Radionuclide NESHAPs

SUBPART H INSPECTION MANUAL

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List of Acronyms

American National Standards Institute (ANSI)

Code of Federal Regulations (CFR)

Effective Dose Equivalent (EDE)

National Emissions Standards for Hazardous Air Pollutants (NESHAPs)

National Oceanic and Atmospheric Administration (NOAA)

Quality Assurance / Quality Control (QA/QC)

U.S. Department of Energy (DOE)

U.S. Environmental Protection Agency (EPA)

Occupational Safety and Health Administration (OSHA)

Introduction

The purpose of this manual is to assist an inspector with the inspection of a DOE facility as part of determining compliance with the Environmental Protection Agency's radionuclide NESHAPs standard. The DOE administers many facilities, including government-owned contractor-operated facilities across the country. Some facilities conduct nuclear energy and weapons research and development, some enrich uranium and produce plutonium for nuclear weapons and reactors, and some process, store, and dispose of radioactive wastes. These facilities contain significant amounts of radioactive material and emit radionuclides into the air. Currently, DOE has 37 sites that emit radionuclides and must submit annual Subpart H compliance reports. These facilities emit a wide variety of radionuclides in various physical and chemical states.

This manual is divided into two sections and contains several appendices. The two sections are Regulatory Requirements and Compliance Determination. The Regulatory Requirements section summarizes Subpart H. It highlights the areas that would be particularly useful in an inspection. The second section, Compliance Determination, outlines steps the inspector should take when performing an inspection. Appendices A, B and C contain detailed questions that should be sent to the facility at least two weeks before the inspection is to occur. These questions assist in completely understanding the facility as it relates to Subpart H and the responses can be used in making a compliance determination. Appendix D contains a general outline of an inspection report as well as a sample inspection report.

This inspection manual is only one of a number of necessary items that an inspector should have when conducting an inspection. Ideally the inspector should have a 3-ring notebook, which would include this manual along with a personal journal, agenda, ANSI N13.1-1969, ANSI N13.1-1999, e-mail correspondences, FY 2000 MMM Inspection General Release, FY 2000 MMM Inspection Enforcement Sensitive, travel documents, any supporting documents and the original 1989 Federal Register notice on radionuclide NESHAPs (54FR516952).

It is suggested that this manual be used by experienced inspectors as a reference and by new inspectors as a resource guide when conducting an inspection. However, this manual is not intended to replace appropriate inspection training courses. A new inspector should take the necessary inspection training courses as well as "shadow" an experienced inspector or be on an inspection team before seeking to lead an inspection or to complete one alone.

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Section 1: Regulatory Requirements

All the requirements in 40 C.F.R. Part 61 Subpart H can be classified into three general topics for evaluating on-site stacks and fugitive emission points: (1) emissions monitoring and test procedures, (2) estimated releases and reporting, and (3) quality assurance practices. Together, these three topics comprise a "system," each part of which is important to a proper compliance determination. A problem in one part of the system will likely invalidate the results in other parts.

1.1 Inspecting the Facility

1.1.1 The Standard

Ultimately, the Inspection Team has to make a determination whether or not the facility is in compliance with the Agency's standard. The standard is 10 millirem EDE in any year to a member of the public (40 CFR 61.92). Radiation dose is calculated as "effective dose equivalent" (EDE).

Compliance is determined by calculating the highest EDE to any member of the public at any point where there is a residence, school, business or office (40 CFR 61.94(a)). Calculations must be performed using an approved model.

For each of the three elements of the system identified above, the following discussion identifies specific applicable requirements and discusses how to inspect for compliance issues.

Emission Monitoring and Test Procedures

Emission Measurements

Continuous radionuclide emission measurements must be made at release points (point sources) that have the potential to discharge radionuclides that would cause an effective dose equivalent in excess of $\geq$ 0.1 mrem/year (40 CFR 61.93 (4)(i)).

- The facility must measure all radionuclides that could contribute greater than 10% of the potential effective dose equivalent from a release point.
- Other release points that have a potential to release radionuclides into the air must be measured periodically to ensure emissions are below these levels.
- Evaluation of potential emissions must be based on the discharge of the effluent stream that would result if all pollution control equipment did not exist, but the facilities operations were otherwise normal.

MONITOR, COLLECT, MEASURE

Sampling site selection in the exhaust stack or duct is covered in 40 CFR Part 60, Appendix A, Method 1. Sample collection and measurement is covered in Appendix B, Method 114, "Test Methods for Measuring Radionuclide Emissions from Stationary Sources," which provides requirements for:

- Stack monitoring and sample collection methods appropriate for radionuclides
- Radiochemical methods used in determining the amounts of radionuclides collected by stack sampling; and
- Quality assurance methods, which are conducted in conjunction with these measurements.

For release points with a potential EDE $\geq$ 0.1 mrem/yr, the effluent must be monitored continuously, with an in-line detector, or sampled continuously, followed by lab analysis. In some cases, periodic sampling may be adequate. EPA must grant prior approval for periodic sampling.

Some additional points:

- Continuous monitoring or sampling should be conducted following the guidance in ANSI[1] N 13.1 - 1969 "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities" or ANSI N13.1-1999 “Sampling and Monitoring Releases of Airborne Radioactive Substances From the Stacks and Ducts of Nuclear Facilities.” *(Refer to Subpart H Section 61.93 Emission Monitoring and Test Procedures for additional information.)*
- Approval for periodic sampling may be granted in cases where continuous sampling is not practical and radionuclide emission rates are relatively constant. In such cases, grab samples shall be collected with sufficient frequency so as to provide a representative sample of the emissions. (Refer to Subpart H, Section 61.93 Emission on monitoring and test procedures.)
- 40 CFR 60 Appendix A Method 1, "Sample and Velocity Traverses for Stationary Sources," provides requirements for the selection of sites to be used when performing sampling or velocity measurements of ducts, stacks and vents.

EFFLUENT FLOW RATE MEASUREMENTS

In any stack sampling or monitoring system, effluent flow rate must be measured. This information is necessary to calculate total radionuclide releases. The frequency of the flow rates measurement shall depend upon the variability of the efficient flow rate. If the flow is variable, continuous or frequent measurements are necessary (40 CFR 61.93 (b) (iii)).

General methods for flow rate measurements are given in Part 60, Appendix A, Method 2. For small vents and pipes, refer to Part 60, Appendix A, Method 2A.

ALTERNATIVE PROCEDURES TO MEASURE EFFLUENT FLOW RATE

If it is impractical to comply with the flow rate measurement requirements, a facility may apply for approval for an alternative procedure (40 CFR 61.93 (b)(3)).

It is up to the facility to show that the alternative procedure will not underestimate emissions significantly. The facility should show that the proposed measurement point has been carefully selected. If the proposed alternative method is not approved, then the use of standard methods would be required.

[1] American National Standard Institute

COMPUTER MODELS FOR COMPLIANCE

Radiation dose due to emissions must be calculated and compared to the dose standard. Only approved calculational models may be used. Currently, the approved models are:

- CAP88
- CAP88-PC
- AIRDOS-PC
- COMPLY

CAP88, CAP88-PC or AIRDOS-PC may be used to calculate effective dose equivalent to any member of the public.

The COMPLY model may be used to calculate effective dose equivalent if the maximally exposed individual lives within 3 kilometers of all sources of emissions in the facility.

Emissions determined in Curies/year (Ci/yr) from proper sampling procedures are used as inputs for these models. Other input variables include stack height, distance to receptor, etc. Each of these programs will calculate the EDE and print a compliance report.

For further information, consult User's Guide for CAP88-PC, EPA 402-B-92-001, March 1992, User's Guide for the COMPLY Code, EPA 520/1-89-003, October 1989, and User's Guide for AIRDOS-PC EPA 520/6-89-035, December 1989.

COMPLIANCE – ENVIRONMENTAL MEASUREMENTS

Instead of air dispersion computer models, a facility may use environmental measurements of radionuclide concentrations in the air at critical receptor sites to show compliance. However, prior approval is required.

A facility using environmental measurements must continually sample air at critical receptor locations. Radionuclides that are major contributors to dose (EDE) must be collected and measured. Radionuclides that cause an EDE of 1 mrem/yr should be distinguishable from background. Facilities can use Table 2, 40 CFR Part 61.90 to determine compliance with the standard.

OTHER REQUIREMENTS

Annual compliance reports are required, and must be submitted by June 30 for the previous year. For example, reports for calendar year 2008 must be submitted by June 30, 2009. If the facility fails to meet the dose standard, then monthly reports are required until EPA determines that monthly reports are no longer necessary (40 CFR 61.94(c)).

Each facility required to measure radionuclide emissions must follow the quality assurance methods described in Part 61, Appendix B, Method 114.

1.1.2 COMPLIANCE WITH THE STANDARD

The objective of the site inspection is to gather facts (or evidence). The objective is not to make an on-site determination of compliance. Rather, EPA intends to gather evidence to assess whether the data submitted by the site, upon which the assessment of compliance rests in part, are valid. In the

determination of validity, one must ask basic questions: Are the right things being measured? Are measurements being taken using techniques and equipment appropriate to the conditions? The types of emissions at issue as well as answers to these questions are discussed below.

EMISSIONS MONITORING

Annual emissions data, reported to EPA, should be the same as that used in the facility's dose assessment. **Inspectors should attempt to verify the derivation of the reported emissions data. This should be done by checking laboratory results and calculations made to derive emissions.**

During inspections, unmonitored stacks should be checked for venting contaminated areas. This condition could result in an unmonitored release. Health physics records can help identify contaminated areas and areas of airborne contamination.

SAMPLING FOR PARTICULATES

The most common type of emissions monitoring is particulate sampling. A stream of exhaust air is drawn off for sampling. The point of sampling should be selected so that the sample is representative of what is being released. *[Refer to Subpart H (Section 61.93), ANSI N13.1-1969 (Chapter 4) and ANSI N13.1-1999 (Chapter 5) for additional information.]*

The sample stream is pulled through a filter, which collects the particulates. The filter type should be appropriate for the particles being emitted. Some choices are:

- Cellulose B – a general-purpose filter, but not suited to alpha-emitting nuclides.
- Glass fiber - high collection efficiency, without high airflow resistance, good for high temperature applications.
- Membrane (Millipore) - good for alpha-emitting nuclides, but is fragile and has high airflow resistance.
- Synthetic fiber - special fibers tailored to specific needs and situations.

A common problem in sampling particulates is particulate loss in the sample line. Particulates will collect at bends and joints, some never making it to the collection filter. Inspect the sample lines for tight bends or uneven joints or situations where the filter is mounted vertically.

Finally, confirm that the filter is being properly analyzed (Refer to ANSI N13.1-1969, ANSI N13.1-1999 and 40 CFR61 Appendix B, Method 114) to determine the identity and quantity of nuclides collected.

A Lab Stack

"Gauldin" Sampler

Pitot Ports

SAMPLING FOR GASES

Gases cannot usually be collected on filter media. They require direct measurement in the stack or of an extracted sample. Some exceptions are:

- Radioiodines - which can be collected on activated charcoal, silver zeolite, and other media, depending on the chemical form of the iodine.
- Tritium (HTO) vapor - which can be collected on silica gel.
- Carbon Dioxide ($^{14}CO_2$) - which can be collected in a cold trap.

Direct measurement of gases in the stack can be accomplished with an ionization chamber. A specific volume of gas flows at a given flow rate through the chamber. The sample acts as the counting gas for the chamber. The activity of the radionuclide is determined from the current measured in the ionization chamber. However, it does not identify nuclides--this must be done separately.

Use of an ion chamber requires careful calibrations, and measurements of sample and stack flows.

SAMPLING FOR TRITIUM

Tritium is commonly seen in emissions at DOE facilities. It is often collected on silica gel. However, silica gel will collect tritiated water vapor (HTO) only. If tritium gas (HT) is present, it can be oxidized into HTO, and then collected.

Silica gel may saturate in high humidity situations resulting in under-collection of tritium. An indicator is needed to determine whether saturation has occurred. This is usually a colorant that responds to water vapor. A quick look at the silica gel column will show how far water vapor has migrated. Some facilities use a back-up column, which is analyzed for tritium.

After removal, water vapor is baked off the silica gel (or appropriate apparatus), condensed, collected and counted for tritium.

SINGLE NOZZLE PROBE SAMPLER

One probe is adequate for small ducts-less than 8" in diameter, or less than 0.5 square feet in cross section. Also, single probe samplers are adequate for release points with properly mixed gaseous (aerodynamic particle size less than 5 microns) effluent. Gaseous effluents are those with aerodynamic particle size less than 5 microns.

The particulate filter should be placed as close as possible to the probe. This minimizes particulate loss in the sample line. There should be no sharp elbows or fittings to trap particulates.

A recommended sampling point should be at least 8 duct diameters downstream of a flow disturbance and 2 diameters upstream of a disturbance. This is known as the "8 and 2" rule. A flow disturbance is a fan, junction or sharp elbow, contraction in the stack or visible flame.

The vacuum pump and flow meter should be downstream of the filter.

MULTIPLE NOZZLE PROBE (RAKE) SAMPLER

In a large duct, multiple probes are necessary. These are normally attached to a center tube or pipe. This is referred to as a "rake." The five-probe rake is used for a round duct, 30" to 48" in diameter, or a rectangular duct, approximately 2 ft^2 in cross section.

Each probe is designed to sample an equal annular area of the duct. In a five probe rake, for example, each probe should sample an area of one-fifth the total cross-sectional area.

As with a small duct, the particulate filter should be placed as close as possible to the probe, to minimize particulate loss in the sample line. Sharp bends and fittings should be avoided.

The selection of the recommended sampling point should follow the "8 and 2" rule. In a large duct, it is prudent to take a velocity profile to ensure that a representative sample will be taken at a well-mixed location.

ANSI N13.1 – 1969 AND ANSI N13.1-1999

The American National Standards Institute's (ANSI) guide for sampling airborne radioactive material is known as ANSI N13.1. This standard is referenced in the NESHAPs regulation. It is an important reference document for Subpart H inspectors.

The document contains guidance on:

- Particulate collection media, including measured efficiencies;
- Sampling point placement in ducts and stacks;
- Sampling probe design; and
- Related factors.

Much of the information on sampling presented in this manual was taken from ANSI N13.1.

ISOKINETIC SAMPLING

An isokinetic condition exists in the sampling probe when the air velocity in the probe is the same as the air velocity in the stack at the point of sampling.

If the velocity in the probe is too low, the condition is sub-isokinetic. Possibly under this condition, the larger particles will impact into the probe, leading to an overestimate of the sample concentration.

If the velocity in the probe is too high, the condition is super-isokinetic. Possibly under this condition, a greater fraction of smaller, rather than larger particles will be drawn into the probe. This leads to an underestimation of sample concentration.

