General

ESH-17-94-1360.3

CAN-ES

Progress Report

for

Radioactive Air Emissions Management

April 1 through June 30, 1994

Contents

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.

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. The RAEM Program, now a component of ESH-17, has submitted to DOE (and to EPA through DOE) a plan to bring the Laboratory into compliance over 5 years.

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, disallowing use of a shielding factor in calculating the dose to the maximally exposed individual (MEI) of the public. As a result of this notice, RAEM is reporting emissions data monthly until the Laboratory is in 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 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 Functions

RAEM manages the Laboratory's radioactive air emissions. Its 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 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. In May 1994, EPA Region 6 forwarded a draft FFCA to DOE's Los Alamos Area Office (DOE/LAAO) for comment. Comments are being prepared by ESH-17 and DOE/LAAO. A version of the draft FFCA, agreed upon by both EPA and DOE, will be eventually published in the Federal Register.

Participants at an initial meeting with EPA Region 6 , held in Dallas on June 26, 1994, discussed compliance philosophies and general issues. As a result of discussions at this meeting, ESH-17 is preparing a draft compliance plan without the use of alternative methods. A second meeting has been scheduled to further discuss the various technical and legal issues of the FFCA. Proposed topics of discussion for the upcoming meeting include (1) the compliance schedule with or without alternative methods, (2) compliance determination in regard to radioactive diffuse sources, and (3) an outline of the compliance plan.

Introduction

Alternative Methods

Given the cost of following American National Standards Institute (ANSI) standards, RAEM is pursuing alternative methods to achieve compliance. On August 9, 1993, the Laboratory submitted a proposal for four alternative methods to DOE Headquarters, which in turn submitted the proposal to EPA Headquarters. The proposed alternative methods follow:

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

EPA Region 6 supports the proposed alternatives, and the chair of the ANSI N13.1 Revision Working Group strongly supports their approval. EPA Headquarters and all of the regional offices have reviewed the proposal. EPA Headquarters has several technical questions and requests for further information to which DOE/LAAO and ESH-17 are responding. The additional information will be sent to DOE Headquarters and forwarded to EPA Headquarters.

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. RAEM 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.

Report on the Progress of RAEM

This report summarizes RAEM's progress in managing the Laboratory's radioactive air emissions. For the period from April through June 1994, this report describes and details the progress of RAEM 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 the RAEM Program.

Progress in Program Development and Administration

Project Management and Control Systems

Description. RAEM 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.

- Master schedule updates and maintenance are continuing.
- Project updates on current site upgrades are available.
- Approximately 10 CPM schedules for characterized diffuse (nonpoint) sources were incorporated into the master CPM schedule database. Schedule logic development continued for activities of diffuse source emissions not yet characterized.

Contract Administration

Description. RAEM has agreements with several contractors to support various 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;
- Texas A&M University, which is gathering field data on the performance of several critical stack sampling components and performing 1/3 scale stack modeling as required;
- Oracle Corporation, which is involved in development and maintenance of 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.

Progress in Program Development and Administration

Contract Administration (continued)

RAEM provides oversight to ensure that these contractors' activities are compatible with and integrated into the Radioactive Air Emissions Management 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.
- A purchase request is being established with Graesby Anderson Inc. to build the shrouded probes required for stack upgrades.
- A purchase request is being established with Texas A&M University to continue the upgrade of stack FE-16 at the Plutonium Facility (TA-55).

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.

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 will be the first to use these probes. Several designs are complete.

Progress in Operations

Configuration Control Hardware Requirements (continued)

- Results of aerosol tests of the stacks at the Plutonium Facility (TA-55) indicate inadequate particle-size distribution at the sampling points. To achieve proper turbulent mixing, RAEM personnel coordinated mixing studies and 1/3 scale modeling of the TA-55 stacks at Texas A&M University. These studies will guide efforts to meet sampling criteria, which involve the design and implementation of necessary modifications to the plenum feeding the stack. The studies have been completed and await verification in situ.

Technical Support for Facility Upgrades

Description. RAEM 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. A RAEM operations employee serves as a point of contact with Laboratory organizations responsible for stacks slated for upgrade.

Progress. The following actions were taken.

- RAEM, engineering, and CMR Building operating group personnel continued to hold regular meetings on the status of the upgrades.
- Stack characterization at the CMR Building continued.
- Tritium stack upgrades are proceeding as scheduled, with approximately 75 percent of the upgrades completed.
- Upgrades at TA-48, TA-3 building 29 (the CMR Building), and TA-50 continued.
- TA-2 (the Omega West Reactor) was placed in permanent safe shutdown. Therefore, its associated stack is no longer an emission point.
- TA-21 building 3 stack FE -6 was removed as a result of decontamination and decommissioning activities.
- Numerous stacks were reviewed for potential removal as emission points or for consolidation. This effort continues as a part of the stack upgrades.

Progress in Quality Assurance and Quality Control

Quality Assurance/ Quality Control

Description. RAEM 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 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.

- The quality assurance program plan was revised to assure compliance with DOE Order 5700.6C, EPA regulation 40 CFR 61 subparts A and H, and the anticipated revision of EPA guideline QAMS-005/80 with QA/R-5 and ASQC E-4 release.
- The RAEM quality assurance project plan has been revised and is now being reevaluated and reviewed.
- Procedure updates continued for the TA-53 quality assurance project plan following a trial operation of the Los Alamos Meson Physics Facility.
- Quality assurance requirements for the TA-55 quality assurance project plan continued to be evaluated.
- Evaluation and discussions of quality assurance issues at TA-50 continued.
- Quality assurance project plans for tritium facilities at the Laboratory continued to be developed.
- Quality assurance project plans for category 1 and 2 stacks continued 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 objectives continued to be revised.
- Data quality objectives continued to be developed for tritium facility quality assurance project plans.
- Data quality objectives continued to be developed for quality assurance project plans for category 1, 2, and 4 stacks.
- A tritium error analysis draft report is being reviewed.

