

General

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CANC-ES

Progress Report

for

Radioactive Air Emissions Management

July 1 through September 30, 1994



12549

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Introduction

Emissions at the Laboratory

Laboratory policy states that "no activity or operation will be done at the Laboratory unless it can be performed in a manner designed to protect employees, the public, and the environment." To ensure such protection, the Laboratory must meet all applicable federal, state, and local regulations.

In its operations, the Laboratory emits radionuclides into the air through various emission points. (The annual *Environmental Surveillance Report* details these emissions.) Radioactive air emissions from Department of Energy (DOE) facilities such as the Laboratory are regulated by the Environmental Protection Agency (EPA). The Radioactive Air Emissions Management (RAEM) component of ESH-17, the Air Quality Group, verifies data that ensures the Laboratory's compliance with EPA regulations for radioactive air emissions.

Background

In 1985, EPA issued its first radioactive air emissions regulations for DOE facilities. The Environment, Safety, and Health (ESH) Division's existing program to sample Laboratory stacks was in compliance with these regulations.

On December 15, 1989, EPA issued revised regulations for DOE facilities. The Laboratory assessed these regulations and found that it could not fully comply but determined that the existing sampling program, with verification from the ambient air program, was adequate. EPA disagreed and on November 27, 1991, issued DOE a notice of noncompliance stating five findings, listed in Appendix A.

In May 1992, the Radioactive Air Emissions Management (RAEM) Program (formed in late 1991) was formalized with the charter to (1) ensure that reliable data are collected from Laboratory stacks and (2) take a proactive approach to managing the Laboratory's radioactive air emissions.

EPA's Region 6 Office conducted an audit of the Laboratory on August 24-28, 1992. This audit was an independent baseline evaluation conducted pursuant to the National Emission Standards for Hazardous Air Pollutants (NESHAP) 40 CFR 61, subparts A (General Provisions) and H (Radionuclides Other than Radon). Following the audit, EPA issued a second notice of noncompliance to DOE on November 23, 1992, the findings of which are summarized in Appendix A. As a result of this notice, the Laboratory removed a shielding factor from calculations of the dose to the maximally exposed individual (MEI) of the public. Also as a result of this notice, the Laboratory is reporting emissions data monthly until it achieves full compliance. EPA is using data gathered during the audit as it develops a federal facility compliance agreement (FFCA) between EPA and DOE.

Introduction

RAEM Component Mission

The RAEM Program Office was established in December 1991 and was reorganized as a component of ESH-17 in the second quarter of 1994. The primary mission of the RAEM component is to

- ensure that reliable data are collected from Laboratory stacks and
- take a proactive approach to managing the Laboratory's radioactive air emissions.

RAEM Component Functions

Through its RAEM component, ESH-17 manages the Laboratory's radioactive air emissions. The RAEM component's functions are to

- establish criteria to assess data reliability,
- provide technical guidance and support to Laboratory operations that emit airborne radionuclides,
- recommend ways to reduce the number of sources of radioactive air emissions,
- coordinate Laboratory activities to ensure that all Laboratory operations are in full compliance with EPA regulations for radioactive air emissions,
- develop and implement new methods and systems to reduce radioactive air emissions to as low as reasonably achievable (ALARA), and
- serve as the Laboratory's point of contact with EPA and DOE on issues relating to radioactive air emissions.

FFCA Negotiations

On November 13, 1991, DOE and EPA agreed to negotiate a federal facility compliance agreement (FFCA) for the Laboratory. DOE submitted the Laboratory's first compliance action plan to EPA Region 6 on March 13, 1992.

A recent FFCA meeting, held on August 19, 1994, brought together representatives of ESH-17, DOE, and EPA Region 6. This meeting focused on an updated plan to bring the Laboratory into compliance with NESHAP regulations. EPA gave a positive response to the general concepts of the plan. DOE presented three proposals concerning our compliance efforts:

- Use of historical stack emission data, process knowledge, operation level, and facility type to determine whether a stack needs sampling equipment. Based on current operations, there are approximately 41 stacks that will require upgrades, 32 of which will be addressed in the FFCA schedule.
- Use of the AIRNET system to demonstrate compliance for radioactive air emissions from diffuse sources. EPA indicated acceptance of this approach but requested more information

Introduction

FFCA Negotiations (continued)

on the location of AIRNET stations and the overall AIRNET operation.

