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Plan

Environmental Surveillance Program Plan

Idaho Cleanup Project

CH2M ◆ WG Idaho, LLC is the Idaho Cleanup Project contractor for the U.S. Department of Energy

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ACRONYMS

ARP	Accelerated Retrieval Project
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	chain of custody
DOE	Department of Energy
DOE-ID	Department of Energy, Idaho Operations Office
DQO	data quality objective
EBR-I	Experimental Breeder Reactor I
EPA	Environmental Protection Agency
ICDF	Idaho CERCLA Disposal Facility
ICP	Idaho Cleanup Project
INL	Idaho National Laboratory
MCP	management control procedure
NESHAP	National Emissions Standards for Hazardous Air Pollutants
PARCC	precision, accuracy, representativeness, completeness, and comparability
PRD	procedure requirements document
QA	quality assurance
QAO	quality assurance objective
QC	quality control
RU	relative uncertainty
RWMC	Radioactive Waste Management Complex
SAM	Sample and Analysis Management
SDA	Subsurface Disposal Area
SOW	statement of work
SPR	sampling procedure
TPR	technical procedure
TRAIN	Training Records and Information Network

Environmental Surveillance Program Plan

1. INTRODUCTION

The Idaho Cleanup Project (ICP) conducts environmental surveillance at the Idaho National Laboratory (INL) Site facilities and selected off-Site locations. The ICP contractor, INL contractor, and off-Site monitoring contractor conduct surveillance for compliance with Department of Energy (DOE) Order 458.1 Admin Chg 3, "Radiation Protection of the Public and the Environment." Collectively, these contractor monitoring projects comprise the overall INL Environmental Surveillance Program, as described in the *Idaho National Laboratory Environmental Monitoring Plan* (DOE/ID-11088).

ICP conducts environmental surveillance in and around waste management facilities for compliance with DOE Order 435.1, "Radioactive Waste Management." Currently, ICP waste management operations occur in the Radioactive Waste Management Complex (RWMC) Subsurface Disposal Area (SDA) and the Idaho Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Disposal Facility (ICDF) at the Idaho Nuclear Technology and Engineering Center. ICP also measures radionuclide concentrations in ambient air at a critical receptor location so that these concentrations may be compared with Table 2 of Appendix E, 40 Code of Federal Regulation (CFR) 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities" (NESHAP). The comparison will be used to verify that the Accelerated Retrieval Project (ARP) emissions cause off-Site doses less than the standard following the method described in 40 CFR 61.93(g). This activity is performed in accordance with the proposal submitted to the Environmental Protection Agency (EPA) (Burton 2008). These measurements are taken at the Experimental Breeder Reactor-I (EBR-I), and serve as a conservative estimate of long-term average air concentrations at the location of the INL Site's maximally exposed individual.

1.1 Purpose

This "Environmental Surveillance Program Plan" summarizes the quality assurance/quality control (QA/QC) protocols for ICP environmental surveillance operations. All surveillance operations are carried out according to the guidelines provided in this program plan. This document identifies the regulatory requirements for the Environmental Surveillance Program and presents the objectives and basis for design of the program.

1.2 Organization of Program Management Plan

The format of this program plan is modeled after EPA guidelines. Appendix A compares and crosswalks the sections in this program plan and the requirements of MCP-561, "Quality Program Plan/Quality Assurance Project Plan Development," and EPA QA/R-5, "EPA Requirements for Quality Assurance Project Plans." Appendix B is a comparison and crosswalk of the sections of this plan to the project plan content required by EPA Method 114 (40 CFR 61, Appendix B).

2. PROGRAM DESCRIPTION

2.1 Environmental Dose Pathways Summary

During routine operations at INL Site facilities (see Figure 1), radioactive and nonradioactive materials are released to the environment. Various environmental processes may transport these materials from the INL Site to nearby populations off the INL Site. These processes include wind, flowing water in the subsurface or surface, or movement of biota.

The transport pathways have been ranked (EGG-NPR-8957) in terms of relative importance during current operations according to four criteria:

- Mechanism of transport of radioactive material from the location of release to a location where an individual or population may be exposed results in exposure of an individual or population to radionuclides released from a facility
- Amount of contaminant that could potentially be transported
- Rate at which the contaminant could be transported to the receptor point
- Duration of the exposure to the contaminant by each transport pathway.

Based on these selection criteria, air is the highest ranked transport pathway during current operations (see Table 1). It is considered more important than the groundwater pathway because air has the potential to transport a large amount of activity off the INL Site in a relatively short period, resulting in direct exposure to contaminated air, and indirect exposure to radionuclides deposited in soil or taken up by plants or animals. Groundwater can also transmit large amounts of radioactivity, but over a much longer timeframe; therefore, more time would be available to identify migration of contaminants and mitigate to minimize doses. Biota and surface water movements are both seasonal and intermittent, and neither is considered to be a significant transport pathway to on-Site or off-Site receptors.

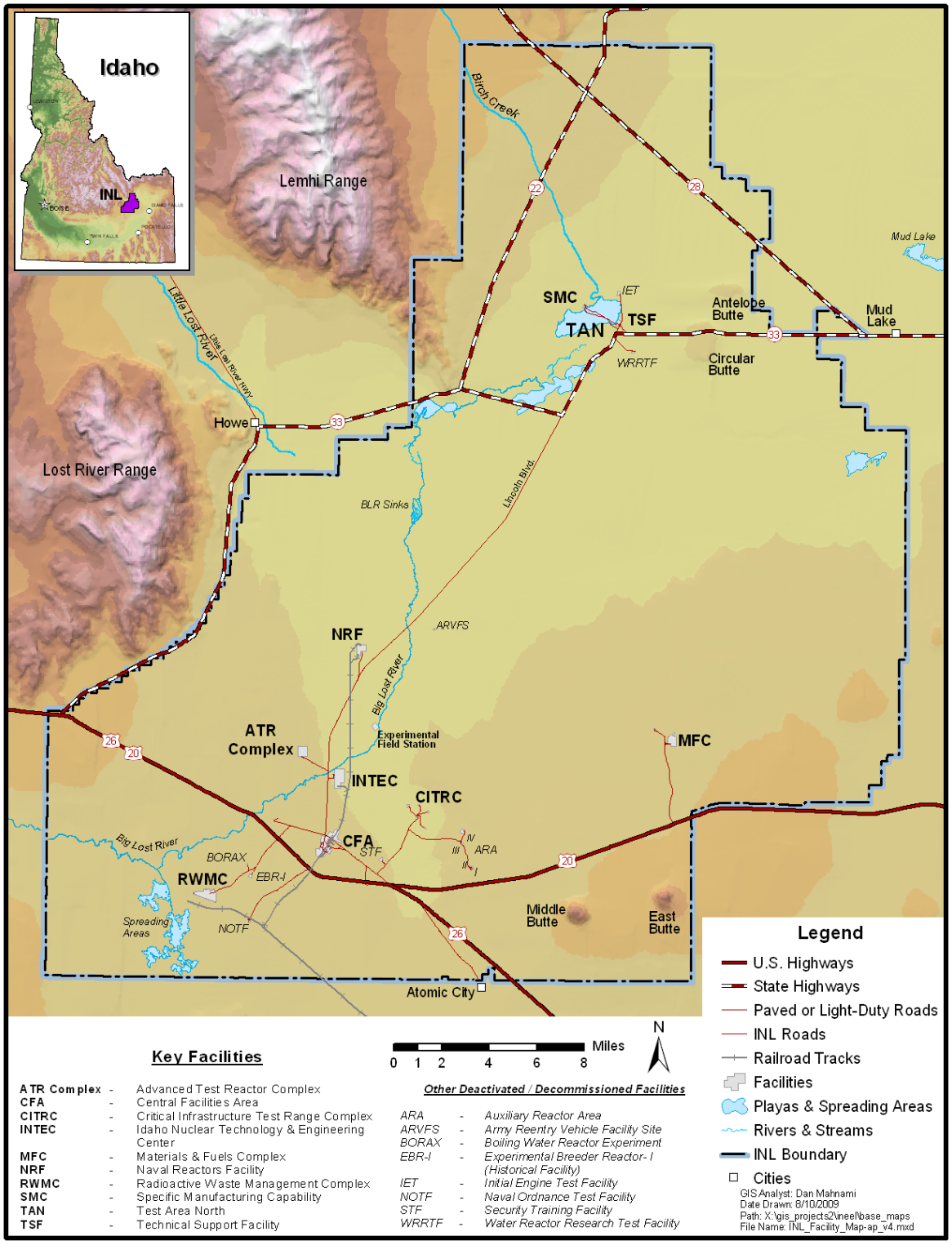

Figure 1. Idaho National Laboratory Site location map.

Table 1. Relative ranking of pathways at the INL Site.

Pathway	Potential Amount	Rate	Duration	Rank[a] (Relative Importance)
Air	Large	Fast	Intermediate	1
Groundwater	Large	Slow	Long	2
Biota	Small	Slow	Short	3
Surface Water	Small	Slow	Short	4

a. 1 = most important
4 = least important

2.2 Environmental Surveillance Activities

Environmental surveillance must be performed at ICP waste management facilities to comply with DOE Order 435.1 Chg 1. These surveillance activities are limited to measuring environmental radioactivity near ICP-operated facilities (RWMC and ICDF at Idaho Nuclear Technology and Engineering Center) to identify trends and assess possible impacts at the facility. Table 2 summarizes the waste management surveillance activities conducted by ICP Environmental and Regulatory Services.

Relatively large amounts of tritiated water (that is, 1–100 Ci/yr range) are released from the SDA primarily as diffuse emissions from waste. At several ICP-operated facilities (e.g., ARP facilities), significant emissions of particulate radioactive materials are possible under abnormal conditions (e.g., loss of a filtration system or an accidental release outside of a contamination-control area). ICP environmental surveillance includes monitoring for airborne particulate materials.

Radionuclides can be transported through several other mechanisms: soils, surface water, and biota. Soils are sampled around the SDA to determine if waste contaminants have accumulated in the surface soil as a result of migration through the soil column, or deposition of airborne materials. Radionuclides could be transported outside the RWMC via surface water run-off. Surface water is sampled at the SDA Lift Station. Plants are potential pathways for migration of radionuclides away from RWMC. Biota samples are collected around the SDA and south of RWMC.

ARP is conducted under CERCLA, under the authority of the *Record of Decision for Radioactive Waste Management Complex Operable Unit 7-13/14* (DOE/ID-11359). ARP complies with the substantive applicable or relevant and appropriate requirements, including 40 CFR 61, "National Emission Standards for Hazardous Air Pollutants" (NESHAP). In addition to CERCLA operations, ambient air surveillance is performed for the RCRA Sludge Repackaging Project in accordance with agreements between EPA and ICP (Burton 2008; Wilson 2013). Ambient air surveillance for NESHAP compliance is performed at EBR-I (see Figure 2). Background samples for NESHAP and SDA surveillance are collected at Howe (see Figure 3). ICP Environmental and Regulatory Services conducts this ambient air surveillance following the requirements of 40 CFR 61.93(g), "Emission Monitoring and Test Procedures." Air samples are collected bimonthly, composited, and analyzed monthly using radiochemical methods for Sr-90, Pu isotopes, Am-241, and uranium, and by gamma spectrometry for gamma-emitting radionuclides. Table 3 summarizes the ARP and Sludge Repackaging Project ambient air surveillance.

Table 2. Waste management surveillance activities.

			Locations		
Media	Analysis	Collection Frequency	INL (Onsite)	Distant	Description
Ambient Air	Gross alpha Gross beta Gamma spectrometry Radiochemistry[a]	Semimonthly Semimonthly Monthly Quarterly	RWMC/SDA	NA	Seven SP[b] air samplers operate at 0.113 m^3/min (includes one control and one replicate, excludes one blank) (see Figure 4)
	Gross alpha Gross beta Gamma spectrometry	Semimonthly Semimonthly Monthly	NA	Howe	One SP air sampler operates at 0.113 m^3/min (see Figure 3)
	Gross alpha Gross beta Gamma spectrometry Radiochemistry	Semimonthly Semimonthly Monthly Quarterly	Idaho CERCLA Disposal Facility	NA	One SP air sampler operates at 0.133 m^3/min (see Figure 5)
Soil	Gamma spectrometry Radiochemistry[a]	Triennially	RWMC/SDA	NA	Four locations in each of four major areas (see Figure 6) (plus two control areas) (see Figure 7)
Surface Water	Gamma spectrometry Radiochemistry[a,c,d]	Quarterly, depending on precipitation	RWMC/SDA	NA	Surface run-off samples from SDA (see Figure 8) and control location
Biota	Gamma spectrometry Radiochemistry	Annually, but species sampled varies each year depending on availability	RWMC	NA	Vegetation—Three composites in each of four major areas (see Figure 9) (plus one control area) (see Figure 10)
Penetrating Radiation (Surface)	External radiation levels	Annually	RWMC/SDA	NA	Surface gamma radiation—truck-mounted GPRS[e] gamma-radiation detector system (see Figure 11)

a. Analysis for Am-241, Pu-238, Pu-239/240, U-235, U-238, and Sr-90.
b. SP—suspended particulate.
c. Samples for radiochemical analyses usually taken during second quarter only.
d. Exact number of samples may vary due to availability.
e. GPRS—global positioning radiometric scanner.

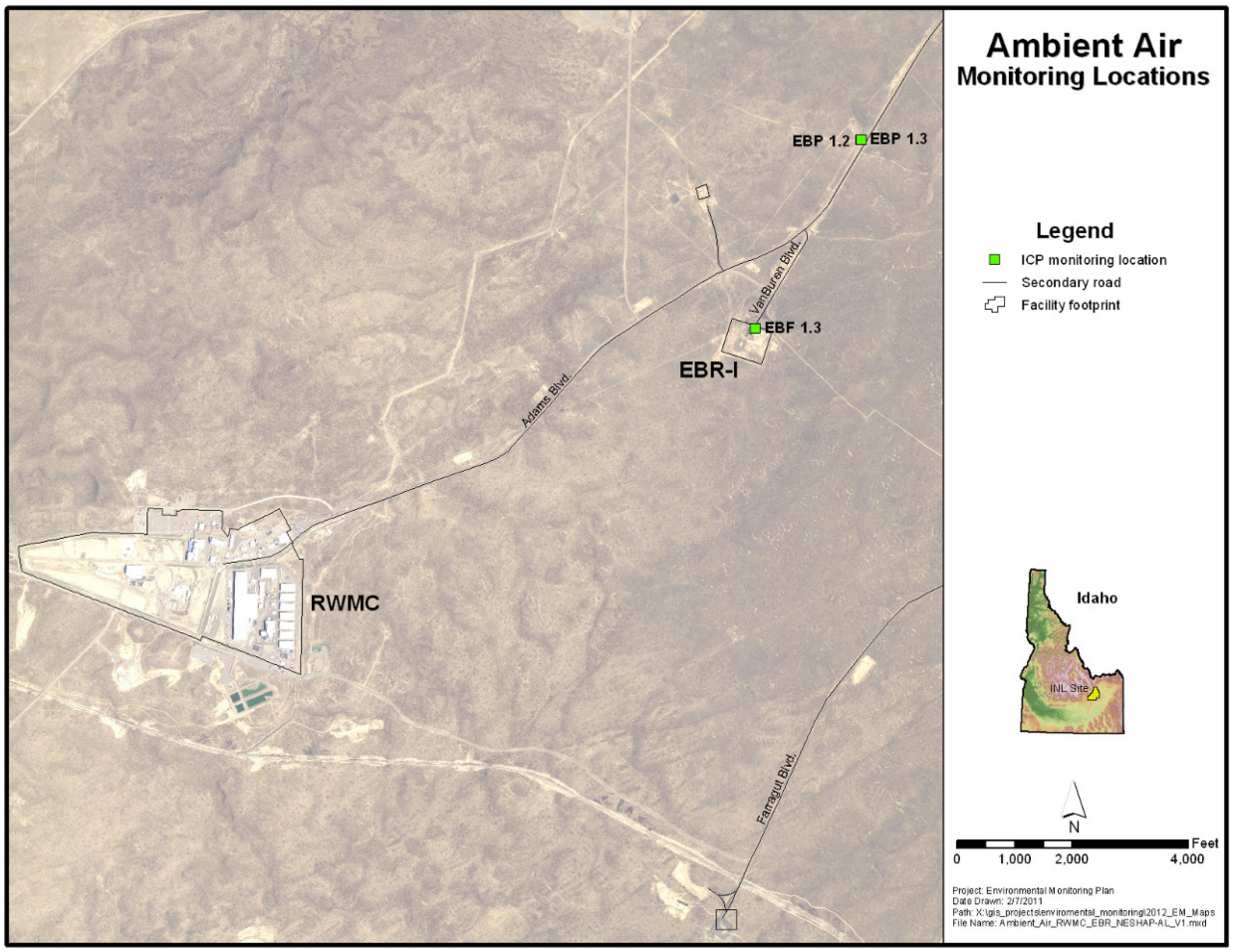

Figure 2. Ambient air monitoring locations for NESHAP compliance.

