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ENVIRONMENTAL MONITORING PROGRAM QUALITY ASSURANCE PROJECT PLAN

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ABSTRACT

The Quality Assurance Project Plan (QAPP) is intended to document the quality assurance of the Environmental Monitoring Program. The Quality Assurance Project Plan has two parts and is written to become a chapter in the *Environmental Monitoring Plan*. Part A describes the management responsibilities and activities performed to assure the quality of the Environmental Monitoring Program. Part B covers the documentation requirements for changes in the Monitoring Program, and provides details on control of the design and implementation of quality assurance activities.

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CONTENTS

Environmental Monitoring Program Quality Assurance Project Plan.....	7
Part A — Management Systems.....	7
Management Commitment and Organization.....	7
Quality Assurance Program Description	9
Personnel Training and Qualification	10
Management Assessment.....	12
Procurement of Items and Services.....	12
Document Control and Records.....	12
Use of Computer Hardware and Software	13
Work Processes and Operations	13
Quality Improvement.....	14
Part B — Technical Description and Reporting Requirements.....	15
Planning and Scoping.....	15
Design of Data Collection Activities.....	16
Implementation of Planned Operations.....	16
Assessment of Data Usability	17
Quality Assessment and Response	17
References.....	18
Glossary and List of Acronyms	19
Distribution	20

ENVIRONMENTAL MONITORING PROGRAM QUALITY ASSURANCE PROJECT PLAN

The Environmental Monitoring Program ensures that SNL/California complies with Federal, State, and local regulations, and DOE Orders governing emissions to the environment. The Program monitors airborne emissions sources, wastewater discharges, and the environment of the Laboratory and nearby vicinity to verify compliance. The program also provides training to line organizations on issues concerning discharges to the air and sanitary sewer.

The Environmental Monitoring Program is part of the Environmental Protection Department within the Center for Environment, Safety & Health (ES&H) and Facilities. The *Environmental Monitoring Plan*, a document required by DOE Order 5400.1 that must be reviewed annually, describes the Environmental Monitoring Program in detail.^{1,2}

The Quality Assurance Project Plan (QAPP) is intended to document the quality assurance of the Environmental Monitoring Program, following guidance presented in DOE Order 5700.6C and ANSI/ASQC-E4-19xx.^{3,4} The Quality Assurance Project Plan has two parts and is written to become a chapter within the *Environmental Monitoring Plan*. Part A describes the management responsibilities and activities performed to assure the quality of the Environmental Monitoring Program. Part B covers the documentation requirements for changes in the Monitoring Program, and provides details on control of the design and implementation of quality assurance activities.

PART A — MANAGEMENT SYSTEMS

Management Commitment and Organization

The manager of the Environmental Protection Department is fully committed to implementing the Center for ES&H and Facilities *Quality Assurance Management Plan* (QAMP).⁵ Pursuant to this commitment, he directed development of this QAPP to implement the QAMP within the Environmental Monitoring Program.

The Department Manager retains ultimate responsibility for implementing this Quality Assurance Project Plan (QAPP). The Environmental Monitoring Program Manager is responsible for ensuring the application of QAPP provisions to daily Program activities.

The primary responsibility, however, for the quality of the work within the Environmental Monitoring Program rests with the individual performing the work. No individual will work on a project for which he or she is not qualified. Each individual is responsible for understanding and complying with the quality assurance requirements for any task performed.

Figure 1 shows the organizational structure of the Environmental Monitoring Program and its relationship to the Environmental Protection Department.