The procedure to determine whether sampling is isokinetic is as follows:

- Review stack flow measurements - determine exhaust velocity at sample point.
- Review probe inside diameter and sample flow rate - determine air velocity in probe.
- Ratio of probe to stack velocities should be between 0.9 and 1.1.

Additional points:

- Stack exhaust velocities should be measured at least annually.
- Sample flow rates should be measured weekly.
- Probe inside diameter may not be known for very old systems (in these cases, focus on finding the isokinetic condition by locating where the contaminant profile is well mixed and stable. Refer to ANSI N13.1-1999 for additional information on isokinetic sampling and selection of sampling sites).
- Depending upon the density of the particulates at a ratio of 2.0, particulates are underestimated by 10 to 50%. (Density =3D mass of particulate/volume of particulate.)

ANSI N13.1-1999

ANSI N13.1-1999 allows for single point sampling of stack and ducts as a means of obtaining a representative sample. The use of single point sampling allows for much greater sample collection efficiency due to decreases in sample loss in the nozzle.

Single point sampling requires that the sampling site be well mixed and well characterized. This requires extensive testing prior to selecting a sampling location to ensure the site provides an even flow distribution, and that particulates and gases are well mixed.

ANSI N13.1-1999 "Sampling and Monitoring Releases of Airborne Radioactive Substances From the Stack and Ducts of Nuclear Facilities" provides guidance on the sampling of stack and ducts, and is a performance based standard rather than the prescriptive 1969 version.

The guidance and criteria of ANSI N13.1-1999 is covered in seven clauses:

- Clause 1 identifies the scope and application of this standard.
- Clause 2 identifies other applicable EPA tests methods and applicable national standards.
- Clause 3 contains the glossary.
- Clause 4 covers the objectives and approaches for sampling programs.
- Clause 5 identifies the requirements for selecting sampling locations.
- Clause 6 identifies the requirements for designing the sampling system components.
- Clause 7 identifies the requirements of an acceptable quality assurance program specific for air sampling.

There is also technical guidance and information provided in eight annexes. They cover the following topics:

- Techniques for measurement of flow rate through a stack or duct;
- Modeling of particle losses in transport systems;
- Special considerations for the extraction, transport, and sampling of radioiodine;
- Criteria for the selection of filters for collecting airborne radioactive particles;
- Statistical basis of evaluating effluent sampling errors and uncertainty;
- When to conduct sampling system performance verification and how this may be accomplished;
- Transuranic aerosol particulate characteristics and the implications for extractive sampling in nuclear facility effluents;
- Tritium sampling and detection.

The goal of ANSI N13.1-1999 is to provide a method of collecting a representative sample from a stack or duct to determine total emissions from that source. To assure a representative sample is collected, the standard established required sampling system performance criteria. These criteria are listed below. The documentation demonstrating compliance with these criteria should be contained in a technical basis document for the sampling system.

- Total transport of 10 µm Aerodynamic (AD) particles and vaporous contaminants shall be >50% from the free stream to the collector/analyzer.
- Sampler nozzle inlet shall have a transmission ratio between 80% and 130% for 10 µm AD particles.
- Sampler nozzle shall have an aspiration ratio that does not exceed 150% for 10µm AD particles.
- Characteristics of a suitable sampling location are: a) coefficients of variation over the central 2/3 area of the cross section within $\pm$ 20% for 10 µm AD particles, gaseous tracer, and gas velocity; b) flow angle $<20^{o}$ relative to the long axis of the stack and nozzle inlet; and c) the tracer gas

concentration shall not vary from the mean >30% at any point on a 40 CFR 60 Appendix A Method 1 velocity mapping grid.

- Continuous measurement of the required effluent flow rate if flow variation is >±20% in a year.
- Effluent and sample flow rate shall be measured within ±10%.
- Continuous measurement and control of the required sample flow rate if flow varies >±20% during a sample interval. Flow control shall be within ±15%.
- A graded approach for allowable dose limits can be used (Table 1 is an example of a graded approach.).

TABLE 1: GRADED APPROACH TO SAMPLING AND MONITORING

POTENTIAL IMPACT CATEGORY	MONITORING AND SAMPLE ANALYSIS PROCEDURES	POTENTIAL FRACTION OF ALLOWABLE LIMIT
1	Continuous sampling for a record of emissions and in-line, real time monitoring with alarm capability; consideration of separate accident monitoring system	>0.5
2	Continuous sampling for record of emissions, with retrospective, off-line periodic analysis	>0.01 and ≤ 0.5
3	Periodic confirmatory sampling and off-line analysis	>0.0001 and ≤ 0.01
4	Annual administrative review of facility uses to confirm absence of radioactive materials in forms and quantities not conforming to prescribed specifications and limits	≤ 0.0001

FUGITIVE OR DIFFUSE EMISSIONS

Fugitive emissions are emissions from sources other than stacks and vents, such as from contaminated soils, ponds, or breathing buildings. DOE may have a slightly different definition—these sources should be defined early in the inspection.

Fugitive emissions are covered by Subpart H and should be treated like other emissions:

- Dose to the nearest receptor must be calculated and added to dose from stacks and vents.
- Monitoring requirements apply if the potential to discharge radionuclides would cause an EDE greater than 0.1 mrem/yr.

MONITORING INFORMATION NEEDED FOR COMPLIANCE

The objective of conducting an inspection is to ***create a credible and traceable body of information detailed enough to support a decision on compliance with Subpart H***. Because compliance determination should not be a hit or miss process, a list of standard questions was developed to help ferret out the information required. These questions have been produced in checklist fashion in Appendices A, B and C to this manual and should be sent to the facility at least two weeks prior to the inspection. The Inspection Team is encouraged to go beyond these questions as the situation and their judgment dictates.

The information provided below is organized into three types of monitoring: stacks; vents and hoods; and environmental. For each release point the facility shall (*note: this is accomplished by the facility answering the questions found in Appendices A, B and C to this manual*):

- Describe the material handled and operations performed.
- Provide a schematic of the stack(s) and flow measurement-monitoring locations.
- Provide physical parameters of the stack.
- Describe the potential for fugitive emissions.
- Identify the applicable QA/QC program/procedures.

For stack monitoring:

- Describe monitoring/sampling system of the stack and procedure for flow and radionuclide measurements, including frequency of measurement.
- Is the level of monitoring consistent with the estimated Potential Impact Categories in Table 1, yes or no?
- Provide the airborne effluent (stack) monitoring/sampling data.
- Describe the effluent control system.
- Provide records to justify decisions and assumptions affecting the performance of the stack monitoring system.
- Identify the applicable QA/QC program/procedures, including those for locating, maintaining, and calibrating radionuclide monitors.

For area, vent, and hood monitoring (if not routed to a stack):

- Describe in-plant area monitoring/sampling data, if any.
- Describe hood monitoring sampling data, if any.
- Describe effluent control system efficiencies.
- Describe calculations used to demonstrate compliance.
- Identify the applicable QA/QC program and procedures.

For environmental monitoring:

- If environmental measurements are made, describe the program.
- Provide documentation of prior EPA approval.
- Provide airborne radionuclide monitoring/sampling data.
- Describe location of sampling/monitoring points.
- Identify the applicable QA/QC program/procedures.

CONCENTRATION LEVELS FOR ENVIRONMENTAL COMPLIANCE

Table 2 shows only a few of the over 400 radionuclides found in 40 CFR Part 61 Appendix E, Table 2. Thus, to meet the required detection limit of 1 mrem/yr, the facility should be able to detect these nuclides at about 10% of the listed concentrations.

TABLE 2: CONCENTRATION LEVELS FOR ENVIRONMENTAL COMPLIANCE

SELECTED EXAMPLE RADIONUCLIDES	CONCENTRATION CI/M3
C-14	1.0E-11
Co-60	1.7E-14
Zn-65	9.1E-14
Kr-85	1.0E-6
Mo-99	1.4E-11
I-125	1.2E-13
I-131	2.1E-13
Cs-137	1.9E-14

When multiple radionuclides are released, use the sum of fractions rule. This rule states, "Net measured radionuclide concentrates shall be compared to the concentration levels in Table 2 of Appendix E to determine compliance with the standard. In the case of multiple radionuclides being released from a facility, compliance shall be demonstrated if the value for all radionuclides is less than the concentration level in Table 2, and the sum of the fractions that results when each measured concentration value is divided by the value in Table 2 for each radionuclide is less than 1." (40 CFR 61.93(b)(5))

For example, suppose the following radionuclide values were given:

Radionuclide	**Annual Quantity in Gaseous Form (As report by a DOE Facility in the Annual Subpart H Compliance Report) (Ci/yr)**	**Annual Possession Quantities for Environmental Compliance (Gaseous Form taken from Table 1, Appendix E, 40 CFR Part 61) (Ci/yr)**
Tritium	7.0×10^{-1}	$1.5 \times 10^{+1}$
Plutonium-238	1.1×10^{-7}	2.7×10^{-6}
Plutonium-239	0.3×10^{-7}	2.5×10^{-6}
Uranium-233	0.8×10^{-8}	7.6×10^{-6}
Uranium-238	0.7×10^{-8}	8.6×10^{-6}

As stated in the first part of the sum of fractions rule, all annual quantities provided are less than the allowable annual possession quantities. To satisfy the second part of the sum of fraction rule, we must divide each radionuclide annual reported quantity by its annual allowable possession. The results are:

Radionuclide	Annual Reported Quantity / Annual Allowable Possession Quantity	Division Result
Tritium	0.7/1.5	0.47
Pu-238	$1.1 \times 10^{-7}/2.7 \times 10^{-6}$	0.04
Pu-239	$0.3 \times 10^{-7}/2.5 \times 10^{-6}$	0.12
U-233	$0.8 \times 10^{-8}/7.6 \times 10^{-6}$	0.001
U-238	$0.7 \times 10^{-8}/8.6 \times 10^{-6}$	.00008

We then sum all division results (0.47 + 0.04 + 0.12 + 0.001 + 0.0008) to get 0.6318. This value is less than 1, therefore the sum of fractions rule has been satisfied.

1.1.3 Estimated Releases and Reporting

The purpose of this section is to provide an understanding of the calculational models used to calculate dose to the public from airborne emissions of radioactive materials. This section will review the dose models approved for use with radionuclide NESHAPs, including the proper use of those models, including inputs and alternatives to using these models.

Dose Models

EPA has developed and/or approved several calculational models for use with radionuclide NESHAPs. These models use as input emissions facility and site area data. They calculate the annual dose to off-site receptors. These models are: CAP88, CAP88-PC, AIRDOS-PC, and COMPLY.

Strengths and limitations of these models are discussed in Section 2 of this manual.

DOE facilities generally use CAP88. This model tracks four pathways for radionuclide air emissions. They are immersion, ingestion, ground surface and inhalation. CAP88 is available for mainframe and PC. EPA encourages the use of CAP88-PC. Access the EPA Web page for copies of this program, along with a user guide and frequently asked questions (www. epa.gov/radiation/assessment/software.html).

During an inspection, it is common to run one or more of these models. The facility will often provide a PC, when requested. If not, a portable laptop can be used.

Some large DOE labs have developed site-specific models to assess off-site dose. These cannot be used for NESHAPs compliance without prior EPA approval.

The models will accept up to six stacks, so large facilities will have to make adjustments. They can either group adjacent stacks into six groups, or they can make multiple runs.

Also, models are generally not able to find the maximum receptor, when there are multiple stacks. This complication results because the maximum receptor may not be the same for each stack. In this case, multiple runs and hand calculations are required.

Meteorological data are required as input to nearly all the models. This data can be obtained from airports near all DOE sites. However, many DOE sites have their own meteorological towers.

Area sources, such as contaminated surface soil, cannot be modeled by COMPLY alone. Use the AREA[2] program to calculate a multiplier for input to COMPLY if radionuclides are released from an area source. Area sources can be modeled, however, by CAP88 and AIRDOS-PC.

Questions that can be used to help develop the technical record include:

- Which code was used? The facility cannot use the COMPLY and associate procedures if the distance to the closest resident is greater than 3000 meters.
- If the facility's releases are measured in terms of gross activity, how was the release quantity of each nuclide determined?
- How did the facility treat multiple release points?
- What is the source of the facility's meteorological data?
- Did the facility change any of the default pathway parameters in CAP88 or CAP88-PC?
- How did the facility determine the distances from the release point to the closest resident in each sector? How did the facility determine the distances to the nearest farm raising produce, milk and meat?
- Was CAP88, CAP88-PC or AIRDOS-PC used to estimate the dose to a resident who is closer than 100 meters to the release point?
- Is the terrain complex? (That is, are there variations in elevation at different parts of the site?)
- Describe distances and directions to nearest residences, offices, schools, and farms.
- Provide site meteorological data (wind rose, wind speeds), if any.
- Identify the applicable QA/QC program/procedures.

SOURCE TERMS

Generally, inputs for source term determination are derived directly from stack or vent/hood monitoring data. However, the regulation also allows a facility to use environmental measurements to demonstrate compliance. For the latter, prior approval is required, and stack monitoring must continue even if approval is obtained. Additionally, the analytical (i.e., laboratory) processes used to interpret the data obtained are also an important line of questioning.

POINT SOURCE MONITORING

Key information required concerning radioactive source terms includes:

- Provide the quantity and forms of each radionuclide handled in Curies (excluding sealed packages that remain unopened and have not leaked during the assessment period), with maximums and daily averages.
- Describe, provide, and/or reference the procedure for assigning radioactive material to appropriate physical states (Refer to 2(b) in Appendix D, 40 CFR Part 61- Methods for Estimating Radionuclide Emissions).

[2] The AREA program allows you to model an area source using the Gaussian plume methodology for a point source.

- Describe any adjustments and all assumptions applied to effluents as a result of effluent controls (Refer to Appendix D, 40 CFR Part 61 Table 1 – Adjustments to Emission Factors for Effluent Controls).
- Provide records to justify source term determinations.
- Identify the applicable QA/QC program/procedures.

ENVIRONMENTAL MONITORING

These measurements would involve continuous air sampling at critical receptor sites. Radionuclides that are considered major sources (>10% of the potential effective dose equivalent for a release point) must be collected and measured. To determine compliance, annual average concentrations of these nuclides are then compared to the concentration levels for environmental compliance (Refer to Table 2, 40 CFR Part 61 – Compliance Procedures Methods for Determining Compliance with Subpart I). When more than one nuclide is involved, use the sum of fractions method to determine compliance.

The measurement of each important radionuclide concentration must be such that the detection limit corresponds to a dose of 1 mrem/yr above background.

In addition, the facility must have a quality assurance program for environmental measurements that comply with 40 CFR Part 61 Appendix B, Method 114.

The application for approval of an environmental measurements compliance program must demonstrate all of the above requirements.

If a facility has received approval for an environmental measurements compliance program, then this program would be reviewed during an inspection. Otherwise, environmental monitoring would generally not be reviewed.