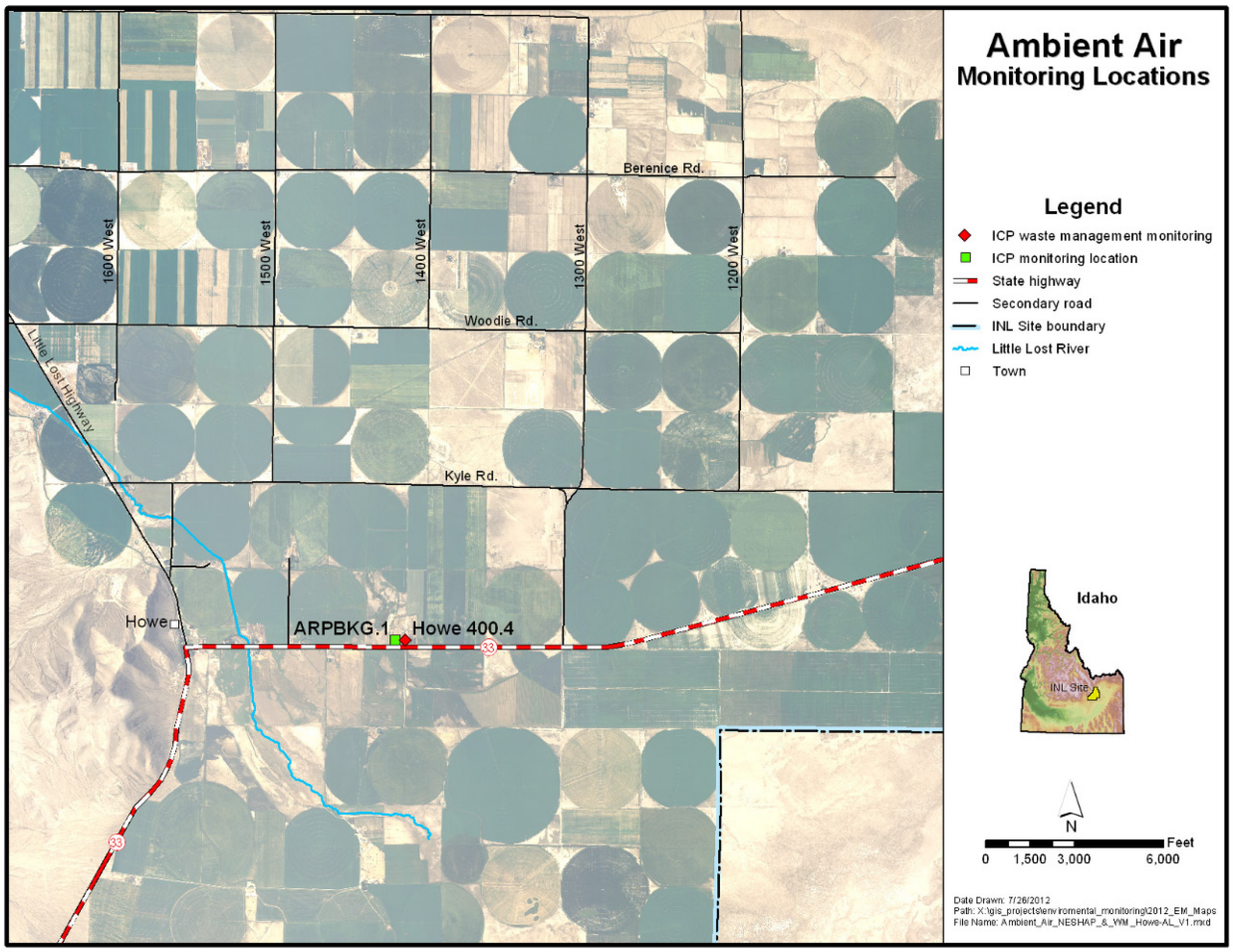

Figure 3. Background ambient air monitoring location in Howe (NESHAP and SDA surveillance).

Table 3. Ambient air surveillance for NESHAP compliance.

			Locations		
Media	Analysis	Collection Frequency	INL (Onsite)	Distant	Description
Ambient Air	Gamma spectrometry Radiochemistry[a]	Collected semimonthly Two-filter composite analyzed monthly	EBR-1 power pole (see Figure 2)	NA	SP[b] air sampler operated at 0.567 m^3/min. This is one of two duplicate samples.
Ambient Air	Gamma spectrometry Radiochemistry[a]	Collected semimonthly Two-filter composite analyzed monthly	EBR-1 power pole (see Figure 2)	NA	SP air sampler operated at 0.567 m^3/min. This is one of two duplicate field samples.
Ambient Air	Gamma spectrometry Radiochemistry	Collected semimonthly Sample is analyzed if the collocated INL sample results are positive; otherwise, sample is archived for the duration of project	EBR-1 fence line (see Figure 2)	NA	One SP air sampler operated at 0.567 m^3/min. Sample is archived at least until results from INL sampling are available, and the project has validated data from the EBR-I power pole location. This sample also may be used for compliance.
Ambient Air	Gamma spectrometry Radiochemistry	Collected semimonthly Two-filter composite analyzed monthly	NA	Howe	One SP air sampler operated at 0.567 m^3/min. Background sampling location (see Figure 3).

a. Analysis for Am-241, Pu-238, Pu-239/240, U-235, U-238, and Sr-90.
b. SP—suspended particulate.

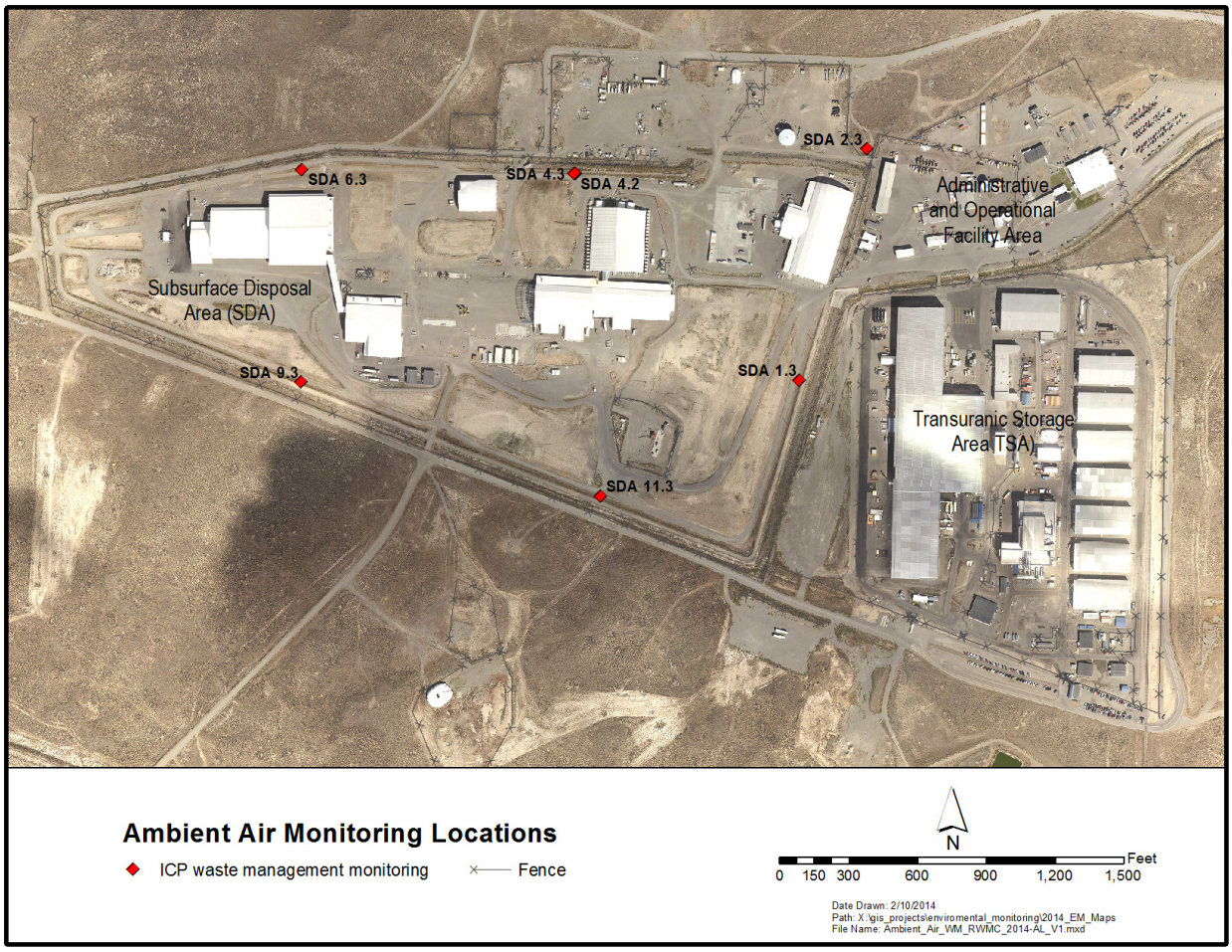

Figure 4. Ambient air monitoring locations at RWMC.

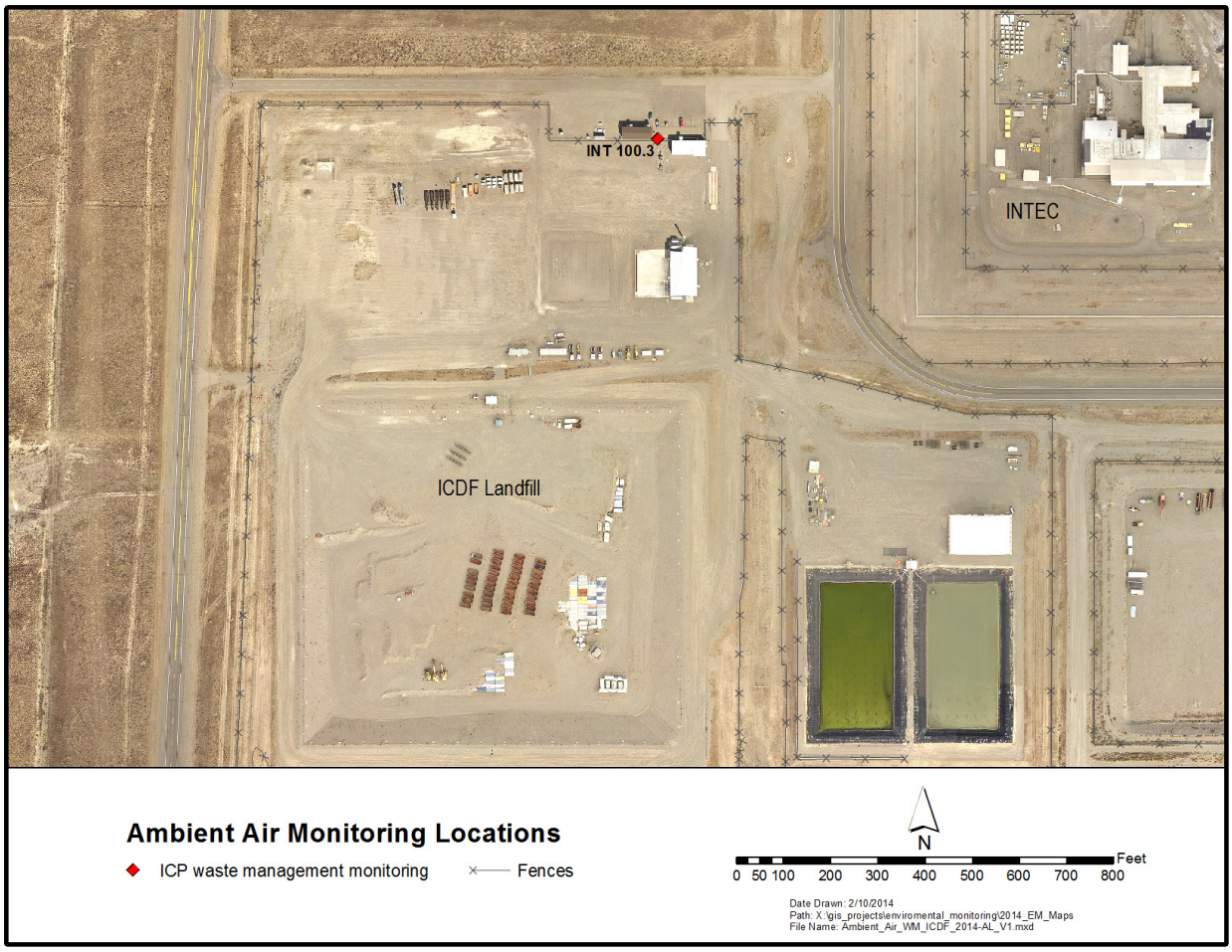

Figure 5. Ambient air monitoring location at ICDF.

