CATEGORIZING AND REPORTING INCREASED AIRBORNE RADIOACTIVE EMISSIONS FROM SAMPLED STACKS

Purpose

This Air Quality Group procedure describes the methods used by ESH-17 to categorize, report, and document increased emissions of airborne radioactive materials from sampled stacks at Los Alamos National Laboratory (LANL).

Scope

This procedure applies to radioactive emissions from sampled LANL stacks, excluding emissions from those stacks at the Los Alamos Neutron Science Center (LANSCE). Use of this procedure is initiated through guidance in ESH-17-119, "Evaluation of Stack Radioactive Air Emissions."

In this procedure

This procedure addresses the following major topics:

Hazard Control Plan

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

Signatures

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Approved by: Terry Morgan,RRES-MAQ Quality Assurance Officer	Date: 2/15/00
Approved by: Jean Dewart, RRES-MAQ Group Leader	Date: 2/18/00

02/03/04

General information

Attachments

This procedure has the following attachments:

Number	Attachment Title	No. of pages
1	Curie Conversion Factors for Sampled Stacks	3
2	ESH-17 Increased Release Documentation Form	2

History of revision

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

Revision	Date	Description Of Changes
0	2/22/96	New document.
1	3/17/97	Process and management changes.
2	2/22/00	Quick change revision to remove prerequisites for dose procedures.

Who requires training to this procedure?

The following personnel require training before implementing this procedure:

- ESH-17 personnel who evaluate stack emissions data.

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).

Prerequisites

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

- ESH-17-119, “Evaluation of Radioactive Air Emissions from Sampled Stacks”

General information, continued

Definitions specific to this procedure

Curie Conversion Factor (CCF): A stack specific number, which, when multiplied by a Curie quantity of radioactive material released to the atmosphere, will provide an approximation of the dose to the nearest hypothetical member of the public. These factors were developed using the methodology described in Attachment 1.

References

The following documents are referenced in this procedure:

- ESH-17-024, "Personnel Training and Orientation"
- ESH-17-112, “Tritium Stack Emission Calculating and Reporting”
- ESH-17-114, “Calculation of Particulate/Vapor Radioactive Air Emissions From Sampled Stacks”
- ESH-17-119, “Evaluation of Radioactive Air Emissions from Sampled Stacks”
- ESH-17-501, “Dose Assessment Using CAP88”
- ESH-17-503, “Dose Assessments for Unplanned Air Effluent Releases”
- 40 CFR 61, Subpart H, “National Emission Standards for Emissions of Radionuclides Other than Radon From Department of Energy Facilities”

Note

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

Background information

Data characteristics

The data for this procedure are obtained from counting filter papers (for particulate emissions), charcoal canisters (for volatile emissions), and glycol samples (for tritium emissions). These data are converted to stack emissions estimates in accordance with procedures ESH-17-112 and ESH-17-114.

Data are generally obtained on a weekly basis. In certain instances (e.g., holidays, vacations, etc.), samples may be collected for longer or shorter periods of time.

CCF limitations

The Curie Conversion factors (CCFs) provided in Attachment 1 were developed using HOTSPOT7. This code utilizes a gaussian plume model to approximate downwind concentrations of radioactive airborne material. Using these concentrations, HOTSPOT7 calculates an effective dose equivalent to a member of the public from the most limiting pathway (excluding ingestion). For most radionuclides, this is through inhalation; however, noble gases and other beta-gamma emitting radionuclides may utilize immersion as the critical pathway.

Since HOTSPOT7 calculates the dose from only one pathway, it may underestimate the dose. However, for the purposes of this procedure, this limitation is not significant. Officially reportable accidental dose estimates should be calculated in accordance with procedure ESH-17-503.

For the purposes of this procedure, the length of the sample period is not considered. Instead, the release is assumed to occur over a ten minute period. This results in an overestimate of the dose to a hypothetical member of the public.

Categorizing and reporting increased emissions

Determine NESHAPs reportability

An increased release of radioactive material may be identified through the performance of procedure ESH-17-119. Use the following steps to determine the reportability of an identified increased release and to document actions taken.

