
Subpart H—National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities

Introduction

Radionuclide releases to the air are subject to the Clean Air Act National Emissions Standards for Hazardous Air Pollutants (NESHAPs). For U.S. Department of Energy (DOE) sites, the U.S. Environmental Protection Agency (EPA) regulates radionuclide emissions to air, other than radon, under Subpart H of 40 CFR Part 61. Subpart H requires DOE operations, which have the potential to emit radionuclides to ambient air, to issue an annual compliance report to EPA to demonstrate site compliance with the dose standard of 10 mrem per year effective dose equivalent (EDE) to a member of the public. While Subpart H-regulated emissions accounts for radioactive material released to ambient air, the dose standard recorded within the regulation applies to exposure from all subsequent pathways (inhalation, ingestion, external dose) resulting from these emissions.

Background and Purpose

DOE staff or DOE contractors operating DOE sites across the complex may engage in radiological activities that can expose the public or environment to ionizing radiation. The Subpart H standard is 10 mrem per year to a public receptor from radionuclide emissions to the ambient air from DOE facilities. EPA established this annual dose-based standard at a level that would not be expected to have a discernable impact on an individual's health over a lifetime of exposure. The dose standard is very small -- far below levels so even a generally healthy person's natural protective defenses would not be overwhelmed (see [Info Brief AU-22 001-2018](#), THE DOE IONIZING RADIATION DOSE RANGES CHART).

Both DOE and EPA strive to protect the public and the environment against undue risk from radiation associated with radiological activities conducted at DOE facilities. Many applicable standards and regulations are based on dose criteria. Depending on the regulatory driver for the dose assessment, standards may combine dose from all radiation/radioactive material sources or, like the Subpart H standard, focus on one source¹.

This Information Brief provides guidance from DOE's Office of Public Radiation Protection (AU-22) to DOE site staff involved in Subpart H compliance reporting. It provides recommendations to DOE sites regarding program related items, such as: compliance reporting; software upgrades; environmental surveillance activities; and definitions for commonly used terms. Additionally, it promotes consistency amongst all reports and is issued to identify compliance tools and procedures that have evolved since Subpart H was issued. This Information Brief does not supersede or replace the requirements of 40 CFR 61, Subpart H; nor does it over-ride existing agreements for compliance reporting between DOE sites and their regulating authority for Subpart H reporting. AU-22 recommendations, while not all-inclusive, capture the most well-known updates. Additional EPA and DOE documents that DOE staff may utilize to assist with compliance with the general rule, include the *Radionuclide NESHAPs: Subpart H Inspection Manual; Methods for Estimating Fugitive Air Emissions of Radionuclides from Diffuse Sources at DOE Facilities; Environmental Monitoring Plan for Airborne Radioactivity from Fugitive and Diffuse Sources, Oak Ridge, Tennessee; and DOE Order 458.1 Radiation Protection of the Public and the Environment*.

¹ All dose criteria exclude background, medical, and occupational dose. In addition, EPA's Subpart H-approved environmental models do not consider surface water or groundwater modeling.

Annual Compliance Reporting – MOU Items

On May 16, 1995, a Memorandum of Understanding (MOU) was approved by DOE and EPA. This MOU (<https://www.energy.gov/sites/prod/files/2020/01/f70/EPA-DOE-MOU-regarding-the-Clean-Air-Act-May-1995.pdf>)² clarified provisions of the radionuclide NESHAPs in 40 CFR 61, Subparts H, I, Q, and T and additional expectations not explicitly found in the Rule. The MOU provided guidance to DOE and EPA offices on how to interpret certain NESHAP provisions that lacked specific technical details to clarify their implementation at DOE sites. For example, in section 6 of the MOU, it states that 40 CFR Part 61, Appendix E, COMPLIANCE PROCEDURES METHODS FOR DETERMINING COMPLIANCE WITH SUBPART I, may be used to fulfill requirements in Subpart H. In other words, facility radionuclide inventories (Table 1 of Appendix E) or appropriate ambient air samples (Table 2 of Appendix E) can be used to demonstrate compliance. DOE staff and contractors that support DOE sites in NESHAPs, should review the entirety of the MOU to determine applicability to their site radionuclide emissions to air. A few items are covered, herein.