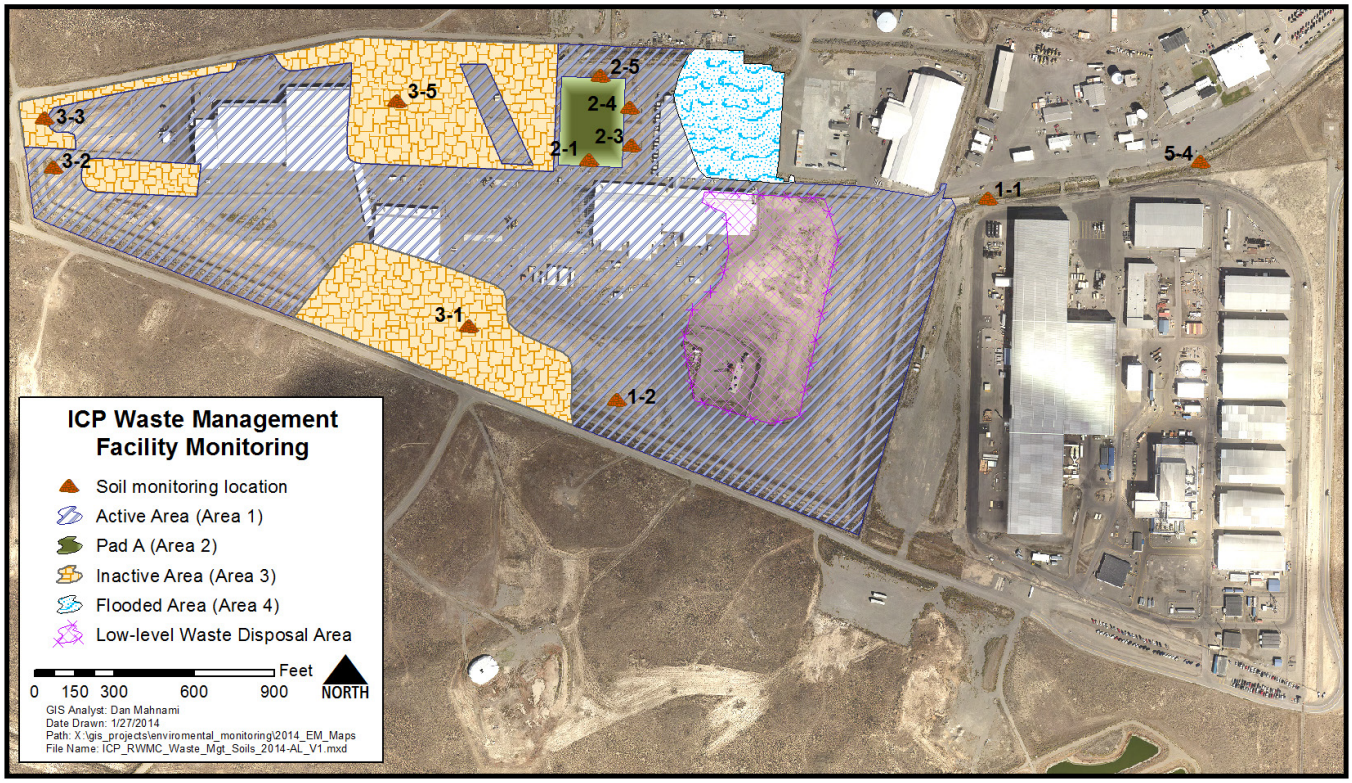

Figure 6. Soil monitoring locations at RWMC.

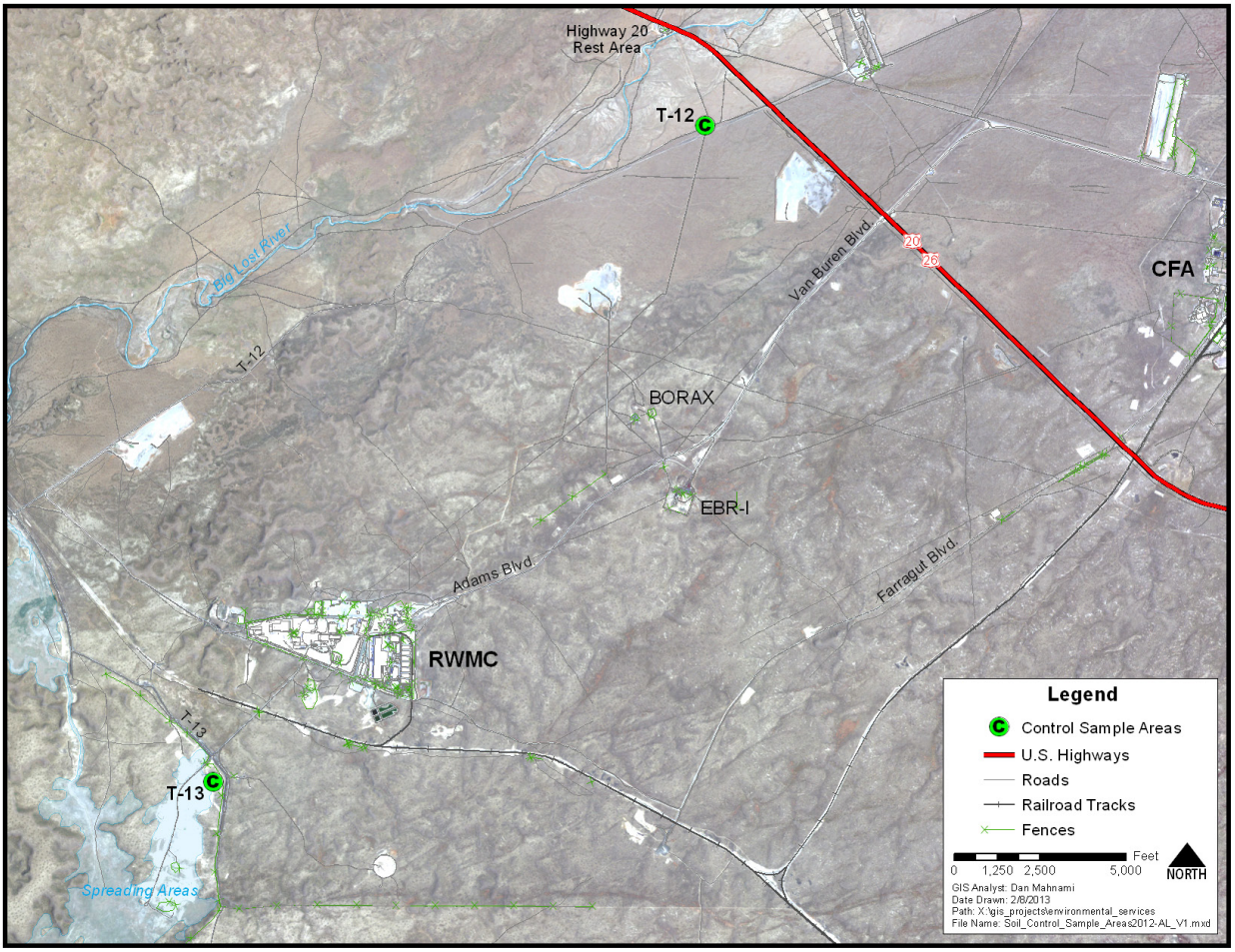

Figure 7. Location of two soil control areas near RWMC.

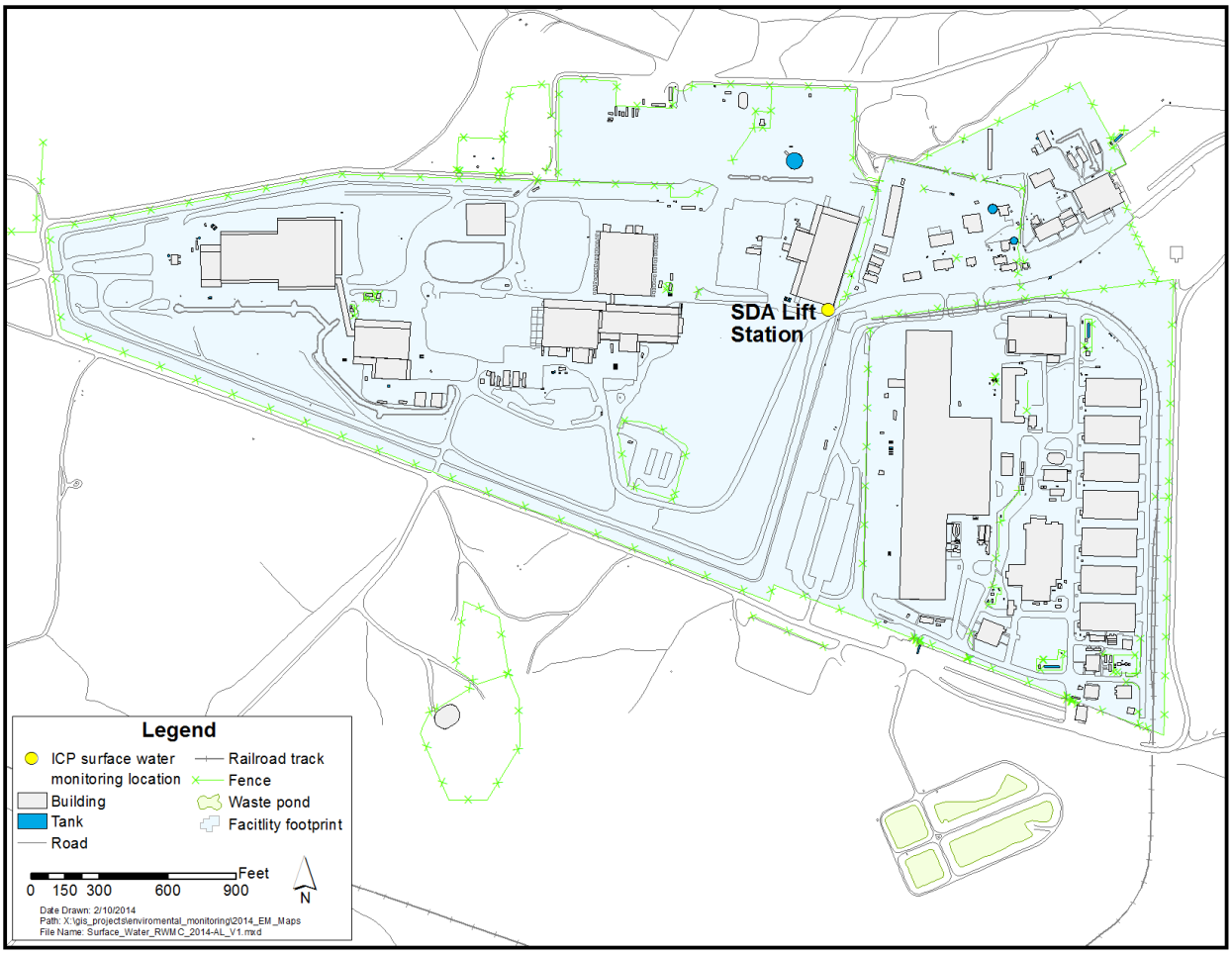

Figure 8. Surface water sampling location at the SDA Lift Station at RWMC.

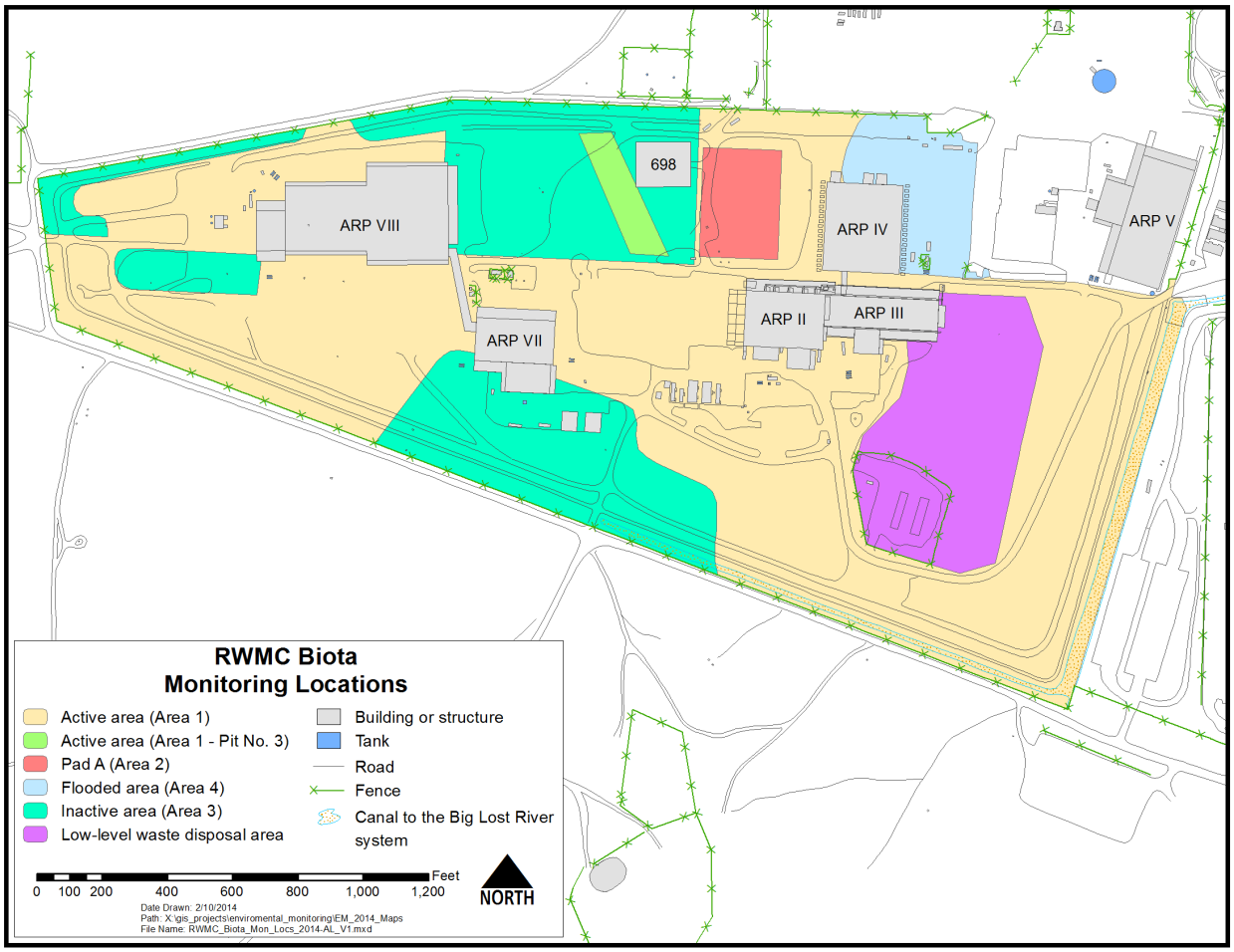

Figure 9. Biotic surveillance monitoring locations (four major areas) at RWMC.

