Rocky Flats Environmental Technology Site

Integrated Monitoring Plan
Background Document

Air Monitoring

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Table of Contents

Page

4.0 AIR MONITORING 4-1

4.1 Introduction 4-1
4.1.1 Air Monitoring Scope 4-2
4.1.2 Environmental Protection Goal 4-3
4.1.3 Monitoring Objectives 4-3
4.2 Rad NESHAPs Compliance Monitoring 4-4
4.3 Meteorological Monitoring 4-7
4.3.1 Data Use for Rad NESHAP 4-7
4.3.2 Data Use for Emergency Preparedness 4-7
4.3.3 Data Use for Other Compliance Modeling 4-8
4.3.4 Meteorological Monitoring Specifications 4-8
4.4 CDPHE Air Quality Control Division Ambient Air Monitoring 4-9
4.4.1 Non-Radiological Ambient Air Quality Monitoring 4-9
4.4.1.1 Ambient Nitrogen Dioxide (NO_2) and Particulate Monitoring 4-9
4.4.1.2 Beryllium 4-10
4.4.2 CDPHE Radiation Control Division Radiological Ambient Air Quality Monitoring 4-11
4.5 Project-Specific Monitoring 4-13
4.5.1 Interim Measures/Interim Remedial Action Ambient Volatile Organic Compound Monitoring 4-13
4.5.2 Interim Measures/Interim Remedial Action Ambient Radiological Monitoring 4-14
4.5.3 Particle Size-Distribution Monitoring 4-15
4.6 Outstanding Issues 4-16
4.6.1 Radiological NESHAP Ambient Monitoring 4-16
4.6.2 Radiological NESHAP Regulatory Authority 4-16
4.6.3 Beryllium Effluent Stack Sampling 4-16
4.7 References 4-17
Yellow Springs Instruments

List of Tables

Page

4-1 Detection Limits (MDA) for Effluent Air Samplers (Typical) 4-6

4-2 Detection Limits (MDA) for Ambient Air Samplers (Typical) 4-7

4.0 AIR QUALITY

4.1 Introduction

Regulatory activities encompassed by federal and state regulations pursuant to the Clean Air Act (CAA) and its amendments are managed and directed at the Rocky Flats Environmental Technology Site (RFETS or Site) by the Air Quality Management (AQM) within Kaiser-Hill Company's (Kaiser-Hill) Compliance and Performance Assurance organization. This group is responsible for developing the compliance scope and reporting and recordkeeping strategies that the project organizations on Site use to maintain compliance with all applicable air quality regulations and Department of Energy (DOE) Orders. Within that framework, AQM operates a monitoring program that supports both compliance demonstration and emergency response needs at the Site.

Monitoring of radioactive emissions from building process vents support both DOE Order requirements and National Emission Standards for Emissions of Radionuclides Other Than Radon from DOE Facilities (Rad NESHAP) monitoring and reporting requirements. Ambient monitoring of radionuclides on the Site and in the communities immediately adjacent to the Site also satisfy DOE Order requirements and is anticipated to be used in the near future to satisfy Rad NESHAP reporting requirements. Ambient monitoring is performed by AQM and by the Colorado Department of Public Health and Environment (CDPHE), both on Site and at the perimeter. Off-Site monitoring is performed by AQM. Meteorological monitoring supports both the Rad NESHAP reporting requirements and emergency response requirements under the DOE Orders.

Effluent monitoring also supports as low as reasonably achievable (ALARA) principals. These DOE principals provide a conceptual radiation exposure guideline intended to encourage radiation protection practices that exceed those of any prescribed standard. The basis for this concept is the acknowledgment that low exposure dose-effect relationships may exist that cannot be measured or demonstrated scientifically. Effluent monitoring is used to verify the efficacy of radiation control mechanisms that are used in the areas containing and handling significant quantities of radionuclide materials. Levels of emissions that cause no concern from a regulatorily significant environmental perspective are sufficient to trigger a proactive investigative response under the ALARA concept.

Meteorological monitoring is conducted on Site by use of a 61-meter (m) tower instrumented at three levels (10, 25, and 60 m). It is designed to provide support for routine monitoring and assessments, and emergency response. A redundant, instrumented, 10 m tower is located near the primary tower to provide backup data support. Meteorological data are currently used for air quality monitoring support, atmospheric dispersion modeling, hydrological studies, construction management, and safety investigation.