Air Monitors

ANALYTICAL PROCESSES

The following information should be obtained from those responsible for the laboratory analysis of effluent data.

- Provide information and data sufficient to allow analysis of the results of the environmental monitoring system, including all assumptions.
- Provide information and data sufficient to allow analysis of the results of the particulate sampling programs, including all assumptions.
- Provide information and data sufficient to allow analysis of the results of all relevant laboratory work, including all assumptions (i.e., the particular radionuclides involved, the media type they are in, whether soluble or insoluble and the methodology used for determination of the various elements and species of each radionuclides, including test methods, uncertainties, and relevant QA for the methodologies used).

- Provide information and data sufficient to allow analysis of the results of the environmental monitoring systems, including all assumptions (refer to the 'Environmental Monitoring' section in this manual).
- Provide information and data sufficient to allow analysis of the results of the particulate sampling programs, including all assumptions (refer to the 'Sampling for Particulates' section in this manual).

1.1.4 Quality Assurance Practices

This section provides a review of the reporting, records and specific quality assurance activities to be covered in an inspection of DOE facilities. In a broad sense, all three items are part of a quality assurance program. The basic core concepts of a quality assurance program are:

- Identification of the equipment and activities important to public and facility safety,
- Identification of requirements and specifications (design, construction, operation, maintenance, etc.) important to the proper functioning of equipment and activities important to public and facility safety,
- Assurance that equipment and activities important to public and facility safety are attended to by persons qualified (by experience or education) to do so,
- Compilation of a record sufficiently clear for an informed lay person to be able to recreate the decision process affecting equipment and activities important to public and facility safety.

Reporting Requirements

An annual report to EPA is due on or before June 30th, covering the previous calendar year. The purpose of the report is to allow both EPA and DOE assurance that the dose standard is being met. This report must include the following (Refer to 40 CFR 61.94):

- Monitoring results and dose calculations,
- List of radioactive materials used at the facility,
- Description of handling and processing that the radioactive materials undergo at the facility,
- List of stacks or vents or other points where radioactive materials are released to the atmosphere,
- Description of the effluent controls used on each stack, vent, or other release point and an estimate of the efficiency of each control device,
- Distance from release points to nearest residence, school, business or office and nearest farms, producing vegetables, milk, and meat,
- Values for all input parameters for computer models,
- Description of all construction/modification completed in calendar year, and
- Statement certifying the report's accuracy and completeness, and signed and dated by a corporate official in charge.

If the standard is not met, then monthly reports to EPA are required. These monthly reports would include:

- Same information as annual report, and
- Changes to bring facility into compliance.

Monthly reports will continue until EPA determines they are no longer necessary.

All reports should be reviewed prior to an inspection, and attempts made to verify the reported data during the inspection.

RECORDKEEPING

To allow independent verification of compliance, the facility must document sources of all information used to demonstrate compliance. Such information typically includes, as a minimum, results of measurements, calculations and/or analytical methods used, and the procedure used to determine EDE.

Records must be kept on site for at least five years, and be made available for inspection upon request. Only rarely would these records be classified. However, if some records are classified, EPA can arrange for an inspector with the appropriate security clearance to be on the inspection team.

QUALITY ASSURANCE

Quality assurance is an essential element of NESHAPs compliance. As a minimum, the NESHAPs requires the permit holder take the following actions:

- Evaluate measurement data against preset criteria. Preset criteria include replicates, spikes, split samples, blanks and control charts.
- Establish a sample tracking system. The sample tracking system should maintain the integrity of the samples during collection, storage and analysis. The system should also provide for a "chain of custody" record to preclude tampering.
- Perform periodic internal and external audits. Audits must be performed according to written procedures and by personnel who are not responsible for performing the operations being audited.
- Establish a corrective action program. When problems are identified, the corrective action program shall identify what corrective actions will be taken and when, and who will be responsible.
- Prepare periodic reports on quality.
- Prepare and carry out a quality assurance project plan.

The QA program should also document an organizational structure (to ensure responsibility and independence for appropriate activities); administrative controls (to ensure prompt response when emission measurements indicate unexpectedly high emissions); sample collection and analysis procedures (to ensure that activities important to compliance with the NESHAPs are conducted by controlled, management-approved instructions); objectives of QA--including precision, accuracy and completeness of emission measurement data; and a description of the procedures used to assess these parameters.

A successful program, however, is more than the sum of its requirements and procedures. A Quality Assurance program will not be successful unless the organization's attitude toward QA is a healthy one, i.e., it recognizes the importance of the QA role. Management's commitment to QA can be gauged by assessing the quality of the QA staff, determining whether the QA budget is commensurate with its responsibilities, and determining whether management is knowledgeable about and involved with QA activities or whether it views QA as the QA Department's job.

1.2 Reviewing Permit Applications

APPLICATION TO CONSTRUCT OR MODIFY

The requirements for obtaining approval from the Agency for constructing a new source or modifying an existing source are contained in Section 61.96 of Subpart H.

Application for approval or notification of startup does not need to be filed for modification/construction within an existing facility if the increase in the EDE is less than 1% of the standard. When estimating the new source term, the facility is to use the procedure and guidance given in 40 CFR Part 61, Appendix D. However, to qualify the facility must be in compliance as established by the previous annual report.

Conditions for approval are subject to 40 CFR Part 61.08.

Upon receipt of an application, the Agency should conduct a "completeness review," i.e., determine whether or not the application provides the information and analyses required by the applicable requirements. If the results of the review identify missing information, a letter detailing the missing information should be sent by the Agency to the applicant and noting the additional information that would be needed before action on the application can be taken. Note that a technical review has not yet been performed.

Upon the receipt of a complete or substantially complete application, an "acceptance review" should commence. A multi-disciplinary team is required. The acceptance review provides an independent technical assessment of the supporting data and calculations, and findings.

EXEMPTIONS

All DOE facilities are exempt from the source reporting requirements established in at 40 CFR 61.10 (40 CFR 61.97).

Section 2: Compliance Determination

2.1 Inspection Preparation

The elements of pre-inspection planning are to (1) establish the scope of the inspection, (2) identify resource needs, (3) develop an Inspection Plan, and (4) perform activities pre-requisite to gaining site access.

2.1.1. Scope of Inspection

The scope of the inspection can be established through (a) ***review of the facility's background and past inspection reports***, if any, to identify open issues and (b) review of Subpart H requirements.

To evaluate on-site stacks and fugitive emission points for compliance with Subpart H, the inspection may include interviews with facility staff and/or former employees, walk-through inspections of equipment (stacks, monitors, filters, etc), and reviews of documents/records.

Factors affecting scope include: area covered by the facility (Department of Energy facilities may occupy hundreds of square miles); number of stacks; number of other emissions points, e.g., fugitive or diffuse emission points; definitions as to what constitutes a fugitive or diffuse emission point; the quantity of maintenance, process and procedures, records to be reviewed; the number of open items from prior inspections; number of people to be interviewed (e.g., those involved with operation, maintenance, and upgrades of radioactive emissions air monitoring equipment), etc.

2.1.2. Resource Needs

Identify the types of expertise required to conduct the scope of work.

Often, a multi-disciplinary Inspection Team and support staff are required to perform an inspection.

Special expertise may be necessary to establish radionuclide emissions monitoring requirements (e.g., legal advice to determine the criteria for identifying the stacks to be, or not to be, monitored), to actually conduct the inspections, to analyze the data obtained (i.e., the results of environmental monitoring systems, particulate sampling programs, laboratory work, and CAP88 inputs), and to perform dose calculations.

Nuclear engineers, QA specialists, and health physicists with experience in conducting inspections, running compliance codes, inspecting radioanalytical laboratories, or designing monitoring and filter equipment would be good choices to have on the team.

The most important member of the team is the team leader. Because the success of the inspection depends to a large degree on the inspection process, it is recommended that the Inspection Team leader be an experienced inspector.

2.1.3 INSPECTION PLAN

The objective of this activity is to ***develop an inspection process*** (the Inspection Plan) providing assurance that facility activities related to airborne radionuclide emissions result in ***a credible and traceable body of information detailed enough to support a decision on compliance with applicable EPA NESHAPs requirements.***

THE INSPECTION PLAN SERVES AS A WORKBOOK

The Inspection Plan, when fully developed, serves as both a comprehensive regulatory reference and as a "workbook." It should identify the requirements and other standards against which the facility will be measured; it should identify the "acceptance criteria" to be followed in determining when a requirement or standard has been met; and, it should outline the overall process (including schedule) for conducting the inspection.

The Inspection Plan should include sections on Background, Purpose and Scope, Regulatory Requirements, Prerequisites, Audit Team Members, Schedule, and Appendices containing all checklists to be used.

BACKGROUND

- Identify the facility, location, and dates of the inspection (e.g., Los Alamos National Laboratory, Los Alamos, New Mexico, August 24 through August 28, 2000).
- Describe the facility's compliance record.

PURPOSE AND SCOPE

- Describe the inspection purpose (e.g., "This audit is an independent baseline evaluation pursuant to the radionuclide NESHAP standard, 40 CFR 61, Subpart H.").
- Describe the inspection scope (e.g., interviews with staff, walk-through surveys of equipment and audit of documents/records will be conducted to evaluate on-site stacks and fugitive and diffuse emissions for compliance with Subpart H standards pertaining to (1) emissions monitoring and test procedures, (2) actual releases and reporting, and (3) quality assurance methods).
- Identify the applicable facility documents to be reviewed.

Greater specificity allows the facility to better prepare for the inspection by providing access to physical facilities and necessary records, assuring the availability of key staff, etc.

REGULATORY AND OTHER REQUIREMENTS

- Identify the specific regulatory requirements ***(the Regulatory Baseline)*** (e.g., 40 CFR 61, Subpart A, "General Provisions," 40 CFR 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities," and 40 CFR 61, Appendix B, Method 114, Section 4, "Quality Assurance Methods."). Refer to Appendix A of this manual.
- Identify other requirements (e.g., open items from prior inspections, items identified in annual Emissions Monitoring Reports, issues raised in other audits, etc.).
- Since identifying requirements is much easier than interpreting them, the Inspection Team should be acquainted with policies and positions on issues arising from prior inspections.

INSPECTION TEAM

- Identify Inspection Team personnel by name and responsibility to allow the facility time for security issues ***(authorization, credentials, clearances)*** and assuring the availability of facility personnel with the proper expertise to respond to questions.
- Identify written procedures (if any) or checklists to be used during the inspection. Ideally, checklists should be made available to the facility and returned filled-out prior to inspection to facilitate good information exchange. Refer to Appendices A, B and C of this manual.

PREREQUISITES

Items required of the facility prior to inspection:

- As soon as practical, identify the clearances, training, and/or documentation required (e.g., waivers, releases and nondisclosure statements) for personnel to get on-site.
- A brief site history (including a description of the facility and its operation).
- A map of the facility showing all emission points whether monitored or not, including the fugitive and diffuse emissions.
- A list by name/designation of all the emission points.
- A copy of NESHAPs recommendations from prior official inspections and the facility's response to the NESHAPs portion of all recommendations.
- If applicable, Radionuclide NESHAPs Annual Reports for several prior years, inputs to CAP88, and printouts of CAP88 runs.
- Diagrams of stack monitoring systems.
- Permission to take photographs or to have a facility photographer assigned.

Items required of the facility at the beginning of the inspection:

- Use of a private meeting room for the Inspection Team, and use of phones, copy equipment, etc.
- Facility escorts familiar with the facility systems and layout, specifically the monitoring systems.
- Facility QA Manual; QA Plan; QA Procedures; maintenance records, and calibration and testing records for process and air monitoring equipment; and any other technical documents the facility or the inspector believes to be relevant.

Items required of Inspection Team members prior to inspection:

- Where security is an issue, social security numbers at least 10 days in advance to allow security checks.
- For applicable facilities, at least one member who holds necessary security clearances and proof of same.
- Appropriate inspection training and proof of same or appropriate waivers. (Inspectors need to have OSHA-required training, an eight-hour training course, certification card).
- General equipment – pocket calculator, tape measure, clipboard , locking briefcase, camera, waterproof pens, pencils, and markers, and a flashlight and batteries.
- Safety equipment - safety glasses or goggles, earplugs, rubber-soled, metal-toed, non-skid shoes, long-sleeved coveralls, and a hard hat.
- Emergency equipment - substance-specific first aid information, emergency telephone numbers, and a first-aid kit with eyewash.
- Identify, to the extent practical, any precedents established during prior NESHAPs inspections.

INSPECTION TEAM MEMBERS

Identify Inspection Team members by name and give their responsibility (e.g., team leader, health physics, observer, etc.) and affiliation.

SCHEDULE

- Specify inspection dates, times, and places of opening and closing conferences, e.g.,
  - Opening Conference: 9:00 AM, August 24, Room 100
  - Conduct of inspection: August 24-28
  - Daily Briefing: 8:00 AM, Hotel
  - Closing Conference: 10:00 AM, August 28, Room 100
  - Daily Closeout-of-the-day meetings late afternoon or evening.

For record keeping purposes, it is recommended that each site's facility inspections be assigned a unique inspection number, e.g., DOE-RL/PFP/2000/01, where "DOE-RL" designates the site, PFP designates the facility, "2000" designates the year, and "01" designates the sequential inspection for that year.

2.1.4 Pre-Requisite Activities

Pre-requisite activities consist of several elements: describing the inspection process to help flush out the scope of work, establishing the regulatory baseline to identify the requirements governing the inspection, establishing acceptance criteria to know when compliance with a requirement has been achieved, and other activities.

Describe the Inspection Process

Inspections will consist of a series of interviews conducted from a prepared list of questions derived from applicable requirements, and observations of operating equipment. Any deficiencies identified may be discussed in the exit interview and in the Inspection Report. Such deficiencies would be cross-referenced to the specific regulatory requirements.

Establish the Regulatory Baseline

The Inspection Team should identify applicable laws, regulations, standards, and guides (the "Regulatory Baseline") required to conduct a consistent regulatory compliance review effort. Requirements for effluent monitoring and data analysis are included in Subpart H and all relevant reference material, including guidance documents. There can be considerable diversity of opinion as to the interpretation in meaning of words and phrases used therein.

In the event the facility applied for a variance from EPA requirements, the Inspection Team leader should establish the status of the request by reviewing the facility's files. Any such variances would be part of the regulatory baseline.

Establish Acceptance Criteria

The Inspection Team must decide what constitutes acceptable evidence of compliance. The first step in this two-step process is the easiest, i.e., determining the evidence exists. For example, if the NESHAPs

calls for a QA Plan, does the facility have one that addresses all of the NESHAPs requirements? It is almost a yes or no determination. Almost. The reason it isn't a simple "yes" or "no" is that in some cases the facility may be following a set of procedures and guidance which, even though not called a QA Plan, in all other respects accomplishes the objectives of the QA Plan. In this case, the facility may be technically out-of-compliance (refer to 40 CFR 61 Appendix B, Method 114).

