

EVALUATING POTENTIAL EMISSIONS AND POTENTIAL EFFECTIVE DOSE EQUIVALENT FROM POINT SOURCES

Purpose This Air Quality Group procedure describes the methods used to evaluate potential emissions and potential effective dose equivalent (PEDE) from radioactive materials exhausted by monitored and unmonitored point sources at LANL. These methods include: (1) calculating estimated emissions, (2) calculating PEDE, and (3) reviewing and identifying stack sampling requirements.

Scope This procedure applies to the evaluation of potential emissions and potential effective dose equivalent (PEDE) from LANL point sources as defined in ESH-17-102.

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Hazard Control Plan The hazard evaluation associated with this work is documented in HCP-ESH-17-Office Work.

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General information about this procedure

Attachments This procedure has no attachments:

History of revision This table lists the revision history and effective dates of this procedure.

Revision	Date	Description of Changes
0	3/31/00	New document from parts of ESH-17-102, R1.
1	3/18/02	Process changes to reflect new database system.

Who requires training to this procedure? The following personnel require training before implementing this procedure:

- ESH-17 personnel assigned to perform all or part of this procedure.

Training method The training method for this procedure is “**self-study**” (**reading**) and is documented in accordance with the procedure for training (ESH-17-024).

Annual retraining is required and will be by self-study (“reading”).

Prerequisites In addition to training to this procedure, the following training is also required prior to performing this procedure:

- ESH-17-501, “Dose Assessment Using CAP88” (only if dose assessments are performed)

General information, continued

Definitions specific to this procedure

Potential Emissions: The “estimated radionuclide release rates shall 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” (40 CFR 61.93(b)(4)(ii)). In addition, Appendix D guidance and good engineering judgement are also used to calculate potential emissions from radioactive materials usage/throughput data.

Potential Effective Dose Equivalent (PEDE): The effective dose equivalent that is calculated “to any member of the public at any offsite point where there is a residence, school, business or office” (40 CFR 61.94.(a)). This dose is calculated using CAP88 and assumes that “all pollution control equipment [does] not exist, but the facility operations were otherwise normal” (40 CFR 61.93(b)(4)(ii)).

NOTE: For additional definitions and information on characterizing point sources, see ESH-17-RN.

References

The following documents are referenced in this procedure:

- ESH-17-024, “Personnel Training”
 - ESH-17-102, “Radioactive Materials Usage Survey for Point Sources”
 - ESH-17-126, “Performing a Radioactive Materials Usage Survey Interview”
 - ESH-17-501, “Dose Assessment Using CAP88”
 - ESH-17-511, “Calculating mrem/Ci Factors”
 - ESH-17-RN, “Quality Assurance Project Plan for the Rad-NESHAP Compliance Project”
 - 40 CFR 61, “National Emission Standards for Hazardous Air Pollutants”
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Note

Actions specified within this procedure, unless preceded with “should” or “may,” are to be considered mandatory guidance (i.e., “shall”).

Background

Background As required by 40 CFR 61, Subpart H, LANL must monitor any point source with the potential to contribute an effective dose equivalent of 0.1 mrem/yr or greater to any member of the public. The regulation further requires that LANL perform periodic confirmatory measurements to verify the low emissions from unmonitored point sources. LANL uses data from its Radioactive Materials Usage Survey for Point Sources to evaluate a point source against these criteria. (NOTE: prior to 1997, this survey was called 199x Radionuclide Point Source Inventory)

This procedure is closely associated with two other ESH-17 procedures. First, ESH-17-126, "Performing a Radioactive Materials Usage Survey Interview" describes how to conduct a usage survey interview. Second, ESH-17-102, "Radioactive Materials Usage Survey for Point Sources" describes how ESH-17 (1) conducts a usage survey update, (2) conducts an ESH-ID/AQR review, and (3) develops radioactive materials usage data.

This procedure is intended only as a generic guide -- all possible considerations cannot be included, and some which are included may not apply in all cases. Good engineering judgment and health physics practices must be applied in the use of this procedure, consistent with requirements.