- Use of temperatures somewhat below the melting or boiling point to determine if a specific compound or alloy is in liquid or gas phase. (The assumption in NESHAP Appendix D is that every compound or alloy is in the gas phase at 100° C.) EPA accepted this proposal, and DOE requested that acceptance in writing.

Alternative Methods

On August 9, 1993, the Laboratory submitted a proposal for three alternative methods to DOE Headquarters, which in turn submitted the proposal to EPA Headquarters. The proposed alternative methods follow:

- use of numerical criteria for determining the suitability of a sampling location instead of the "8 and 2 duct diameter rule"
- use of single-point sampling with the shrouded probe
- use of a computer code, for example, DEPOSITION, to evaluate losses in aerosol transport systems.

Although ESH-17 hopes to pursue the alternative methods, approval delays and the desire to sign an FFCA are necessitating preparations to use present ANSI-standard sampling requirements for stack upgrades.

Stack Reduction

The Laboratory currently has approximately 130 stacks that emit or have the potential to emit radionuclides. In the interest of cost-effective operations, the Laboratory is considering a reduction in the total number of stacks. ESH-17 is investigating how to reduce emission points and at the same time maintain flexibility in operations that involve radioactive materials. Several scenarios are being explored, which include the following:

- stack reduction and decommissioning
- emission point consolidation
- use of existing emission points for new or modified programs.

A formal methodology has been established for ceasing sampling on stacks that no longer require it.

Introduction

Report on the Progress of the RAEM Component

This report summarizes the RAEM component's progress in managing the Laboratory's radioactive air emissions. For the period from July through September 1994, this report describes and details the progress of RAEM-component activities, which are divided into five general functions: program development and administration; operations; quality assurance and quality control; reporting, risk assessment, and communication; and data analysis. The report provides a glossary of terms that may be unfamiliar to readers. Appendix A discusses the EPA notices of noncompliance, and Appendix B lists external audits of RAEM activities.

Progress in Program Development and Administration

Project Management and Control Systems

Description. Costs and schedules are tracked through a critical path method (CPM) scheduling system that establishes work and action plans, generates periodic progress reports, and provides timely and accurate data analysis for Laboratory managers.

Progress. The following actions were taken.

- Logic and schedule updates for stack upgrades began.
- Activity definition and schedule logic development began for AIRNET monitoring.
- A preliminary evaluation of quality assurance scheduling issues was conducted.
- Project updates on current site upgrades are available.

Contract Administration

Description. ESH-17 has agreements with several contractors to support various RAEM-component activities. These contracts include

- Roy F. Weston, which is providing quality assurance support;
- ICF Kaiser Engineering, Inc., which is involved in project development through a project management control system;
- Radian Corporation, which is involved in the source term inventory;
- Oracle Corporation, which is developing and maintaining a database of stack information;
- Los Alamos Technical Associates, which is involved in internal quality assurance audits; and
- Johnson Controls World Services, Inc., which plays a critical role in measuring stack flows and maintaining sample pumps.

ESH-17 provides oversight to ensure that these contractors' activities are compatible with and integrated into the group's quality assurance program.

Progress. The following actions were taken.

- Fiscal-year 1994 quality assurance needs, including major procurements, continued to be assessed.
- Critical contracts continued to be put into place or renewed.

Progress in Operations

Configuration Control Documentation

Various configuration control documents are prepared and maintained:

- engineering drawings of all systems with stacks, collected from the Laboratory's central drawings archive or, as resources allow, prepared from actual measurements ("as-built" drawings), to reflect current configurations
 - lists of stacks, used to determine stack status, perform needs assessments, and establish priorities
 - detailed operating procedures describing measurement and characterization methods.
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Configuration Control Proposed Changes

To determine how proposed changes to facilities will affect source terms, documents detailing these changes are reviewed. If necessary, configuration changes (such as new probe locations, additional stack characterizations, and new sampling equipment) are recommended. Reviews and recommendations are tracked and documented.

Configuration Control Hardware Requirements

Description. Basic sampling systems for radioactive air emissions are divided into four categories:

- tritium sampling
- particulate sampling
- activated gas and noble gas sampling
- iodine and other halogen sampling.