Radon: Subpart H excludes reporting on radon-220 and radon-222 emissions and doses. Section 5b of the MOU states that DOE sites will provide radon-220 data to EPA. AU-22 recommends where radon emissions are relevant, the data include annual emission rates. At relevant sites, this data should be reported to supplement the data in the annual Subpart H compliance reports.

Subparts Q and T: 40 CFR Part 61, Subpart Q applies to specific DOE sites managing radium-containing material³. DOE sites currently managed under the Uranium Mill Tailings Radiation Control Act (UMTRCA) by the DOE Program Offices of Legacy Management and Environmental Management apply Subpart Q standards for radon-222 emissions from radium-226 storage and disposal facilities and Subpart T, applies to radon-222 emissions from the disposal of uranium mill tailings. Both Subparts Q and T have a radon-222 flux standard (<20 pCi/m²-sec), rather than a dose standard. When Subparts Q and T do not apply to a site, AU-22 recommends that this information is explicitly indicated in compliance reports.

Stack/Vent Listing: The MOU section 6b indicates that a list of all stacks, vents, or other points of radionuclide emissions to air are included in the compliance report. To provide additional detail, AU-22 currently recommends that sites indicate which emissions source (or grouped source) is responsible for the majority of the dose to the maximum public receptor in compliance reports.

Annual Compliance Reporting

Annual compliance reports are required and must be submitted to the EPA by June 30 for the previous year [40 CFR Part 61.94(a)]. Suggested updates to the annual reports have been collected from various sources, including the regulatory authority (EPA), DOE staff, and contractors that support DOE sites in NESHAPs. These suggestions are not mandatory but are guidelines intended to foster consistency among reports subject to the 40 CFR Part 61, Subpart H, reporting; reflect current radiation protection technical resources and standards from EPA and DOE; and capture notable improvements to the reporting process that have been incorporated into the process over the years.

Subpart H, as well as, DOE policy (DOE O 458.1 and DOE G 44.1-1C), specifies the use of special units of mrem, Ci, or person-rem with the most appropriate SI unit (i.e., mSv or µSv) –following in parenthesis– in order to maintain consistency in terminology with the regulations. The use of cSv units is discouraged. If the parenthesis disrupts the readability of the text, using the non-SI units is the preferred approach.

² The 1995 EPA/DOE MOU does not replace or supersede regulations.

³ 10 CFR Part 61, Subpart Q include any DOE facility that emits radon-222 into air, in addition to the following sites: The Feed Materials Production Center, Ohio; Niagara Falls Storage Site, New York; Weldon Spring Site, Missouri; Middlesex Sampling Plant, New Jersey; and Monticello Uranium Mill Tailings Pile, Utah.

Sites should take care to ensure information related to radionuclide emissions to air is consistent between other regulatory or public documents, such as the Annual Site Environmental Report (ASER). Additionally, AU continues to recommend that any unplanned, non-routine radionuclide emissions to air are reported as supplemental information in annual compliance reporting to EPA. Use a graded approach for this information with larger releases and public doses described in greater detail.

Regional regulatory authorities differ on whether to include CAP-88 PC or COMPLY output files in annual compliance reports. Certainly, these files must be part of the report's archival record, along with the meteorological data used in the code. Considering this, AU-22 recommends that code parameters for the receptors and stacks, as well as, any non-default parameter values implemented, are included in the annual compliance report. This information does not need to be a verbatim copy of the code output. The intent is for the regulator (and DOE and the public) to be able to establish code input parameters for stack(s) and receptor(s) from the annual Subpart H compliance report. Sufficient detail should be provided so that stakeholders can reproduce CAP-88 PC calculations.

AU-22 recommends that the site office, organization, or contractor who manages each site emission unit are specifically listed in the annual compliance report. This information would assist headquarters with identifying a specific point of contact for the various emissions releases and reporting if questions or inquiries arise.

Each annual compliance report requires a signed certification statement of the report's accuracy and completeness, by the corporate officer or public official in charge of the facility [40 CFR Part 61.94(b)(9)]. For clarity, a corporate officer or public official in charge of the facility is a person in a high-level management office such as site manager, assistant manager, or federal director, or deputy director of the facility. Facilities may internally acquire additional certifications from staff responsible for compiling various sections of the report, but at least one signature must accompany the report submitted to the regulator and to DOE Headquarters.