Calculating potential emissions and PEDEs

Overview

The potential emissions and potential effective dose equivalent (PEDE) are based on numerous factors, including facility surveys. The information on the interview and process forms may include radioactive materials usage data, potential duct holdup, potential room/area contamination, and historic monitoring data if this information exists for a release point. After the update of the survey to the current calendar year is complete, that radioactive materials usage information is entered into a Microsoft Access database (part of ESH-17-126). The database has the capability to calculate potential emissions and PEDE from hand-entered radioactive materials usage data and process information; with the push of a button. The information is also used to review the monitoring systems of monitored release points (discussed in the next section).

Steps to calculate potential emissions and PEDE

After completing the steps in ESH-17-102 and ESH-17-126, the completed interview forms and process forms are provided to the ESH-17 person designated to complete the calculations described in this procedure. To calculate potential emissions and PEDE, perform the following steps:

Step	Action						
1	Data entry into the Microsoft Access database was completed as part of ESH-17-126. Once a physical state is selected (ESH-17-126, Step 8), the database automatically populates the Reduction Factor field. Verify that the appropriate physical state was selected using guidelines in Appendix D to 40 CFR 61, the FFCA, and engineering calculations (do not account for pollution controls).						
2	Calculate emissions and PEDE by selecting the "Calculate emissions and PEDE for entire interview" button on the interview page. <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>If the PEDE is...</th> <th>then...</th> </tr> </thead> <tbody> <tr> <td>>0.001 mrem</td> <td>go to Step 3.</td> </tr> <tr> <td>≤0.001 mrem</td> <td>go to Step 4.</td> </tr> </tbody> </table>	If the PEDE is...	then...	>0.001 mrem	go to Step 3.	≤0.001 mrem	go to Step 4.
If the PEDE is...	then...						
>0.001 mrem	go to Step 3.						
≤0.001 mrem	go to Step 4.						
3	Repeat Steps 1 & 2 and perform a more realistic, but conservative, emissions estimate if it is determined that there is additional information that can be incorporated into the emissions estimate. Use best professional judgment. Obtain additional information from facility personnel as necessary. Some information which may be utilized is (1) known recovery rates of materials from processes, (2) analytical data, and (3) historical monitoring data.						
4	The calculated value is the PEDE. Record in the Usage Survey Report.						

Review status of monitored release points

Overview

For monitored release points at LANL, 40 CFR 61, Subpart H (61.93(b)(4)(i)) states, "All radionuclides which could contribute greater than 10% of the potential effective dose equivalent for a release point shall be measured". This review of the monitoring status of each monitored release point is conducted and documented as part of the usage survey.

Steps to review monitoring status

To review the monitoring equipment status of each monitored release point, perform the following steps:

Step	Action
6	Obtain data from Step 5 for monitored point sources. This PEDE data will be in the units of PEDE per radionuclide and total PEDE for each release point.
7	Divide the PEDE per radionuclide by the total PEDE for each monitored release point, and multiply by 100. The results will be the percent of total PEDE that is contributed by each radionuclide. ESH-17 must demonstrate that the monitoring system(s) in place will detect any radionuclide contributing >10% of the PEDE ("10%ers") for each monitored release point.
8	Compare the 10%ers for each monitored release point with the current monitoring systems for each and determine if ESH-17 is monitoring for the appropriate radionuclides for each monitored release point. Document the results of the comparison in the usage survey report.

Documenting the work

Required documents

Fully document your processes for determining:

- potential emissions
- PEDEs
- 10%ers comparison.

Required documentation includes:

- all final emissions calculations
 - all final PEDE calculations
 - all Quality Assurance documentation
 - Results of the 10%ers comparison
 - all supporting calculations, CAP-88 output (if appropriate)
 - memos exchanged between ESH-17 and the operating groups
 - all ESH-17 internal memos.
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Steps to document the work

To document the work, perform the following steps:

Step	Action
9	Document the results of all estimates, calculations, and communications described above.
10	Attach all supporting calculations.
11	Attach any memos prepared as a result of this procedure.
12	File documentation in the ESH-17 Records Room according to a schedule established by the Records Coordinator.

Records resulting from this procedure

Records

The following records generated as a result of this procedure are to be submitted to the Records Coordinator:

- all final emissions estimates
- all final PEDE calculations
- results of the 10%ers comparison
- CAP-88 output (if appropriate)
- all supporting calculations and documents
- all memos resulting from the performance of this procedure

[Click here to record “self-study” training to this procedure.](#)