For each of these systems, the requirements for stack and sampling hardware are provided to operating groups in guidance documents. In addition, a theoretical basis is being developed to describe state-of-the-art components and methods that can be applied to future stack monitoring systems to ensure representative sampling.

Progress. The following actions were taken.

- Designs of families of shrouded probes to fit particulate stacks of various sizes and with varying flow rates continued. Stacks at the Chemistry/Metallurgy Research (CMR) Building may be the first to use these probes. Several designs are complete.

Progress in Operations

Configuration Control Hardware Requirements (continued)

- The Plutonium Facility (TA-55) upgrades to test the 1/3 scale design modeled at Texas A&M University are being negotiated with TA-55 management. Preliminary estimates indicate testing at the end of December.
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Technical Support for Facility Upgrades

Description. ESH-17 provides guidance in prioritizing and assessing upgrades to stacks at all Laboratory facilities to bring them into compliance with EPA regulations for radioactive air emissions. An ESH-17 operations employee serves as a point of contact with Laboratory organizations responsible for stacks slated for upgrade.

Progress. The following actions were taken.

- Personnel from ESH-17; the Facilities, Security, and Safeguards (FSS) Division; and the CMR Building operating group continued to hold regular meetings on the status of the upgrades.
 - Stack characterization at the CMR Building (TA-3, building 29) continued.
 - Tritium stack upgrades are proceeding as scheduled, with approximately 90 percent of the upgrades completed. Remaining issues focus on quality assurance/quality control. Only the hardware at TA-55 remains to be installed.
 - Upgrades at TA-48, the CMR Building, and TA-50 continued.
 - Sampling was terminated at the ten office stacks at the CMR Building.
 - Numerous other stacks were reviewed for potential removal as emission points or for consolidation. As an example, eight stacks at TA-50 are being considered for consolidation into one stack. The stack reduction effort continues as a part of the stack upgrades.
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Progress in Quality Assurance and Quality Control

Quality Assurance/ Quality Control

Description. RAEM-component quality assurance is an integrated system of activities that ensures that radioactive air emissions samples and data meet defined standards of quality with a stated level of confidence. RAEM-component quality control comprises the technical activities that measure and control the quality of radioactive air emissions samples and data so that they meet the needs of those who use them.

Progress. The following actions were taken.

- ESH-17 personnel supported the startup of the Los Alamos Meson Physics Facility (TA-53).
- The quality assurance plan and procedures for TA-53 operations are complete.
- The RAEM quality assurance plan structure and hierarchy are being reevaluated as a result of organizational and procedural changes. Because of changes in methods to determine potential effective dose equivalents (PEDEs), previous PEDE categories are no longer applicable, and plan development based on these categories has ceased.
- The RAEM quality assurance project plan for stack upgrades has been issued.
- Negotiations with analytical laboratories for services continue.
- Quality assurance project plans for tritium facilities continue to be developed.

Data Quality Objectives/Data Performance Criteria

Description. To ensure the quality of RAEM data, the uncertainty (or error) that can be tolerated in the data is analyzed. In addition, techniques, instruments, and criteria are chosen to ensure that the samples taken accurately represent the actual effluent.

Progress. The following actions were taken.

- TA-53 data quality objective revisions are complete.
 - Data quality objectives continued to be developed for tritium facility quality assurance project plans.
 - Review of the tritium error analysis draft report is complete.
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Progress in Quality Assurance and Quality Control

Audit Response

Description. Action plans and other responses are prepared to address deficiencies identified during audits conducted by EPA and other organizations outside the Laboratory. A historical list of external audits appears in Appendix B.

Progress. The following actions were taken.

- ESH-17 quality assurance personnel continued to survey the TA-53 quality assurance project plan.
- Johnson Controls quality assurance personnel continued an internal audit of Johnson Controls work procedures that support the RAEM component.

Training

Quality assurance/quality control training is an ongoing effort that ensures that all operations personnel have the skills they need to perform their duties effectively.

Progress in Reporting, Risk Assessment, and Communication

Reporting

Description. Reports of the Laboratory's radioactive air emissions are based on data that are either provided in reports or transferred electronically from the health physics analytical laboratories to ESH-17's database. These reports include

- radioactive air emissions annual and monthly reports to Laboratory personnel;
- radioactive air emissions annual and monthly reports to DOE and EPA (required by 40 CFR 61);
- Effluent Information System/Off-site Discharge Information System (EIS/ODIS) annual reports to DOE; and
- site environmental reports (part of the annual *Environmental Surveillance Report*) to DOE and EPA.