Step	Action
1	Multiply the data point (in Ci) by its respective Curie conversion factor (mrem/Ci) found in Attachment 1. If more than one radionuclide is emitted from a given stack, apply the conversion factor for each individual nuclide, and sum the resulting doses. **If the result is...** — **Then...** greater than 10 mrem — go to *Step 2* greater than 0.5 mrem, but less than or equal to 10 mrem — go to *Step 3* less than or equal to 0.5 mrem — go to *Step 6*
2	Provide ESH-17 group management, the Rad-NESHAP Project Leader, the facility manager, and the Health Physics Operations (ESH-1) RCT or team leader with the value calculated in *Step 1*. Inform these individuals that the Laboratory has ***potentially*** exceeded the 10 mrem/yr standard set forth in 40 CFR 61, Subpart H, and that further assessments are under way.
3	Request a LANL-wide dose assessment in accordance with ESH-17-501 be performed by an appropriately trained ESH-17 health physicist. **If the result is...** — **Then...** greater than 10 mrem/yr — go to *Step 4* less than or equal to 10 mrem/yr — go to *Step 5*

Categorizing and reporting, continued

Step	Action
4	Provide EM&R, ESH-17 group management, the Rad-NESHAP Project Leader, the facility manager, and the ESH-1 RCT or team leader with the value from *Step 1*. Inform these individuals that LANL has exceeded 10 mrem/yr and is in violation of 40 CFR 61, Subpart H, and that DOE must be notified. Exceedance of this value requires immediate notification of the EPA by DOE. Inform the facility manager that ESH-7 must be notified. Go to *Step 6*.
5	Provide ESH-17 Group management, the Rad-NESHAP Project Leader, the facility manager, and the ESH-1 RCT or team leader with the value from *Step 3*. Inform these individuals that LANL has not exceeded the 10 mrem/yr limit, but that all operations at the facility should be reviewed to ensure that LANL will remain in compliance with 40 CFR 61 Subpart H. Go to *Step 6.*

Determine the reportability under DOE 5000.3b requirements.

If the release is determined to be a NESHAPs violation, it must be reported to ESH-7 under the requirements of DOE 5000.3b. However, another criterion for DOE reportability is "any controlled radionuclide release that occurs as a monitored part of normal operations and that exceeds what analysis of historical data show is expected during normal operations." To determine if this criterion for reportability applies, perform the following steps.

Step	Action	
6	Determine an "expected" emissions range in accordance with guidance from procedure ESH-17-119. Compare the data point with this expected range.	
	If the data point is...	**Then...**
	above the expected range	go to *Step 7*
	not above the expected range	go to *Step 8*
7	Determine if the release was consistent with the operating condition of the facility by contacting facility personnel (or by other means).	
	If the release is...	**Then...**
	consistent with operating condition	go to *Step 9*
	not consistent with operating condition	go to *Step 8*

Categorizing and reporting, continued

Step	Action
8	Inform the facility manager or designee and ESH-1 RCT or team leader that the emission from the facility is higher than normal emissions. Inform the facility manager or designee that, unless prior approval for the release is documented or unless the cause of the emission has been identified, ESH-7 should be notified.
9	**To document the event**, complete the ESH-17 Increased Release Documentation Form (Attachment 2). Use the guidance provided in the *Documenting actions* section (page 8).
10	Track future emissions to detect possible increasing trends or other signs of problems.

Documenting actions

Documenting contacts made and actions taken

When required (per *Step 9*), complete an ESH-17 Increased Release Documentation Form (Attachment 2, or other form approved by ESH-17 Group management).

A *comments* section is provided on page 2 of the Increased Release Documentation Form. Record any information necessary for interpretation and future analysis of the release. Include, at a minimum, any assumptions and calculations. Also, provide any explanations or justifications for the increased emissions. Attach any correspondence relating to the release to the Increased Release Documentation Form.

Peer review of completed forms must be performed by an ESH-17 health physicist or other qualified personnel. Peer review is not required if the form was initiated by *Step 7* and facility emissions were consistent with operating conditions.

In the event that an Increased Release Documentation Form is initiated as the result of a NESHAPs reportable event, a member of ESH-17 group management must review and sign the form. If, for other reasons, the preparer believes that ESH-17 group management should be informed of the release, request that the a member of ESH-17 group management review and sign the form.

Records resulting from this procedure

Records

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

- ESH-17 Increased Release Documentation Form
- Supporting documentation (e.g. justification memos)

The above records are to be submitted to the records coordinator **within three weeks of generation.**

Click here to record “self-study” training to this procedure.

CURIE CONVERSION FACTORS FOR SAMPLED STACKS

The following Curie conversions factors (CCF) are to be used to determine an approximate value for the EDE to a facility MEI as required in ESH-17-118. Due to assumptions involved in the calculation of these values, they may or may not be valid for a given situation. As a result, the CCFs are to be used only as rough approximations, and are not to be used as officially reportable values, unless the assumptions made in their determination are deemed valid.