In cooperation with the surrounding communities, DOE has implemented a five-station Community Radiation (ComRad) Program. Independently operated monitoring stations were installed in 1992 in the communities of Arvada, Westminster, Broomfield and Northglenn. Ambient concentrations of plutonium (Pu) are collected continuously using monitoring protocols comparable to those at the Site. Analytical support for sample analysis is provided by U.S. Environmental Protection Agency (EPA) Region 7 laboratories in Las Vegas. Although not a compliance-driven monitoring program, DOE supports this independent evaluation of its potential emissions as a gesture of public assurance in the Site's safe operation.

Air quality monitoring programs provide compliance and support data to other Site functional organizations. Effluent data supports Nuclear Safety evaluation of the building safety envelope. Ambient data can be used in the Human Health Risk Assessment evaluations of Operable Unit closure and to validate effluent modeling results. Emergency response operations and their associated modeling efforts (Terrain Response Atmospheric Code) make major use of the 61 m meteorological tower.

4.1.1 Air Monitoring Scope

The AQM organization provides programmatic support to Site operations, specifically directed toward compliance with all state and federal laws originating from the CAA and its amendments, regulations, and DOE Orders related to air quality impacts on the environment due to Site operations. The scope of this support includes the characterization of both airborne materials and the meteorology responsible for their transport and dispersion. Criteria for success include completeness of the permitting and surveillance activities, no violations of air quality regulations, adequate quality assurance/quality control (QA/QC) of the measurement activities, well-characterized data sets, and full reporting of required information to state and federal regulatory authorities. Within this program, monitoring activities play a major role in characterizing the emissions from the Site.

Air quality monitoring programs do not include sampling conducted to support Industrial Hygiene or radiation worker safety programs; however, these activities are being examined to determine ways that the information gathered during environmental restoration work can be used to evaluate the adequacy of existing air monitoring and its analysis schedule.

Regulatory drivers pertinent to air monitoring programs include:

- Effluent Monitoring:
  - *Title 40 of the Code of Federal Regulations (CFR) Part 61, Subparts A and H, and Appendix B (Rad NESHAPs),*
  - Regulation No. 8, Part A, Section III A-C, “State of Colorado Emission Standards for Beryllium,” Colorado Air Quality Control Commission, and

- DOE Order 5400.1, *General Environmental Protection Program*, U.S. Department of Energy.

- Ambient Monitoring:

  - DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, U.S. Department of Energy (Ch 1.10), and
  - 40 CFR 61, Subpart H (ambient proposed for alternative compliance demonstration methodology for former point sources transition to fugitive sources); and

- Meteorological Monitoring:

  - 40 CFR 61, Subpart H (meteorology parameters used as input parameters to compliance dispersion modeling),
  - DOE Order 5400.1-IV; 2.4, *General Environmental Protection Program*, U.S. Department of Energy, and
  - DOE Order 5500.3A, *Emergency Planning and Preparedness for Operational Emergencies*, U.S. Department of Energy.

4.1.2 Environmental Protection Goal

The goal of the air quality programs is to provide a means to assess the impact of Site operations on the air quality on and around the Site and thereby protect the public and the environment. These programs integrate into a Site-wide Environmental Protection Program by providing monitoring, compliance, and permitting projects that quantify and/or characterize the air pathway impact on public receptors.

4.1.3 Monitoring Objectives

Air quality monitoring objectives provide assessment support for Site operations, either directly, as is the case with the effluent program, or indirectly, as with ambient monitoring and meteorological monitoring. Data from ambient monitoring are also used to validate projections made by dispersion modeling and may soon be used as direct confirmation of low emissions for demonstrating compliance under Rad NESHAP requirements. In addition, ambient data from the Radioactive Ambient Air Monitoring Program (RAAMP) are used to confirm controls are operating within Nuclear Safety's ALARA limits, under the DOE directive that strives to keep dose to all receptors as low as reasonably possible by maintaining administrative and mechanical controls on all potential radiological sources.

At routine (weekly or monthly) intervals, particulate material samples from a continuous effluent sampling system are removed from each exhaust system identified as having a potential to emit significant quantities of radioisotopes. Each of these 47-millimeter (mm) filters is radiometrically analyzed for long-lived alpha emitters. The concentration of long-lived alpha emitters is indicative of effluent quality and overall performance of the high-efficiency particulate air (HEPA) filtration system. If the total long-lived alpha concentration for an effluent sample exceeds the RFETS action level of 0.02×10^{-12} microCuries per milliliter (µCi/ml), a follow-up investigation is conducted to determine the cause and to evaluate the need for corrective action.