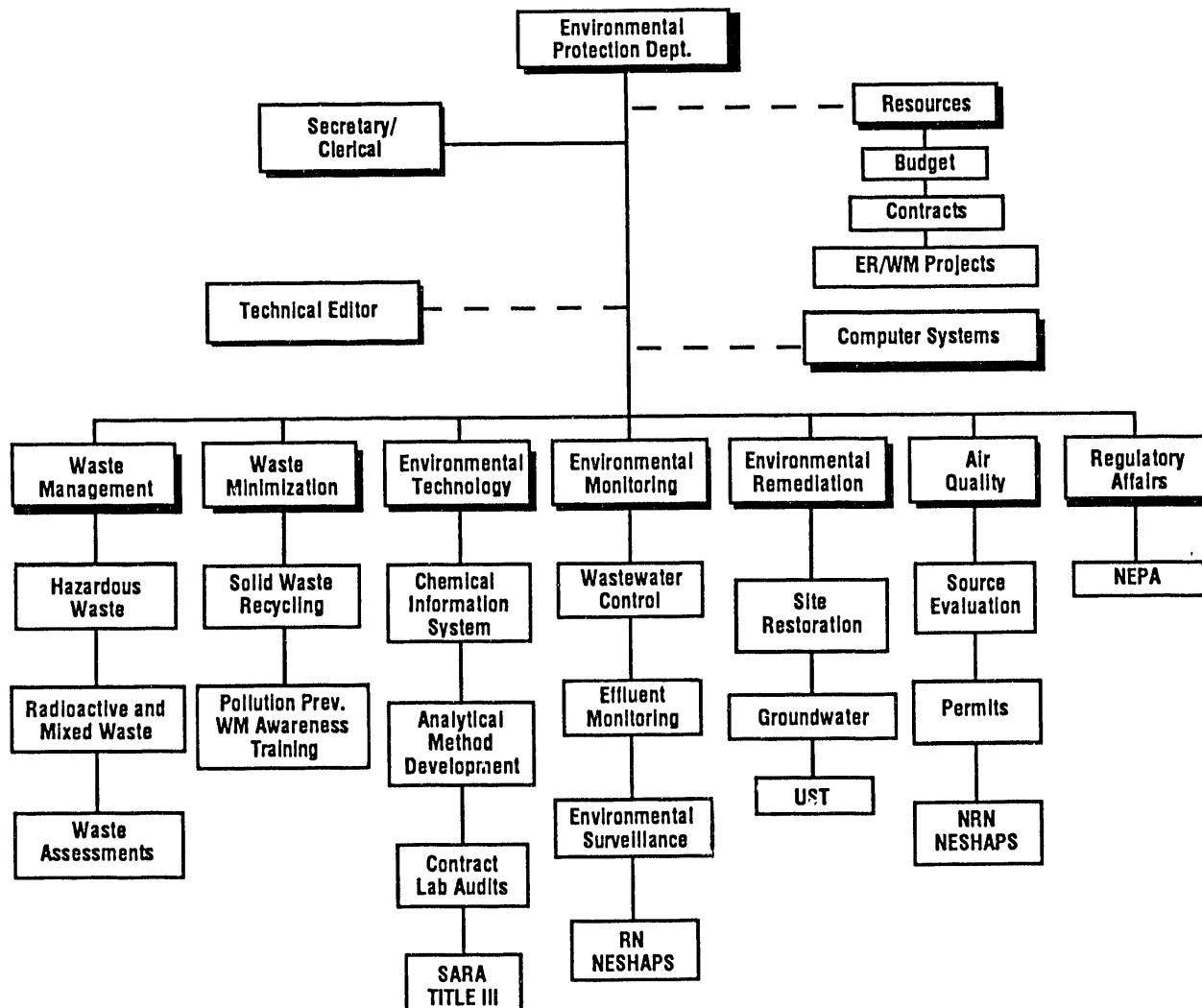


Figure 1. Organizational structure of the Environmental Protection Department.

