are determined to be satisfactory—the reason(s) are documented in the data package, which includes the QA cover sheet, instrument data printouts, and associated QC data.

Environmental investigations of soils and sediments, primarily for Resource Conservation and Recovery Act/Comprehensive Environmental Response, Compensation, and Liability Act units, are performed by subcontract laboratories. Data are reviewed by ACP according to U.S. Environmental Protection Agency (EPA) standards for analytical data quality, or as specified by SRS onsite customers.

The ACP environmental data review program is based in part on two EPA guidance documents, “Guidance for the Data Quality Objectives Process for Superfund” [EPA, 1993a] and “Systematic Planning: A Case Study for Hazardous Waste Site Investigations” [EPA, 2006]. These documents identify QA issues to be addressed, but they do not formulate a procedure for data evaluation or provide pass/fail criteria to apply to data and document acceptance. Hence, the SRS data review program contains elements from—and is influenced by—several other references, including

- “Guidance on Environmental Data Verification and Data Validation” (QA/G-8) [EPA, 2002b]
- “USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review” [EPA, 1999b]
- “USEPA Contract Laboratory Program National Functional Guidelines for Chlorinated Dioxin/Furan Data Review” [EPA, 2005]
- “USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review” [EPA, 2004]
- “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,” EPA, November 1986, SW-846, Third Edition; Latest Update, February 2008 [EPA, 2008f]
- “DOE Quality Systems for Analytical Services,” Revision 2.6, November 2010 [DOE, 2010]
- “Analytical Data Qualification,” ER-SOP-033, Revision 3 [SRNS, 2007]

For the ACP program, many QA parameters are evaluated by automated processing of electronically reported data. Others are selectively evaluated by manual inspection of associated analytical records. A summary of findings is presented in each project narrative or validation report prepared by ACP personnel.

An annual DOE Consolidated Audit Program (DOECAP) evaluation of each subcontract laboratory is performed to ensure that all the laboratories proficiently demonstrate technical capability and follow the required QA programs. The evaluation includes an examination

of laboratory performance with regard to sample receipt, instrument calibration, analytical procedures, data verification, data reports, records management, nonconformance and corrective actions, and preventive maintenance. In 2010, evaluations were conducted at three laboratories, resulting in a total of 13 Priority II findings. A Priority II finding documents a deficiency that is not of sufficient magnitude to render the audited facility unacceptable to provide services to DOE. A report on the 2010 findings and recommendations was provided to each laboratory. For findings, each affected laboratory submitted corrective action responses, and the responses subsequently were reviewed. The findings typically are closed during the next laboratory audit (scheduled for 2011).

Evaluations also were conducted at three laboratories in 2009, resulting in 23 Priority II findings. Each laboratory submitted a corrective action response that addressed each finding. Twenty-one of the 23 Priority II findings identified during 2009 were reviewed and closed during 2010. It is anticipated that the remaining two findings will be closed out with the next scheduled audit in 2011.

### Laboratory Certification

EMP is certified by the South Carolina Department of Health and Environmental Control (SCDHEC) Office of Laboratory Certification for field pH, temperature, total residual chlorine measurements, biological oxygen demand, fecal coliform, and low-level mercury sampling.

EML is certified by the SCDHEC Office of Laboratory Certification for analytical measurements using the following methods:

- Total suspended solids (Standard Methods, 2540D), 25 metals by ICP-AES (EPA, 200.7), mercury by FIMS (EPA, 245.2), and 17 metals by ICP-MS (EPA, 200.8)
- 40 volatile organic compounds by GC-MS (EPA, 8260B), 26 metals by ICP-AES (EPA, 6010C), mercury by FIMS (EPA, 7470A and 7471B), and 15 metals by ICP-MS (EPA, 6020A)

Certificates are renewed every three years; the current certificates expire in June 2012.

National Pollutant Discharge Elimination System (NPDES) samples are analyzed by four onsite laboratory groups—EML, EMP, D-Area Powerhouse, and the Sanitary Wastewater Treatment Plant—and one offsite subcontract laboratory. All these laboratories are certified by SCDHEC for NPDES analyses.