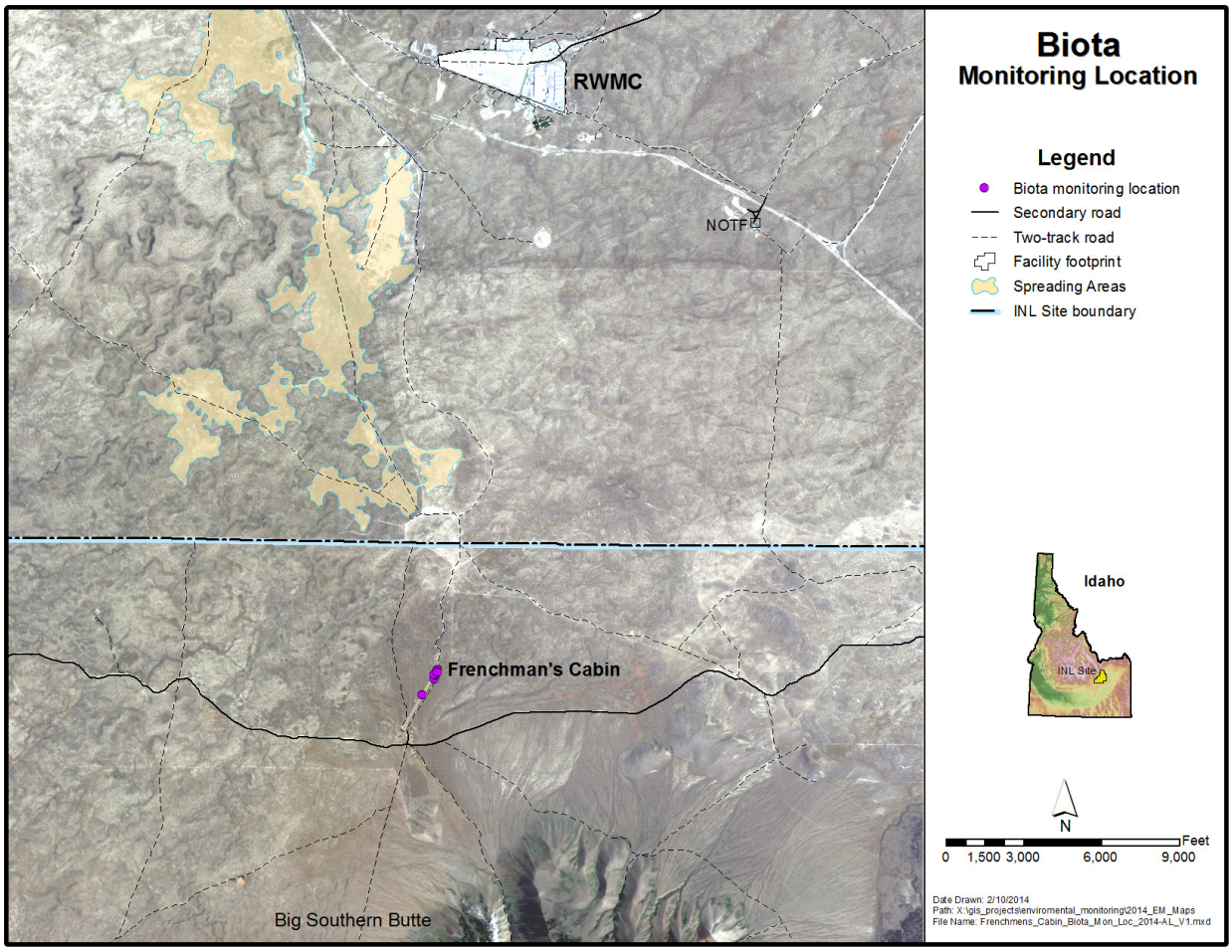

Figure 10. Biota control sampling area.

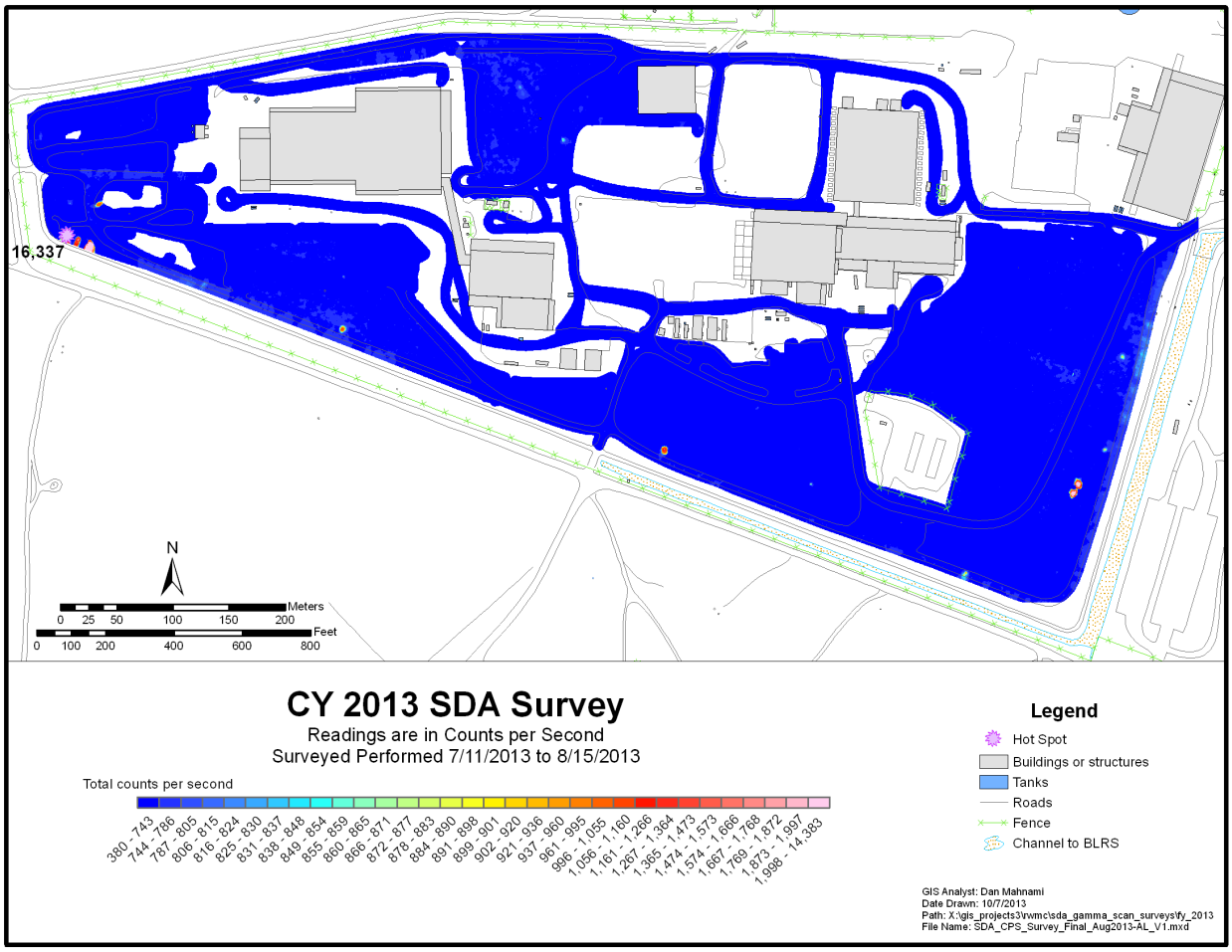

Figure 11. Penetration radiation survey area at the SDA.

3. PROGRAM OBJECTIVES

3.1 Requirements Overview

The general requirements for environmental monitoring and surveillance programs at DOE sites are contained in the following DOE orders and regulatory guides:

- DOE/EH-0173T, "Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance"
- DOE Order 458.1 Admin Chg 3, "Radiation Protection of the Public and the Environment"
- DOE Order 435.1 Chg 1, "Radioactive Waste Management."

The applicable DOE orders contain definitions that make clear distinctions among effluent monitoring, environmental monitoring, and environmental surveillance. Definitions are provided in Appendix C.

The general requirements for ambient air sampling to demonstrate NESHAP compliance are contained in 40 CFR 61.93(g). More detailed guidance for ambient monitoring to comply with the NESHAP has been issued by EPA (EPA 2004). Other EPA documents (not referenced here) describe use of high volume air sampling equipment for collecting airborne particulate material; these documents are consulted, as necessary, to develop detailed monitoring procedures.

3.2 Environmental Surveillance Program Objectives

The Environmental Surveillance Program has the following general objectives:

- Waste management surveillance operations
  - Support the overall programmatic objectives of the Environmental Monitoring Program
  - Comply with applicable requirements regarding environmental surveillance of radioactivity at DOE national laboratories and DOE waste management facilities
  - Identify trends in concentrations of radioactivity in environmental media near ICP waste management facilities and concentrations of contaminants in environmental media near ICP facilities
  - Provide indications of confinement integrity at ICP radioactive waste storage and disposal facilities
  - Make environmental surveillance data available to the Department of Energy Idaho Operations Office (DOE-ID), other federal agencies, INL contractor personnel, State of Idaho officials, and other programs conducting activities such as performance assessment, pathways analyses, dose estimation, and site environmental report preparation
  - Collect data in support of special studies
- National emission standards for hazardous air pollutants (NESHAP)—air surveillance operations
  - Measure ambient air concentrations at EBR-I and Howe to satisfy the requirements for compliance evaluation—NESHAP.

These Environmental Surveillance Program objectives for waste management facilities are to be interpreted as including the program objectives identified in DOE Order 458.1 and DOE Order 435.1. Appendix D provides excerpts from these DOE orders containing the specified objectives. The particular requirements for waste management surveillance at DOE radioactive waste management facilities are contained in DOE Order458.1 and DOE Order 435.1.

The Environmental Surveillance Program mission does not include all aspects of environmental surveillance, but only those components that have been identified by DOE-ID Environmental Programs as appropriate to the operations at the INL Site. The technical objectives provided in this section for each specific activity are designed to meet the aspects of the Environmental Surveillance Program addressed by that activity.

3.2.1 Ambient Air Monitoring at Waste Management Facilities

The specific objectives of ambient air monitoring are as follows:

- Determine concentrations of radionuclides in ambient air in the vicinity of ICP waste management facilities and at appropriate background locations
- Detect and report significant trends in measured concentrations of airborne radionuclides
- Compare measured concentrations of radionuclides to reference levels based on derived concentration guides for the public given in DOE Order 458.1 Admin Chg 3
- Measure the ambient air concentrations of radionuclides in the event of a nonroutine or unmonitored release
- Report comparisons of measured concentrations to reference levels based on derived concentration guides for the public given in DOE Order 458.1 Admin Chg 3.

3.2.2 Ambient Air Monitoring for NESHAP Compliance

The specific objectives of ambient air monitoring for NESHAP compliance are as follows:

- Measure the concentrations of radionuclides in ambient air at EBR-I and Howe, and determine the concentrations of radionuclides attributable to ARP or Sludge Repackaging Project emissions
- Compare measured concentrations at EBR-I with Table 2 of 40 CFR 61, Appendix E.

3.2.3 Surface Soil Sampling

The specific objectives of surface soil sampling are as follows:

- Determine concentrations of radionuclides (natural and fallout) in soils
- Detect and report significant trends in measured concentrations of radionuclides in soil
- Assess any buildup of radioactivity due to INL Site operations.

3.2.4 Surface Water Sampling

The specific objectives of surface water sampling are as follows:

- Determine concentrations of radionuclides in any surface waters leaving ICP waste management facilities
- Report comparisons of measured concentrations against reference levels based on derived concentration guides for the public given in DOE Order 458.1 Admin Chg 3
- Detect and report significant trends in measured concentrations of radionuclides in surface waters leaving ICP waste management facilities.

3.2.5 Biotic Surveillance

The specific objectives of routine biotic surveillance are as follows:

- Determine if biota are transporting radionuclides from buried waste or contaminated soil
- Detect and report significant trends in the radionuclides and concentrations in biotic samples.

3.2.6 Radiation Monitoring

The specific objectives of radiation monitoring are as follows:

- Characterize direct radiation levels at specific points of interest at ICP waste management facilities
- Detect and report significant trends in measured levels of penetrating radiation.

4. ENVIRONMENTAL SURVEILLANCE PROGRAM BASES AND DESIGN

The current Environmental Surveillance Program design is implemented in the technical procedures (TPRs), sampling procedures (SPRs), and management control procedures (MCPs) developed for the individual surveillance activities. These TPRs, SPRs, and MCPs are contained in the *Environmental Monitoring Surveillance Program Handbook*.

The general bases for the current program design include:

- Regulatory requirements and guidance for environmental surveillance
- Historical commitments
- Special studies conducted by DOE-ID or ICP organizations.

The design of new activities is driven by the data quality objective (DQO) process described in Section 7. The primary concern is that the design meets the criteria and constraints established in Stages I and II of the DQO development. Resources used for guidance in the design stage include regulatory requirements and guidance specific to data collection systems, current technical references, and technical peer review.

4.1 Waste Management Surveillance

4.1.1 Ambient Air Monitoring

The Waste Management Surveillance Program collects suspended particulate material on 10-cm (4-inch) membrane filters using particulate monitors. These monitors are designed without size selective inlets, and may admit suspended particles of all sizes. Suspended particulate monitoring is performed using SPR-107, “Waste Management Low-Volume Suspended Particulate Air Monitoring.” The Waste Management Surveillance Project filters are collected and analyzed semimonthly for gross alpha and gross beta activity, and monthly composites of the samples collected from each location are analyzed quantitatively for gamma-emitting radionuclides. Filters from each sample location are also composited quarterly and are analyzed for specific alpha- and beta-emitting radionuclides.

Airborne materials from RWMC and ICDF are predominantly fugitive dusts with small amounts of sorbed radionuclides. The general approach to monitoring an area source, such as the fugitive dusts at RWMC and ICDF, is to monitor around the periphery of the facility. Monitors were, thus, located in predominant wind paths from disposal activities (see Figures 2 and 4).

4.1.2 Surface Soil Surveillance at RWMC

Surface and near-surface soils at RWMC have become contaminated from past flooding of open pits, waste handling, and biotic intrusion. Of particular concern are measured concentrations of Pu-239 and Am-241, caused by past flooding, in surface soils inside and outside the northeast corner of the SDA. Wind, water, and biota can transport contaminated soil particulates near to and distant from the SDA. Sampling is performed using SPR-110, "Surface Soil Sampling." Soil is sampled to evaluate trends over many years. Figure 6 shows soil sampling locations (four major areas) for long-term trend studies.

4.1.3 Surface Water Run-Off at RWMC

Radionuclides could be transported outside the boundaries of RWMC via surface water run-off. Surface water run-off occurs at the SDA only during periods of snowmelt or heavy precipitation. At these times, water runs off of the SDA into a lift station (see Figure 8). The lift station pumps water into a canal, which also carries outside run-off that has been diverted around RWMC. The results of studies conducted by the Radiological and Environmental Sciences Laboratory indicate transport of transuranic nuclides immediately outside of the RWMC perimeter. Local flooding and run-off could have caused this. Sampling is performed at the lift station using SPR-213, "Surface Water Sampling at Radioactive Waste Management Complex."

4.1.4 Biotic Surveillance at RWMC

Plants are potential pathways for migration of radionuclides away from the RWMC. Plant uptake of radionuclides by vegetation at the RWMC has been documented by the Radiological and Environmental Sciences Laboratory (Arthur 1982). Sampling is performed using SPR-106, "Biotic Monitoring." Sampling is performed at the locations shown in Figures 9 and 10.

4.1.5 Penetrating Radiation Surveillance at RWMC

Radiation surveys (see Figure 11) were initiated in 1973 to characterize penetrating radiation fields in the SDA. Surveys were conducted semiannually from 1978 to 2002. Due to the consistency of the results of these semiannual surveys, the frequency was changed to annually in 2003. The surveys are useful in detecting soils that have become contaminated with gamma-emitting nuclides.

A global positioning radiometric scanner system is used to perform the gamma-radiation surveys. The global positioning radiometric scanner is mounted on a four-wheel drive vehicle; two plastic scintillation detectors identify contaminated areas, and both global positioning system and radiometric data are recorded. The vehicle is driven at approximately 8 kilometers per hour (5 mph) to collect survey data. Surveys are performed using TPR-6525, "Surface Radiation Surveys using the Global Positioning Radiometric Scanner."

4.2 Surveillance for NESHAP Compliance

Surveillance monitoring for NESHAP compliance is performed using SPR-193, "Ambient Air Sampling for NESHAP Compliance at Accelerated Retrieval Project." Samples are collected at 20 scfm on 8-in. × 10-in. membrane filters using high-volume air samplers. The ambient air filters are collected in accordance with the proposal submitted May 1, 2008, to the EPA (Burton 2008). The ambient air filters are composited and analyzed monthly using radiochemical methods for Sr-90, Pu isotopes, Am-241, and uranium, and by gamma spectrometry for seven gamma-emitting radionuclides. Figure 2 shows the ambient air monitoring locations, and Figure 3 shows the background location in Howe, Idaho.