The Environmental Monitoring Program also interfaces with other organizations within and outside of Sandia:

- Lawrence Livermore National Laboratory (LLNL) conducts most of the off-site environmental monitoring. Monitoring Program personnel receive LLNL off-site monitoring data to review ongoing environmental quality and to prepare the annual Site Environmental Report.
- The on-site Atmospheric Release Advisory Capability (ARAC) system provides meteorological data as inputs to computer dose modeling programs.
- The Environmental Technology Program of the Environmental Protection Department performs metals analyses of the wastewater samples collected from the Liquid Effluent Control Systems (LECS).

- The ES&H and Facilities Management Center Quality Assurance Organization provides independent oversight for and assessment of the implementation of this QAPP.
- Off-site analytical laboratories analyze environmental samples and support sample collection activities.

Quality Assurance Program Description

The Quality Assurance Program for the Environmental Monitoring Program includes:

- The ES&H and Facilities Center QAMP and its Implementing Procedures (IPs), and
- This QAPP and the Operating Procedures written to support its implementation.

The QAMP covers quality assurance traits common to all functions of the Center for ES&H and Facilities. These standardized functions include management assessment, personnel qualifications and training, procurement policies, and document control.

This QAPP applies to all program specific activities necessary to produce the desired type and quality of environmental monitoring data. These activities include: sample collection, data validation, data manipulations, equipment calibration, dose calculations, and reports.

The Operating Procedures will be established in accordance with IP 4.02, *Development of Operating Procedures*.⁶ The procedures will cover the following areas:

- Data analysis
- Meteorological monitoring
- Direct radiation monitoring
- Sewer monitoring
- Liquid Effluent Control System monitoring (LECS)
- Stormwater runoff monitoring
- Annual off-site radiological dose assessment
- Sampling process wastewater for federal categorical pretreatment regulation compliance.

Planning documents and operating procedures, as described in the QAMP and this QAPP, will be developed before any new activity affecting quality is undertaken. These documents and procedures serve to ensure the data produced are of the required type and accuracy commensurate with the importance of the activity.

Personnel Training and Qualification

The qualifications and training of Environmental Monitoring Program personnel conform to the requirements of QAMP Section 2, and IP 2.01, *Qualifications and Training*.⁷ This IP requires that training documentation or training exemption documentation be maintained for all personnel and procedures. Table 1 lists job descriptions and qualifications within the Environmental Monitoring Program.

Table 1. Job Descriptions and Qualifications

Position	Qualifications
Environmental Monitoring Program Manager Responsible for the overall management of the Environmental Monitoring Program, including sampling strategies and methods, preparing required reports, interacting with regulatory agencies, and informing management of Environmental Monitoring activities.	Master's degree in Environmental Science, Biology, Health Physics, or related biological or physical science. Minimum of five years' experience in environmental monitoring, meteorological monitoring, radiological dose assessment, or related environmental field.
Task Leader Responsible for a given task or a particular project. Responsibilities include performing all technical aspects of the given task in compliance with DOE Orders, Federal, State, or local regulations, and Sandia procedures, as appropriate.	Bachelor's degree in Environmental Science, Biology, Health Physics, or related biological or physical science, or equivalent experience. Minimum of two years' experience in environmental monitoring, meteorological monitoring, radiological dose assessment, or related environmental field.
Task Support Responsible for assisting Task Leaders and the Program Manager as assigned.	Bachelor's degree in Environmental Science, Biology, Health Physics, or related biological or physical science, or equivalent experience. Minimum of two years' experience in environmental monitoring, meteorological monitoring, radiological dose assessment, or related environmental field.
Technical Support Responsible for field monitoring, sample collecting, handling, storage, shipping to appropriate analytical facilities, analyzing report verification, and maintaining sampling equipment.	Two-year technical degree, or the equivalent. Minimum of two years' experience in either environmental sampling or installing and maintaining mechanical or electrical systems.

In accordance with IP 2.01, the Environmental Monitoring Program Manager is responsible for assuring and documenting that Program personnel receive appropriate training for their duties. The Program Manager maintains training records for all personnel and keeps copies for quality assurance records, as specified in IP 4.04, *Records Management*.⁸ Table 2 shows the training required of all Monitoring Program personnel. Table 3 shows additional training that may be required of individual Monitoring Program personnel, depending on their assigned duties.