Collective Dose Reporting

EPA has a NESHAP dose standard for an individual receptor in Subpart H. There is currently no collective dose standard. However, DOE O 458.1 requires an estimation of collective dose for as low as reasonably achievable (ALARA) and operations optimization. The collective dose to an exposed population is the measure used to identify the optimum radiation protection system among several alternatives; indicates the magnitude of the benefit of possible emission reductions; or may demonstrate the very low risk of health impacts as a result of DOE operations. Collective doses are traditionally performed for populations, out to a distance of 50 miles (80 km). AU-22 continues to recommend that Subpart H compliance reports include collective dose results, per DOE O 458.1. For several DOE sites, radionuclide emissions by air effluents are the only emissions source, making the Subpart H compliance report the singular reporting mechanism for collective dose. Sites that demonstrate compliance with the dose standard using only environmental measurements do not need to provide a collective dose estimate.

Chapter 5 of DOE-HDBK-1215-2014, *OPTIMIZING RADIATION PROTECTION OF THE PUBLIC AND THE ENVIRONMENT FOR USE WITH DOE O 458.1, ALARA REQUIREMENTS*, provides guidance on how staff at DOE sites and Headquarters calculate and use collective dose results to support radiation protection programs. While conservative (i.e., over-estimates) collective doses are common, sites should provide realistic estimates which yield(s) a representative result. This is important for accurate decision-making, especially when performing semi-quantitative or quantitative ALARA assessments, as outlined in the Handbook.

Sites should make sure the following information is indicated in Subpart H reporting of collective dose: the total population; the maximum distance of the population assessed; the year that the population data reflects; and a citation for the source of the population data. For sites closely surrounded by large business properties or large schools, sites should consider providing estimates of dose to daytime populations surrounding the site, providing such information is available from a quality source. In addition, DOE O 458.1 (4.e.1.d) indicates that collective radon-220 and radon-222 and their progeny doses should be reported separately, for sites where such emissions are a concern.

Use of Modeling Software

Two EPA computer models are pre-approved for air emissions compliance determinations: CAP-88 PC (Clean Air Act Assessment Package-1988) and COMPLY. While no site is required to use the most recent code versions, AU-22 recommends use of the most recent software, version 3.0 through 4.0 for CAP-88 PC and COMPLY 1.7.1. Recent versions generally run faster, contain the broadest array of nuclides, and typically implement more current radiological, physiological, and environmental models and data. Some sites will use both codes in their compliance reports.

CAP-88 PC, utilized by more than two-thirds of the sites that submitted Subpart H compliance reports in 2018, assesses dose (and risk) from radionuclide emissions to air. The most current version released is CAP-88 PC Version 4.0⁴ and is reflected in this document. NOTE: As of this publishing, EPA continues to beta-test an updated version of the software, CAP-88 PC version 4.1. CAP-88 PC is a user-friendly code, but requires some expertise to create new meteorological data files and should not be used for receptors less than 100 meters (m) from an emission source.

COMPLY may also be used for compliance determinations under Subpart H; with Version 1.7 as the most current model released by EPA. This code is most useful for sites with “low” emission rates and receptors within about a 2 mile (3 km) radius. COMPLY is the recommended model for use with receptors 10-100 m from an emission source. COMPLY has 4 levels of compliance estimation available and relieves the need to obtain site-specific meteorological information at all but the most detailed levels. About 15 percent of the DOE sites that submitted Subpart H compliance reports in 2018 used EPA’s COMPLY code.

Subpart H Dose Reporting

The Subpart H dose standard for radionuclide emissions to air is not to exceed 10 mrem/yr EDE to a public receptor [40 CFR 61.92]. Updated internal dose and risk factor databases were incorporated into CAP-88 PC versions 3.0 (2013) and 4.0 (2014). As a result of these updates, the code produces a total dose which combines external dose and internal dose results⁵. When using CAP-88 PC for dose estimation, EPA has recommended that sites report dose units consistent with the CAP-88 PC output. AU-22 supports EPA’s recommendation that sites report all emission results as mrem/yr EDE when reporting dose based on Version 3.0 and 4.0 modeling.