5. PROGRAM ORGANIZATION AND RESPONSIBILITIES

The Environmental Surveillance Program recognizes the importance of efficient project management and ensures this through well-defined job descriptions and areas of responsibility. Appendix E describes the organization and responsibilities for NESHAP ambient air surveillance. The *Environmental Monitoring Surveillance Program Handbook* contains procedures that identify performers for environmental surveillance tasks.

6. PERSONNEL TRAINING

Qualified Environmental Surveillance staff are hired and trained to produce results consistent with sampling and data quality objectives. Personnel are trained in sampling procedures via required reading and on-the-job training for each specific task.

6.1 Program Training Techniques

The project manager or designated alternate develops task-specific training requirements. Individual training plans are updated per MCP-27, "Preparation and Administration of Individual Training Plans." These task-specific training requirements are based upon task-specific job safety analyses and requirements identified in task-related MCPs, TPRs, and SPRs. This training is identified consistent with the needs of the individual based on the following:

- Scope, complexity, and nature of the work to be performed
- Review of the education, experience, and proficiency of each new, recently promoted, or transferred Environmental Surveillance employee.

The new employee receives the required Environmental Surveillance Program training in accordance with MCP-27.

6.2 Project-Specific Training

Both the home organization and work organization provide employee training requirements, which are documented in individual training plans. These plans are available on the Training Records and Information Network (TRAIN) System.

6.3 Additional Training

Additional training is conducted during routine sampling meetings and education programs. Safety training occurs during the initial staff orientation meeting and on a continuing basis. Records of the attendance at staff training and safety training are kept in ICP Records and are entered in TRAIN.

7. DATA QUALITY OBJECTIVES AND QUALITY ASSURANCE OBJECTIVES

The Sample and Analysis Management (SAM) Data System is a database of information that is a product of a complex, coordinated effort involving field sample collection, laboratory analyses, and data management. Personnel who might use the data need to be aware of the appropriate ranges and limitations of its use. An Environmental Surveillance Program objective is to provide data (as in the SAM Data System and various program reports) of known, documented quality. The precision, accuracy, representativeness, completeness, and comparability of surveillance data are validated by an independent validator before final entry into the SAM Data System. This section summarizes the Environmental Surveillance DQOs and the methods used to evaluate the data.

7.1 Data Reporting Objective

The Environmental Surveillance data reporting objective is to report data meeting project DQOs and quality assurance objectives (QAOs) as defined in this section. DQOs and QAOs are closely related, but distinctly different measures of data quality. The DQOs provide the overall quality requirements for each data collection activity, and the QAOs provide a continuing measure of performance for the activity. Section 7.2 describes DQOs, and Section 7.3 describes QAOs.

7.2 Data Quality Objectives

DQOs provide the overall quality requirements for each surveillance activity. DQOs are defined as the level of uncertainty in environmental data that may be accepted when making a decision or reaching a conclusion with respect to a program objective. DQOs are statements of the level of uncertainty that a decision-maker is willing to accept from environmental data. They are derived from program objectives with consideration of the decisions supported by the environmental data. The development of DQOs provides the basis for designing each data collection activity and the QA/QC programs that support them.

7.2.1 Waste Management Surveillance Data Quality Objectives

DQOs for waste management surveillance were developed using a step-by-step process adapted from that recommended by EPA (EPA QA/G-4).

A report (Otis et al. 1991) describing the DQO process and a worksheet for developing waste management surveillance DQOs have been prepared. For each type of environmental data, the worksheet documents statements of:

- Programmatic objectives supported
- Decisions to be made
- Why environmental data are needed and how these data will be used

- Time and resource constraints on data collection
- Descriptions of the environmental data to be collected
- Specifications regarding the domain of the decision
- Results to be derived from the data for purposes of reporting.

Completed worksheets for each radiological environmental surveillance activity are provided in the waste management DQO report (Otis et al. 1991).[a]

The waste management surveillance DQOs are based on the tolerable levels of uncertainty in each type of environmental data collected, depending on how the data are to be used. The data generated by the waste management surveillance activities are typically radioactivity concentrations in environmental media. These are typically based on two types of measurements of environmental samples:

- Laboratory analyses of the amount of radioactivity in a sample
- A measurement of the volume or mass of environmental medium represented by the sample.

Estimates of radioactivity concentration are used for two general purposes:

- Analyses of trends against past estimates and background levels
- Comparison to appropriate alert levels.

Tolerable levels of uncertainty of samples collected for laboratory analysis have been established for each waste management surveillance activity. Data used for comparison to alert levels must meet a higher level of statistical significance than data used only to indicate the presence of radioactivity or to investigate potential trends.

Quantitative DQOs are expressed as relative uncertainty (RU) calculated using Equation (1):

$$RU = \frac{\sigma}{\chi} \tag{1}$$

Where

RU	=	relative uncertainty
σ	=	standard error of measurement
χ	=	value of measurement.

In addition to quantitative estimates of tolerable uncertainty, qualitative criteria have been established. These data acceptance criteria ensure data quality by requiring that all appropriate procedures have been followed to collect data.

The quantitative and qualitative DQOs are used to screen environmental data prior to interpreting and reporting data. If data do not meet the level of quality, then the data are not reported. If data meet

a. Otis et al. followed earlier EPA guidance for the DQO process that was similar to the later (EPA QA/G-4) guidance cited in this plan.

minimum quality requirements, then they are further evaluated to determine whether they represent a detection of radionuclides in a sample that can be used for trending, or additionally for comparison of radiation to alert levels. Table 4 summarizes the DQOs for waste management surveillance activities. More complete information on the development of these DQOs is presented in the DQO report (Otis et al. 1991) for these data collection activities.

Table 4. Waste management surveillance data quality objectives.

Surveillance Activity/ Data Type	Positive[a]	Detection[b]	Negative[c]	General Data Acceptance Criteria[d]
Ambient Air Monitoring Laboratory Analyses	RU[e] ≤ 0.33	0.33 < RU ≤ 0.50	RU > 0.50	
Air Sampler Reading	≥11 days	≥11 days	<11 days	SPR-107 followed
Surface Soil Sampling Laboratory Analyses	RU ≤ 0.33	0.33 < RU ≤ 0.50	RU > 0.50	SPR-110 followed
Surface Water Sampling Laboratory Analyses	RU ≤ 0.33	0.33 < RU ≤ 0.50	RU > 0.50	SPR-213 followed
Biotic Monitoring Laboratory Analyses	≤0.33	0.33 < RU ≤ 0.50	RU > 0.50	
Sample Weight	≥1 gram	<1 gram	<1 gram	SPR-106 followed
Penetrating Radiation Scintillator Readings	NA[f]	NA	NA	TPR-6525 followed

a. Provides a quantitative measure of the amount of radioactivity. Suitable for all purposes, including comparison to alert levels.
b. Provides an indicator of the presence of radioactivity. Suitable for trend analyses.
c. Not distinguishable from zero.
d. Data not suitable for any use unless these criteria are documented.
e. RU—relative uncertainty.
f. NA—no applicable quantitative criterion.

7.2.2 NESHAP Ambient Air Data Quality Objectives

According to the NESHAP, 40 CFR 61.93(g), radionuclide concentrations that would cause an effective dose equivalent of 10% of the standard shall be readily detectable and distinguishable from background. EPA guidance (EPA 2004) for ambient surveillance indicates that air concentrations must be measured at a small fraction of the concentrations listed in 40 CFR 61, Subpart H (NESHAP), Appendix E, Table 2, which is used for evaluating compliance with the standard. By analogy with requirements for stack monitoring, radionuclides causing more than 10% of the dose caused by expected potential emissions must be measured. Based on air emissions evaluations for ARP, Pu-239[b] and Am-241 are the only radionuclides contributing more than 10% of the potential dose. For the purpose of determining sensitivity requirements, it is assumed that quantitative measurement of an airborne radionuclide is reliably assured when its concentration is greater than approximately 10 times the minimum detectable concentration. Therefore, the required sensitivities (i.e., minimum detectable concentrations) for measurement of Pu-239 and Am-241 are at least 1.9E-17 and 2.0E-17 Ci/m^3, respectively, to ensure that either radionuclide will be quantifiable at 10% of the standard, based on Table 2 values. Uranium isotopes, Sr-90, and gamma-emitting radionuclides also will be measured to help

b. Pu-239 includes Pu-240 activity because these two radionuclides cannot be chemically separated or distinguished by alpha energy using alpha spectrometry.

distinguish ARP or Sludge Repackaging Project emissions from other facilities' emissions. These radionuclides will be measured with sensitivities specified for the waste management air samples. Table 5 presents data quality requirements for identifying results that are considered quantitative (i.e., positive) and acceptable with respect to procedural compliance.

Table 5. NESHAP surveillance data quality objectives.

Surveillance Activity/ Data Type	Positive[a]	Detection[b]	Negative[c]	General Data Acceptance Criteria[d]
Ambient Air Monitoring				
Laboratory Analyses	RU[e] ≤ 0.33	0.33 < RU ≤ 0.50	RU >0.50	
Air Sampler Reading	≥11 days	≥11 days	<11 days	SPR-193 followed, proper operation of air sampler for ≥11 days out of the 14-day sampling period

a. The maximum RU considered to indicate quantitative results; conservatively specified for the purpose of National Emissions Standards for Hazardous Air Pollutants compliance.
b. Provides an indicator of the presence of radioactivity. Suitable for trend analyses.
c. Not distinguishable from zero.
d. Data not suitable for any use unless these criteria are documented. Requirement for 11-day operation in the 14-day sampling period is based on 80% completeness requirement for sampling operations (EPA 2004).
e. RU = relative uncertainty.

Appendix F lists the estimated minimum detectable concentrations for detection of single radionuclides (per Currie 1968, with a 5% chance of false detection and false non-detection) that are currently requested of the analytical laboratories. The Surveillance Air Sampling Program can reliably detect most radionuclides at concentrations that correspond to 10% of the NESHAP standard, including Pu-239 and Am-241.

7.3 Quality Assurance Objectives

QAOs are qualitative and quantitative specifications for quality of data. They include evaluation of acceptable conformance with established sampling procedures and criteria for evaluating the results of analyses of QA/QC samples. QAOs provide a continuing measure of performance for the activity.

EPA has identified five areas relating to QAOs. These are sometimes referred to as the PARCC parameters:

- Precision
- Accuracy
- Representativeness
- Completeness
- Comparability.

Three of the five PARCC parameters lend themselves to quantitative measures of data quality for waste management surveillance. They are precision, accuracy, and completeness. The remaining two, representativeness and comparability, are addressed in qualitative terms.

The Environmental Surveillance Program evaluates precision and accuracy of measurements using QC samples. The precision and accuracy of measurements are evaluated using field duplicates and spiked environmental samples. Periodic reviews (i.e., surveillances per MCP-1221) of procedures and field operations are conducted to assess the representativeness and comparability of data. Various QC processes designed to evaluate the PARCC of data are integrated in the project's detailed procedures.

7.3.1 Precision

Precision is a measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Duplicate samples are used as indicators of the precision of sampling techniques and laboratory analytical methods. Two types of duplicates are used: field replicates and laboratory recounts. Field replicates measure the precision of the entire sampling and analysis process. Laboratory recounts measure the precision of laboratory radiation counting procedures only.

Samples analyzed for radioactivity are reported by the laboratory as a value and an associated uncertainty expressed as $\pm 1\sigma$. The uncertainty in gross and radiochemical measurements provided by the laboratory is an estimate of total random error, including that associated with counting statistics, detector background, and laboratory-defined procedures.

Precision (P) is calculated from analytical results of duplicate or triplicate samples as shown in Equations (2) and (3):

$$\text{Precision criterion for duplicates (P)} = \frac{|x_1 - x_2|}{\sqrt{\sigma_1^2 + \sigma_2^2}} \qquad (2)$$

Where

x_1	=	first sample value
x_2	=	second sample value
σ_1	=	first sample uncertainty
σ_2	=	second sample uncertainty.

Precision criterion (P) for triplicates = $s_x^2 \left(\frac{\sigma_1^2 + \sigma_2^2 + \sigma_3^2}{3} \right)^{-1}$ (3)

Where

$$s_x^2 = \frac{1}{2} \sum_{i=1}^{3} (x_i - \bar{x})^2 ,$$

$$\bar{x} = \frac{1}{3} \sum_{x=1}^{3} x_i$$

x_1 = first sample value
x_2 = second sample value
x_3 = third sample value
σ_1 = first sample uncertainty
σ_2 = second sample uncertainty
σ_3 = third sample uncertainty.

The value of the precision criterion is used to qualify the results of replicate analyses or recounts using the criteria presented in Table 6 (duplicates) and Table 7 (triplicates). The tabulated values were chosen to provide more rigorous criteria for recounts than replicates because the total uncertainty of replicates is affected by both the laboratory counting procedure and field sampling procedure. If results for recounts or replicates indicate unacceptable precision, the technical resource and Sample and Analysis Management personnel will contact the laboratory and pursue the actions specified in the laboratory statement of work (SOW).

Table 7 presents the values of the precision criterion to be used to qualify the results. These values were chosen to correspond to the same probability levels as those used to determine the values presented in Table 6 for duplicates.

Table 6. Precision criteria for duplicate radiological analyses.

Laboratory Recount	Field Duplicate	Degree of Precision
≤1.28	≤1.65	Acceptable
>1.28 – ≤1.96	>1.65 – ≤2.33	Questionable
>1.96	>2.33	Not acceptable

Table 7. Precision criteria for triplicate radiological analyses.

Laboratory Recount	Field Triplicate	Degree of Precision
≤1.61	≤2.30	Acceptable
>1.61 – ≤3.00	>2.30 – ≤3.93	Questionable
>3.00	>3.93	Not acceptable

7.3.2 Accuracy

Environmental Surveillance personnel use spiked environmental samples (i.e., performance evaluation samples) to determine the accuracy of laboratory analyses of radioactivity in environmental media. The samples are prepared by the QA laboratory and submitted, "double-blind," for analysis. The QA laboratory compares the results of the performance evaluation sample analysis to the known value and submits a summary report indicating whether the results are statistically identical to the known values. Statistical agreement with the known value is evaluated per the DOE/RESL Mixed Analyte Performance Evaluation Program (see the program handbook at www.inl.gov.resl/mapep/). If results for performance evaluation samples indicate disagreement, Environmental Surveillance personnel will contact the laboratory and pursue the actions specified in the laboratory SOW.

7.3.3 Representativeness

Representativeness is the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is ensured through use of established sampling locations and schedules and TPRs and SPRs for field data collection.

7.3.4 Completeness

7.3.4.1 Waste Management Surveillance. Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct normal conditions. The QAO addresses completeness for laboratory and field operations. The criterion for completeness by laboratories supporting the program is that at least 90% of the samples submitted annually must be successfully analyzed and reported according to specified procedures. Similarly, the criterion for field data collection under the control of the program is that at least 90% of the scheduled samples must be successfully collected on an annual basis and reported according to the specified procedures. If a completeness criterion is not met, the problem will be evaluated, and it will be determined whether the quality of the remaining data is suspect and whether corrective action is needed either in the field collection or laboratory analysis.

7.3.4.2 Surveillance for NESHAP Compliance. Based on EPA guidance (EPA 2004), analytical results should be received for 95% of all samples submitted for analysis. Eighty percent of the planned number of field and background samples should be recovered. A duplicate field sample may be substituted for a field sample to recover a field sample lost during collection or analysis.