The second, more difficult step toward determining compliance is the quality of the material submitted. In the example cited above, the issue is whether or not the material submitted by the facility meets the letter and the intent of the regulations, i.e., does the QA plan help assure quality? To answer this question, the Inspection Team should have a member familiar with QA procedures.

To establish whether compliance has or has not been achieved, it will be necessary to develop a list of the facility data, reports, analyses, discussions, and other evidence necessary to make an informed judgment on the state of compliance with the NESHAPs regulatory baseline. Checklists are very helpful in keeping track of this process. Checklists should be developed to assist the verification of performance, and acceptability, of required activities. Refer to Appendices A, B, and C to this manual.

In another example, the radionuclide NESHAPs requires facilities to apply a specific model to demonstrate compliance with the standard. The models used to demonstrate compliance with the radionuclide NESHAPs include CAP88, CAP88-PC, AIRDOS-PC, and, in certain circumstances, COMPLY. All four of these models have inherent limitations in evaluating special or atypical source/receptor configurations. The four models listed above are the only models approved to date for NESHAPs compliance. If the facility wishes to use an alternate model, the facility must obtain prior approval from EPA Headquarters.

OTHER ACTIVITIES

Regarding notification of inspections - a total surprise inspection may create access problems and result in a lengthy wait at the gate. Therefore, for Federal Facilities, this decision should be made on a case-by-case basis in conjunction with the Region's Federal Facility Coordinator. While surprise inspections are preferred, an acceptable compromise is to provide notice on the afternoon prior to the inspection.

It is also appropriate to consider forwarding to the facility well in advance of the inspection a copy of Appendix A, "40 CFR 61, Subpart H, Requirements Checklist" (Located in this manual). The questions and information requests contained therein may take the facility several weeks to respond. Thus, early transmittal is recommended.

Note: Sending Appendix A "40 CFR 61, Subpart H Requirements Checklist" in advance to the facility should not prevent a surprise; the inspection team does not have to notify the facility of the exact date of its plans to arrive for an inspection.

2.2 INSPECTION OF FACILITIES

OBJECTIVE

The objective of the site inspection is to ***gather facts (evidence)*** -- not to make an on-site compliance determination.

IMPLEMENTATION

The objective of the inspection phase is accomplished by visiting operating facilities to physically inspect equipment and processes emitting airborne radioactive effluents and related quality assurance records.

2.2.1 PLANT ENTRY

AUTHORITY

The statutory authority to inspect facilities subject to Subpart H is found in Section 114 of the Clean Air Act.

ARRIVAL

With the arrival on-site of the Inspection Team, the inspection begins. You are cautioned to be prompt so that the day's schedule may be adhered to. The first order of business is to prepare for identity verification and sign-in.

Actual plant entry consists of a series of activities conducted predominantly by the facility security force. The overall objective of this process is to (1) maintain plant security by verifying the identity of the personnel entering the plant, and (2) assure that all necessary precautions are taken to protect the health and safety of the Inspection Team.

The Inspection Team

SIGN-IN AND PRESENTATION OF CREDENTIALS

Each member of the team will be asked to sign-in at the security desk. At that time, the security officer in charge will ask to see identification, preferably with a photograph. A driver's license, voter registration card, etc., may be required. Once the security officer is satisfied, you will be issued a security badge to be worn at all times on-site.

Persons not possessing proper identification will be subject to the site's security provisions and may not be allowed to participate in the inspection. This decision will be a function of the type of facility being inspected.

For tight security facilities like DOE facilities, expect to be denied access if credentials are lacking.

During the sign-in process, the members of the Inspection Team may be asked to sign waivers, releases and nondisclosure statements. These documents should be made known as part of the pre-inspection phase activities. If necessary, counsel should be asked to review such material beforehand and approve the efficacy of signing waivers and releases, since the purpose of the inspection is in part to disclose certain information.

CLEARANCE

If the site to be inspected is a secure site, access to secure areas will be restricted to those with the appropriate security clearance. At all times and in all places on-site, you should be prepared to be accompanied by facility personnel serving as escorts.

Inspection of secure sites may take place without a member of the Inspection Team holding a proper clearance. This practice is discouraged primarily for two reasons. First, access to certain equipment, rooms, buildings, etc., may be denied. Second, questioning of facility staff will be limited to non-security sensitive material. In either instance, information necessary to base compliance judgments may be missing. Without all necessary information, the compliance record, and thus the objective of the NESHAPs, is compromised.

Inspectors should first contact the Department of Energy regarding the appropriate level of clearance necessary to inspect the facility. If problems or inordinate delays are encountered, inspectors should ask the EPA Regional Federal Facility Coordinator for assistance. (Notification of an impending inspection to the Office of Federal Facilities should be done during the planning phase of the inspection. Also, a call to your program's attorney may be helpful).

2.2.2 OPENING CONFERENCE

The opening conference will generally commence directly after sign-in and will be led by the Inspection Team leader and a facility official. The conference has several purposes, one of which is to introduce staff. Other administrative purposes include serving as an orientation on safety protocols, providing information on lines of communication, eating facilities, administrative support capabilities, etc.

The conference also has its technical side. The conference provides an opportunity to reiterate the purpose, scope, and process of the inspection.

The opening conference establishes a forum for the exchange of information between inspection personnel and facility officials. This information exchange should focus on, but not be limited to, the inspection itself. The inspector should be aware of several principles that can increase the effectiveness of the opening meeting:

- Gain an early rapport.
- Start the meeting on a positive and professional note.
- Prepare and use any supporting information that will enhance the discussion; e.g., a copy of the Clean Air Act, technology transfer materials, or other resources.
- Acknowledge that the inspection may disrupt daily facility routines, but assert that reasonable efforts will be made to minimize such disruptions.
- Listen carefully and be willing to answer facility officials' questions. But, do not permit yourself to be maneuvered into bending policies/procedures or overstepping your authority in an attempt to accommodate facility representatives. For example, do not give opinions that are "shot from the hip" about whether facility practices, as described during the discussion, are acceptable and will be found in compliance.

A cooperative working relationship developed during this opening meeting can set the tone for the remainder of the inspection. It also can be used as the foundation for strengthening relationships. If approached properly, the opening conference provides an ideal opportunity for the inspector to function as public relations liaison and educator.

From the perspective of the regulated community, the inspector is well positioned to serve as a source of regulatory information. As such, the inspector should provide tactful help before, during, and after the inspection.

If not done beforehand, facility responses to the questions and information requests contained in Appendices A, B and C of this manual should be requested. Two to three weeks should be allotted for the facility to comply.

Logistical requirements and arrangements should be addressed in the opening conference to minimize delays and avoid misunderstandings. Relevant considerations include:

ACCOMPANIMENT

It may be beneficial to encourage a facility official to accompany the inspector during the inspection (or selected parts of it) to describe the facility and its principal operating characteristics and, where appropriate, to indicate which processes, records, etc., should be claimed as confidential business information.

SAFETY REQUIREMENTS

The inspector should determine what OSHA and facility safety regulations will be involved in the inspection, and should be prepared to follow these requirements. Note, however, that EPA typically has its representatives use the same safety equipment that is actually used by employees. If what is actually used is different from the safety equipment required, then use the required safety equipment.

ORDER OF INSPECTION

A discussion of the order in which operations will be inspected will help eliminate wasted time by allowing officials time to make records available and control intermittent operations.

LIST OF RECORDS

A list of records to be inspected will permit officials to gather and make them available for the inspector.

MEETING SCHEDULE

Based upon the planned inspection activities and the inspector's understanding of facility personnel responsible for key assessment topic areas, a schedule of meeting times can be developed. This schedule will permit key personnel to clear time to meet with the inspector.

2.2.3 INSPECTION DOCUMENTATION

As noted in section 2.1.3, the objective of the inspection process is to produce a credible and traceable body of information detailed enough to support a decision on compliance with applicable NESHAPs requirements. This doesn't just happen. It must be thought about and planned for. One goal of the Inspection Team should be to leave the site with all the information (documents, notes, disks, etc.) necessary to make a compliance finding. To know what that information is precisely requires some thought on what information it will take to satisfy the requirements of the Subpart H, i.e., compliance acceptance criteria. To assist in this determination, a requirements checklist (Appendix A) and information checklists (Appendices B and C) have been prepared to help the team obtain the appropriate information.

The checklists are relatively complete, however, other information not contained therein may be useful in making a compliance determination. Thus, the team members are encouraged to go beyond the checklists into any and all areas considered important in determining compliance.

INSPECTION FIELD NOTEBOOK AND FIELD NOTES

The inspector's field logbook is the core of all inspection documentation. It should contain accurate and inclusive documentation of all inspection activities. The logbook is used as the basis for preparing the inspection report and to refresh the inspector's memory regarding the specifics of sample collection and other inspection procedures should the inspector be called upon to testify. Logbooks become a part of the official inspection file.

Language in the logbook should be objective, factual, and free of personal feelings and conclusions of law. The logbooks can be provided to the opposing side during the discovery process of an enforcement case and can be entered as evidence in court.

Inspectors should use only bound field logbooks for maintaining field records, preferably with consecutively numbered pages.

Observations and answers to interview questions should be recorded in logbooks. Examples of checklists used to elicit and record information are provided in the appendices.

Field notes should be kept in accordance with requirements established by QA plans. Typically, such requirements deal with alteration of records, i.e., write-overs, cross-outs, whiteout, etc. The essence of these requirements is to make all alterations traceable. Thus, cross-outs with a single line and initials are allowed whereas use of whiteout or other obliteration of material would not be. There may also be requirements to use bound notebooks to preclude the substitution of pages. In any event, the appropriate requirement should be identified and followed.

DRAWINGS AND MAPS

During an inspection, making maps and sketches of the equipment being inspected helps the inspector to recreate the situation for later analysis. Team members are encouraged to make such sketches in their logbooks. Sometimes, the facility may be able to provide schematics of the process. If available and permitted, photographs are additionally helpful to create a record of the as-found condition. See pictures below for examples.

"Canyon" Sampler

"Canyon" Sampler

COPIES OF RECORDS, PRINTED MATERIAL

In reviewing records, certain information (schematics, descriptions, data, or the entire record) will be useful in establishing the database upon which the compliance findings will depend. Copies of such records should be obtained within the boundaries established by the proprietary or security nature of the information. In the latter case, it may be possible to obtain a "clean" version of the information, i.e., information from which the sensitive material has been removed. Examples may include facility QA plans, technical procedures, memos, etc. However, all business information claimed confidential should be noted by the inspector.

PHOTOGRAPHS

The Inspection Team is encouraged to take photographs to help assist in the inspection. With time, memories may fade or provide incomplete records of what was observed in the field. Photographs are useful for preserving the as-found conditions.

However, use of cameras on-site or in certain areas may not be allowed if security or proprietary information is involved. In these cases, photographs may still be feasible if taken by facility officials. If the Inspection Team wishes to use photographs in the inspection process, the request should be made during the pre-inspection planning phase.

The Team should, if possible, take pictures.

2.2.4 VERIFICATION OF FACILITY RECORDS

It is essential to establish the validity of the data upon which compliance determinations will be based.

Facilities subject to the radionuclide NESHAPs are also subject to the quality control provisions therein. One such provision requires periodic reports to responsible management, which assess the quality of the data, results of audits, and descriptions of corrective actions. An investigation of these reports can help establish a level of confidence in facility records. Further, it should be possible to trace requirements from the NESHAPs to on-site implementing procedures addressing record keeping requirements.

2.2.5 ON-SITE DOSE CALCULATIONS

When on-site, there are two main objectives the Inspection Team members assigned responsibility for dose calculations will wish to pursue. First, the team will evaluate the validity of the facility's use of CAP88, CAP88-PC, AIRDOS-PC, or COMPLY, the codes approved for use. Second, the team may wish to use one of these codes to run an independent check of the facility's results.

Appendix D provides descriptions of these codes as well as guidance on their use. For additional information on these computer codes, go to ***http://www.epa.gov/radiation/assessment/software.html***.

To evaluate the validity of the facility's use of the codes, the technical questions in Appendix B to this manual (Section 5 – Dose Standard checklist) should be considered. Nuances related to some of these questions are discussed below.

- Which code was used? The facility must use CAP88, CAP88-PC, or AIRDOS-PC if the distance to the closest resident is greater than 3,000 meters.
- How did the facility treat multiple release points? CAP88 allows multiple release points; however, they are all put in one location. If the facility used this option, how did they choose the location for the single release point representing the many? COMPLY allows a more detailed treatment of multiple release points than CAP88. Multiple release points can become quite complicated, but COMPLY can be used to determine which release point produces the highest dose. See the COMPLY user guide.
- What is the source of the facility's meteorological data? To check the reasonableness of the data, use NOAA data from a nearby location to calculate air concentrations. If the terrain is not too different, the results should be reasonably close to one another.
- Did the facility change any of the default pathway parameters in CAP88? These parameters cannot be changed in COMPLY. A list of the CAP88 parameters and their default values is given in the CAP88 user guide.
- Was CAP88 used to estimate the dose to a resident who is closer than 100 meters to the release point? This is not specifically disallowed in the rule, but is not good practice. For close-in distances, COMPLY should be used because it accounts for building wake effects.
- Is the terrain complex? For example, the Gaussian plume model used by both COMPLY and CAP88 is not very accurate in hilly or mountainous terrain. A particular problem occurs when the source is on top of a hill and the receptor is located in a valley. In such a case the concentration could be grossly overestimated. The opposite problem, having the source in the valley and the receptor on top of a hill, can be approximated by subtracting the difference in elevation from the stack height. If the difference is negative, use a ground-level release (zero stack height). Complex terrain is challenging for compliance models to consider. EPA is in the process of evaluating additional models that seek to consider complex terrain.

2.2.6 POST-INSPECTION CONFERENCE

The post-inspection conference will be led by the Inspection Team leader.

The post-inspection conference is neither the time nor the place to announce compliance judgments. Rather, the most appropriate use of the conference is to build confidence that the observances made in the field are in fact accurate. Sharing observations and asking for comment by facility officials can often clear up misunderstandings before they get into print. Once in print, errors can be embarrassing and difficult to explain.

Another reason to avoid rushing to judgment is that facility officials may put too much credence in compliance findings they hear at the conference, not realizing that a rigorous analysis, review, and approval process must yet be conducted. Officials may commit funds to repairs that later may not turn out to be necessary.

The post-inspection conference is also an appropriate time to request missing information, to exchange phone numbers in case questions arise during the analysis, and to estimate the schedule for making findings and issuing the Inspection Report.

2.2.7 POST-INSPECTION ACTIVITIES

OBJECTIVE

This phase of the process has several objectives. First, it is necessary to analyze all the facts gathered and observations made during the physical inspection and establish the record. Compliance determinations should be based upon the record. Second, it is necessary to make recommendations, which, if implemented, would correct the deficiencies noted. Third, it is important to establish a list of facility commitments to allow follow up efforts on correction of deficiencies.