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.

- RAEM 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 the RAEM 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.

- DOE's summary of the EIS/ODIS 1993 annual reports was reviewed and returned to DOE.
- A final draft of the 1993 annual report to EPA was reviewed, and final comments were provided to the authors.
- Data from operating groups and the analytical laboratory were checked for accuracy.
- Development of the 1993 annual emissions summary to Laboratory personnel continued.
- Emission reports for the first quarter of 1994 are available on request.
- Emission reports for the second quarter of 1994 are in preparation.

Progress in Reporting, Risk Assessment, and Communication

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
- 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.
- Database organizational structures and processes have been fundamentally reconstructed to ease document location and system maintenance. The resulting Records Management System includes an expanded computerized database, physical file reorganization and review, color-coding, indexes, legends, document processing and request logs, routing slips, flowcharts, and a policies and procedures manual.
- The ORACLE database has been refined to allow more efficient data retrieval and wider access to data. The Records Management System is expected to be transferred from dBASE to ORACLE within the next 3 months.
- Software and hardware were obtained to expand access to databases.
- In the interest of saving physical space, conversion of hard copy files to other media such as CD-ROM or microfiche is being considered.
- The point source database is being converted from dBASE to ORACLE.

Progress in Reporting, Risk Assessment, and Communication

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.
- RAEM personnel hosted a booth at the second annual New Mexico Conference on the Environment in Albuquerque April 24–26. The booth featured a fact sheet on radioactive air emissions management at Los Alamos and posters portraying RAEM mission and goals, stack probe design, stack minimization, sample analysis, and data reporting. Professionals in various environmental fields and members of the general public attended the conference.
- RAEM personnel participated in a program sponsored by the Human Resources Division to teach the fundamentals of radiation and science communication to area high school students.

Progress in Data Analysis

Source Inventory

Description. The RAEM component collects information on possible radiation sources, analyzes the data to determine if they meet the criteria for point or diffuse (nonpoint) sources, and determines if the sources must be monitored. From this information, an inventory of identified potential release points (including both point and diffuse sources) is developed and maintained. Current efforts are aimed toward developing a method for estimating emissions from the identified diffuse sources.

Progress. The following actions were taken.

- Approximately 50% of the diffuse sources have been characterized.
- Environmental Restoration soil analysis is being performed for TA-54 and several other sites with diffuse sources.

Assessment of Potential Effective Dose Equivalents

Description. The potential effective dose equivalent (PEDE) is the maximum dose that a person nearest a stack could receive from the total radioactive material inventory (the source term), not considering filters. The PEDE is calculated using the EPA-approved method, CAP-88, and used to establish monitoring requirements. Radian Corporation is assessing PEDEs for each identified potential release point. The following table shows the monitoring criteria for the four PEDE categories:

Los Alamos National Laboratory Monitoring Criteria			
PEDE (mrem/yr)	**Required Monitoring**	**Applicable Citation**	**PEDE Category**
>5	Continuous monitoring with real-time analysis	40 CFR 61.93(b)(1,2)	1
>0.1–≤5	Continuous sampling with periodic analysis	40 CFR 61.93(b)(1,2)	2
>0.001–≤0.1	Periodic confirmatory measurements	40 CFR 61.93(b)(4)	3
≤0.001	Controlled by radionuclide inventory limitations	40 CFR 61.93(b)(3)	4

Progress in Data Analysis

Assessment of Potential Effective Dose Equivalents (continued)

Progress. The following actions were taken.

- Lists categorizing stacks by the PEDE of their emissions are reviewed on an ongoing basis.
- PEDEs continued to be calculated for the emissions from all identified and characterized diffuse sources.

Glossary

action plan	approved plan that describes actions and provides schedules for correcting identified deficiencies
aerosol test	investigation in which particles of known size distribution are introduced into a stack to characterize the size distribution of particles at sampling points within and outside of the stack and within the sampling system components (probes, transfer lines, filters)
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
as-built drawing	drawing to scale of all systems associated with radioactive air emissions, including exhaust ducts, fans, stacks, release points, and monitoring systems
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)
data performance criteria	quantitative specification of how much uncertainty or error is acceptable in components used for making radioactive air emissions measurements

Glossary

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	a source of radiation that cannot be traced to a discrete location; also called fugitive or nonpoint source, these definitions are under negotiation with EPA
EPA Region 6	EPA regional office, located in Dallas, Texas, which has enforcement jurisdiction over certain Laboratory activities
error	see *uncertainty*
ES&H questionnaire	document used to identify potential hazardous conditions or changes to stack, control, or monitoring systems before a structure is modified or a process is changed.
FE	fan exhaust
federal facility compliance agreement (FFCA)	agreement between DOE and EPA on methods and schedules the Laboratory will follow in attaining compliance with EPA regulations for radioactive air emissions
fugitive source	see *diffuse source*
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

Glossary

NESHAP	National Emission Standards for Hazardous Air Pollutants
nonpoint source	see *diffuse source*
notice of noncompliance	legal notice by EPA that the Laboratory is not in compliance with EPA regulations for radioactive air emissions
point source	a source of radiation that 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
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

Glossary

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	radioactive materials other than those that are sealed or encapsulated
source term	amount of radiation released to the atmosphere by a source, usually measured in Ci/y
stack	chimney through which radioactive substances are exhausted into the atmosphere; see also *release point*
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
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.

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).

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	• Omit shielding factor from calculation • Submit monthly emissions reports to EPA	Complete Ongoing	Findings 1 and 2 Finding 3

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.