AU-22 acknowledges the units’ difference between the CAP-88 PC dose reporting (committed EDE) and the total ED dose units of both the current international standard [units first introduced in ICRP Publication 60 (1991)] and DOE Orders and Technical Standards on radiation protection (e.g., DOE Order 458.1, *Radiation Protection of the Public and the Environment*). AU-22 considers the reported CAP-88 PC dose to be a very close approximation of a modeled ED result and well within the uncertainty bounds of the dose estimate. The COMPLY code version 1.7, reports dose as mrem EDE. Any dose reporting for DOE Orders or Technical Standards based on appropriately modeled CAP-88 PC or COMPLY cases will be acceptable.

CAP-88 PC output reports both dose (mrem/yr EDE) and risk (lifetime fatal cancer risk). The Subpart H standard is a dose measure. Neither AU-22 nor EPA requires risk results to be presented in Subpart H compliance reporting.

Subpart H Meteorological Data

CAP-88 PC version 4.0 (and earlier versions) provides older DOE site 5-year-average meteorological files with the code installation. However, AU-22 recommends use of meteorological data associated with the emission year for dispersion modeling of Subpart H emissions, based on DOE O 458.1(4.e.3). Two divergences from this recommendation are recognized: (1) if a DOE site has been approved to use an alternate dataset by their regulator (e.g., state regulatory authority for radionuclide air emissions) and (2) if the data for a given year is unacceptable for use as a result of technical failings (e.g.,

⁴ Version 4.0.1.17 is abbreviated in this document as version 4.0.

⁵ CAP-88 PC output files continue to report total dose as mrem/yr EDE, which is internal dose as mrem committed EDE plus external dose as mrem EDE. Sites should note the terminology reported used in CAP-88 PC is not consistent with DOE’s use of total effective dose (TED) as defined in DOE Order 458.1.

equipment failure or other unexpected loss of data). In the second case, a recent multi-year-average file of meteorological data for the relevant monitoring location should be used. Additionally, in such cases, AU-22 requests the yearly compliance report include a brief summary of why the multi-year-average file was used and when new or repaired tower data is anticipated. If a new tower is established, sites should summarize changes from the old and new tower parameters, which are relevant to Subpart H use.

In May 2019, EPA issued technical guidance to assist DOE sites needing to convert a common meteorological data format (Science to Achieve Results [STAR]) to the format appropriate for use in CAP-88 PC Version 3 or 4. This conversion utility (GETWIND) is unavailable in Version 4 and will only run in Version 3 with older operating systems, until EPA distributes an updated conversion utility. The EPA technical guidance indicates several methods are available to work around the lack of GETWIND for sites using CAP-88 PC Version 4.0 (<https://www.energy.gov/sites/prod/files/2020/01/f70/EPA-Final-CAP-88-Met%20Guidance-to-DOE-2019-05.pdf>).

One additional item is related to the use of meteorological data for dispersion modeling. The height of the meteorological monitoring station instrumentation should be consistent with the effective height of the emission point. If an appropriate instrumented height is not available, AU-22 recommends sites use the data set that will over-estimate dose to the critical receptor. Also, AU-22 recommends special consideration be given when the meteorological tower is located on a geographic peak and nearby receptors are in valleys. For these situations, sites should consider adopting peak plus tower height as the meteorological tower measurement height to implement more appropriate modeling of the atmospheric dispersion between the emission point and the receptor.

Environmental Measurements

For compliance determination, sites may use environmental measurements at critical receptor locations as an alternative to air dispersion calculations, if specific criteria are met [40 CFR 61.93 (b.5)] and prior approval is received (1995 MOU, Section 1c). For sites that meet the regulatory criteria and utilize this option, AU-22 recommends that sites translate the environmental measurement to a dose estimate. The method for estimating a public receptor dose for Subpart H reporting based on annual ambient air sampling is not standardized. Several options are indicated later in this section.

Ambient air surveillance may be performed for various reasons. Some sites may be required to implement an ambient air surveillance program for certain emissions from major emission units and/or for diffuse emission sources. These programs also provide evidence indicating proper functioning of stack abatement systems. Ambient surveillance is most commonly performed for particulates, though gases (e.g., tritium or other gases) or iodine samples may be collected using differing sampling systems. To provide quality results, all sampling systems should be part of a surveillance program that includes appropriate quality assurance (e.g., equipment, sample collection, chain of custody, analytical results). Ambient air surveillance may be conducted to confirm low emissions or are approved as a basis of reporting compliance with the Subpart H standard. Sites with only diffuse or fugitive sources (“non-point” sources) may be approved by the regulator to use surveillance results as the sole method of determining compliance with Subpart H.