IMPLEMENTATION

To achieve the first and second objectives, it is necessary to establish the record, or evidence, upon which decisions will rest. This body of evidence consists of (1) the information gathered in the field and (2) the summary and analysis of field information. The latter material will be included as appendices in the Inspection Report. The third objective requires the creation and updating of databases important to verification of compliance, including corrective action.

REPORT PREPARATION

The information submitted by the facility will be reviewed to determine the degree of compliance with Subpart H. If it is determined that information is still lacking, it must be identified and obtained from the facility. Each team member is responsible for determining the information needed for his/her area of expertise. Conclusion of the inspection process is not feasible without all necessary data.

The results of all work done by an inspector are finally expressed in some form of written report. Proper documentation of an inspection is a key aspect of an inspector's job. Government officials and attorneys who review the report must have all the facts to make appropriate and effective decisions. Well-written reports create an impression of a well-conducted inspection, and facilitate the report review and decision-making process.

The purpose of the inspection report is to present a factual record of an inspection, from the initial planning of the inspection through the analysis of samples and other data collected during the inspection. An inspection report must be complete and accurate, because it will provide the bases for potential enforcement actions and may become an important piece of evidence in litigation. The length and format of inspection reports may vary based on program and individual office policy and practice.

The objective of an inspection report is to organize and coordinate all evidence gathered in an inspection in a comprehensive, usable manner. To meet this objective, information in an inspection report must be:

- Accurate,
- Relevant,
- Comprehensive,
- Coordinated,
- Objective,
- Clear, and
- Neat and Legible.

No single standard inspection report format exists; the specific information needs will vary depending on the program and regulatory requirements involved. While the format and exact contents of the inspection report vary, the report should always contain enough information for the reader to determine:

- The specific reason for the inspection;
- Who participated in the inspection;
- Compliance with all required notices, receipts, and other legal requirements;
- Actions taken during the inspection, including the chronology of these actions;
- Statements, records, physical samples and other evidence obtained during the inspection;
- Observations made during the inspection; and
- The results of sample analyses related to the inspection.

NOTE: The Inspection Report is to be treated as enforcement sensitive pending final closeout to all potential violations. The draft Inspection Report may be shared with the facility to be certain all factual information is correct.

2.3 Determining Compliance

Satisfactory results from running the computer codes are insufficient to establish Subpart H compliance.

Compliance with Subpart H is not simply a matter of running CAP88 or COMPLY.

The code results are important and serve to establish that the facility is in compliance with the dose standard, however, verification of correct input values is necessary before making a compliance determination.

For each technical activity, the report should state concisely the findings of fact. A concise statement of the applicable regulatory requirement(s) referenced to the NESHAPs should follow these findings. Lastly, by comparing the two, a compliance finding of that technical activity can be made. Conclusions and compliance findings should be contained in a separate memorandum or other format that is clearly separate.

Conclusion

The intent of this manual is to assist an inspector with the inspection of Department of Energy facilities for compliance with 40 CFR Part 61.90, Subpart H. This manual is not intended to replace proper formal training with inspecting Department of Energy facilities. However, both new and experienced inspectors can use it in performing a successful inspection.

It is recommended that one is familiar with the content of Subpart H before attempting an inspection. However, Section 1 of this manual discusses the regulatory requirements associated with conducting a successful inspection. Section 2 of this manual highlights the key points of an inspection but should not replace formal inspection training. The manual concludes with several appendices, three of which are detailed questions concerning operations at the facilities. These appendices (A, B and C) should be sent to the facility in advance and reviewed by the inspector before the actual inspection takes place. Finally, Appendix D outlines an inspection report and provides an example inspection report.

For further information regarding information cited in this manual, please go to the radionuclide NESHAPs homepage at: ***http://www.epa.gov/radiation/neshaps/*.**

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Introduction to Appendices A through D

For Appendices A through C, an attempt has been made to make these attached checklists and questionnaire as easy to use as practical. They should be sent to the inspection facility at least two weeks prior to an inspection. On the checklist there are requests for both documents and questions. Of these, some are for information purposes only. The information or documents sought may enable EPA to determine whether the facility is in compliance with section 112 of the Clean Air Act and implementing regulations; the information may also be needed to determine what the future regulatory status of the facility will be. However, a yes or no answer to these "information only" requests and questions does not per se indicate that the facility is in or out of compliance. These requests and questions are marked with a "☐," which may be checked once the question is answered or the documents provided.

The balance of the questions bear directly on whether the facility is in compliance with the act and the regulations, e.g., is there a QC plan, is there certain monitoring, etc. The answers to these questions may be checked in the "yes" and "no" columns on the left, under "Compliance Factor." A space is provided for comments.

Appendix D provides an example of an inspection report format as well as an example sanitized inspection report.

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Appendix A: 40 CFR 61, Subpart H, Requirements Checklist

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40 CFR Subpart H Requirements Checklist

Facility Name: _____ Building Name: _____

Facility Contact: _____ Phone: _____

The purpose of this checklist is to highlight the requirements of Subpart H. It is to be completed in a "yes" or "no" format, in most cases. Detailed responses are to be provided in Appendices B and C to this manual.

ITEM	COMPLIANCE FACTORS		COMMENTS	RADIONUCLIDES NESHAPS COMPLIANCE CHECKLIST
	YES	NO		
Historic Compliance Questions				
1.				1. For any sources that did not have an initial startup date after December 15, 1989, which would include the facility as a whole, was the following information furnished to EPA within 90 days of December 15, 1989: the name and address of the facility owner or operator; the location of the source; the hazardous pollutants emitted by the source; a brief description of the design, operation, nature and size of the source, including the design capacity of the source; each point of emission for each hazardous pollutant; the amount of hazardous materials (average weight/month for the preceding 12 months) the source processes; and a description of the existing control equipment for each emission point, including each control device for each hazardous pollutant and the estimated percentage efficiency for each such device? [Note: This information is required by 40 CFR 61.10]
2.				2. Did the owner or operator of the facility indicate to EPA that within 90 days of December 15, 1989, that facility could comply with the requirements of 40 CFR Part 61, Subpart H ("Subpart H")? [Note: This information is required by 40 CFR 61.10]
3.				3. A. At what point did it become evident to the facility that it could not comply with Subpart H?
				3. B. Was a waiver of Subpart H sought pursuant to 40 CFR 61.10?
				3. C. If so, when was it sought and was it granted?

ITEM	COMPLIANCE FACTORS		COMMENTS	RADIONUCLIDES NESHAPS COMPLIANCE CHECKLIST
	YES	NO		
				3. D. If it was granted when was it granted, and if it was denied when was it denied?
				3.E. If it was granted, was it granted for the full two years from the effective date of Subpart H or for some other period?
				3.F. If for some other period, what was that period?
4.				4.A. Have there been any waivers granted of the requirement for the initial emissions testing generally required by 40 CFR 61.13?
				4.B. If not, for any source with an initial startup date prior to December 15, 1989, including the facility as a whole, was there emissions testing within 90 days of December 15, 1989?
				4.C. If not, for any building, structure, or other component of the facility emitting or having the potential to emit radionuclides and having a startup date after December 15, 1989, was initial emissions testing performed within 90 days of startup?
				4. D. Was EPA given at least 30 days notice of any initial emissions tests? [Note: This is required by 40 CFR 61.13(c).]
5.				5. If initial emissions testing were performed, were the samples analyzed and emissions determined within 30 days of the tests and the results sent to EPA within 31 days of the test? [Note: This is required by 40 CFR 61.13(f).]
6.				6. Have all records of emissions tests results been maintained for at least two years? [Note: This is required by 40 CFR 61.13(g).]
Current Compliance Questions				
7.				7. Is information provided that identifies each operation at the facility using or generating radionuclides and each building or structure within which radionuclides are used or generated?
8.				8. Is information provided that lists existing releases of radionuclides from each building or structure, or as a result of any operation taking place at the facility, including the following information for each release: source, form of release (gas, liquid, or solid, including range of particulate size if solid), emission rate (Ci/yr or Ci/second), and radionuclide released?

ITEM	COMPLIANCE FACTORS		COMMENTS	RADIONUCLIDES NESHAPS COMPLIANCE CHECKLIST
	YES	NO		
9.				9. Is information provided that outlines the estimated fugitive radionuclide emissions from the facility as well as which radionuclides are so emitted and from what area or areas (location and size) do such emissions emanate?
10.				10. Are permits, consent decrees, orders, etc. currently in effect apply to radionuclide emissions from the facility provided?
11.				11. Is a map of the facility and any other explanatory material provided to show (1) the location and height of vents and stacks from which the emissions listed in response to Item 2, above, are released, (2) which radionuclides are emitted from each vent or stack and emission rates for each radionuclide from each stack in Ci/yr or Ci/second and the amount of emissions in Ci/cubic meter, (3) locations and size of the offsite and any onsite population and all residences ("any home, house, apartment building, or other place of dwelling which is occupied during any portion of the relevant year" 40 CFR 61.91(d)) schools, businesses, or offices within 3 kilometers. The map should be of sufficient scale to allow determinations of distances from both the perimeter of the facility and from each vent or stack from which radionuclides are released to the receptor. II. COMPLIANCE WITH SECTION 112 CAA AND IMPLEMENTING REGULATIONS (40 CFR PART 61, SUBPARTS A AND H)
12.				12. A. Was any building, structure, or any other portion of the facility that emits or has the potential to emit radionuclides, built or modified after December 15, 1989?
				12. B. If so, was approval under the CAA obtained? [Note: This is simply the requirement contained in 40 CFR 61.05.]
13.				13. If any building, structure, or portion of the facility emitting or having the potential to emit radionuclides had an initial startup after December 15, 1989, were the anticipated and actual startup dates submitted to EPA? [Note: This is required by 40 CFR 61.09]
14.				14. A. At all release points that have the potential to discharge radionuclides into the air in quantities that could cause an effective dose equivalent greater than 0.1 mrem/yr, were the following radionuclide emissions measurements made?
				14. B. Were periodic confirmatory measurements made at all other release points?
				14. C. Were all radionuclides that could contribute greater than 10% of the potential effective dose equivalent for a release point measured as prescribed below?

ITEM	COMPLIANCE FACTORS		COMMENTS	RADIONUCLIDES NESHAPS COMPLIANCE CHECKLIST
	YES	NO		
				[Note: This is required by 40 CFR 61.93(b)(4)]
				1. Effluent flow rate measurements to determine velocity and volumetric flow rates for stacks and large vents (a stack greater than approximately 0.3 meter in diameter or a stack or a vent with a cross-sectional area greater than approximately 0.071 square meter) were made in the following manner and under the following conditions? A. The measurements were made at least eight stack diameters, or equivalent diameters, downstream and two diameters, or equivalent diameters, upstream from any flow disturbances or from a visible flame. If this was not possible, an alternative measurement point at least two stack diameters downstream and more than a half diameter upstream from a flow disturbance was used. If the opening is rectangular, the equivalent diameter is equal to: 2 x length x width/(length + width).
				B. The measurements were made using: a type S pitot tube, a differential pressure gauge, a temperature gauge, a pressure probe and gauge, a barometer, gas density measuring equipment, and, if necessary, a calibration pitot tube and a differential pressure gauge for type S pitot tube calibration. This equipment was used in the manner and met the specifications of 40 CFR Part 60, appendix A, method 2, sections 2 through 4, inclusive.
				C. Based upon the measurements referred to immediately above, the calculations required by 40 CFR Part 60, Appendix A, Method 2, Section 5 were made.
				D. If the flow rates were variable, continuous or frequent measurements were made. Otherwise, periodic measurements were made.
				2. Were effluent flow rate measurements to determine velocity and volumetric flow rates through pipes and small vents made in the following manner and under the following conditions? A. Either in-line or at the exhaust, wherever the measurements were made, the temperature was between 0 and 50 degrees C.
				B. The measurements were made using: a gas volume meter, a barometer, and a stopwatch. This equipment was used in the manner and met the specifications of 40 CFR Part 60, Appendix A, method 2A, sections 2 through 4, inclusive.
				C. Based upon the measurements referred to immediately above, the calculations required by 40 CFR Part 60, Appendix A, method 2A, section 5 were made.

ITEM	COMPLIANCE FACTORS		COMMENTS	RADIONUCLIDES NESHAPS COMPLIANCE CHECKLIST
	YES	NO		
				D. If the flow rates were variable, continuous or frequent measurements were made. Otherwise, periodic measurements were made.
				3. Were radionuclides directly monitored or extracted, collected and measured in the following manner? A. The measurements were made at least eight stack diameters, or equivalent diameters, downstream and two diameters, or equivalent diameters, upstream from any flow disturbances or from a visible flame (the "eight and two criterion"). If this was not possible, an alternative measurement point at least two stack diameters downstream and more than a half diameter upstream from a flow disturbance was used. If the opening is rectangular the equivalent diameter is equal to: 2 x length x width/(length + width).
				B. If the eight and two criterion was met, the minimum number of traverse points was: twelve for stacks with diameters or, in the case of rectangular stacks, equivalent diameters greater than .61 meters; eight for circular stacks with diameters between .30 and .61 meters; and, nine for rectangular stacks with equivalent diameters between .30 and .61 meters.
				C. If the eight and two criterion were not met, the number of traverse points was determined in accordance with 40 CFR Part 60, Appendix A, Method 1, Figure 1-1, in the case of particulates, and Figure 1-2, in the case of non-particulates.
				D. Monitoring or sampling sites were otherwise in conformance with 40 CFR Part 60, Appendix A, Method 1.14. For batch processes when the unit is in operation and unless otherwise authorized by EPA, the effluent stream was monitored continuously with an in-line detector or representative samples were continuously withdrawn in accordance with ANSI-N13.1-1969, "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities."
				4. Did the stack monitoring and sample collection methods conform to the following guidelines established in 40 CFR Part 61, Appendix B, Method 114? A. Radionuclides of most elements in effluent streams will be particulates and can be collected using a suitable filter. Radionuclides of hydrogen, oxygen, carbon, nitrogen, the noble gases, and, in some circumstances, iodine will be gases. Radionuclides of these elements will require either the use of an in-line or off-line monitor to directly measure the radionuclides, or suitable sorbers, condensers or bubblers to collect the

ITEM	COMPLIANCE FACTORS		COMMENTS	RADIONUCLIDES NESHAPS COMPLIANCE CHECKLIST
	YES	NO		
				radionuclides. 1. Particulates. The extracted effluent stream is passed through a filter media to remove the particulates. The filter must have a high efficiency for removal of sub-micron particles. The guidance in ANSI N13.1-1969 and in ANSI N13.1-1999 shall be followed in using filter media to collect particulates.
				2. Gases. a. Tritium. Tritium in the form of water vapor is collected from the extracted effluent sample by sorption, condensation or dissolution techniques. Appropriate collectors may include silica gel, molecular sieves, and ethylene glycol or water bubblers. Tritium in the gaseous form may be measured directly in the sample stream using direct counting in flow through ionization chambers, collected as a gas sample or may be oxidized using a metal catalyst to tritiated water and collected as described above.
				b. Radionuclides of Iodine. Iodine is collected from an extracted sample by sorption or dissolution techniques. Appropriate collectors may include charcoal, impregnated charcoal, metal zeolite and caustic solutions.
				c. Radionuclides of Argon, Krypton and Xenon. Radionuclides of these elements are either measured directly by an in-line or off-line monitor, or are collected from the extracted sample by low temperature sorption techniques. Appropriate sorbers include charcoal or metal zeolite.
				d. Radionuclides of Oxygen, Carbon, Nitrogen and Radon. Radionuclides of these elements are measured directly using an in-line or off-line monitor. Radionuclides of carbon in the form of carbon dioxide may be collected by dissolution in caustic solutions.
				B. The type of method applicable to the analysis of a radionuclide is dependent upon the type of radiation emitted, i.e., alpha, beta or gamma. Therefore, the methods listed below are grouped according to principles of measurements for the analysis of alpha, beta and gamma emitting radionuclides. Furthermore, each method has its limitations and should only be used as described in Method 114. For example, for I-123 and I-131 all four methods below are approved, whereas for I-125 only high resolution gamma spectrometry is approved. 1. Methods for Alpha Emitting Radionuclides: Radiochemistry-Alpha Spectrometry, Radiochemistry-Alpha Counting, Direct Alpha Spectrometry. Direct Alpha Counting (Gross alpha determination), and Chemical Determination of Uranium (by either colorimetry or fluorometry).