During 2010, all laboratories performing NPDES analyses for SRS participated in the SCDHEC-required proficiency testing studies, per State Regulation 61–81 (“State Environmental Laboratory Certification Program”). All laboratories utilized accredited proficiency testing providers, accredited by the American Association of Laboratory Accreditation.

During 2010, four full-service subcontract laboratories were used by ACP, and subcontract laboratories also participated in various water pollution studies.

The onsite and subcontract laboratories reported acceptable proficiency testing results during 2010; therefore, state certification was maintained for all analyses.

SRS lost SCDHEC certification for about two weeks during January 2010 for laboratory methods EPA 6010C, EPA 6020A, EPA 7470A, and EPA 7471A. Proficiency testing results had been completed as required in 2009; however, when reporting the results to SCDHEC, the EML made an administrative error by not specifying these methods on the report form. The reason for the error was that SCDHEC had changed the way methods were to be reported in 2009, and the change was missed by the laboratory. A new set of proficiency testing samples was analyzed by mid-January 2010, resulting in the demonstration of satisfactory performance. SCDHEC subsequently renewed the certification for these methods by the end of the month. During this period, there was no impact on laboratory analyses or on the reporting of data to site customers.

### Blind pH Samples

EMP personnel routinely conduct blind sample analyses for field measurements of pH to assess the quality and reliability of field data measurements. The results for blind sample analyses were acceptable during 2010. Blind pH sample results can be found in [data table 8–1](#) (see “SRS Environmental Data/Maps” on the CD accompanying this report).

### NPDES Field Duplicate and Blind Samples

The environmental monitoring program reviews laboratory performance by analyzing field blind and duplicate samples throughout the year.

The results for onsite and offsite laboratory blind and duplicate sample analyses indicated that, although there were some differences, no problems occurred consistently within the laboratories during 2010. For blind samples, only one value out of 70 exceeded 20 percent; for duplicate samples, only four values out of 71 exceeded 20 percent. Complete field blind and duplicate sample program results can be found in [data tables 8–2](#) and [8–3](#) (see “SRS

Environmental Data/Maps” on the CD accompanying this report).

### Stream and River Water Quality Duplicate Samples

SRS’s water quality program requires checks of 10 percent of the samples to verify analytical results. Duplicate samples from site streams and the Savannah River were analyzed by EML and a subcontract laboratory in 2010. Results for the field duplicate sampling program indicated that, although there were some differences, no problems occurred consistently within the laboratories. Detailed stream and Savannah River field duplicate sample results can be found in [data table 8–4](#) (see “SRS Environmental Data/Maps” on the CD accompanying this report).

### External QA Program

EML participated during 2010 in the DOE Mixed Analyte Performance Evaluation Program (MAPEP), a laboratory comparison program that tracks performance accuracy and tests the quality of environmental data reported to DOE. The DOE Radiological and Environmental Sciences Laboratory, under the direction of the Office of Health, Safety, and Security, administers the MAPEP. MAPEP samples include water, soil, air filter, and vegetation matrices—all with environmentally important stable inorganic, organic, and radioactive constituents. Two separate studies were offered by MAPEP in 2010. In 2010, EML participated in the two studies, and the results for both studies were found to be satisfactory; out of 140 analyses, only two results were not acceptable (uranium-233,234 and uranium 238).

MAPEP results for the four full-service subcontract laboratories used by ACP in 2010 also were satisfactory, with the exception of air filter analyses for one laboratory. The laboratory evaluated the cause for the failed analyses and developed corrective actions to prevent a recurrence.

To help participants identify, investigate, and resolve potential quality concerns, MAPEP issues a letter of concern to a participating laboratory upon identification of a potential analytical data quality problem in the MAPEP results. Letters of concern have been issued since 1996, shortly after the beginning of the MAPEP program. A copy of each letter is sent to DOE/contractor oversight points of contact. Intended to be informative—not punitive—each letter states, “This letter is solely intended to alert your laboratory to a potential quality concern that you may wish to investigate for corrective action.” Three subcontract laboratories were issued letters of concern in 2010—one lab for uranium-235,238, a second for pyrene, and a third for americium-241.