Historically, at the end of each month, individual samples from each exhaust system were composited into larger samples by location. Beginning in fiscal year 1996 (FY96), samples from minor (insignificant) emission locations have been collected monthly and composited on an annual basis. Filters from significant sources [having the potential to contribute more than 0.1 millirem (mrem) per year (yr) effective dose equivalent (EDE), uncontrolled, to any member of the public] are analyzed on a monthly basis. Radionuclides are extracted from these filter composites and subjected to radiochemical separation and alpha spectral analysis, which quantifies specific alpha-emitting radionuclides. Analyses are performed for specific isotopes of Pu, uranium (U), and americium (Am). Tritium (H-3) samples are collected twice weekly at six locations. Detection limits are established to ensure that these radionuclides are detected in concentrations well under 10% of the regulatory standard for that radionuclide, using Appendix E guidelines from 40 CFR 61.

The RAAMP monitors airborne dispersion of radioactive materials from the Site into the surrounding environment. Thirty-five samplers comprise the RAAMP network. Twelve of these existing samplers will be included in a proposal to satisfy future regulatory compliance demonstration requirements under the CAA using environmental measurements; the others are used for backup should there be accidental releases from the Site or for determining local impacts from remediation projects. Samplers operate continuously at a volumetric flow rate of approximately 40 cubic feet per minute (ft^3/min), collecting air particulates on two collection surfaces. Coarse and fine particulates are collected on separate substrates and can be analyzed independently. Samples are routinely analyzed for selected isotopes of Pu, U, and Am.

4.2 Rad NESHAP Compliance Monitoring

The Site must demonstrate compliance with the Rad NESHAP air emission and dose standards. To demonstrate compliance, the following critical inputs must be evaluated.

Inputs:

- Monitored concentrations of Pu-239/240, Am -241, U-233/234, U–238, and H-3 from applicable emission sources.

- Site-specific meteorology for the year that the monitored data are reported.
- Resuspension coefficient for soils.
- Documentation of emissions potential from all unmonitored Site activities having potential to emit radionuclides.
- Verification of low emissions for sources not subject to continuous monitoring requirements.

Boundaries:

Spatial: All areas hosting activities on the Site that could impact off-Site populations.
Current effluent sampling (stack sampling) is occurring at 52 locations within buildings located throughout the Industrial Area.
RAAMP samplers sited with a density that would typically allow capturing a plume that has a duration of two hours or more (35 locations).

Temporal: Annual dose estimates.
Quarterly estimates of emissions reported to public.
Monthly data from significant emission points to generate 12-month rolling average.
Weekly or monthly alpha-activity screening analyses.

Decision Statement:

IF The estimated radiological dose to any member of the public is greater than 10 mrem/yr due to Site operations

THEN The Site is out of compliance.

Point sources (significant sources) that have an estimated uncontrolled (without HEPA filtration) potential to result in an EDE to any member of the public greater than 0.1 mrem/yr require continuous effluent monitoring for radionuclides. Current data from this monitoring yield estimated doses that are three orders of magnitude below the regulatory standard at the Site boundary.

IF The Site cannot use standard prescribed monitoring methods to characterize the emissions from a regulated emission source

THEN The Site must obtain approval for an alternative methodology from the regulatory agency having primacy.

The use of ambient monitoring is being proposed as a plausible alternative sampling method to document dose to potential public receptors and demonstrate compliance.

Monitoring Requirements:

A continuous effluent monitoring system must be installed and/or activated for analytes identified in above inputs. For point sources (significant sources) that have an estimated uncontrolled potential to result in a dose to any member of the public greater than 0.1 mrem/yr (significant sources), the continuous monitoring system samples are analyzed monthly. Other ducts or vents yielding potential doses that are less than 0.1 mrem/yr (insignificant sources) are presently continuously sampled; these sample filters are collected monthly and analyzed as an annual composite sample from each location. The on-Site laboratory defines detection limit as: "The smallest amount of sample activity using a given measurement process that will yield a net count for which there is confidence at a pre-determined level that activity is present." Table 4-1 shows typical minimum detectable activity (MDA) or detection limits for various effluent analyses performed by the lab. These values are based on the average sample volume, typical detector efficiency, detector background, count time, and chemical recovery efficiency. MDA values calculated for individual analyses may vary depending on actual sample volume, chemical recovery, and analytical blank variability.