ITEM	COMPLIANCE FACTORS		COMMENTS	RADIONUCLIDES NESHAPS COMPLIANCE CHECKLIST
	YES	NO		
				2. Methods for Gaseous Beta Emitting Radionuclides: Direct Counting in Flow-Through Ionization Chambers and Direct Counting With In-line or Off-line Beta Detectors.
				3. Methods for Non-Gaseous Beta Emitting Radionuclides: Radiochemistry Beta Counting, Direct Beta Counting (Gross Beta determination), and Liquid Scintillation Spectrometry.
				4. Gamma Emitting Radionuclides: High Resolution Gamma Spectrometry, Low Resolution Gamma Spectrometry, Single Channel Gamma Spectrometry, and Gross Gamma Counting.
15.				15. Were all counters calibrated for specific radionuclide measurements using a standard of the radionuclide under either identical, or very similar, conditions as the sample to be counted as required by Method 114 and as outlined below?
				15.A. For gamma spectrometers, a series of standards covering the energy range of interest may be used to construct a calibration curve relating gamma energy to counting efficiency.
				15.B. In those cases where a standard is not available for a radionuclide, counters may be calibrated using a standard with energy characteristics as similar as possible to the radionuclide to be measured. For gross alpha and beta measurements of unidentified mixtures of radionuclides, alpha counters are calibrated with a natural uranium standard and beta counters with a cesium-137 standard. The standard must contain the same weight and distribution of solids as the samples, and be mounted in an identical manner. If the samples contain variable amounts of solids, calibration curves relating weight of solids present to counting efficiency are prepared.
16.				16.A. Does the facility have a radionuclide emissions quality assurance program that includes the following requirements?
				16.B. The organizational structure, functional responsibilities, levels of authority and lines of communications for all activities related to the emissions measurement program shall be identified and documented.
				16. C. Administrative controls shall be prescribed to ensure prompt response in the event that emission levels increase due to unplanned operations.
				16.D. The sample collection and analysis procedures used in measuring the emissions shall be described including where applicable:

ITEM	COMPLIANCE FACTORS		COMMENTS	RADIONUCLIDES NESHAPS COMPLIANCE CHECKLIST
	YES	NO		
				1. Identification of sampling sites and number of sampling points, including the rationale for site selections. 2. A description of sampling probes and representativeness of the samples. 3. A description of any continuous monitoring system used to measure emissions, including the sensitivity of the system, calibration procedures and frequency of calibration. 4. A description of the sample collection systems for each radionuclide measured, including frequency of collection, calibration procedures and frequency of calibration. 5. A description of the laboratory analysis procedures used for each radionuclide measured, including frequency of analysis, calibration procedures and frequency of calibration. 6. A description of the sample flow rate measurement systems or procedures, including calibration procedures and frequency of calibration. 7. A description of the effluent flow rate measurement procedures, including frequency of measurements, calibration procedures and frequency of calibration.
				16.E. The objectives of the quality assurance program shall be documented and shall state the required precision, accuracy and completeness of the emission measurement data including a description of the procedures used to assess these parameters. Accuracy is the degree of agreement of a measurement with a true or known value. Precision is a measure of the agreement among individual measurements of the same parameters under similar conditions. Completeness is a measure of the amount of valid data obtained compared to the amount expected under normal conditions.
				16.F. A quality control program shall be established to evaluate and track the quality of the emissions 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.
				16.G. A sample tracking system shall be established to provide for positive identification of samples and data through all phases of the sample collection, analysis and reporting system. Sample handling and preservation procedures shall be established to maintain the integrity of samples during collection, storage and analysis.
				16.H.Periodic internal and external audits shall be performed to monitor compliance with the

ITEM	COMPLIANCE FACTORS		COMMENTS	RADIONUCLIDES NESHAPS COMPLIANCE CHECKLIST
	YES	NO		
				quality assurance program. These audits shall be performed in accordance with written procedures and conducted by personnel who do not have responsibility for performing any of the operations being audited.
				16.I. A corrective action program shall be established including criteria for when corrective action is needed, what corrective actions will be taken and who is responsible for taking the corrective action.
				16.J. Periodic reports to responsible management shall be prepared on the performance of the emissions measurements program. These reports should include assessment of the quality of the data, results of audits and description of corrective actions.
17.				17.A. If a computer code, model, or program was used to determine compliance with 40 CFR 61.92 (the 10 mrem/yr ede standard) what input parameters were used?
				17.B. If CAP88 was not used, what code, model, or program was used?
				17.C. If the code, model, or program was not CAP88, AIRDOS-PC, or COMPLY, was the approval of EPA obtained prior to it's being used to determine compliance?
				17.D. If COMPLY was used, does -- or at the time, did -- the maximally exposed individual live within three kilometers of all sources of emissions at the facility? [Note: 40 CFR 61.93 provides that one of the above referenced models or another model previously approved by EPA may be used to determine compliance with 40 CFR 61.92.]
18.				18. In addition to all input parameters, please also provide a copy of the code, program, or model used to determine compliance with 40 CFR 61.92.
19.				19.A. Has all documentation, including all measurements, calculations, and analytical methods, from which the facility derived the input parameters used in making the calculation of the effective dose equivalent received by any member of the public in a year been maintained at the site?
				19.B. If so, please provide copies of same or access to the originals. [Note: 40 CFR 61.95 requires that the above documentation be maintained at the site for at least five years. The documentation is required to be sufficient to allow an independent auditor to verify the accuracy of the determination made concerning the facility's compliance with 40 CFR 61.92.]
20.				20.A. If air dispersion calculations were not performed to determine compliance with 40 CFR 61.92, was the alternative procedure in 40 CFR 61.93(b)(5) (measurement of radionuclide air

ITEM	COMPLIANCE FACTORS		COMMENTS	RADIONUCLIDES NESHAPS COMPLIANCE CHECKLIST
	YES	NO		
				concentrations at critical receptor locations) used instead?
				20.B. If so, was prior EPA approval obtained?
				20.C. If so, please provide the sampling and analytical methodology and data used to make the determination of whether the 10 mrem/yr ede standard was being met.
21.				21.A. Provide the results of any air sampling for radionuclides that was performed and the sampling and analytical methodology used.
				21.B. Where were the samples taken and what was being sampled?
22.				22.A. Has a report been submitted each year, by June 30, from the facility to EPA headquarters and the appropriate Regional Office containing the following information:
				22.B. The results of the monitoring as recorded in DOE's Effluent Information System?
				22.C. Dose calculations for the previous year using an approved computer program, model or code?
				22.D. The name and location of the facility?
				22.E. A list of the radioactive materials used at the facility?
				22.F. A description of radioactive material handling and processing?
				22.G. A list of stacks and vents and other points where radioactive materials are released to the atmosphere?
				22.H. A description of the effluent controls and their efficiency?
				22.I. Distance of each release point from the nearest school, office, business, or residence and the nearest farms producing vegetables, milk, or meat?
				22.J. Values of user supplied input parameters and source thereof?
				22.K. All construction and modifications that were completed during the calendar year for which the report was prepared and for which approval was waived by EPA and documentation used to support the waiver request?

ITEM	COMPLIANCE FACTORS		COMMENTS	RADIONUCLIDES NESHAPS COMPLIANCE CHECKLIST
	YES	NO		
				[Note: This report is required by 40 CFR 61.94]
23.				23. If the report referred to in question 24 above was submitted for each year, as required, was it signed by a corporate officer or public official in charge of the facility and did that official acknowledge that statements made in the report were subject to the provisions of 18 USC 1001?
24.				24.A. Was the facility not in compliance with the 10 mrem/yr ede standard for any calendar year covered by a report referred to above in question 24?
				24.B. If so, were reports detailing compliance efforts submitted each month to EPA? [Note: This is required by 40 CFR 61.94(c).]

Appendix B: Radionuclide NESHAPs Information Checklist – Questions and Answers

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Radionuclide NESHAPs
Information Checklist - Technical

Facility Name: _____ Building Name: _____

Facility Contact: _____ Phone: _____

FOR EACH RELEASE POINT:

1. FACILITY/BUILDING DESCRIPTION:

1a. Describe the material handled and operations performed.

_____

_____

_____

_____

1b. Provide a schematic of the stack(s) and flow measurement monitoring locations.

_____

_____

_____

_____

Additional info attached: Yes/No

1c. Provide stack physical parameters.

	Stack	Stack	Stack
Height above ground:	_____	_____	_____
Stack diameter:	_____	_____	_____
If heated exhaust: cal/sec	_____	_____	_____
If tall stack: exit temp.	_____	_____	_____
Exit velocity	_____	_____	_____
If stack is on a building:	_____	_____	_____

Height above building:	_____	_____	_____
Building length:	_____	_____	_____
Building width:	_____	_____	_____

1d. Describe the potential for fugitive or diffuse emissions.

_____

_____

_____

_____

Additional info attached: Yes/No

1e. Identify the applicable QA/QC program/procedures.

_____

_____

_____

_____

Additional info attached: Yes/No

2. RADIOACTIVE SOURCE TERMS

2a. Provide the gross quantity and forms of each radionuclide handled in Curies (excluding sealed sources), with maximums and daily averages.

_____

_____

_____

_____

Annual thruput:	Solids	Liq/Pdr	Gases	Special*
199__	_____	_____	_____	_____
199__	_____	_____	_____	_____
200__	_____	_____	_____	_____

* Describe, including processing.

_____

_____

_____

_____

Data attached: Yes/ No/ Not Available

2b. Describe, provide, and/or reference the procedure for assigning radioactive material to i, ii, iii physical states (Appendix D to Part 61 – Methods for Estimating Radionuclide Emissions).

_____

_____

_____

_____

Additional info attached: Yes/No

2c. Describe any adjustments and all assumptions applied to effluents as a result of effluent controls (Appendix D to Part 61 – Methods for Estimating Radionuclide Emissions).

_____

_____

_____

_____

Additional info attached: Yes/No

2d. Provide records to justify source term determinations.

_____

_____

_____

_____

Additional info attached: Yes/No

2e. Identify the applicable QA/QC program/procedures.

_____

_____

_____

_____

Additional info attached: Yes/No

3. RADIOACTIVE EFFLUENT MONITORING/SAMPLING

3A. STACK MONITORING

3Aa. Describe the stack monitoring/sampling system and procedure for flow and radionuclide measurements, including frequency of measurement.

_____

_____

_____

_____

Additional info attached: Yes/No

3Ab. Is the level of monitoring consistent with estimated PEDE category? Yes/No

_____

_____

Additional info attached: Yes/No

3Ac. Provide the airborne effluent (stack) monitoring/sampling data.

_____

_____

_____

_____

Data attached: Yes/No/ Not Available

3Ad. Describe the effluent control system.

_____

_____

_____

_____

Additional info attached: Yes/No

3Ae. Provide records to justify decisions and assumptions affecting the performance of the stack monitoring system.

_____

_____

_____

_____

Additional info attached: Yes/No

3Af. Identify the applicable QA/QC program/procedures, including those for locating, maintaining, and calibrating radionuclide monitors.

_____

_____

_____

_____

Additional info attached: Yes/No

3B. AREA, VENT, AND HOOD MONITORING (if not routed to stack)

3Ba. Describe in-plant area monitoring/sampling data, if any.

_____

_____

_____

_____

Data attached: Yes/ No/ Not Available

3Bb. Describe hood monitoring sampling data, if any.

_____

_____

_____

_____

Data attached: Yes/ No/ Not Available

3Bc. Describe effluent control system efficiencies.

_____

_____

_____

_____

Additional info attached: Yes/No

3Bd. Identify the applicable QA/QC program/procedures.

_____

_____

_____

Additional info attached: Yes/No

3C. ENVIRONMENTAL MONITORING

3Ca. If environmental measurements are made, describe the program:

_____

_____

_____

_____

Additional info attached: Yes/No

3Cb. Provide airborne radionuclide monitoring/sampling data.

_____

_____

_____

_____

Data attached: Yes/ No/ Not Available

3Cc. Describe location of sampling/monitoring points.

_____

_____

_____

_____

Additional info attached: Yes/No

3Cd. Identify the applicable QA/QC program/procedures.

_____

_____

_____

_____

Additional info attached: Yes/No

4. ANALYTICAL PROCESSES

4a. Provide information and data sufficient to allow analysis of the results of the environmental monitoring system, including all assumptions. (Refer to Section 1.1.3 Estimated Release and Reporting Environmental Monitoring in this manual.)

_____

_____

_____

_____

Additional info attached: Yes/No

4b. Provide information and data sufficient to allow analysis of the results of the particulate sampling programs, including all assumptions. (Refer to Section 1.1.3 Estimated Release and Reporting Environmental Monitoring in this manual.)

_____

_____

_____

_____

Additional info attached: Yes/No

4c. Provide information and data sufficient to allow analysis of the results of all relevant laboratory work, including all assumptions.

_____

_____

_____

_____

Additional info attached: Yes/No

5. DOSE STANDARD

5a. Which code was used? The facility must use CAP88-PC if the distance to the closest resident is greater than 3000 meters.