TA/Bldg	Exhaust Stack	Distance to nearest receptor (meters)[1]	Nuclide of interest[2]	Dose at nearest receptor (mrem/Ci)[3]
TA-03-029	ES-14	993	MFP[4]	1.5E+01
TA-03-029	ES-14	993	Pu-239	3.7E+03
TA-03-029	ES-15	993	MFP	1.5E+01
TA-03-029	ES-15	993	Pu-239	3.7E+03
TA-03-029	ES-19	993	MFP	1.5E+01
TA-03-029	ES-19	993	Pu-239	3.7E+03
TA-03-029	ES-20	993	MFP	1.5E+01
TA-03-029	ES-20	993	U-235	1.4E+03
TA-03-029	ES-23	993	MFP	1.5E+01
TA-03-029	ES-23	993	U-235	1.4E+03
TA-03-029	ES-24	993	MFP	1.5E+01
TA-03-029	ES-24	993	U-235	1.4E+03
TA-03-029	ES-28	993	MFP	1.5E+01
TA-03-029	ES-28	993	Pu-239	3.7E+03
TA-03-029	ES-29	993	MFP	1.5E+01
TA-03-029	ES-29	993	Pu-239	3.7E+03
TA-03-029	ES-32	993	MFP	1.5E+01
TA-03-029	ES-32	993	Pu-239	3.7E+03
TA-03-029	ES-33	993	MFP	1.5E+01
TA-03-029	ES-33	993	Pu-239	3.7E+03
TA-03-029	ES-37	993	MFP	1.5E+01
TA-03-029	ES-37	993	Pu-239	3.7E+03
TA-03-029	ES-44	993	MFP	1.5E+01
TA-03-029	ES-44	993	Pu-239	3.7E+03
TA-03-029	ES-45	993	MFP	1.5E+01
TA-03-029	ES-45	993	Pu-239	3.7E+03
TA-03-029	ES-46	993	MFP	1.5E+01
TA-03-029	ES-46	993	Pu-239	3.7E+03
TA-03-035	ES-1	1035	MFP	1.4E+01

TA/Bldg	Exhaust Stack	Distance to nearest receptor (meters)[1]	Nuclide of interest[2]	Dose at nearest receptor (mrem/Ci)[3]
TA-03-035	ES-1	1035	U-235	1.3E+03
TA-03-102	ES-22	1163	MFP	1.1E+01
TA-03-102	ES-22	1163	U-238	1.0E+03
TA-16-205	ES-4	500[5]	H-3(GAS)	1.3E-07
TA-16-205	ES-4	500[5]	H-3(HTO)	3.3E-03
TA-21-155N	ES-5	673	H-3(GAS)	9.8E-08
TA-21-155N	ES-5	673	H-3(HTO)	2.5E-03
TA-21-209	ES-1	704	H-3(GAS)	9.1E-08
TA-21-209	ES-1	704	H-3(HTO)	2.4E-03
TA-33-086	ES-6	2443	H-3(GAS)	1.1E-08
TA-33-086	ES-6	2443	H-3(HTO)	2.7E-04
TA-41-004	ES-17	210	H-3(GAS)	1.0E-06
TA-41-004	ES-17	210	H-3(HTO)	2.7E-02
TA-48-001	ES-7	724	Pu-239	6.5E+03
TA-48-001	ES-7	724	Sr-90	2.6E+01
TA-48-001	ES-54	724	MFP	2.6E+01
TA-48-001	ES-54	724	Pu-239	6.5E+03
TA-48-001	ES-60	724	MFP	2.6E+01
TA-48-001	ES-60	724	Se-75	1.6E-01
TA-48-001	ES-60	724	Pu-239	6.5E+03
TA-50-001	ES-2	1110	MFP	1.5E+01
TA-50-001	ES-2	1110	Pu-239	3.7E+03
TA-50-037	ES-1	1118	MFP	1.4E+01
TA-50-037	ES-1,2	1118	Pu-239	3.7E+03
TA-50-069	ES-1	1175	MFP	1.3E+01
TA-50-069	ES-1	1175	Pu-239	3.4E+03
TA-50-069	ES-2	1175	MFP	1.3E+01
TA-50-069	ES-2	1175	Pu-239	3.4E+03
TA-50-069	ES-3	1175	MFP	1.3E+01
TA-50-069	ES-3	1175	Pu-239	3.4E+03
TA-55-004	ES-15	977	MFP	1.8E+01
TA-55-004	ES-15	977	Pu-239	4.7E+03
TA-55-004	ES-16	977	MFP	1.8E+01
TA-55-004	ES-16	977	Pu-239	4.7E+03
TA-55-004	ES-16	977	H-3(GAS)	6.3E-08
TA-55-004	ES-16	977	H-3(HTO)	1.6E-03

Notes:

[1] Distance to nearest receptor is obtained from Table 1-1, 'RAEM Meteorological File and Receptor Data for 1992.'