Progress. The following actions were taken.

- The 1993 annual report to EPA was submitted to EPA Region 6.
 - Data from operating groups and the analytical laboratory were checked for accuracy.
 - The 1993 annual emissions summary to Laboratory personnel went to print.
 - Emission reports through the third quarter of 1994 are available upon request.
 - DOE released the 1992 Environmental Surveillance Report.
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Data Management

Description. Databases (electronic and physical) ensure that RAEM documents and data are easily accessible but protected from indiscriminate use. The databases house the following RAEM information:

- administration
- regulatory compliance
- quality assurance/quality control
- radioactive air emissions data
- NESHAP information and records
- ES&H questionnaires (design reviews)
- site-specific data
- assessment

Progress in Reporting, Risk Assessment, and Communication

Data Management (continued)

- miscellaneous correspondence
- reference materials and publications

Progress. The following actions were taken.

- Historical and current documents (memos, reports, data, drawings/maps, and policies/procedures) related to radioactive air emissions were collected and processed into electronic and physical databases.
- ESH-17 became a control document station for Laboratory-controlled documents.

Risk Assessment and Communication

Description. The RAEM component has a radioactive air emissions risk assessment function and is involved in several risk communication efforts.

Progress. The following actions were taken.

- A public relations database on radioactive air emissions was maintained.
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Progress in Data Analysis

Source Inventory

Description. ESH-17 collects information on possible sources that contribute to radioactive air emissions. The inventory for radioactive point sources (stacks and vents) is being updated. The inventory for radioactive nonpoint sources (diffuse sources) involves the soil sample results from the Environmental Restoration (ER) Program and other information. While the nonpoint-source inventory will not solely determine emissions or characterize sites, it will identify nonpoint-source locations and provide potential site characterizations.

Because nonpoint sources are dispersed over the 43 square miles of the Laboratory, emissions from these sources are most accurately determined by air sampling at specific locations. The AIRNET sampling stations have been proposed as the most comprehensive method to determine emissions from radioactive nonpoint sources and their impact at off-site locations.

Progress. The following actions were taken.

- The point-source inventory is being updated.
 - The locations of existing AIRNET stations were evaluated, and locations for additional stations were identified.
 - Procedures for the AIRNET stations are being reviewed.
 - Analytical procedures and the turnaround time for results are being reviewed.
 - The nonpoint-source sampling criteria for the FFCA compliance plan were established.
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Progress in Data Analysis

Assessment of Potential Effective Dose Equivalents

Description. Potential effective dose equivalents (PEDEs) were previously determined with the inventory of radioactive material for a given point source and with 40 CFR 61, Appendix D. The PEDEs were broken down into four categories, as outlined in the Progress Report for Radioactive Air Emissions Management: April 1–June 30, 1994. Because the method used to determine potential emissions has changed, the PEDE categories 1 through 4 are no longer applicable.

The current method to estimate potential emissions is to use actual emissions data from point sources sampled over the past 4 years, along with other resources listed below. A case-by-case analysis has been performed for each point source to approximate potential emissions and sampling requirements. Potential emission rates have been estimated without consideration of pollution control equipment. The following resources play a role in determining point-source sampling requirements:

- historical sampling data
- radionuclide inventory data
- 40 CFR 61, Appendix D
- duct holdup studies
- engineering estimates and judgment
- operational flexibility.

The case-by-case analyses indicate that 32 point sources require continuous sampling to meet EPA requirements, and 9 point sources require continuous sampling to meet DOE requirements, for a total of 41 point sources that require continuous sampling. The remaining 88 point sources that do not require continuous sampling will be subject to periodic confirmatory evaluations which may focus on radioactive material inventories, process status, impact of design changes, or other potential concerns.

Progress. The following actions were taken.