_____

_____

_____

_____

Additional info attached: Yes/No

5b. If the facility's releases are measured in terms of gross activity, how was the release quantity of each nuclide determined?

_____

_____

_____

_____

Additional info attached: Yes/No

5c. How did the facility treat multiple release points?

_____

_____

_____

_____

Additional info attached: Yes/No

5d. What is the source of the facility's meteorological data?

_____

_____

_____

_____

Additional info attached: Yes/No

5e. Did the facility change any of the default pathway parameters in CAP88-PC?

_____

_____

_____

_____

Additional info attached: Yes/No

5f. How did the facility determine the distances from the release point to the closest resident in each sector? How did the facility determine the distances to the nearest farms raising produce, milk and meat?

_____

_____

_____

_____

Additional info attached: Yes/No

5g. Was CAP88-PC used to estimate the dose to a resident who is closer than 100 meters to the release point?

_____

_____

_____

_____

Additional info attached: Yes/No

5h. Is the terrain complex?

_____

_____

_____

_____

Additional info attached: Yes/No

5i. Describe distances and directions to nearest residences, offices or schools.

Direction	Receptor Dist.	Direction	Receptor Dist.
____ to N	_____	____ to S	_____
____ to NNE	_____	____ to SSW	_____
____ to NE	_____	____ to SW	_____
____ to ENE	_____	____ to WSW	_____
____ to E	_____	____ to W	_____
____ to ESE	_____	____ to WNW	_____
____ to SE	_____	____ to NW	_____
____ to SSE	_____	____ to NNW	_____

5j. Distances and directions to nearest farms.

Direction	Farm Dist/Type	Direction	Farm Dist/Type
____ to N	_____	____ to S	_____
____ to NNE	_____	____ to SSW	_____
____ to NE	_____	____ to SW	_____

____ to ENE _____ ____ to WSW _____

____ to E _____ ____ to W _____

____ to ESE _____ ____ to WNW _____

____ to SE _____ ____ to NW _____

____ to SSE _____ ____ to NNW _____

5k. Provide site meteorological data (wind rose, wind speeds), if any.

Direction	FREQ	SPD	Direction	FREQ	SPD
____ to N	_____	_____	____ to S	_____	_____
____ to NNE	_____	_____	____ to SSW	_____	_____
____ to NE	_____	_____	____ to SW	_____	_____
____ to ENE	_____	_____	____ to WSW	_____	_____
____ to E	_____	_____	____ to W	_____	_____
____ to ESE	_____	_____	____ to WNW	_____	_____
____ to SE	_____	_____	____ to NW	_____	_____
____ to SSE	_____	_____	____ to NNW	_____	_____

Source: _____

5l. Identify the applicable QA/QC program/procedures.

_____

_____

_____

_____

Additional info attached: Yes/No

Additional comments of the operations as applicable:

Appendix C: Radionuclide NESHAPs Information Checklist – Additional Questions and Answers

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Radionuclide NESHAPs Information Checklist - QA

Facility Name: _____ Building Name: _____

Facility Contact: _____ Phone: _____

QUALITY ASSURANCE

1. QUALITY ASSURANCE PROGRAM - GENERAL QUESTIONS:

REQT: The quality assurance program should be documented in a quality assurance project plan which addresses each of the requirements in 40 CFR Part 61, Appendix B, Method 114, Section 4. [Pt. 61, App B, Meth. 114, §4.10]

PURPOSE: To cause the project manager to articulate the actions necessary to plan and implement an effective quality assurance program.

a. Has the project established an effective QA program prior to the start of work?

_____

_____

_____

_____

Additional info attached: Yes/ No

b. In instances where the project chooses to use existing data (such as existing computer codes), have measures been described to validate and/or corroborate the data before its use?

_____

_____

_____

Additional info attached: Yes/ No

c. Has the project written or scheduled the writing of the policies, procedures, and instructions such that the documented directions are to be in place before work starts?

_____

_____

_____

Additional info attached: Yes/ No

d. Has the project identified items and activities important to the accomplishment of the performance objectives stated in the application for permits which are to be covered by the QA program?

_____

_____

_____

Additional info attached: Yes/ No

e. Has the project provided for the qualified personnel, appropriate equipment, suitable environmental conditions for accomplishing planned work, and verification and inspection of the completed work?

_____

_____

_____

Additional info attached: Yes/ No

f. Has the project provided for timely measurement and assessment of the effectiveness of the QA program implementation, and are actions to be taken to correct deficiencies and prevent their recurrence?

_____

_____

_____

Additional info attached: Yes/ No

g. Have the program objectives that must be met been determined and listed?

_____

_____

_____

Additional info attached: Yes/ No

h. Have the necessary internal and external interfaces with regulators, legislative groups, interveners, local citizens groups, and appointed technical oversight committees been recognized?

_____

_____

_____

Additional info attached: Yes/ No

i. Once the total job is understood and can be articulated by the Program Manager, has the organization been structured, functions assigned, and plans formulated that integrate the actions to accomplish the objectives?

_____

_____

_____

Additional info attached: Yes/ No

j. Is it recognized that the single most important characteristic of an effective quality assurance program is a project manager who accepts full responsibility for the quality of the end product and who carefully assigns the achievement and assurance of the end product quality to a capable and trained staff?

_____

_____

_____

Additional info attached: Yes/ No

k. Has careful planning and preparation of procedures for activities to accomplish the technical and administrative objectives been accounted for?

_____

_____

_____

Additional info attached: Yes/ No

l. Has the project designed and planned to use "sensors" in the management systems to permit "real-time" measurement of the effectiveness of implementation of the planned actions and timely adjustment by management controls to correct for anomalies?

_____

_____

_____

Additional info attached: Yes/ No

2. ORGANIZATIONAL STRUCTURE

REQT: The organizational structure, functional responsibilities, levels of authority and lines of communications for all activities related to the emissions measurement program shall be identified and documented. [Pt. 61, App B, Meth. 114, §4.1]

PURPOSE: (1) To identify all quality affecting activities and to assure that key personnel responsibilities and authorities are clear.

(2) To oversee and control the work of contractors and suppliers and to ensure that the results are consistent with the accomplishment of the performance objectives.

a. Does the project's QA program description reflect full comprehension of the performance objectives of the regulations, and have authorities been effectively assigned to ensure accomplishment of the performance objectives?

_____

_____

_____

Additional info attached: Yes/No

b. Has the project manager made a commitment to comply with regulatory requirements, and is this reflected in the assignment of functional authorities?

_____

_____

_____

Additional info attached: Yes/No

c. Does the project provide for maintaining control over work performed by contractors and suppliers that affects the accomplishment of the performance objectives of the regulations and design bases?

_____

_____

_____

Additional info attached: Yes/No

d. Has the project designed an organization and assigned functions and authorities such that the achievement and assurance of quality are integrated and are a part of everyday work activities?

_____

_____

_____

Additional info attached: Yes/No

e. Does the project assign an individual to be responsible for the development, implementation, and assurance of continued effectiveness of the QA program? Does the individual have organizational freedom to carry out the assignment?

_____

_____

_____

Additional info attached: Yes/No

f. Does the project manager retain full responsibility and accountability for the overall quality assurance program? Is the project manager responsible and accountable for the end product quality?

_____

_____

_____

Additional info attached: Yes/No

g. If contractors are used:

1. Does the project ensure that purchased material, equipment, and services, whether purchased directly or through contractors and subcontractors, conform to procurement documents?

_____

_____

_____

Additional info attached: Yes/No

2. Does the project ensure that documented evidence of review and acceptance of the purchased material, equipment, or service is retained and is available for review?

_____

_____

_____

Additional info attached: Yes/No

3. Does the project assess the effectiveness of the control of quality by contractors and subcontractors?

_____

_____

_____

Additional info attached: Yes/No

4. Does the project assure that applicable performance objectives, and other requirements which are necessary to assure adequate quality are suitably included or referenced in documents for procurement of material, equipment, and services, whether purchased by the project or by its contractors and subcontractors?

_____

_____

_____

Additional info attached: Yes/No

5. Does the project require contractors and subcontractors to have quality assurance programs commensurate with the importance of the work assigned to the accomplishment of the performance objectives?

_____

_____

_____

Additional info attached: Yes/No

6. Does the project ensure that the contractor and supplier QA programs are reviewed for adequacy?

_____

_____

_____

Additional info attached: Yes/No

7. Does the project describe the organization responsibilities for (1) procurement planning; (2) the preparation, review, approval, and control of procurement documents; (3) supplier selection; (4) bid evaluations; (5) review and concurrence of supplier QA programs prior to the initiation of activities affected by the program?

_____

_____

_____

Additional info attached: Yes/No

8. Is the role of the QA organization described?

_____

_____

_____

Additional info attached: Yes/No

3. ADMINISTRATIVE CONTROLS

REQT: Administrative controls shall be prescribed to ensure prompt response in the event that emission levels increase due to unplanned operations. [Pt. 61, App B, Meth. 114, §4.2]

PURPOSE: (1) To ensure the use of formal instructions for work activities related to the accomplishment of performance objectives.

(2) To ensure that documents prescribing activities related to the accomplishment of the performance objectives are controlled during review, approval, and distribution to ensure that those performing activities have only approved and up-to-date instructions.

a. Provide an example of the administrative control called for in this requirement.

_____

_____

_____

_____

_____

_____

Additional info attached: Yes/No

4. SAMPLE COLLECTION AND ANALYSIS

REQT: The sample collection and analysis procedures used in measuring the emissions shall be described including where applicable [Pt. 61, App B, Meth. 114, §4.3]:

1. Identification of sampling sites and number of sampling points, including the rationale for site selections. [§4.3.1]

2. A description of sampling probes and representativeness of the samples. [§4.3.2]

3. A description of any continuous monitoring system used to measure emissions, including the sensitivity of the system, calibration procedures and frequency of calibration. [§4.3.3]

4. A description of the sample collection systems for each radionuclide measured, including frequency of collection, calibration procedures and frequency of calibration. [§4.3.4]

5. A description of the laboratory analysis procedures used for each radionuclide measured, including frequency of analysis, calibration procedures and frequency of calibration. [§4.3.5]

6. A description of the sample flow rate measurement systems or procedures, including calibration procedures and frequency of calibration. [§4.3.6]

7. A description of the effluent flow rate measurement procedures, including frequency of measurements, calibration procedures and frequency of calibration. [§4.3.7]

PURPOSE: (1) To ensure that all work activities important to the accomplishment of performance objectives are controlled, including activities requiring specially trained personnel, equipment, or procedures.

(2) To ensure that appraisals affecting the quality of work related to the accomplishment of the performance objectives are taken only with instruments, tools, gauges, or other measuring devices that are accurate, controlled, calibrated, and adjusted at predetermined intervals to maintain accuracy within necessary limits.

a. Does the project establish a test program to assure that all testing to demonstrate that systems and components will perform satisfactorily in service is identified and performed in accordance with written test procedures that incorporate the requirements and acceptable limits contained in design documents?

_____

_____

_____

Additional info attached: Yes/No

b. Does the project establish a planned program for sampling and testing and ensure the precision, accuracy, and repeatability of the analytical data?

_____

_____

_____

Additional info attached: Yes/No

c. Does the project document and evaluate test results to assure that requirements have been satisfied?

_____

_____

_____

Additional info attached: Yes/No

d. Does the project document the plans, procedures, results, and verification of tests?

_____

_____

_____

Additional info attached: Yes/No

5. QA OBJECTIVES

REQT: The objectives of the quality assurance program shall be documented and shall state the required precision, accuracy and completeness of the emission measurement data including a description of the procedures used to assess these parameters. Accuracy is the degree of agreement of a measurement with a true or known value. Precision is a measure of the agreement among individual measurements of the same parameters under similar conditions. Completeness is a measure of the amount of valid data obtained compared to the amount expected under normal conditions. [Pt. 61, App B, Meth. 114, §4.4]

a. Provide an example of the administrative control called for in this requirement.

Additional info attached: Yes/No

6. EMISSIONS MEASUREMENT DATA

REQT: A quality control program shall be established to evaluate and track the quality of the emissions 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. [Pt. 61, App B, Meth. 114, §4.5]

a. Provide an example of the administrative control called for in this requirement.

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Additional info attached: Yes/No

7. SAMPLE TRACKING

REQT: A sample tracking system shall be established to provide for positive identification of samples and data through all phases of the sample collection, analysis and reporting system. Sample handling and preservation procedures shall be established to maintain the integrity of samples during collection, storage and analysis. [Pt. 61, App B, Meth. 114, §4.6]

PURPOSE: To ensure control over handling, storage, cleaning, packaging, preservation, and shipping of items affecting the quality of work related to the accomplishment of the performance objectives.

a. Provide an example of the administrative control called for in this requirement.

_____

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Additional info attached: Yes/No

8. AUDITS

REQT: Periodic internal and external audits shall be performed to monitor compliance with the quality assurance program. These audits shall be performed in accordance with written procedures and conducted by personnel who do not have responsibility for performing any of the operations being audited. [Pt. 61, App B, Meth. 114, §4.7]

PURPOSE: To ensure that audits, which are part of the management system's sensors, are effective by being well planned, conducted by trained personnel familiar with the work being audited, and designed to measure the potential of the activity or process being audited to produce an acceptable product.

a. Provide an example of the administrative control called for in this requirement.

_____

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Additional info attached: Yes/No

9. CORRECTIVE ACTIONS

REQT: A corrective action program shall be established including criteria for when corrective action is needed, what corrective actions will be taken and who is responsible for taking the corrective action. [Pt. 61, App B, Meth. 114, §4.8]

PURPOSE: (1) To ensure that items not conforming to specified requirements are identified and controlled to prevent inadvertent use. (2) To ensure that management systems that comprise the QA program are constantly monitored and that timely corrective measures are taken to correct conditions adverse to quality.

a. Does the project establish measures to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances, are promptly identified and corrected?

_____

_____

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Additional info attached: Yes/No

b. Does the project provide for identification and documentation of significant conditions adverse to quality (i.e., a nonconformance or adverse condition which, if left uncorrected, could have a serious effect on safety, reliability, or performance), the cause of the condition, and the corrective action taken? Are appropriate levels of management notified?

_____

_____

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Additional info attached: Yes/No

10. REPORTING

REQT: Periodic reports to responsible management shall be prepared on the performance of the emissions measurements program. These reports should include assessment of the quality of the data, results of audits and description of corrective actions. [Pt. 61, App B, Meth. 114, §4.9]

a. Provide an example of a periodic report to management.

_____

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Additional info attached: Yes/No

Additional comments of the operations as applicable:

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Appendix D: Example Inspection Report Format and Example Inspection Report

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Example Inspection Report Format

SUMMARY OF COMPLIANCE FINDINGS

Summarize each technical and administrative area in Section 3 for which there has been a compliance finding.

1. INTRODUCTION

1.1 Background

1.2 Purpose and Scope of Inspection

The information for these sections may be obtained directly from the Inspection Plan.