7.3.5 Comparability

Comparability expresses the confidence with which one data set can be compared to another data set measuring the same property. Comparability is ensured through the use of TPRs and SPRs for sample collection and preparation, approved analytical methods for laboratory analyses, and consistency in reporting procedures.

7.4 Reconciliation with User Requirements

Reconciling environmental surveillance results with the DQOs provides a way to ensure data are of adequate quality to support the surveillance program requirements. Reconciliation with the DQOs takes

place at both the program and the customer levels. At the program level, reconciliation is performed by the technical resource or designee, and submitted to the customer for review and concurrence.

Specific routine procedures used to assess PARCC are described in Sections 7.3.1 through 7.3.5 of this plan.

8. SAMPLING PROCEDURES

Sampling procedures are developed to ensure that samples are collected in such a way that no pollutant distribution bias exists, no foreign material is introduced into the sample, and no material of interest escapes from the sample prior to analyses. Representative sampling depends on the selection of proper sample locations, use of a proven sampling protocol, adherence to a cleanliness control protocol, and effective sample preservation.

8.1 Sample Collection

Reviewed and approved TPRs and SPRs delineating the sampling protocol used for surveillance projects are found in the *Environmental Monitoring Surveillance Program Handbook.*

8.2 Sample Containers and Sample Preservation

Using clean containers, as well as the correct type and size container for the analyses required, will ensure that errors will not result from inadequate sample size or contamination. The recommended container types, sizes, and sample preservation requirements are presented in Table 8. Using containers only one time ensures that errors will not result from sample contamination. When containers are used only once, cleaning is not required. Sample cartridges and columns are reused and cleaned per applicable implementing procedures.

Table 8. Sample container and preservation requirements.

Parameter or Media	Volume Required per Sample	Container	Preservative
Air (Waste Management Surveillance)[a, b, c]	~ 86,400 ft^3 [d]	New Ziplock bag	None
Air (NESHAP Compliance)	~ 403,000 ft^3 [d]	Filter cartridges and resealable plastic bags	None
Water[a, b, c]	4 L	4-L cubitainer	Nitric acid
Soil[a, c]	500 grams	500-gram LDPE[e] squat jar	None
Vegetation[a, c]	150 grams	500-gram LDPE squat jar	None

a. Gamma spectrometry.
b. Gross alpha/beta.
c. Radiochemistry.
d. Sample consists of a filter containing the particulate material collected from the identified sample volume.
e. LDPE—low-density polyethylene.

8.3 Sample Security

The chain of custody (COC) procedures described in Section 9 of this program plan and in the TPRs and SPRs reduce the opportunity for errors resulting from fraud and sabotage and ensure that any occurrences of fraud and sabotage of samples are detected.

8.4 Sample Transport

MCP-9228, "Managing Nonhazardous Samples," describes the proper sample handling, packaging, and shipping process for environmental samples collected in support of the sampling activities.

8.5 Sample Storage

Samples are stored by the subcontract analytical laboratory, ensuring sample integrity. Procedures to verify laboratory sample storage techniques are described in Section 9.2 of this program plan.

8.6 Recordkeeping

Field measurements are recorded in a bound field logbook according to MCP-9227, "Environmental and Regulatory Services Logkeeping Practices." Errors are crossed out with one line, initialed, and dated.

9. SAMPLE CUSTODY

With the exception of thermoluminescent dosimeters, all samples are collected under COC so others can use that data for environmental investigations that require full COC. Sample handling and analyses must strictly follow COC procedures and documentation to guarantee sample integrity and to ensure that the analytical data will be useful for environmental investigators outside of Environmental and Regulatory Services. COC procedures provide this assurance by producing a record of sample custody, preparation, analyses, and disposal. The sample custody protocols used by the Environmental Surveillance Program are outlined in MCP-9228, "Managing Nonhazardous Samples." A COC violation involving waste management surveillance samples will not invalidate data for Environmental Surveillance uses and trending. A COC violation involving NESHAP compliance samples may invalidate the sample results, depending on the nature of the violation. Any violation of COC will be documented so that data (ARP or Waste Management Projects) can be properly qualified for use.

9.1 Transfer of Chain of Custody

All sample custody transfers are documented using COC procedures. When the possession of samples is transferred, the individual relinquishing the samples signs and records the date and time on the COC document. The individual receiving the samples repeats the procedure.

9.2 Laboratory Custody Procedures

The laboratory must provide a custody procedure for review against program requirements according to the SOW.

10. STANDARDIZATION PROCEDURES AND FREQUENCY

Sampling and analytical instruments must be standardized to ensure that the analytical system is operating correctly and functioning at the proper sensitivity to meet established reporting limits and to ensure that results are accurate and reproducible.

10.1 Laboratory Instruments

Either or both calibration or standardization procedures and frequencies for laboratory analytical methods are specified in the methods requested by the SOW for analytical services. Any deviations from these procedures will be noted in the laboratory report narrative. The Environmental Surveillance Program TPRs and SPRs list field equipment needed for each activity.

10.2 Field Sampling Equipment

10.2.1 Waste Management Air Surveillance

Ambient air samplers used for waste management air surveillance will be calibrated according to MCP-1264, "Ambient Air Surveillance Instrumentation Calibration." Air flow meters are calibrated such that readings are within ±15% of the conventionally true value of the actual flow rate (ANSI N42.17B-1989 and ANSI N323C-2009)

10.2.2 Surveillance for NESHAP Compliance

Ambient air samplers used for ambient air measurements will be calibrated according to SPR-193.

11. ANALYTICAL PROCEDURES

11.1 Laboratory Selection Process

Sampling procedures, detection limits, and analytical methods must be clearly and concisely communicated to the laboratory. The Environmental Surveillance Program controls the performance of analytical laboratories by establishing a contractually binding SOW that specifies detection limits, analytical procedures, and other requirements. A SOW is drafted and negotiated with the laboratories annually. Prior to the start of any analyses when off-Site laboratories are used, a contract addendum SOW is drafted and negotiated. The SOW defines the terms of analyses and also forms the basis from which laboratories can submit competitive bids if off-Site laboratories are used.

11.2 Statement of Work

The SOW is used as a binding agreement between the Environmental Surveillance Program and the laboratory performing the analytical tasks. The SOW for analytical laboratory contracts identifies the following items:

- Summary of analyses to be performed by the laboratory
- Acceptable procedure for sample delivery and storage
- Report deliverables

- Maximum time that can elapse between the submittal of samples to the laboratory and the delivery of data reports to the Sample and Analysis Management point of contact.
- Penalties for late delivery
- Special requirements for supporting documentation and electronic data files
- Laboratory QA/QC requirements.

11.3 Analytical Methods

The analytical procedures to be used in support of environmental surveillance are cited in the laboratory SOW or the sample delivery group.

12. DATA VALIDATION, REVIEW, AND REPORTING

The general objectives for data validation, review, and reporting are the following:

- Identify data that fail to meet the DQOs
- Review data to identify trends, and determine the significance of outlying data points
- Summarize the results of sampling and analyses
- Verify that data recorded in the electronic databases are valid and have been accurately transcribed from the original data reports.

12.1 Data Validation

Data validation is performed to determine if data meet the DQOs and if access or use of a result or set of results should be restricted because of deficiencies with respect to the DQOs. Data are validated with respect to the DQOs for precision, accuracy, and completeness using the statistical tests described in Section 7 of this plan and the "Statement of Work for Validating Radiological Data" (SOW-7687). Data are validated by an independent subcontracted validator. If tests of field and laboratory precision indicate that deficiencies in the sampling or analytical procedures or technique may have had an adverse effect on representativeness and comparability, special assessments are performed to identify the cause of the problem. The technical resource also evaluates representativeness and comparability by periodically assessing field operations (procedure walk-throughs) and field notebooks. These assessments are used to identify specific sources of error that might invalidate the data and to help plan improvements to field procedures.

12.2 Data Assessment

Data are assessed by comparing the summarized data evaluation comments against the DQOs provided in Section 7 of this document.

12.3 Data Review

12.3.1 Waste Management Surveillance

Valid data are reviewed to determine their significance with respect to programmatic objectives, in particular the detection of trends in environmental concentrations of radioactive materials. Outlying data are also potentially significant and receive a commensurate level of review.

The laboratory calculates analytical error (σ) for each gross radioactivity and radiochemical measurement, using the estimated overall analytical uncertainty (σ) of the measurement. The analytical error is used to determine the relative uncertainty (RU) by taking the quotient of the analytical error and the measured value (σ/result). The RU is used to determine whether the results are positive (RU < 0.333), negative (RU > 0.5), or indicate that radioactivity is present in a detectable amount (0.5 ≥ RU ≥ 0.333) (see Table 9). If the RU of a radiochemical measurement falls between 0.5 and 0.333, the sample is recounted, and the second result is reported. Gamma spectrometric data are reviewed by the analytical laboratory. The laboratory identifies all spectral peaks with relative counting uncertainty (based on net peak area) less than 0.5, and also reports the results of subsequent reviews by the laboratory staff to determine if the flagged peaks are true positive measurements.

12.3.2 Surveillance for NESHAP Compliance

Valid results for NESHAP compliance samples will be reviewed to identify positive, detected, and negative results, as described in Table 9. Valid Pu-239 and Am-241 data will be compared with corresponding concentrations listed in 40 CFR 61, Appendix E, Table 2.

Table 9. Determination of positive, detected, and negative sample concentrations using the relative uncertainty of measurements.

Surveillance Activity/Data Type	Acceptable Range of Relative Uncertainty		
	Positive[a]	Detection[b]	Negative[c]
Ambient Air	RU[d] ≤ 0.33	0.33 < RU ≤ 0.50	RU > 0.50
Biotic	RU ≤ 0.33	0.33 < RU ≤ 0.50	RU > 0.50
Surface Water	RU ≤ 0.33	0.33 < RU ≤ 0.50	RU > 0.50
Soil Sampling			
Surface soil	RU ≤ 0.33	0.33 < RU ≤ 0.50	RU > 0.50
Subsurface soil	RU ≤ 0.33	0.33 < RU ≤ 0.50	RU > 0.50

a. Provides a quantitative measure of the amount of radioactivity. Suitable for all purposes, including comparison to alert levels.
b. Provides an indicator of the presence of radioactivity. Suitable for trend analyses.
c. Not distinguishable from zero.
d. RU—relative uncertainty.

12.4 Data Reporting

Waste management surveillance data are reported in a variety of ways. Validated and reviewed data are summarized, interpreted, and presented in reports. These reports contain a summary of the data with associated validation and data assessment comments. Also, statistical analyses are performed on the

data using commercial software packages. A data synopsis is included in the INL Annual Site Environmental Report (DOE/ID-12082). The complete raw data sets, including segregated (invalid) data, are maintained on an electronic database with controlled access.

Annual reports for NESHAP compliance will be issued to meet the schedule for the INL NESHAP Annual Report, typically by mid-February of the year following the reporting year.

12.4.1 Response to Increased Emissions

Results of ambient air surveillance measurements typically are available no sooner than one month after the end of sampling and are not used as indicators of increased emissions during unplanned operational conditions. ARP and Sludge Repackaging Project confinement integrity is monitored by RWMC operations (stack continuous air monitor on Enclosures 1, 2) and Radiological Control.

13. INTERNAL QUALITY CONTROL CHECKS

13.1 Field Performance Samples

For waste management surveillance, field duplicate samples periodically are submitted as specified in the TPR for each surveillance activity. For NESHAP compliance, field duplicates are collected and analyzed every sampling period.

13.2 Laboratory Activities

Performance evaluation samples are prepared annually for each environmental sample matrix, including separate samples for SDA, ARP, and Sludge Repackaging Project ambient air filters. Two performance evaluation samples are prepared for each sample matrix. Each performance evaluation sample contains a mixture of relatively high and low amounts of National Institute for Standards and Technology-traceable alpha-, beta-, and beta/gamma-emitting radionuclide standard material. The performance evaluation samples are prepared by an independent laboratory, and the evaluation is double-blind. Results of the performance evaluation sample analysis will be interpreted as described in Section 7.3.2.

14. PERFORMANCE AND SYSTEM ASSESSMENTS

14.1 Self-Assessments

A self-assessment is a systematic check to determine whether personnel are adhering to the requirements outlined and referenced in this program plan and the individual TPRs, SPRs, and MCPs. The technical resource schedules the frequency of field activity assessments according to MCP-9172, “Developing, Integrating, and Implementing Assessment Plans and Schedules.” The schedule is tracked in the companywide Integrated Assessment Schedule database. Any issues determined from these assessments are identified and the response actions scheduled and tracked in the Issue Communication and Resolution Environment (ICARE) database in accordance with MCP-598, “Corrective Action System,” and as applicable, per MCP-538, “Control of Nonconforming Items.”

14.2 Laboratory Assessments

Environmental Surveillance staff periodically conduct an onsite evaluation of all laboratories used by the Environmental Surveillance Program to ensure that the laboratory is performing at a standard acceptable to meet programmatic requirements.

14.3 Quality Assurance Assessments for Accelerated Retrieval Project

The Quality Assurance organization will conduct an assessment of the NESHAP air surveillance activities every 3 years.

15. PREVENTIVE MAINTENANCE PROCEDURES

To minimize downtime and interruption of sampling activities, preventive maintenance is routinely performed on each field instrument. Designated sampling personnel are trained in routine maintenance procedures. Trained service engineers repair the field instruments. Routine preventive maintenance on the instruments is coordinated through the preventive maintenance point of contact and performed by the Health Physics Instrument Laboratory or the Standards Calibration Laboratory. The Health Physics Instrument Laboratory or the Standards Calibration Laboratory notifies Environmental and Regulatory Services staff when preventive maintenance is performed and maintains a file of results of preventive maintenance.

16. CORRECTIVE ACTION

The identification of, cause of, and corrective actions for conditions adverse to quality are documented and reported to appropriate levels of management, as discussed in implementing procedures. Nonconforming items are resolved per MCP-538. Corrective actions are resolved as described in MCP-598.

Deviations are uncontrolled and unapproved changes from an approved plan or procedure and may result in data that do not meet the DQO requirements. Deviations are reconciled and corrected by implementing MCP-598 to correct issues with field operations and by laboratory assessments as identified in Section 14.2. The technical resource and designated responsible managers are responsible for evaluating and dispositioning these deviations.

The technical resource, or designate, is responsible for immediately informing applicable facility and regulatory points of contact of any conditions that may affect the quality of previously reported data or of data currently being collected. Deficiency reports and corrective actions associated with Environmental Surveillance Program data collection is summarized in quality reports to management (see Section 17).

17. QUALITY ASSURANCE REPORTS TO MANAGEMENT

The reporting system is a valuable tool for measuring the overall effectiveness of the QA Program. It provides information for evaluating the program design, identifying problems and trends, and planning for future needs. Results of self-assessments are communicated to and reviewed by the project manager.

18. RECORDKEEPING AND REPORTING

Environmental Surveillance Program quality record identification and record management are performed in accordance with MCP-557, "Records Management." Environmental Surveillance MCPs, TPRs, and SPRs reference the Records Schedule Matrix for implementation of record identification, categorization, and retention requirements for data and other records generated by the Environmental Surveillance Program.

Environmental Surveillance Program reporting is performed in accordance with this plan, Program Requirements Document (PRD)-5030, "Environmental Requirements for Facilities, Processes, Materials, and Equipment," MCP-3480, "Environmental Instructions for Facilities, Processes, Materials and Equipment," and MCP-9109, "Preparation, Certification and Transmittal of Environmental Deliverables."