Table 4-1
Detection Limits (MDA) for Effluent Air Samples (Typical)

Parameter	Minimum Detectable Activity (per sample)	Approximate Sample Volume	MDA
Pu-239/240	1.6×10^{-7} µCi	7,340 m^3 [a]	0.02×10^{-15} µCi/ml
U-234	4.6×10^{-7} µCi	7,340 m^3 [a]	0.06×10^{-15} µCi/ml
U-238	3.4×10^{-7} µCi	7,340 m^3 [a]	0.05×10^{-15} µCi/ml
Am-241	1.0×10^{-7} µCi	7,340 m^3 [a]	0.01×10^{-15} µCi/ml
Tritium (H-3)	2.1×10^{-7} µCi	1.4 m^3	1.53×10^{-12} µCi/ml

Notes:
[a] Volume analyzed is usually an aliquoted fraction of the total volume collected.

µCi	=	microCuries	ml	=	milliliters
Am	=	Americium	MDA	=	Minimum Detectable Activity
Ci	=	Curies	Pu	=	Plutonium
m^3	=	cubic meters	U	=	Uranium

With approval from EPA Region 8 and CDPHE, ambient monitoring will also satisfy the regulatory requirements to demonstrate compliance with the 10 mrem/yr dose standard. Samples from selected ambient sites that can be demonstrated by dispersion modeling to

have a reasonable probability of capturing the highest potential ambient concentrations due to source emissions will be collected and analyzed on a monthly basis. Analytes will include Pu-239/240, U-234 and -238, and Am-241. Table 4-2 gives the typical analytical detection limits (MDA) expected for the ambient sampling network

Table 4-2
Detection Limits (MDA) for Ambient Air Samplers (Typical)

Parameter	Minimum Detectable Activity	Approximate Sample Volume	MDA
Pu-239/240	9.4×10^{-8} µCi	48,937 m^3	1.9×10^{-18} Ci/m3
U-233/234	2.6×10^{-7} µCi	48,937 m^3	5.3×10^{-18} Ci/m3
U-238	2.8×10^{-7} µCi	48,937 m^3	5.7×10^{-18} Ci/m3
Am-241	4.3×10^{-8} µCi	48,937 m^3	8.8×10^{-18} Ci/m3

Notes:

Based on Monthly Composites

µCi	=	microCuries	ml	=	milliliters
Am	=	Americium	MDA	=	Minimum Detectable Activity
Ci	=	Curies	Pu	=	Plutonium
m^3	=	cubic meters	U	=	Uranium

4.3 Meteorological Monitoring

Continuous meteorological monitoring is conducted in the north-west Buffer Zone at a 61-m tower, instrumented at three levels (10, 25, and 61 m). Data are collected for wind speed, wind direction, temperature, relative humidity (dew point), solar radiation, and a calculated sigma-theta (used to determine Pasquill-Gifford stability classes). Data are used as inputs for all air quality and emergency response dispersion modeling. Data are also used as inputs to CERCLA risk assessment calculations and hydrogeological assessments.

4.3.1 Data Use for Rad NESHAP

Data are used as Site-specific meteorological inputs to the Rad NESHAP compliance modeling. Inputs to the modeling calculations require annual averaged meteorological data. Continuous monitoring is required in order to collect representative annual values.

4.3.2 Data Use for Emergency Preparedness

Data also provide real-time input to the Site-specific emergency response model (Terrain Responsive Atmospheric Code [TRAC]). Fifteen-minute averaged data are required to calculate

the real-time movement of a pollutant plume as it disperses from the location of an accident. Five CDPHE-owned meteorological towers can also provide support to Site emergency response modeling. These towers are located along the perimeter of the Buffer Zone and are in the process of being integrated into the TRAC model under a program separate from Air Quality Management.

4.3.3 Data Use for Other Compliance Modeling

Data are basic inputs into various regulatory models used at the Site. Air Quality Management uses screening and predictive models to assess emissions impacts on the public and the environment. Exceedance of calculated thresholds may require implementation of pollution control measures and/or monitoring requirements.