Significant radionuclides at a site (i.e., nuclides from major emission units that are analyzed in air samples) are those that account for >10% of the potential dose resulting from potential emissions from a major emission unit [40 CFR 61.93(b.4.i)]. The list of significant nuclides will vary from site to site, depending on the types of radiological operations performed. AU-22 recommends that ambient air sampling results for significant radionuclides are presented in Subpart H reporting when these results are used as a basis for compliance. For each site sampling location and the background location, minimum reporting should include: the sample result with associated sample minimum detectable activity; sampling period; volume of air sampled; the annual air concentration result; and specific indication whether the reported annual air concentration or individual sample result includes background.

Section 6 of DOE-HDBK-1216-2015 *Environmental Radiological Effluent Monitoring and Environmental Surveillance* provides guidance regarding environmental surveillance at DOE sites. The Handbook information aligns with the objectives of routine-operations ambient air sampling used as a basis for Subpart H compliance – with the exception of detection and

quantitation of unplanned releases⁶. Environmental surveillance locations must reflect critical locations. Determination of critical receptor locations should be based on atmospheric dispersion modeling and potential public receptor locations (see guidance provided in Section 6.7.2 of DOE-HDBK-1216-2015). Briefly, candidate ambient air sampling locations would include locations where higher-than-average boundary location ambient air samples would be expected; where potential receptors of interest or populations of interest are found; and where, for background measurements, ambient air samples would not be impacted by site emissions. If no actual public receptor would be expected to routinely occupy a region near the sampling location, that detail should be noted in compliance reporting.

Sites establish a method for translating the sample analysis result with background subtracted (e.g., pCi/m³), to a dose estimate or other compliance measure. Annual average sampling results should be used, though maximum annual results or another over-estimating approach can be used when site emissions result in surveillance results that are well below regulatory criteria (dose or air concentration). Methods currently used to translate an environmental measurement to dose consider: **A**) sample results compared with values from Appendix E of 40 CFR Part 61 – *Compliance Procedures Methods for Determining Compliance with Subpart I*, Table 2, or **B**) CAP-88 PC stack modeling results that implement a more site-specific dose per air concentration result that is used as a dose factor with the air sampling result. Both methods are further described, as follows:

For **Method A**, the “Table 2” values of Appendix E of 40 CFR Part 61 were developed to approximate air concentrations that would result in a 10 mrem/yr EDE dose to a generic receptor, using conservative exposure and intake assumptions. Therefore, any air concentrations below the Table 2 values would be less than the Subpart H dose standard. AU-22 recommends that an estimated dose result is stated in Subpart H compliance reports when Method A is used, for example:

$$\sum_{i=1}^n \left(10 \frac{\text{mrem}}{\text{yr}} \times \left[\frac{S_i}{T_i} \right] \right) = DE_A \frac{\text{mrem}}{\text{yr}}$$

Where:

S_i = average annual air concentration of nuclide i from site sampling at or very near the receptor location.

T_i = air concentration for nuclide i from 40 CFR 61, Table 2, (S_i and T_i in the same units).

DE_A = Method A dose estimate for a receptor at the sampling location for all radionuclide emissions.

For **Method B**, the emission source is modeled in CAP-88 PC with the sampled radionuclides. Emission rates for this particular modeling are not critical, so a 1 Ci/yr or 1 mCi/yr is recommended. To estimate dose, two options are available. The first option provides a more route-specific (i.e., inhalation, ingestion, and external [immersion or ground surface]) dose result, whereas the second option provides an all-routes dose factor. For the first option, the *.FAC output file dose factors can be used with other parameters to calculate dose. Under the second option, the nuclide-specific dose in the *.SUM file can be divided by the receptor-location-specific air concentration in the *.CON file to determine the dose-per-air-concentration dose factor.

⁶ While unplanned emissions monitoring is outside the scope of Subpart H, it is a critical DOE site need under DOE O 151.1D for sites with an Emergency Management Hazardous Material Program.