Environmental Surveillance Program controlled documents are controlled and revised by implementing MCP-135, "Document Management."

19. REFERENCES

40 CFR 61, "National Emission Standards for Hazardous Air Pollutants"

40 CFR 61, Appendix B, Method 114, "Test Methods for Measuring Radionuclide Emissions from Stationary Sources"

40 CFR 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities"

40 CFR 61, Appendix E, Table 2, "Concentration Levels for Environmental Compliance"

40 CFR 61.93(g), "Emission Monitoring and Test Procedures"

ANSI N42.17B-1989 (R2005), "American National Standard Performance Specifications for Health Physics Instrumentation—Occupational Airborne Radioactivity Monitoring Instrumentation"

ANSI N323C-2009, "American National Standard for Radiation Protection Instrumentation Test and Calibration—Air Monitoring Instruments"

Arthur, W. J., *Radionuclide Concentration in Vegetation at a Solid Radioactive Waste Disposal Area in Southeastern Idaho*, 1982

Burton, Brent, Idaho Cleanup Project, to Dennis Faulk, EPA, and Daryl Koch, DEQ, April 17, 2008, "Accelerated Retrieval Project Ambient Air Monitoring White Paper," EDMS Record 2665176, CCN 306885

Currie, Lloyd A., "Limits for Qualitative Detection and Quantitative Determination: Application to Radiochemistry," *Anal. Chem*., 40:3, pp. 586−593, 1968

DOE Manual 435.1-1 Chg 2, "Radioactive Waste Management Manual"

DOE Order 435.1 Chg 1, "Radioactive Waste Management"

DOE Order 458.1 Admin Chg 3, "Radiation Protection of the Public and the Environment," Attachment 1

DOE/EH-0173T, "Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance"

DOE/ID-10890*, National Emission Standards for Hazardous Air Pollutants Annual Report*

DOE/ID-11088*, Idaho National Laboratory Environmental Monitoring Plan*

DOE/ID-11359, *Record of Decision for Radioactive Waste Management Complex Operable Unit 7-13/14*

DOE/ID-12082, *Idaho National Laboratory Site Environmental Report Calendar Year 20XX*

DOE/NE-ID-11179, *Action Memorandum for Accelerated Retrieval of a Described Area within Pit 4*

EGG-NPR-8957, *New Production Reactor Exposure Pathways at the Idaho National Engineering Laboratory*

Environmental Monitoring Surveillance Program Handbook

EPA QA/G-4, *Guidance on Systematic Planning Using the Data Quality Objectives Process*

EPA-QA/R-5, *EPA Requirements for Quality Assurance Project Plans*

EPA QAMS-005/80, *Interim Guidelines and Specifications for Quality Assurance Project Plans*

EPA, *Methods for Estimating Fugitive Air Emissions of Radionuclides from Diffuse Sources at DOE Facilities,* Contract No. 63-10F-0036K, released September 3, 2004

MCP-27, "Preparation and Administration of Individual Training Plans"

MCP-135, "Document Management"

MCP-538, "Control of Nonconforming Items"

MCP-557, "Records Management"

MCP-561, "Quality Program Plan/Quality Assurance Project Plan Development"

MCP-598, "Corrective Action System"

MCP-1221, "Performing Inspections and Surveillances"

MCP-1264, "Ambient Air Surveillance Instrumentation Calibration"

MCP-3480, "Environmental Instructions for Facilities, Processes, Materials and Equipment"

MCP-9109, "Preparation, Certification and Transmittal of Environmental Deliverables"

MCP-9172, "Developing, Integrating, and Implementing Assessment Schedules"

MCP-9227, "Environmental and Regulatory Services Logkeeping Practices"

MCP-9228, "Managing Nonhazardous Samples"

Otis, M. D. et al., *Data Quality Objective Development Process for the EG&G Idaho Environmental Monitoring Unit,* SAIC-017-08-332(2), 1991

PRD-5030, "Environmental Requirements for Facilities, Processes, Materials, and Equipment"

SOW-7687, "Statement of Work for Validating Radioanalytical Data"

SPR-106, "Biotic Monitoring"

SPR-107, "Waste Management Low-Volume Suspended Particulate Air Monitoring"

SPR-110, "Surface Soil Sampling"

SPR-193, "Ambient Air Sampling for NESHAP Compliance at Accelerated Retrieval Project"

SPR-213, "Surface Water Sampling at Radioactive Waste Management Complex"

TPR-6525, "Surface Radiation Surveys Using the Global Positioning Radiometric Scanner"

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Appendix A

Comparison of Program Plan to MCP-561, QAMS 005/80, and EPA-QA/R-5

Table A-1. Comparison of "Environmental Surveillance Program Plan" to MCP-561, QAMS-005/80, and EPA-QA/R-5.

PLN-720 Elements		MCP-561, Appendix B (QAMS-005/80) Elements		EPA-QA/R-5 Elements	
	Title Page, Form 412.14	1.1	Cover Sheet, Form 412.14, with provision for approval signatures for the project manager, and quality engineer	A1	Title and Approval Sheet
	Document Approval Sheet, Document Revision Form with record of approval	1.2	Document Approval Sheet, Form 412.15 for recording concurrence signatures (not required if concurrence signatures are recorded on a Document Revision Form)	A1	Title and Approval Sheet
	Table of Contents	1.3	Table of contents	A2	Table of Contents
2	Program Description	1.4 (5.3)	Project description	A5	Problem Definition/Background
3	Program Objectives			A6	Project/Task Description
4	Environmental Surveillance Program Bases and Design				
5	Program Organization and Responsibilities	1.5 (5.4)	Project organization and responsibility	A3 A4 A8 A9	Distribution List Project/Task Organization Special Training/Certification Documents and Records
7	Data Quality Objectives	1.6 (5.5)	QA objectives for measurement data in terms of precision, accuracy, completeness, representativeness and comparability	A7	Quality Objectives and Criteria
6	Personnel Training	1.6.1	Personnel qualifications	A8	Special Training/Certification
8	Sampling Procedures	1.7 (5.6)	Sampling procedures	B1 B2	Sampling Process Design Sampling Methods

Table A-1. (continued).

PLN-720 Elements		MCP-561, Appendix B (QAMS-005/80) Elements		EPA-QA/R-5 Elements	
9	Sample Custody	1.8 (5.7)	Sample custody	A7 B3	Quality Objectives and Criteria Sample Handling and Custody
10	Standardization Procedures and Frequency	1.9 (5.8)	Calibration procedures and frequency	A7 B7	Quality Objectives and Criteria for Measurement Data Instrument/Equipment Calibration and Frequency
11	Analytical Procedures	1.10 (5.9)	Analytical procedures	B4	Analytical Methods
12	Data Reduction, Validation and Reporting	1.11 (5.10) (5.14)	Data reduction, validation and reporting	A7 B9 B10 D1 D2 D3	Quality Objectives and Criteria for Measurement Data Non-Direct Measurements Data Management Data Review, Verification and Validation Verification and Validation Methods Reconciliation with User Requirements
13	Internal Quality Control Checks	1.12 (5.11)	Internal quality control checks and frequency	B2 B5 B6 B7 B9	Sampling Methods Quality Council Instrument/Equipment Testing, Inspection, and Maintenance Instrument/Equipment Calibration and Frequency Non-Direct Measurements

Table A-1. (continued).

PLN-720 Elements		MCP-561, Appendix B (QAMS-005/80) Elements		EPA-QA/R-5 Elements	
14	Performance and System Assessments	1.13 (5.12)	Performance and system audits and frequency	C1	Assessments and Response Actions
15	Preventative Maintenance Procedures	1.14	Preventive maintenance procedures and schedules	B6	Instrument/Equipment Testing, Inspection, and Maintenance
		1.15	Specific routine procedures to be used to assess data precision, accuracy and completeness of specific measurement parameters involved	D3	Reconciliation with User Requirements
16	Corrective Action	1.16 (5.15)	Corrective action	C1	Assessments and Response Actions
		1.16.1	Deviations		
17	Quality Assurance Reports to Management	1.17 (5.16)	Quality assurance reports to management	A7 C2	Quality Objectives and Criteria for Measurement Data Reports to Management
18	Recordkeeping and Reporting	1.20	Records	A9 & B10	Documents and Records Data Management
		1.19	Reporting		
		1.18	Change control or revision process while App. is effective		

Appendix B

Crosswalk Table for PLN-720 Elements to EPA Method 114 Quality Plan Elements

Method 114 Quality Program Plan Element	PLN-720 Program Plan Element
4.1 Document organizational structure, functional responsibilities, levels of authority and lines of communications.	Appendix E
4.2 Describe administrative controls for prompt response should emission levels increase due to unplanned operations.	12.4.1
4.3 Describe sample collection/analysis procedures for measuring emissions – include where applicable a description of:	4.2 (Section 4.2 cites SPR-193)
4.3.1 Number/location of sampling sites – provide the rationale for selecting sites.	2.2 (Table 3 summarizes number/location) 1.1 (Refers to proposal accepted by EPA)
4.3.2 Sampling equipment and representativeness of the sample collection.	4.2
4.3.3 Continuous monitoring system used to measure emissions, including sensitivity, calibration procedures and frequency of calibration.	Not applicable for ambient measurements (per proposal, ICP will operate continuous air monitors on stacks; continuous air monitors are operated by Radiological Control)
4.3.4 Sample collection systems, collection frequency, calibration (frequency and procedures) for each radionuclide measured.	10.2.1 (Refers to MCP-1264 for ambient air sampler calibration)
4.3.5 Laboratory analysis procedures, frequency of analysis, calibration (procedures and frequency) for each radionuclide measured	11
4.3.6 Sample flow rate measurement systems or procedures, including calibration procedures/frequency.	10.2.1 (Refers to MCP-1264 for ambient air sampler calibration)
4.3.7 Effluent flow rate measurement procedures, including frequency of measurements and calibration procedures/frequency.	Not applicable for ambient measurements
4.4 The objectives of the quality assurance program shall be documented, stating the required precision, accuracy, and completeness of the data, with a description of the procedures used to assess these parameters.	7.3

Method 114 Quality Program Plan Element	PLN-720 Program Plan Element
4.5 A quality control program shall be established to evaluate and track the quality of the measurement data against preset criteria. The program should include where applicable a system of replicates, spiked samples, split samples, blanks and control charts. The number and frequency of such quality control checks shall be identified.	13.1
4.6 Establish a sample tracking system positively identify samples and data through the sample collection, analysis, and reporting process. Establish sample handling and preservation procedures to maintain sample integrity during collection, storage, and analysis.	9
4.7 Regular maintenance, calibration, and field checks shall be performed for each sampling system in use by satisfying the requirements found in Table 2 of this method [114]: Maintenance, Calibration and Field Check Requirements.	10.2.1 (Refers to MCP-1264)
4.8 Perform periodic internal and external audits in accordance with written procedures to monitor QA program compliance. Audits shall be conducted by personnel not responsible for performing any of the audited operations.	14
4.9 Establish a corrective action program including criteria for when corrective action is needed, what corrective actions will be taken, and who is responsible for taking the corrective action.	16 (Refers to MCP-598)

Appendix C

Definitions

a. Environmental Monitoring is the collection and analysis of samples or direct measurements of environmental media. Environmental monitoring consists of two major activities: effluent monitoring and environmental surveillance.

b. Effluent Monitoring is the collection and analyses of samples, or measurements of liquid and gaseous effluents for the purpose of characterizing and quantifying contaminants, assessing radiation exposures of members of the public, providing a means to control effluents at or near the point of discharge, and demonstrating compliance with applicable standards and permit requirements.

c. Environmental Surveillance is the collection and analyses of samples or direct measurements of air, water, soil, foodstuff, biota, and other media from Department of Energy (DOE) sites and their environs for the purpose of determining compliance with applicable standards and permit requirements, assessing radiation exposures of members of the public, and assessing the effects, if any, on the local environment.

d. DOE Contractor includes any prime contractor or subcontractor subject to the contractual provisions of 48 CFR Part 923.70, 48 CFR Part 970.23, or other contractual provisions where DOE has elected to enforce environment, safety, and health (ES&H) requirements by specific negotiated contract provisions.

e. Field Organization is the first line DOE field element that carries the organizational responsibility for (a) managing and executing assigned programs, (b) directing contractors who conduct the programs, and (c) assuring that ES&H are integral parts of each program.

Appendix D

Site Surveillance Objectives from DOE M 435.1-1 and DOE O 458.1

Site Surveillance Objectives from DOE M 435.1-1 (Implementation Manual)

DOE M 435.1-1

CHAPTER I: General Requirements and Responsibilities

PART 1: Requirements

SECTION E: Requirements of Other Regulations and DOE Directives

SUBSECTION (7): Environmental Monitoring

Radioactive waste management facilities, operations, and activities shall meet the environmental monitoring requirements of DOE 458.1, "Radiation Protection of the Public and the Environment."

CHAPTER IV: Low-Level Waste Requirements

SECTION R: Monitoring

SUBSECTION 3: Disposal Facilities

(3) **Disposal Facilities**. A preliminary monitoring plan for a low-level waste disposal facility shall be prepared and submitted to Headquarters for review with the performance assessment and composite analysis. The monitoring plan shall be updated within one year following issuance of the disposal authorization statement to incorporate and implement conditions specified in the disposal authorization statement.

(a) The site-specific performance assessment and composite analysis shall be used to determine the media, locations, radionuclides, and other substances to be monitored.

(b) The environmental monitoring program shall be designed to include measuring and evaluating releases, migration of radionuclides, disposal unit subsidence, and changes in disposal facility and disposal site parameters which may affect long-term performance.

(c) The environmental monitoring programs shall be capable of detecting changing trends in performance to allow application of any necessary corrective action prior to exceeding the performance objectives in this Chapter.

Site Surveillance Objectives from DOE O 458.1

DOE O 458.1, Radiation Protection of the Public and the Environment

Attachment 1, Contractor Requirements Documents

4. REQUIREMENTS

a. Environmental Radiological Protection Program

b. Public Dose Limit

c. Temporary Dose Limits

d. As Low As Reasonably Achievable (ALARA).

e. Demonstrating Compliance with the Public Dose Limit.

(1) Dose evaluations to demonstrate compliance with the public dose limit in paragraph 4.b.(1) of this Order and to assess collective dose must include the following:

(a) The TED to members of the public from exposure to radiation, airborne effluents, and liquid effluents, of DOE origin.

1 Compliance may be demonstrated by calculating dose to the representative person or to the maximally exposed individual (MEI).

2 Determination of the representative person or the MEI must include members of the public both on DOE sites outside of controlled areas and off DOE sites.

3 If it is suspected that any of the dose limits specified in paragraph 4.b.(1)(a) of this Order may be exceeded or the estimated TED for members of the public exceeds 25 mrem (0.25 mSv) in a year, then dose to the lens of the eye, skin and extremities must be evaluated.