Table 2. Mandatory Training Requirements for Environmental Monitoring Personnel

Training	Frequency
Radiation Safety Orientation	Biannual
Fire Extinguisher Awareness	Annual
Occurrence Reporting Procedures	Biannual
Lockout/Tagout Awareness	Annual
Emergency Preparedness Awareness	Annual
ES&H Rights Self-Study	Annual
Quality Assurance Project Plan Orientation	Upon hire, or changes to the QAPP

Table 3. Individual Training Requirements for Environmental Monitoring Personnel (assigned as appropriate)

Training	Frequency
Data Validation and Verification	Upon assignment of responsibility or update of the procedure.
Control of the LECS	Upon assignment of responsibility or update of the procedure.
Operation of the B. 913 LECS	Upon assignment of responsibility or update of the procedure.
Operation of the B. 906 LECS	Upon assignment of responsibility or update of the procedure.
Operation of the B. 910 LECS	Upon assignment of responsibility or update of the procedure.
Operation of the B. 968 LECS	Upon assignment of responsibility or update of the procedure.
TLD Collection	Upon assignment of responsibility or update of the procedure.
Meteorological Program Performance Checks	Upon assignment of responsibility or update of the procedure.
Data Analysis	Upon assignment of responsibility or update of the procedure.
Sanitary Sewer Outfall Monitoring	Upon assignment of responsibility or update of the procedure.
Dose Assessment	Upon assignment of responsibility or update of the procedure.
Stormwater Runoff Monitoring	Upon assignment of responsibility or update of the procedure.
Federal Categorical Process Monitoring	Upon assignment of responsibility or update of the procedure.

Management Assessment

The Director of the Center for ES&H and Facilities is responsible for management assessment of the operations of the Environmental Monitoring Program. These duties and responsibilities are detailed in IP 9.01, *Management Assessment*.⁹

Environmental Monitoring Program personnel are responsible for cooperating with the management assessment teams. This cooperation includes allowing access to files and equipment, and permitting physical inspection of work activities in progress.

Procurement of Items and Services

IP 7.01, *Procurement*, describes the steps necessary to assure the quality of purchased items and services.¹⁰

Typical items and services procured by the Monitoring Program include:

- Laboratory analyses of environmental samples;
- Calibration services for meteorological sensors;
- Flow measuring, pH measuring, and proportional sample collecting equipment for sewer monitoring; and
- Consulting services for specialized tasks.

IP 7.01 requires that quality assurance requirements for procurements be documented to ensure that these items and services meet the quality requirements of the Monitoring Program.

Document Control and Records

The ES&H and Facilities Management Center Document Control System controls Documents and Records generated by the Monitoring Program, as detailed in IP 4.03, *Document Control*, and IP 4.04, *Records Management*.^{11,8}

The following items, produced by the Environmental Monitoring Program, are considered quality assurance records. Therefore, they are subject to the conditions specifying retrievability, safeguards, and retention time.

- All data generated by environmental sampling.
- All chain-of-custody forms, field notebooks, and other documents associated with environmental sampling.
- All documents specifying the design or rationale of environmental monitoring systems.
- All Operating Procedures, both current and superseded.
- All reports, plans, and other forms of data transmittal, intended for either internal or external purposes.

Use of Computer Hardware and Software

The Environmental Monitoring Program uses only standard hardware and software. No software is developed specifically for the Monitoring Program.