2. INSPECTION PROCESS

Describe the Inspection Plan, the inspection topics, inspection documentation, and inspection team. For inspection topics, the following should be considered for each technical area inspected:

Radioactive Sources

- Determine the criteria for identifying the sources and/or stacks being monitored.
- Determine the criteria/rationale for all sources and/or stacks not being monitored.

Radionuclide Air Emissions Monitoring

- Inspect all stack monitoring systems.
- Inspect stacks not being monitored using spot-checks.
- Inspect potential fugitive emissions areas, including environmental monitoring systems.

Analytical/Sampling Processes

- Analyze the results of particulate sampling programs.
- Analyze the results of laboratory work.

Dose Assessment

- Analyze CAP88 inputs used by facility.
- Identify and obtain data necessary to perform independent dose calculations.
- Perform independent dose calculations using data obtained on-site

Quality Assurance

- Assess activities for compliance with quality assurance methods requirements.

3. STATEMENT OF FACTS

The purpose of this section is (1) to summarize the facts observed during the EPA's inspection, and (2) to state the applicable regulatory requirements.

The section is organized around several key NESHAPs topics: overall compliance, sources of radioactive emissions, emissions measurements, emissions sampling and analytical processes, the dose standard, and quality assurance.

Additional detail on regulatory requirements and a summary of facts observed during the audit can be found in Subpart H.

3.1 Overall Subpart H Compliance

3.2 Radioactive Sources

3.3 Radioactive Air Effluent Monitoring/Sampling

3.4 Analytical Processes

3.5 Dose Standards

3.6 Quality Assurance

APPENDIX A REGULATORY REQUIREMENTS CHECKLIST

This appendix should differ in no significant way from Appendix A of the Inspection Plan.

APPENDIX B DESCRIPTIONS OF RELEASE POINTS INSPECTED

Descriptions of the technical processes being conducted giving rise to radioactive releases. This Appendix may not be required for relatively small, non-complex facilities. For the latter, a description should be provided in the body of the Inspection Report.

APPENDIX C INSPECTION SUMMARIES

Inspection summaries are written by the individual team inspectors who were granted responsibility for coordinating inspections of specific release points. The inspection summaries integrate the information obtained from the technical and/or QA checklists with all other information obtained on-site pertaining to a specific release point. The inspection summaries are relatively detailed compared to the main body of the Inspection Report.

REFERENCES

All material relied upon to make a compliance finding should be traceable.

Sanitized Example Inspection Report

Inspection Under the National Emission Standards for
Emissions of Radionuclides Other Than Radon
From Department of Energy Facilities
40 CFR 61, Subpart H

I. FACILITY IDENTIFICATION

A. Facility Location

B. Responsible Official

II. DATE OF INSPECTION

III. PARTICIPANTS

A. Facility

B. USEPA

C. State of XXXX

IV. ACRONYMS AND ABBREVIATIONS USED IN THIS REPORT

V. OBJECTIVE/SCOPE OF INSPECTION

VI. FACILITY DESCRIPTION

VII. INSPECTION FINDINGS

GENERAL FINDINGS
SPECIFIC FINDINGS

VIII. CONCLUSIONS AND RECOMMENDATIONS

Sanitized Example Inspection Report

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
AIR AND RADIATION DIVISION
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

Inspection Under the National Emission Standards for
Emissions of Radionuclides Other Than Radon
From Department of Energy Facilities
40 CFR 61, Subpart H

I. FACILITY IDENTIFICATION

A. Facility Location

Portsmouth Gaseous Diffusion Plant
3930 U.S. Route 23 South
Piketon, Ohio 45661

B. Responsible Official

USEC T. Michael Taimi, Environmental Assurance and Policies Manager
Phone: (301) 564-3409

II. DATE OF INSPECTION

October 19-22, 1998

III. PARTICIPANTS

A. Facility

Steven B. Guthrie, USEC; Robert Blythe, LMUS; Larry Zonner, LMUS; William Gundlah, LMUS; Kathy Easter, LMUS

B. USEPA

Michael H. Murphy, USEPA Region 5

IV. ACRONYMS AND ABBREVIATIONS

ANSI	American National Standards Institute
APC	Air Pollution Control
BE	Building exhaust
BRP	Bureau of Radiation Protection
CDO	Central District Office
CFR	Code of Federal Regulations
cpm	Counts per minute
DAPC	Dayton Air Pollution Control or Division of Air Pollution Control
DMR	Discharge Monitoring Report
DQO	Data Quality Objective
EML	Environmental Measurements Laboratory
EMSL-LV	Environmental Monitoring Systems Laboratory at Las Vegas
FFCA	Federal Facility Compliance Agreement
g	Grams
Ge(Li)	Germanium Lithium detection probe
HASA	High Assay Sampling Area
IPO	Initial Public Offering
KeV	Kilo electron volts (1000 electron volts)
km	Kilometer(s)
LMES	Lockheed Martin Energy Systems (formerly MMES)
LMUS	Lockheed Martin Utility Services (formerly MMUS)
M&A	Merger and Acquisition
µm	Micrometer, Micron (0.000001 meter)
MDL	Minimum detection Limit
MMES	Martin Marietta Energy Systems

MMUS	Martin Marietta Utility Systems
mph	Miles Per Hour
N/A	Not Applicable or Not Available
NAREL	National Air and Radiation Environmental Laboratory
NESHAP	National Emission Standard for Hazardous Air Pollutants
NOAA	National Oceanographic and Atmospheric Administration
ODH	Ohio Department of Health
OEPA	Ohio Environmental Protection Agency
OFFO	Office of Federal Facility Oversight
PAT	Proficiency Analysis Testing Program
PET	Proficiency Environmental Testing Program
PORTS	Portsmouth Gaseous Diffusion Plant
QA	Quality Assurance
QAPjP	Quality Assurance Project Plan
QC	Quality Control
SC&A	Sanford Cohen and Associates
SEDO	Southeast District Office
SOPs	Standard Operating Procedures
Tc-99	Technetium-99
TRU	Transuranic materials
U-235	Uranium-235
USDOE	United States Department of Energy
USEC	United States Enrichment Corporation

USEPA	United States Environmental Protection Agency
USU	New York Stock Exchange Ticker Symbol for USEC
WP	Water Pollution Performance Evaluation Study

V. OBJECTIVE/SCOPE OF INSPECTION

The scope of this inspection was to perform a walk through of the sampling systems for the NESHAPs compliance demonstration and specifically the X-705 Decontamination facility for USEC. All sampling systems and exit points on the process buildings will be evaluated to address allegations of unreported emissions that could endanger the public health and the environment. Additionally, data from the meteorological tower will be evaluated for completeness. There will be an evaluation of the data for the diffuse emissions for the site that is under the USDOE's oversight along with areas during the walk through that impact upon the emissions attributable to USDOE.

VI. FACILITY DESCRIPTION

The following site description is quoted from the Calendar Year 1995 annual report submitted to the USEPA on June 24, 1996.

The Portsmouth Gaseous Diffusion Plant (PORTS) is owned by the Department of Energy (DOE). PORTS was operated by DOE and managed by Martin Marietta Energy Systems, Inc., until July 1, 1993. In 1992 Congress passed legislation amending the Atomic Energy Act of 1954 to create the United States Enrichment Corporation (USEC). A government corporation similar to the Tennessee Valley Authority, to operate the uranium enrichment enterprise in the United States. The new corporation began operation on July 1, 1993. In accordance with the Act, USEC leased all production facilities at PORTS and its sister plant at Paducah, Kentucky, from DOE. DOE retained operational control of all waste storage and handling facilities as well as all sites undergoing environmental restoration.

The PORTS site is located in sparsely populated, rural Pike County, Ohio, on a 16.2-km² (6.3-mile²) site about 1.6 km (1 mile) east of the Scioto River Valley at an elevation of approximately 36.6 m (120 ft) above the Scioto River floodplain. The terrain surrounding the plant, except for the Scioto River floodplain, consists of marginal farmland and densely forested hills. The Scioto River floodplain is farmed extensively, particularly with grain crops.

Pike County has a generally moderate climate. Winters in Pike County are moderately cold, and summers are moderately warm and humid. The precipitation is usually well distributed with fall being the driest season. Prevailing winds at the site are out of the southwest to south. Average wind speeds are about 5 mph (8 km/h) although winds of up to 75 mph (120 km/h) have been recorded at the plant site. Usually high winds are associated with

thunderstorms that occur in spring and summer. Southern Ohio is within the Midwestern tornado belt although no tornados have struck the plant site to date.

Pike County has approximately 23,000 resident. Scattered rural development is typical; however, the county contains numerous small villages such as Piketon, Wakefield, and Jasper, which lie within a few kilometers of the plant. The county's largest community, Waverly, is about 19 km (12 miles) north of the plant site and has a population of approximately 5,100 residents. Additional population centers within 80 km (50 miles) of the plant are Portsmouth (population 25,500), Chillicothe (population 23,420), and Jackson (population 6,675). The total population of the area lying within an 80-km (50-mile) radius of the plant is approximately 600,000.

USEC is responsible for the principal site process and support operations. The principal site process is the separation of uranium isotopes through gaseous diffusion. Support operations include the feed and withdrawal of material from the primary process, treatment of water for both potable and cooling purposes, steam generation for heating purposes, decontamination of equipment removed from the process for maintenance or replacement, recovery of uranium from various waste materials, and treatment of industrial wastes generated onsite. DOE is responsible for the decontamination activities in the X-326 building, X-326 "L-Cage" and its glove box, X-345 high assay sampling area (HASA), X-744G glove box and site remediation activities. The emissions from the DOE sources listed in this report represent 13% of the air emissions from the USEC Source one (X-326 Top Purge, Side Purge and E-jet vents), 13% of the emissions from the Seal Exhaust (SE) 6 (which is part of USEC Source two), and all of the emissions from DOE sources one (X-326 SE 5 Vent) and two (X-345 HASA).

Additional information was supplied regarding the privatization of USEC and the PORTS facility as of November 3, 1998. This information is from the "About Privatization" Fact sheet dated August 24, 1998.

The Energy Policy Act of 1992 created the United States Enrichment Corporation (USEC), a wholly owned government corporation, as a first step in transferring the uranium enrichment business to the private sector. The Act transferred the U. S. Department of Energy's uranium enrichment enterprise to USEC with the requirement that "within two years after the transition date, the Corporation shall prepare a strategic plan for transferring ownership of the corporation to private investors."

USEC began operation July 1, 1993, and on June 30, 1995, presented President Bill Clinton and Congress with the corporation's plan for privatization. On April 26, 1996, the USEC Privatization Act was signed into law.
On July 25, 1997, President Clinton approved the initiation of the USEC privatization. In January 1998, a dual-path privatization process was implemented when the Board agreed to consider simultaneously a direct sale to the public through an Initial Public Offering (IPO) and a merger and acquisition (M&A) process.

After an exhaustive examination of both options, the Board announced on June 29, 1998 that the IPO option would best meet the statutory criteria, provisions and requirements governing the sale. The company then proceeded with a stock sale under the guidance of Transaction Manager Morgan Stanley Dean Witter. The process culminated with the U.S. Treasury's approval of the sale, the transfer to the Treasury of the proceeds of the sale, and the listing of the company on the New York Stock Exchange under the symbol USU in July 1998.

Following privatization, USEC, Inc. is building its customer-oriented approach to business and maintaining its position as a strong competitor in the global marketplace.

As of March 3, 1997, the Nuclear Regulatory Commission assumed regulation of USEC's nuclear related operations previously regulated by USDOE. The regulation of USEC's nuclear emissions as it applies to the NESHAPs regulations remains with USEPA.

VII. INSPECTION FINDINGS

This inspection was of limited scope due to a single investigator being available to conduct this inspection.

GENERAL FINDINGS

Minor problems with the meteorological tower equipment and the data collected during this period were found. USEC and LMUS personnel reported that these problems were being addressed. There were a few instances in which corrected data had not been initialed and/or dated. It was stated that this issue would be addressed by heightening the awareness of the appropriate personnel for the need for this procedure.

SPECIFIC FINDINGS

Allegations had been made that a “yellow powder” could be readily found around sampling points and at exhaust points that were supposed to be monitored. If true, this could indicate serious deficiencies in procedures and monitoring equipment. After careful examination of the areas that this would have potentially occurred, no evidence could be found to support these allegations. Additionally, reports and monitoring data for these areas were examined for any discrepancies that could be linked with the allegations. Once again, no evidence could be found to substantiate the allegations at this time.

Appendix A
USEC Comments
Appendix B
USEPA Region 5 Response to Comments

RESPONSE TO THE USEC COMMENTS TO THE USEPA REGION 5 DRAFT REPORT FOR THE NESHAP INSPECTION CONDUCTED OCTOBER 19-22, 1998

1. Section II, Date of Inspection

The inspection was conducted during October 19-22, 1998, not October 19-27, 1998.

Response:

The typographical error was corrected to reflect the correct time period for the inspection.

2. Section IV, Acronyms and Abbreviations Used in This Report:

3. The following acronyms and abbreviations were omitted from the list:

IPO	Initial Public Offering
km	Kilometer
M&A	Merger and Acquisition
mph	Miles Per Hour
USU	New York Stock Exchange Ticker Symbol for USEC

Response:

These acronyms and abbreviation were added to the listing and the section title was revised to read Acronyms and Abbreviations.

4. Delete those acronyms and abbreviations not referenced in the report: ANSI, APC, BE, BRP, CDO, cpm, DAPC, DMR, DQO, EML, EMSL-LV, FFCA, Ge(Li), KeV, LMUS, µm, MDL, MMUS, N/A, NAREL, NOAA, ODH, OEPA, OFFO, PAT, PET, QA, QAPjP, QC, SC&A, SOPs, Tc-99, TRU, U-235, and WP.

Response:

These acronyms and abbreviations were left in this report due to historical use in most previous reports, as well as the potential to revise this report further with regard to quality assurance with regard to the meteorological tower and the data outputs reviewed and commented upon at the close out meeting.

5. Section V, Objective/Scope of Inspection:
"...Scope..." should not be capitalized in the first sentence.

Response:

This typographical error has been corrected.

6. Section VI, Facility Description

7. Change "...23,000resident..." to 23,000 residents..." in fifth paragraph.

Response:

This is a direct quote from the referenced document, though grammatically incorrect is part of the direct quote.

8. Delete last sentence in the sixth paragraph, references the percentage of emissions attributable to DOE.

Response:

See response for 3, a.

9. In the seventh paragraph, "...information Supplied..." should read "...information was supplied..."

Response:

This correction was made and incorporated into the document.

10. It is suggested that a statement be included in this section that the Nuclear Regulatory Commission, as of March 3, 1997, regulates USEC's nuclear-related operations.

Response:

Agreed. A statement was included to indicate the changes in regulatory authorities.