4.3.4 Meteorological Monitoring Specifications

The following data quality specifications are common to all three of the above data needs. Inputs to the meteorology decisions include:

Inputs:

- Site-specific wind speed, wind direction, temperature, and relative humidity.
- Site-specific rainfall data.
- Atmospheric stability class calculations.
- Solar radiation data.

Boundaries:

Spatial: Representative air flow patterns impacting the Site.
A minimum of 10 m above ground level.

Temporal: Continuous data, averaged every 15 minutes.
Hourly averaged data, calculated from the 15-minute averages.
Annual averages and frequency distributions.

Decision Statement:

IF Regulatory compliance, emergency response, or risk assessment modeling is performed at RFETS

THEN Standard, consistent, Site-specific meteorological summaries shall be used to ensure consistent model results.

Monitoring Requirements:

Operate meteorological monitoring station with a 95% or better data capture to provide data inputs in support of Site-required modeling programs. Operation shall follow guidance detailed in the Site Meteorological Monitoring Project Plan.

4.4 CDPHE Air Quality Control Division Ambient Air Monitoring

4.4.1 Non-Radiological Ambient Air Quality Monitoring

Pollutants regulated under the CAA National Ambient Air Quality Standards (NAAQS) are monitored along the Site perimeter by the CDPHE Air Pollution Control Division (APCD). Ambient sampling for beryllium (Be) is also performed by CDPHE to verify compliance with Colorado Air Quality Control Commission Regulation No. 8.

4.4.1.1 Ambient Nitrogen Dioxide (NO_2) and Particulate Monitoring

Inputs:

- Ambient particulate and NO_2 concentrations.
- Meteorological data, especially wind direction.

Boundaries:

Spatial: Property boundaries. Data must characterize concentrations as air enters the Site and leaves the Site. These concentrations continually change with wind direction.

Temporal: Continuous NO_2 measurements. No specified time increments for determining difference but averaging time for NO_2 standard is annual.

Particulates. Every sixth day, a 24-hour sample is collected and used to generate a quarterly estimate. Averaging times for PM_{10} standards are 24 hours and annual.

Decision Statement:

IF A perimeter monitor detects an exceedance of an ambient NO_2 [0.053 parts per million (ppm)] or fine particulate (PM_{10}) [50 micrograms per cubic

meter ($\mu g/m^3$) annual and 150 $\mu g/m^3$ 24-hour] standard, and the difference in concentrations of PM_{10} or NO_2 at upwind monitors and downwind monitors indicates that the Site may be a primary contributor to the exceedance

THEN The Site's operating permit may be reopened and potentially revised to mitigate the exceedance.

4.4.1.2 Beryllium

Inputs:

Emission source assessment data, Air Pollutant Emission Notices (APENs).
Stack test data.

Boundaries:

Spatial: Emission points (stacks) of applicable sources.

Temporal: Twenty-four-hour sampling average.

Decision Statement:

IF Be emissions from sources subject to CAQCC Regulation No. 8 (40 CFR 61, Subpart C) exceed 10 grams per 24-hour period

THEN CDPHE may take enforcement action.

Inputs:

Ambient Be sampling data.
Meteorological data.

Boundaries:

Spatial: Site fenceline.

Temporal: Samples are composited for quarterly decisions.

Decision Statement:

IF Ambient Be concentrations due to sources subject to CAQCC Regulation No. 8 (40 CFR 61, Subpart C) exceed 0.01 $\mu g/m^3$ averaged over a 30-day period

THEN CDPHE may take action to identify the source.

4.4.2 CDPHE Radiation Control Division Radiological Ambient Air Quality Monitoring

CDPHE's Radiation Control Division (RCD) has monitored radioactive emissions from the Site since 1969. The primary purpose for this sampling has been to provide an independent assessment of public exposure to radioactive material released from the Site. RCD's monitoring program has provided validation of sampling methods used by Site organizations; confirmation of Site measurements of Pu in air; and, on occasion, helped identify errors made by Site monitoring personnel. The data are compared to Derived Concentration Guides for nonoccupationally exposed persons. Historically, the desirability of an independent monitoring program outweighed concerns about costs, partly due to public mistrust of monitoring performed by DOE contractors.