Summary of AU-22 Recommendations

ANNUAL COMPLIANCE REPORTS:

- Include radon-220 and radon-222 emissions and dose to the MEI – with collective radon dose requested when the estimated MEI dose from radon is greater than 0.1 mrem/yr.
- Include collective dose for all emissions used to determine compliance with the Subpart H dose standard, unless environmental measurements are used to indicate compliance. Estimate collective dose when maximum radon individual receptor dose is greater than 1% of Subpart H dose standard.
- List site office, organization, or contractor who manages each site emission unit.
- Report doses in non-SI units, mrem, followed by SI units, mSv, in parenthesis.
- Note details regarding any new DOE meteorological monitoring stations established and summarize changes between the old and new parameters that are relevant to Subpart H modeling.
- Ambient air sampling results for significant radionuclides should be presented in annual compliance reporting when results are used as a basis for Subpart H compliance. Indicate individual ambient air sample results when environmental measurements are used as a basis for Subpart H compliance.
- For sites that use environmental measurements at critical receptor locations, as an alternative to air dispersion calculations, environmental measurements should be translated to a dose estimate.
- Annual compliance reports should include an estimated dose result when using Method A, Table 2 values of Appendix E of 40 CFR Part 61 to approximate air concentrations to a generic receptor.
- The annual compliance report should indicate which emissions source (or grouped source) is responsible for majority of dose to maximum public receptor.

COMPLIANCE SOFTWARE ITEMS:

- Utilize the most recent code versions for Subpart H compliance when CAP-88 PC or COMPLY software is used.
- Report dose results as mrem/yr EDE, as recommended by EPA, when CAP-88 PC Version 3.0 and 4.0 is used for modeling.
- Give special consideration to model input when emission sources are located on a geographic peak and receptors are in valleys.
- Specify non-default CAP-88 PC or COMPLY code parameters implemented for receptors and stacks; copies of code output are not mandatory unless required by the regulator.
- Utilize meteorological data associated with the emission year for dispersion modeling of Subpart H emissions, per DOE 458.1 (4.e.3); if an alternative data set is used, include a brief summary in annual compliance report.
- Utilize meteorological data that will over-estimate dose to the critical receptor, if the appropriate station instrumentation height for the emission source is not available.

OTHER

- Ensure consistency of NESHAPs reporting between the various regulatory or public documents.

Commonly Used Terms

Collective Dose: The sum of the total effective dose to all persons in a specified population received in a specified period of time. For clearance of property the collective dose refers to the population potentially exposed to the cleared property. Collective dose is expressed in units of person-rem (or person-sievert). (DOE Order 458.1, *Radiation Protection of the Public and the Environment*)

Effective Dose (E): The summation of the products of the equivalent dose received by specified tissues or organs of the body (H_T) and the appropriate tissue weighting factor (w_T). Equivalent dose to the whole body may be used as effective dose for external exposures. The effective dose is expressed in units of rems (or sieverts). (DOE Order 458.1, *Radiation Protection of the Public and the Environment*). Terminology and calculational methods first introduced in ICRP Publication 60 of the Annals of the International Commission on Radiological Protection in 1991.

Effective Dose Equivalent (EDE). The summation of the products of the dose equivalent (H) received by specified tissues of the body and a tissue-specific weighting factor (w_T). This sum is a risk-equivalent value and can be used to estimate health-effects risks of an exposed individual. (DOE/EH-0071, *Internal Dose Conversion Factors for Calculation of Dose to the Public*, 1988). Values correspond to an equivalent risk of health effects from uniform irradiation of the whole body, using the weighting factors first introduced in ICRP Publication 26 of the Annals of the International Commission on Radiological Protection in 1977.

Public Dose: The dose received by members of the public from exposure to radiation and to radioactive material released by a DOE radiological activity whether the exposure is within a DOE site boundary or offsite. (DOE Order 458.1, *Radiation Protection of the Public and the Environment*)

Emission unit: Emissions units include all individual pieces of equipment that emit air pollutants at a stationary source. EPA regulations define an emissions unit as any part of a stationary source which emits or would have the potential to emit any pollutant subject to regulation under the Clean Air Act. (FROM: https://ofmpub.epa.gov/sor_internet/registry/termreg/searchandretrieve/glossariesandkeywordlists/search.do?details=&vocabName=Air%20Permitting%20Terms accessed 12/3/19)

There are several (non-exclusive) ways to categorize emission units: major/minor; point/non-point with sub-categories of non-point sources being fugitive/diffuse; and ANSI/HPS-N13.1–2011⁷ PIC classifications. In some cases, emissions units can be described using various terms. Figure 1, below, demonstrates how these terms can potentially be used to describe a single emission unit.