Work Processes and Operations

Work processes and operations include all Monitoring Program activities that affect the quality of the data produced. These activities include: sampling, dose modeling, data analysis, and equipment calibrations. All Operating Procedures are developed in accordance with IP 4.02, *Development of Operating Procedures*.¹² The following areas are addressed:

- **Sampling.** Environmental sampling activities are described in Operating Procedures (as specified in Section 2). The Operating Procedures specify necessary quality control checks and acceptance criteria.
- **Dose Modeling.** Dose modeling activities are described in an Operating Procedure. This procedure includes necessary quality control checks and acceptance criteria.
- **Data Analysis.** Data manipulation is described in an Operating Procedure. This procedure includes: data validation and verification, data quality objectives (developed in accordance with IP 5.04, *Data Quality Objectives Process*),¹³ data tracking and trending, quality control data analysis, developing summary statistics, and comparing data to specified regulatory limits.
- **Equipment Calibrations.** Calibration of measuring and test equipment is described in Operating Procedures. These procedures follow the guidance provided in IP 5.03, *Control of Measuring and Test Equipment*.¹⁴ These procedures incorporate guidance from the equipment manufacturers as appropriate. The procedures include acceptance criteria. Calibrations are traceable to a national standard (such as National Institute for Standards and Technology—NIST).

The Center for ES&H and Facilities Quality Assurance organization independently assesses the implementation of Quality Assurance for work processes, in accordance with IP 10.01, *Independent Assessment*.⁹

The ES&H Assessments Department (Organization 7001) performs independent technical assessments. These technical assessments use procedures developed by the ES&H Assessments Department.

Quality Improvement

The Environmental Monitoring staff constantly strive to improve the quality of Program operations. Improvement is accomplished through the following actions:

- *Management and Independent Assessments:* Recommendations from both outside organizations and internal management assessments (see Part B, Section 5) are implemented as soon as is reasonably achievable. Recommendations are tracked in order to identify any trends adverse to quality.
- *Design Reviews:* All revisions or additions to the design of environmental monitoring operations receive peer review by a qualified individual and a management review up to the level of the Director, ES&H and Facilities Management Center.
- *Corrective Action:* Necessary corrective actions (identified during Program assessments) are carried out in a timely fashion. These corrective actions are documented by memorandum to file. If the corrective action requires a change in the Monitoring Program, these changes will be documented as specified in Part B of this QAPP.

All personnel are encouraged to identify and correct problems. Staff are encouraged to offer ideas for improvement to the Monitoring Program.

Nonconforming data and equipment may be detected in two ways: 1) through routine inspections, calibrations, or usage; and 2) through management assessments. For the purposes of this QAPP, nonconformances are defined as deficiencies in procedure, characteristic, or documentation, which render the quality of an item unacceptable or indeterminate.

Disposition of nonconforming equipment is covered in the Operating Procedure for calibration of the equipment. This procedure also includes guidelines for use of data collected during the period when the equipment was not performing within specifications.

The disposition of nonconforming data (i.e., data that fails to meet established Data Quality Objectives) is covered in IP 5.01, *Identification and Control of Technical Data*, and OP-EM-9, *Data Validation and Verification* (see Part A, Sections 2 and 8).^{15,16}

PART B — TECHNICAL DESCRIPTION AND REPORTING REQUIREMENTS

Planning and Scoping

The *Environmental Monitoring Plan* describes the Environmental Monitoring Program in detail, and includes the rationale for sampling, sampling procedures, analytical procedures, and previous data analysis.² This document is required by DOE Order 5400.1, must be reviewed annually and revised at least once every three years. The latest version of the *Environmental Monitoring Plan* reflects the current status of the Environmental Monitoring Program, and includes the final documentation on all changes.

Between revisions to the *Environmental Monitoring Plan*, Planning and Scoping Packages provide documentation for changes or additions to the Monitoring Program. The following revision of the *Environmental Monitoring Plan* includes all the changes described in the interim Planning and Scoping Packages.

Planning and Scoping Packages receive the same level of review as the *Environmental Monitoring Plan*, up to and including the Manager of the Environmental Protection Department.