Currently, concerns about releases during accidents or off-normal situations continue to arise and may increase as cleanup progresses. Emergency response plans for the Site include provisions for sampling environmental media after a plume dissipates. The continuous air samplers operated by RCD allow the state to begin fulfilling this obligation immediately after a release and would ultimately provide more accurate exposure assessments than output from TRAC or other models. Routine analyses of these samples provide baseline data for comparison to known or suspected releases.

In the future, data from RCD air samplers will support APCD in its evaluation of Site compliance with NESHAP requirements, especially around the 903 Pad and at the Site boundary, as well as providing documentation for ALARA decisions, which may arise during cleanup.

Inputs:

Adequate historical and baseline data and defensible estimates of normal variation; adequate QA/QC measures on laboratory analyses. Analytes include gross alpha/gross beta on weekly samples, and Pu and Am on quarterly composites. To fully satisfy NESHAP requirements, U would have to be added to the quarterly list, should these samples be used to supplement DOE's Site measurements.

Boundaries:

Spatial: RCD currently samples air at 13 locations, 9 surrounding the industrial area and 4 near the plant boundary. Most of these sample total suspended particulates (TSP) but some locations have collocated PM_{10} samplers. Precipitation is collected at three locations and analyzed for tritium.

Temporal: Individual samples are collected continuously for one week. Fractions of 13 samples are composited and analyzed as quarterly samples, corresponding to calendar quarters.

Decision Statement:

IF Any measurement of radionuclides in the air exceeds the normal variation seen in historical and baseline measurements

THEN A series of actions may be taken.

These actions include, but are not limited to, re-analysis of composite samples for verification; analysis of individual samples included in the composite; a request for analysis of comparable samples from the nearest DOE ambient samplers, ComRad Program samplers, and/or APCD samplers; a request for investigation or explanation of elevated results from DOE or its contractor; a calculation of public dose and/or risk; and a presentation of analysis and investigation results to CDPHE management, and in public forums, as requested.

IF The student's T-test or other appropriate test to determine if the latest data point exceeds the seasonally adjusted historical range indicates exceedance of the normal range

THEN Investigate cause; otherwise trend analysis.

Limits On Decision Errors:

Since Pu and Am have historically constituted a small fraction of the measured gross alpha concentration, extremely high concentrations of these nuclides would be required to result in an elevated gross alpha result. Such a sample would also be difficult to detect when composited with 12 samples in the "normal" range. Therefore narrow limits on what is defined as the normal range and a fairly high chance of a false positive result will be necessary to identify any unplanned short-term release. In the absence of real or suspected

exceedences, trend analysis should be sensitive to small, upward shifts in concentration, especially in the case of boundary samplers.

4.5 Project-specific Monitoring

Environmental restoration programs require air quality assessments to evaluate potential emissions from remedial action projects. Project-specific monitoring may result, based on both risk assessment and CAA air quality screening. Project-specific ambient monitoring may also be triggered by soil screening measurements performed for radiation worker protection.

4.5.1 Interim Measures/Interim Remedial Action (IM/IRA) Ambient Volatile Organic Compound Monitoring

The Site's remediation and deactivation operations within the Industrial Area (the central portion of the Site that includes most Site buildings and historical radionuclide processing areas) may potentially emit significant concentrations of volatile organic compounds (VOCs). The Final Interim Measures/Interim Remedial Action Decision Document for the Rocky Flats Industrial Area recommended ambient VOC monitoring where appropriate to document the impacts and results of cleanup operations on the environment. However, additional ambient sampling for VOCs is not required. Emission calculations and risk assessments will be the primary decision tools used to determine the need to implement source controls.

Inputs:

- Environmental Restoration Residential Screening Level values.
- Rocky Flats VOC baseline data for 34 Rocky Flats Target Compounds.
- Assessment of building or emission source Remediation Plans for emission potential evaluation.
- Current meteorological data applicable to the source under evaluation.

Boundaries:

Spatial: Industrial Area perimeter fenceline.
Building or source perimeter.

Temporal: 24-hour sample averaging time (typical).
3-8 hour sample averaging time (short-term event).
Annual mean VOC data.

Decision Statement:

IF The highest annual baseline mean VOC concentration at any station exceeds residential screening levels

THEN Evaluate risk to determine need for source control.

4.5.2 Interim Measures/Interim Remedial Action Ambient Radiological Monitoring

Ambient monitoring to document releases of radiological particulates that may impact the public or environment supports remediation or D&D of nonpoint sources. Air quality data provide verification of proper source control and model results.