(b) Analytical models that consider likely exposure pathways, such as:

1 Direct external radiation from sources located on-site;

2 External radiation from airborne radioactive material;

3 External radiation from radioactive material deposited on surfaces off-site;

4 Internal radiation from inhaled airborne radioactive material;

5 Internal radiation from radioactive material ingested with water, and with food from terrestrial crops or animal products (e.g., meat, eggs, milk);

6 Internal radiation from radioactive material ingested with aquatic food products such as fish, shellfish, crustaceans (e.g., crayfish, shrimp, crab, lobsters), and aquatic plants and algae;

7 External or internal radiation due to residual radioactive material on, or in, cleared real property; and

8 Any other pathway unique to the DOE site or activity.

(c) The dose to members of the public from DOE-related exposure sources only, if the projected DOE-related dose to the representative person or MEI is 25 mrem (0.25mSv) in a year or less. If the DOE-related dose is greater than 25 mrem in a year, the dose to members of the public must include both major non-DOE sources of exposure (excluding dose from radon and its decay products in air, background radiation dose, occupational doses and doses due to medical exposures) and dose from DOE-related sources.

(d) Collective dose for members of the public resulting from radiation emitted and radioactive materials released from DOE radiological activities only (not including radon and its decay products). Collective dose for members of the public must be representative of the total dose and of adequate quality for supported comparisons, trending or decisions. Consistent with the graded approach, collective dose estimates may be truncated by distance (e.g., 50 miles) or individual dose level (e.g., 10 microrem) when integration of doses beyond such thresholds does not significantly affect data quality objectives. Where it is of concern, collective dose for members of the public resulting from radon and its decay products released by DOE radiological activities needs to be calculated separately from other radionuclides.

(2) The estimated individual dose to the MEI or representative person that is representative of the persons or group likely to receive the most dose and is based on pathway and exposure parameters that are not likely to underestimate or substantially overestimate the dose, and, the collective dose (population dose) that is a realistic as practicable estimate of the sum of the doses to all members of the actual exposed population.

(3) Site-specific information on radiation source dispersion patterns, location and demography of members of the public in the vicinity of DOE radiological activities, land use, food supplies, and exposure pathway information must be updated, as necessary, to document significant changes that could affect dose evaluations.

(4) Values of assumed default or site-specific parameters used in calculations must be identified and included with the documentation of the calculations.

(5) Direct measurements must be made, to the extent practicable, to obtain information characterizing source terms, exposures, exposure modes, and other information needed in evaluating dose.

(6) Models for dose evaluation calculations must be appropriate for their purpose. Dose evaluation models that are codified or approved for use by regulators of DOE or by DOE must be used where applicable. Alternatives to such codified or approved dose evaluation models to be used for demonstrating compliance with this Order must be approved by the Field Element Manager and, as determined necessary by the Field Element Manager, in consultation with their Cognizant Secretarial Officer and the Office of Health, Safety and Security.

(7) DOE-approved dose coefficients must be used to evaluate doses resulting from DOE radiological activities. Use of alternative dose coefficients must be approved by the Chief Health, Safety and Security Officer or by a Cognizant Secretarial Officer in consultation with the Chief Health, Safety and Security Officer.

(8) Doses to members of the public from airborne effluents must be evaluated with the CAP-88 model or another EPA-approved model or method to demonstrate compliance with applicable subparts of 40 CFR Part 61, National Emission Standards for Hazardous Air Pollutants.

(9) Environmental monitoring must be conducted to characterize routine and non-routine releases of radioactive material from radiological activities, estimate the dispersal pattern in the environs, characterize the pathway(s) of exposure to members of the public and estimate the doses to individuals and populations in the vicinity of the site or operation commensurate with the nature of the DOE radiological activities and the risk to the public and the environment. Radiological monitoring must be integrated with the general environmental and effluent monitoring. Environmental monitoring must include, but is not limited to:

(a) Effluent Monitoring

(b) Environmental Surveillance

(c) Meteorological Monitoring. Meteorological monitoring must be commensurate with the level of site radiological activities, the site topographical characteristics, and the distance to critical receptors. The scope must be sufficient to characterize atmospheric dispersion and model the dose to members of the public over distances commensurate with the magnitude of potential source terms and possible pathways to the atmosphere.

(d) Pre-operational Monitoring. Prior to the startup of a new site, facility or process with the potential to expose the public or environment to radiation or radioactive material, it is necessary to ensure that adequate knowledge exists to understand: 1) radiological background; 2) pertinent environmental and ecological parameters; and 3) potential pathways for human exposures or ecological/natural resource impacts either from existing data or documents (for example, NEPA evaluations or existing monitoring and surveillance programs, etc.) or from the conduct of a pre-operational study initiated at least one year prior to startup of a new operation.

(10) Site-specific environmental monitoring criteria must be established to ensure that representative measurements of quantities and concentrations of radiological contaminants are conducted and that the effects from DOE radiological activities on members of the public and the environment are monitored sufficiently to demonstrate compliance with this Order.

f. Airborne Radioactive Effluents

Radiological activities must be conducted in a manner such that the release of radioactive material to the atmosphere will:

(1) Be evaluated using the ALARA process established in paragraph 4.d. of this Order;

(2) Not cause radon-222 flux rates to exceed 20 pCi (0.7 Bq)/m2-sec averaged over the surface area overlaying waste, including the covering or other confinement structures, wherever radium-226 wastes are accepted for storage or disposal (See 40 CFR Part 61, Subparts Q and T);

(3) Meet compliance agreements under 40 CFR Part 61, Subparts H, Q, and T;

(4) Not cause the radon-220 and radon-222 decay product concentration, including background, to exceed 0.03 WL in buildings that are being released from DOE control. Further, a reasonable effort must be made to meet a 0.02WL generic guideline for annual average radon-220 and radon-222 decay product concentration, including background, in such buildings; and

(5) Not exceed 3 pCi/L annual average radon-220 and radon-222 concentration, not including background, at the site boundary if DOE activities release radon-220 and radon-222 or their decay products.

Appendix E

Method 114, Element 4.1—Project Organization and Responsibility for NESHAP Ambient Air Surveillance

This section identifies the organizational responsibilities, relationships, and lines of communication for activities related to the ambient air measurement and reporting of radionuclides in support of NESHAP compliance. Individual organizations identified in this plan maintain current organizational charts that reflect the levels of authority and responsibility used to implement this plan. Functional relationships and lines of communication for the NESHAP Ambient Air Surveillance Program are summarized in Table E-1.

Table E-1. Lines of communication for the National Emission Standards for Hazardous Air Pollutants monitoring program.

Function	Performer	Lines of Communication
Maintenance—NESHAP ambient air sampler[a]	Health Physics Instrument Laboratory technical staff	Environmental and Regulatory Services air sampling field team leader ↔ Health Physics Instrument Laboratory supervisor
Operation—NESHAP ambient sampler[a]	Environmental and Regulatory Services air sampling field team leader	Environmental and Regulatory Services air sampling field team leader ↔ Environmental and Regulatory Services reporting project environmental lead
Sample filter removal	Environmental and Regulatory Services air sampling field team leader	Environmental and Regulatory Services air sampling field team leader ↔ Sample and Analysis Management staff
Sample filter removal and transfer to laboratory	Environmental and Regulatory Services air sampling field team leader	Environmental and Regulatory Services air sampling field team leader ↔ Sample and Analysis Management personnel ↔ Contract Laboratory personnel
Sample analysis, review, and reporting to ICP	Analytical laboratory staff	Analytical Laboratory quality assurance ↔ Analytical Laboratory project management ↔ Sample and Analysis Management personnel
Contractual verification and validation of analytical results	Sample and Analysis Management	Sample and Analysis Management personnel ↔ Environmental and Regulatory Services reporting project environmental lead
Data review and analysis	Environmental and Regulatory Services reporting project environmental lead	Sample and Analysis Management personnel ↔ Environmental and Regulatory Services reporting project environmental lead ↔RWMC project environmental lead
Transmit analysis results to CWI organizations	Environmental and Regulatory Services reporting project environmental lead	Environmental and Regulatory Services reporting project environmental lead ↔ RWMC project environmental lead ↔ARP operations and Sludge Repackaging Projects
Environmental Data Warehouse	Sample and Analysis Management	Sample and Analysis Management personnel ↔ Environmental Data Warehouse coordinator
Annual NESHAP reporting	RWMC project environmental lead	RWMC project environmental lead ↔ Environmental and Regulatory Services reporting project environmental lead

Function	Performer	Lines of Communication
NESHAP annual report	Environmental and Regulatory Services reporting project environmental lead	ICP Environmental director ↔ U.S. Department of Energy Idaho Operations Office ICP NESHAP coordinator
Annual internal assessments	Environmental and Regulatory Services reporting project environmental lead (RWMC project environmental lead or Environmental and Regulatory Services reporting project environmental lead must determine mechanism for tracking/scheduling assessments)	Environmental and Regulatory Services reporting project environmental lead ↔ Environmental and Regulatory Services air sampling field team leader
Reporting of internal assessments	Environmental and Regulatory Services reporting project environmental lead (RWMC project environmental lead or Environmental and Regulatory Services reporting project environmental lead must determine mechanism for tracking/scheduling assessments)	Environmental and Regulatory Services reporting project environmental lead ↔RWMC project environmental lead ↔RWMC operations management
Triennial external assessments	ICP QA Department	ICP QA Department↔Environmental and Regulatory Services reporting project environmental lead ↔ Environmental and Regulatory Services air sampling field team leader
Reporting of external assessments	ICP QA Department	ICP QA Department↔ Environmental and Regulatory Services reporting project environmental lead ↔RWMC project environmental lead ↔RWMC operations management

a. The ambient sampler has integral flow measurement equipment.

Organizations and their responsibilities for implementing the NESHAP monitoring program are provided in the following subsections. The listing of responsibilities is not intended to be comprehensive; rather, it reflects the general areas of responsibility for these organizations.

Accelerated Retrieval Project and Sludge Repackaging Project Operations

Accelerated Retrieval Project and Sludge Repackaging Project Operations personnel are responsible for the following activities:

- RWMC project environmental lead reviews and approves this plan and any revisions with concurrence from the RWMC operations quality engineer
- Operations manager reviews procedures concerning the NESHAP emission monitoring activities
- RWMC project environmental lead initiates and coordinates periodic assessments of the NESHAP ambient air surveillance
- RWMC project environmental lead performs annual calculation of the radiological emissions released from the Retrieval Enclosure heating and ventilation stacks in accordance with applicable procedures and guidance identified by the ICP NESHAP coordinator (note that emissions estimates are based on model calculations, not on ambient air measurements).

Health Physics Instrument Laboratory

Health Physics Instrument Laboratory personnel perform the following activities:

- Maintain, calibrate, and repair the record samplers and the stack flow equipment in accordance with applicable procedures and this plan; air flow meters are calibrated such that the readings are calibrated to within ±15% of the conventionally true value of the actual flow rate (ANSI N42.17B-1989, ANSI N323C-2009)
- Provide notice to the RWMC Operations manager (or shift supervisor) concerning problems encountered
- Prepare work packages.

Analytical Laboratory

The analytical laboratory performs the following activities:

- Analyze sample media delivered to the laboratory in accordance with (1) the specifications on the chain of custody (COC) form, (2) laboratory standard operating procedures, and (3) the applicable laboratory Quality Assurance Project Plan
- Ensure that analytical procedures are implemented that result in analytical data consistent with the quantitative parameters specified in this plan and the applicable laboratory Quality Assurance Project Plan

- Review and approve analytical results in accordance with the applicable laboratory Quality Assurance Project Plan

- Transmit the results of radiological analysis to Sample and Analysis Management.

Environmental and Regulatory Services Organization

The ICP Environmental and Regulatory Services organization is responsible for development and review of this plan and to review implementation of the NESHAP monitoring program. The ICP Environmental Regulatory Services organization performs the following activities:

- Collects samples from the ambient air samplers and ships them to the analytical laboratory

- Sample and Analysis Management personnel manage records of NESHAP ambient air surveillance data

- Environmental and Regulatory Services manager ensures that personnel are properly qualified and trained before operations are conducted

- The ICP NESHAP coordinator coordinates periodic reviews of this plan, sampling procedures, and applicable preventive maintenance procedures in accordance with MCP-135, "Document Management"

- The ICP NESHAP coordinator has overall responsibility for coordination and integration of NESHAP ambient air compliance measurements.

  This includes:

  – Interpret applicable regulations (e.g., NESHAP) and permits to identify requirements, which, when fulfilled, ensure compliance with DOE orders, EPA regulations, and Idaho Department of Environmental Quality regulations

  – Identify technical requirements for NESHAP ambient air surveillance to RWMC operations management

  – Perform annual assessments of the INL facility NESHAP monitoring programs

  – Provide support during external audits, as requested.

Idaho Cleanup Project Quality Assurance Department

The ICP QA department performs the following activities:

- Review this plan and any revisions

- Review applicable procedures, design documents, and procurement documents related to NESHAP monitoring for inclusion of quality requirements

- As required by EPA Method 114 quality plan requirements (referenced by the NESHAP), perform triennial external audits of the NESHAP Ambient Air Surveillance Program, and prepare audit reports for management. The triennial audits will cover (1) review of information submitted for compliance with the reporting requirements of the NESHAP to verify that the information is traceable and defensible, (2) review of the sampler flow calibration process, and (3) review of the annual internal assessment process and results.

Appendix F

Data Quality Objectives

Table F-1 lists minimum detectible concentration values for a wide variety of radionuclides. The analytical statement of work for each project (ARP and Sludge Repackaging Project NESHAP Compliance and Ambient Air Monitoring at Waste Management Facilities) is expected to require reporting of a small subset of the radionuclides listed in Table F-1, based on review of potential emissions from the waste inventory or NESHAP reporting requirements.

Table F-1. Environmental Surveillance Program data quality objective—air path.[a]

Nuclide	CAP88 Air Path (µCi/mL per mrem)	MDC[b] (mCi/mL)
Ag-110m	8.69E-14	8.69E-16
Am-241	2.14E-16	2.14E-18
Be-7	2.22E-11	2.22E-13
Ce-141	4.36E-12	4.36E-14
Ce-144	2.20E-13	2.20E-15
Co-58	7.27E-13	7.27E-15
Co-60	1.77E-14	1.77E-16
Cr-51	4.70E-11	4.70E-13
Cs-134	3.23E-14	3.23E-16
Cs-137	1.74E-14	1.74E-16
Eu-152	1.84E-14	1.84E-16
Eu-154	2.29E-14	2.29E-16
Eu-155	5.20E-13	5.20E-15
Fe-59	8.10E-13	8.10E-15
H-3	1.34E-10	1.34E-12
Hf-181	1.56E-12	1.56E-14
Hg-203	8.27E-13	8.27E-15
I-131	6.74E-14	6.74E-16
Mn-54	2.78E-13	2.78E-15
Na-22	3.11E-14	3.11E-16
Nb-94	4.08E-15	4.08E-17
Nb-95	7.69E-13	7.69E-15
Pu-238	3.54E-16	3.54E-18
Pu-239/240	3.28E-16	3.28E-18
Ru-103	2.12E-12	2.12E-14
Ru/Rh-106	1.45E-13	1.45E-15
Sb-124	4.72E-13	4.72E-15
Sb-125	1.72E-13	1.72E-15
Sc-46	3.36E-13	3.36E-15
Sr-90	2.56E-14	2.56E-16
Ta-182	2.07E-14	2.07E-16
U-234	8.75E-16	8.75E-18

Nuclide	CAP88 Air Path (µCi/mL per mrem)	MDC[b] (mCi/mL)
U-235	9.22E-16	9.22E-18
U-238	9.77E-16	9.77E-18
Zn-65	9.01E-14	9.01E-16
Zr-95	1.01E-12	1.01E-14

a. Derived from 2001 NESHAP report screening spreadsheets.
b. Minimum detectible concentration (MDC) required of the analytical laboratory.