- Currently sampled point sources were evaluated to determine sampling requirements.
 - The point-source sampling criteria for the FFCA compliance plan were established.
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Glossary

action plan	approved plan that describes actions and provides schedules for correcting identified deficiencies
AIRNET	a system of ambient air monitoring stations. Stations are placed within Laboratory boundaries; in Los Alamos, Rio Arriba, and Santa Fe counties; and in three neighboring pueblos.
ALARA	as low as reasonably achievable
ambient air program	program for monitoring the surrounding atmosphere from a network of continuously operating air sampling stations including regional stations at Española, Pojoaque, and Santa Fe; perimeter stations at the Laboratory boundary; and on-site stations within the Laboratory boundary
ANSI	American National Standards Institute
as-built drawing	drawing to scale of all systems associated with radioactive air emissions, including exhaust ducts, fans, stacks, release points, and monitoring systems, as constructed
CAP-88	Clean Air Assessment Package 1988; an EPA-approved computer code used to calculate potential effective dose equivalents
CPM scheduling system	a critical path method scheduling system that establishes work and action plans, generates progress reports, and provides data analysis
configuration control	establishing methods and maintaining systems to track and control the status of and changes to inventory, engineering controls (gloveboxes, fume hoods, hot cells), ventilation systems (ducts, fans), filters (high-efficiency particulate air, charcoal), sampling systems (probes, samplers, volume meters, continuous air monitors, sampling filters, pumps), release points, and associated piping (stacks, vents, venturi devices, fans)

Glossary

data performance criteria	quantitative specification of how much uncertainty or error is acceptable in components used for making radioactive air emissions measurements
data quality objectives	qualitative or quantitative specification of the quality of data required to support radioactive air emissions decisions and to prepare reports
diffuse source	<i>see nonpoint source</i>
EPA Region 6	EPA regional office, located in Dallas, Texas, which has enforcement jurisdiction over certain Laboratory activities
ER Program	Environmental Restoration Program
error	<i>see uncertainty</i>
ES&H questionnaire	process designed to ensure appropriate review of new or modified projects, operations, and facilities for all environment, safety, and health issues. The questionnaires are reviewed by ESH-17 specifically for impacts of the proposed work on NESHAP compliance.
FE	fan exhaust
federal facility compliance agreement (FFCA)	agreement between EPA and any federal agency that charts the course for the agency to achieve compliance with EPA regulations. The FFCA referred to in this report focuses on methods and schedules the Laboratory will follow in attaining compliance with EPA regulations for radioactive air emissions.
fugitive source	<i>see nonpoint source</i>
LANL	Los Alamos National Laboratory

Glossary

maximally exposed individual (MEI)

the person most exposed to emissions from a particular source

monitoring systems

systems for assessing, reporting, or recording stack effluents as they are released, including probes, pumps, sample lines, flow meters, continuous air monitors, particulate-iodine-noble gas (PING) monitors, and ion chambers

NESHAP

National Emission Standards for Hazardous Air Pollutants

nonpoint source

a source of radioactive material that cannot be traced to a discrete location; also called fugitive or nonpoint source. These definitions are under negotiation with EPA

notice of noncompliance

legal notice by EPA that an agency is not in compliance with EPA regulations. DOE has received two notices of noncompliance concerning the Laboratory's noncompliance with EPA regulations for radioactive air emissions.

point source

a source of radioactive material that is actively exhausted and can be traced to a discrete location such as a stack or vent

potential effective dose equivalent (PEDE)

effective dose equivalent that a person *could* receive from maximum exposure to all the source terms in a facility's inventory (not considering any effluent-scavenging devices such as filters); used to assess monitoring requirements for a given release point but *not* to assign annual dose

probe

a tube placed in a stack or duct to obtain gaseous and particulate effluent samples from stacks

quality assurance

an integrated system of activities involving planning, quality control, quality assessment, reporting, and quality improvement to ensure that a product or service meets defined standards of quality with a stated level of confidence