Inputs:

- Building emissions inventory or list of potential contaminants of concern.
- Site-specific meteorology.
- Building or operation project plan and project schedule.

Boundaries:

Spatial: Perimeter of source being evaluated or monitored.

Upwind and downwind sampling locations. Two sites would be a minimum, five are typical to ensure representative sample capture relative to wind direction.

Temporal: Continuous sampling during periods of potential high emissions, for multiple days. Continuous sampling is needed to capture sufficient sample for analysis.

Decision Statement:

IF Remediation projects with the potential to emit radionuclide particulates in concentrations that exceed risk assessment thresholds or Site action limits are performed

THEN Emissions to off-Site receptors will be documented by continuous ambient monitoring.

Monitoring Requirement:

For Industrial Area or Buffer Zone monitoring, specific RAAMP samplers must be activated as necessary to gather representative data. The actual number of samplers and their locations must be determined based on the location and extent of the source area. The periods and frequency of sampler operation would be determined by the project activities, action levels established for the projects, and duration of remedial activities that have the potential to emit radionuclide materials.

4.5.3 Particle Size-Distribution Monitoring

A particle-sizing head separates airborne particulate material into seven size fractions. Size distribution of ambient particles is of concern because smaller particles are retained more efficiently in the lungs. If a large fraction of the airborne Pu at the Site is attached to the smaller particles, then the radiation dose from inhalation of radioactive contaminants will be higher than would be expected from an activity distribution that is more soil-like in airborne distribution. Similarly, if the majority of the Pu in air at the Site is attached to the larger particles, then the radiation dose from inhalation will be less than would be estimated from a soil-like distribution. Both DOE and CDPHE have conducted particle size-distribution studies at the E-1 monitoring platform.

Inputs:

Pu and Am concentrations stratified by particle size, together with health physics data appropriate for the specific particle size ranges.

Boundaries:

Spatial: Data collection from the E-1 platform is complete. Data are currently being gathered at the E-2 platform. Funding permitting, similar data may be gathered at the D-13 ground level sampler in the future.

Temporal: In order to make a reasonable estimate of the range of concentrations in each size category, samples were collected at E-1 for three years and analyzed as quarterly composites. Since concentrations at the E-2 and E-3 platforms are lower, definitive quantitative assessments may not be possible for those data.

Decision Statement:

No specific decision is associated with the particle size study. Results will be used to estimate dose conversion factors for chronic exposure to Site emissions during normal

operations, such as could be done during a dose reconstruction calculation. Particle size distributions for use in emergency planning and response activities are being estimated by plant personnel as part of a separate study.

IF Results of the size-distribution study are well quantified and statistically valid

THEN The results will be made available for future quantitative and qualitative assessments of dose impacts from the Site.

Limits On Decision Rule:

Not necessary. RCD typically calculates 95% confidence intervals on all measurements. Statistically based estimates of the minimum number of samples needed to estimate the range of concentrations with 95% confidence and 80% power need to be developed.

4.6 Outstanding Issues

4.6.1 Radiological NESHAP Ambient Monitoring

Approval for the use of ambient monitoring to demonstrate compliance with 40 CFR 61, Subpart H and Appendix B is currently being negotiated by DOE and Kaiser-Hill with EPA and CDPHE. Ambient monitoring is being proposed to ensure that the dose from all contributing sources of radionuclides is adequately quantified during the period when buildings have been deactivated, yet still have the potential to emit significant quantities of radionuclides. While deactivated, the buildings will be configured in a passive mode, without either ventilation or heat, and their effluent ducts will be sealed to the outside. These buildings will become fugitive sources of radionuclide emissions since they will no longer have well-defined and well-characterized ventilation pathways to the atmosphere.

4.6.2 Radiological NESHAP Regulatory Authority

Since regulatory primacy has not yet been transferred from EPA Region 8 to CDPHE, discussions on alternate monitoring protocols include both agencies.

4.6.3 Beryllium Effluent Stack Sampling

A review of future planned Be foundary operations may reveal a need to conduct effluent sampling for Be, such activities being subject to CDPHE Regulation No. 8. Emissions to the atmosphere are not allowed to exceed 10 grams of Be over a 24-hour period.

4.7 References

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8. *Meteorological Monitoring Plan*. U.S. Department of Energy, Rocky Flats Plant, Air Quality Branch, Golden, Colorado, December, 5, 1994, unpublished report.