Planning and Scoping Packages contain the following information:

- Rationale for the change(s)
- Requirements for the change
 - References
 - Regulations
 - Best practices
 - Data quality objectives (defined in IP 5.04)
- Description of the change
 - Manpower required
 - Equipment required
 - Controlled conditions required (if any)
 - Level of assessment tools required (audits, quality control checks, peer reviews, etc.)
 - Detailed identification of methods required
 - New records required (if any) as quality assurance records
- Independent verification of the change—The Environmental Monitoring Program Manager selects a knowledgeable reviewer not directly involved in producing the change or addition. The review includes documented resolution of the reviewer's comments. A letter to the project file (included in the Planning and Scoping Package) documents the reviewer's qualifications.

All Planning and Scoping Packages are retained permanently as quality assurance records.

Planning and Scoping Packages also include procedures to document and control the conduct of new activities generated by these new changes.

Design of Data Collection Activities

The *Environmental Monitoring Plan* describes the design of environmental monitoring operations. Like Planning and Scoping packages, Design Packages provide for changes or additions to the design of the Monitoring Program between revisions to the *Environmental Monitoring Plan*. These design changes are also included in the next revision of the *Environmental Monitoring Plan*.

Design Packages receive the same level of review as the *Environmental Monitoring Plan*, up to and including the Manager of the Environmental Protection Department.

A Design Package is generated with Planning and Scoping documents and contains the following information:

- Sample type
- Sampling locations
- Sample handling and custody requirements
- Personnel qualifications and requirements
- Health and safety requirements
- Analytical methods—selection and requirements
- Analytical facility requirements
- Quality control sample requirements
- Analytical instrumentation and/or sampling equipment requirements
- New data reduction or validation requirements
- Review plans for system readiness prior to collecting samples
- Independent verification by a knowledgeable reviewer not directly involved in producing the new design.

All Design Packages are retained permanently as quality assurance records.

Design Packages include procedures to document and control the conduct of new activities created by these new changes.

Implementation of Planned Operations

The Center for ES&H and Facilities uses Implementing and Operating Procedures developed to support this QAPP. The Operating Procedures written to date include:

- OP-EM-1 *Sanitary Sewer Outfall*
- OP-EM-3 *Control of the LECS*
- OP-EM-4 *Operation of the B. 913 LECS*
- OP-EM-5 *Operation of the B. 906 LECS*
- OP-EM-6 *Operation of the B. 910 LECS*
- OP-EM-9 *Data Validation and Verification*
- OP-EM-10 *Quarterly Replacement of Perimeter Thermoluminescent Dosimeter*
- OP-EM-11 *Response to Sewer Anomalies*
- OP-EM-12 *Data Manipulation*

Assessment of Data Usability

Data Quality Objectives (DQOs) are used to validate all environmental monitoring data per IP 5.04, *Data Quality Objective Process*.¹³ OP-EM-9, *Data Validation and Verification*, specifies verification and validation techniques.¹⁴ OP-EM-12, *Data Manipulation*, further specifies how to apply statistical methods correctly to monitoring data. The Operating Procedures include provisions for marking, segregating, and limiting the use of data that do not meet the DQOs, or fail the verification and validation tests.

All reports containing data generated by the Environmental Monitoring Program are independently reviewed to ensure the accuracy of the data. The Environmental Monitoring Program Manager must also approve these reports prior to release or distribution.

Quality Assessment and Response

The Quality Assurance Group in the ES&H and Facilities Management Center is responsible for assessing the compliance of the Environmental Monitoring Program with this QAPP and with the ES&H QAMP. These assessments are done in accordance with IP 10.01, *Independent Assessment*.⁹

Environmental Monitoring Program personnel cooperate fully with the Quality Assurance Group by providing access to records, personnel, and equipment. Program personnel are also required to provide timely responses to the deficiencies identified in the assessments.