Glossary

quality control	an overall system of technical activities whose purpose is to measure and control the quality of a product or service so that it meets the needs of those who use it
release point	source (such as a stack, vent, or other discrete source of emissions) from which radioactive effluent is exhausted into the atmosphere
representative sampling	obtaining an aliquot that is unbiased toward specific physical or chemical characteristics
sampling systems	systems for collecting representative samples from effluent streams for subsequent off-line analysis; these systems include probes, pumps, sample lines, flow meters, filters and filter holders, and tritium bubblers
shrouded probe	a sampling probe that is surrounded by a larger tube, or shroud, that improves the capability of the probe to collect a representative sample of effluent particulates over a wide range of effluent flow rates
source	in this report, refers to an unsealed source of radioactive material, which may be classified as a point source or nonpoint source. See <i>point source</i> and <i>nonpoint source</i> .
source term	the amount of radiation released to the atmosphere by a source, usually measured in Ci/y. See <i>source</i> .
stack	chimney through which radioactive substances are exhausted into the atmosphere; see also <i>release point</i>
stack characterization	establishing the proper probe location by considering effluent concentration and stack flow profile to ensure representative sampling and accurate dose calculations
stack flow	stack characteristic that considers the volume of air exhausted by the stack and the velocity of the air within the stack and at the exit point

Glossary

stack upgrade	improvements that bring a stack into compliance with EPA regulations for sampling and quantifying radioactive air emissions
TA	technical area
uncertainty	with respect to measurements, the range around a measurement mean or mode within which the true value is expected with an established probability (usually 95%)

Appendix A: Notices of Noncompliance

November 27, 1991 Notice of Noncompliance

The following findings of noncompliance were reported to DOE by EPA.

1. Every release source from an operation that uses radionuclides has not been evaluated using the EPA-approved computer model to determine a dose received by the public as required by 40 CFR 61.93(a).
 2. DOE has failed to comply with 40 CFR 61.93(b)(4) because it has not determined each release point that has the potential to deliver more than 1% of the effective dose equivalent standard. The evaluation of emissions potential is to be performed by estimating the dose without taking any credit for any emissions controls on the effluent stream. The results of this modeling will then determine which release points must be monitored in compliance with 61.93(b) and which release points must be monitored periodically to confirm continuing low emissions.
 3. The facility currently has not installed stack monitoring equipment on all its regulated point sources in accordance with the above analysis and 40 CFR 61.93 (b)(2)(ii) and (iii).
 4. The facility has not conducted and is not in compliance with the appropriate quality assurance programs pursuant to 40 CFR 61.93(b)(2)(iv).
 5. The facility is in violation of 40 CFR 61.94, "Compliance and Reporting," because it has not calculated the highest effective dose equivalent in accordance with the regulations cited above. EPA does acknowledge receipt of an annual report, as required by 40 CFR 61.94(a), but for the reasons specified above that report is incomplete.
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Appendix A: Notices of Noncompliance

**November 23,
1992 Notice of
Noncompliance**

Findings. The following findings of noncompliance were reported to DOE by EPA.

1. DOE/LANL, by using a shielding factor that reduces its CAP-88 emission level by approximately 30%, is using "other procedures" without prior approval of EPA and is in violation of 40 CFR 61.93(a).
2. DOE had emissions of radionuclides to the ambient air such that an effective dose equivalent of 11.5 mrem/year was received by a member of the public from its 1990 emissions (as calculated using the specified methodology), thereby violating 40 CFR 61.92.
3. Since Respondent [DOE] violated the emission limits for the calendar year of 1990, it must immediately comply with the 40 CFR 61.94 and
 - report on a monthly basis all the information required by 40 CFR 61.94(b);
 - continue this monthly reporting until the requirement is either modified or ended by the Director, Air, Pesticides, and Toxics Division, EPA Region 6; and
 - include in each monthly report the additional information described at 40 CFR 61.94(c)(1) and (2).
4. A quality assurance program is not in place.

Response. In response to these findings, the Laboratory has completed or is currently working on the following tasks.

Project	Task	Complete/ Ongoing	Finding Addressed
Reporting	<ul style="list-style-type: none"> • Omit shielding factor from calculation • Submit monthly emissions reports to EPA 	Complete Ongoing	Findings 1 and 2 Finding 3
Quality Assurance	<ul style="list-style-type: none"> • Develop a quality assurance program 	Ongoing	Finding 4

Appendix B: Historical List of External Audits

Historical List of External Audits

1. October 1991—DOE Tiger Team Assessment
2. July 1992—Wastren, Inc. (Idaho Falls, Idaho) audit of LANL Radioactive Air Emissions Management Program
3. August 1992—EPA Region 6 audit of LANL Radioactive Air Emissions Management Program
4. July 1993—DOE Los Alamos Area Office audit of RAEM quality assurance project plan for the Los Alamos Meson Physics Facility.