⁷ ANSI/HPS-N13.1-2011 sets forth guidelines and performance criteria for stacks at facilities with radiological operations. Not all DOE site point sources conform to these latest standards; some are grandfathered (i.e., accepted) as compliant by the regulatory authority, when appropriate, based on site-specific information.

	Major	Minor	Point Source	Non-point Source	Fugitive Source	Diffuse Source	PIC1*	PIC2*	PIC3*	PIC4*
Major			X				X	X		
Minor			X	X	X	X			X	X
Point Source	X	X					X	X		
Non-point Source		X			X	X	†	†	X	X
Fugitive Source		X		X					X	X
Diffuse Source		X		X					X	X
PIC1*	X		X	†						
PIC2*	X		X	†						
PIC3*		X		X	X	X				
PIC4*		X		X	X	X				

Notes:

- Point sources that are ANSI/HPS N13.1-2011 compliant (See Footnote 7).
- While fugitive and diffuse emission units should not be described as a point source, they may be modeled as a point source when such model results generate an over-estimated impact.
- * Potential Impact Categories as indicated in ANSI/HPS N13.1-2011 (see Footnote 7)
- † Infrequently, a non-point source from environmental cleanup operations may be classifiable as a Potential Impact Category 1 or Potential Impact Category 2 source with Subpart H compliance determinations by ambient air sampling.

FIGURE 1. Terms That Can Be Applied To The Same Emission Unit.

Major emission unit: Major emission units are those with potential emissions that could result in a dose greater than 0.1 mrem/year (i.e., 1% of the standard [40 CFR 61.93.4.i]) to a maximally exposed member of the public. Major emission units require continuous sampling and, in some cases, continuous monitoring. Note that this sampling/monitoring differs from environmental surveillance of ambient air.

Minor emission unit: Minor emission units are those with potential emissions that would not result in a dose that exceeds 0.1 mrem/year (i.e., less than or equal to the criteria of [40 CFR 61.93.4.i]) to a maximally-exposed member of the public.

Point source: an individual ANSI/HPS N13.1-2011-compliant emission unit (see Footnote 7) that is actively ventilated or exhausted through a single, well-defined stack or vent or other functionally-equivalent structure; examples include: stacks, vents, vented tanks, and releases from equipment that are collected and actively exhausted to the atmosphere.

Non-point source: an emission unit that is not a point source. Non-point sources are the collective terminology applied to both diffuse and fugitive emission units.

Diffuse source: an area source from which emissions are continuously distributed over a given area or emanate from a number of points randomly distributed over the area; diffuse emission sources are not actively ventilated or exhausted. Examples include resuspension of dust deposited on open fields, evaporation from ponds, and ground seepage of gases following underground nuclear tests. (METHODS FOR ESTIMATING FUGITIVE AIR EMISSIONS OF RADIONUCLIDES FROM DIFFUSE SOURCES AT DOE FACILITIES, EPA 2004)

Fugitive source: releases to air that are not released through a confined air stream and may include both [*not* ANSI/HPS-N13.1 -compliant (see Footnote 7)] point sources and diffuse sources. Examples of fugitive sources include: evaporative losses from ponds, emission units not compliant with ANSI/HPS N13.1, and a leaking seal during re-entry drilling and emissions from wind-blown dust from storage piles. (METHODS FOR ESTIMATING FUGITIVE AIR EMISSIONS OF RADIONUCLIDES FROM DIFFUSE SOURCES AT DOE FACILITIES, EPA 2004).

Potential impact category (PIC): In addition to the Major/Minor and point/non-point emission unit classifications, emission units can be assigned a PIC under the classification examples in ANSI/HPS N13.1–2011 or other site-specific classification scheme. PIC classifications are by potential dose impact to the maximum public receptor (higher classification has a higher potential impact). PIC classification schemes also define the monitoring and sampling required for each classification.

Additional Source of Information

Questions regarding this Information Brief or site requests for technical assistance can be directed to Alicia Williamson at (202) 586-7272 or Alicia.Williamson@hq.doe.gov.