The Environmental Protection Department Manager (or designee) performs Internal Management Assessments annually. Management assessments gauge how well the integrated quality assurance program works, and identify management problems that hinder the organization from achieving the required quality, safety, and environmental objectives. The results of these assessments and any follow-up action taken are documented and retained as quality assurance records.

REFERENCES

1. U. S. Department of Energy (DOE) Order 5400.1, *General Environmental Protection Program* (November 1988).
2. R. C. Holland, *Environmental Monitoring Plan*, Sandia National Laboratories, SAND91-8013 (1992).
3. DOE Order 5700.6C, *Quality Assurance* (1991).
4. American Society for Quality Control, *Quality Assurance Program Requirements for Environmental Programs*, ANSI/ASQC-E4-19xx (review draft, 1991).
5. R. C. Holland, *Quality Assurance Management Plan*, Sandia National Laboratories (1992).
6. Implementing Procedure (IP) 4.02, *Development of Operating Procedure*, Sandia National Laboratories (1992).
7. IP 2.01, *Qualifications and Training*, Sandia National Laboratories (1992).
8. IP 4.04, *Records Management*, Sandia National Laboratories (1992).
9. IP 9.01, *Management Assessment*, Sandia National Laboratories (1992).
10. IP 7.01, *Procurement*, Sandia National Laboratories (1992).
11. IP 4.03, *Document Control*, Sandia National Laboratories (1992).
12. IP 4.02, *Development of Operating Procedures*, Sandia National Laboratories (1992).
13. IP 5.04, *Data Quality Objectives Process*, Sandia National Laboratories (1992).
14. IP 5.03, *Control of Measuring and Test Equipment*, Sandia National Laboratories (1992).
15. IP 5.01, *Identification and Control of Technical Data*, Sandia National Laboratories (1992).
16. Operating Procedure OP-EM-9, *Data Validation and Verification*, Sandia National Laboratories (1992).

GLOSSARY AND LIST OF ACRONYMS

ARAC	Atmospheric Release and Advisory Capability. A DOE-operated emergency response system designed to provide meteorological modeling and dose calculation capabilities in the event of an accidental release of radionuclides at a DOE facility.
Calibration	Testing or resetting a measuring instrument against a national standard (such as NIST) to ensure it is functioning correctly and accurately.
Data Validation and Verification	Actions taken to assure the quality of environmental monitoring data, such as analyses of: duplicate samples, spiked samples, blanks, and inter-laboratory comparison samples.
Data Manipulation	The development of summary statistics to describe environmental monitoring data sets. Statistical tests performed to compare environmental monitoring data sets to determine significant differences and trends.
ES&H	Environment, Safety, and Health.
Implementing Procedures (IPs)	Procedures written to implement the provisions of the QAMP. The Environment, Safety & Health and Facilities Management Center are required to apply these Implementing Procedures to all their operations. (See also Operating Procedures .)
LECS	Liquid Effluent Control System. Retention tanks designed to contain potentially contaminated, process wastewater until this wastewater can be analyzed and disposed of properly.
NIST	National Institute for Standards and Technology (formerly the National Bureau of Standards).
Nonconformance	A deficiency in characteristic, documentation, or procedure that renders the quality of an item unacceptable or indeterminate. Examples of nonconformance include: physical defects, test failures, incorrect or inadequate documentation, and/or deviations from prescribed processing, inspection, or test procedures.
Operating Procedures	Procedures covering actual daily activities. Operating procedures also implement the provisions of the QAMP and this QAPP. (See Implementing Procedures .)
QAMP	Quality Assurance Management Plan. The quality assurance document covering the operations of the Environmental Protection Department.
QAPP	Quality Assurance Project Plan. A quality assurance document describing the specific quality assurance activities performed by the Environmental Protection Department to implement the provisions of the QAMP.
Quality assurance records	Documentation generated by Environmental Monitoring Program operations required by Federal, State, local regulation, or by DOE Order, and retained for a specific time. Storage conditions and methods may also be specified.

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