[2] Nuclide of interest is based on process knowledge and historical emissions. Where no such information is available, alpha emissions are assumed to be Pu-239, and beta emissions are assumed to be Sr-90. In the event of an emission of a radionuclide other than those provided, a CCF value may be developed according to the methodology in Notes [3] & [4].

[3] To calculate the dose at the nearest receptor, the following methodology was used:

a. Dose calculations were performed using a Gaussian Plume model, HOTSPOT7.
b. Meteorological data included:
    - Wind speed = 2 m/s
    - Stability category = D
c. Release time = 10 minutes.
d. Stack height (from 1994 Annual Air Emissions Summary)
    - For TA-41, h = 0 m
    - For TA-3 and TA-16, h = 15.1 m
    - For TA-33, h = 22.9 m
    - For TA-50, and TA-55, h = 3.5 m
    - For TA-48, h = 12.5 m
e. Type of run was general plume.
f. Deposition velocity = 1 cm/sec.

[4] MFP ≡ Mixed Fission Products. For Attachment 1 purposes, MFP is assumed to be Sr-90.

[5] The distance provided for TA-16-205 is an approximate distance to the campground on S.R. 501.

ESH-17, Air Quality

ESH-17 INCREASED RELEASE DOCUMENTATION FORM

ESH-17-118-IRD:

TA/Building/ES _____-_____-_____ FE(s) _____

Complete the following steps. If additional room is needed, use the comments section on page 2 or attach additional sheets as necessary.

1. Complete Table 1

TABLE 1

Radionuclide	Activity emitted (Ci) [Column A]	Curie Conversion Factor, CCF (mrem/Ci) [Column B]	Approximate dose to facility MEI (mrem) [Column A * Column B]
Total[1]			

[1] The total is the sum of all values in Column 4 of Table 1.

2. Complete Table 2 (if total from Table 1 is greater than 10 mrem):

TABLE 2

Notifications:

Name/Organization	Date/time

3. Complete Tables 3 and 4 (if total from Table 1 is greater than 0.5 mrem):

TABLE 3

Dose from ESH-17-501 (mrem/yr):	

TABLE 4

Notifications:

Name/Organization	Date/time

ESH-17, Air Quality

ESH-17 INCREASED RELEASE DOCUMENTATION FORM, continued

ESH-17-118-IRD:

4. Complete Table 5 to determine DOE reportability.

TABLE 5

Radionuclide	Activity emitted (Ci) [Column A]	Expected range (Ci)[3] [Column B]	Is Column A greater than Column B? [Column C]

[3] Determined according to ESH-17-119

TABLE 6

Notifications (if Column C = yes):

Name/Organization	Date/time

5. Was ESH-7 (Occurrence Investigation) contacted? If so, when? by whom?

Comments (attach additional sheets if needed):

Prepared by:

_____ _____ _____ _____/_____/_____
Signature Print name Z-Number Date

Peer review by (if required):

_____ _____ _____ _____/_____/_____
Signature Print name Z-Number Date

Group management review by:

_____ _____ _____ _____/_____/_____
Signature Print name Z-Number Date

ESH-17 INCREASED RELEASE DOCUMENTATION FORM

 This form is from ESH-17-118

ESH-17-118-IRD:

TA/Building/ES _____-_____-_____ FE(s) _____

Complete the following steps. If additional room is needed, use the comments section on page 2 or attach additional sheets as necessary.

1. Complete Table 1

TABLE 1

Radionuclide	Activity emitted (Ci) [Column A]	Curie Conversion Factor, CCF (mrem/Ci) [Column B]	Approximate dose to facility MEI (mrem) [Column A * Column B]
Total[1]			

[1] The total is the sum of all values in Column 4 of Table 1.

2. Complete Table 2 (if total from Table 1 is greater than 10 mrem):

TABLE 2

Notifications:

Name/Organization	Date/time

3. Complete Tables 3 and 4 (if total from Table 1 is greater than 0.5 mrem):

TABLE 3

Dose from ESH-17-501 (mrem/yr):	

TABLE 4

Notifications:

Name/Organization	Date/time

ESH-17 INCREASED RELEASE DOCUMENTATION FORM, continued

ESH-17-118-IRD:

4. Complete Table 5 to determine DOE reportability.

TABLE 5

Radionuclide	Activity emitted (Ci) [Column A]	Expected range (Ci)[3] [Column B]	Is Column A greater than Column B? [Column C]

[3] Determined according to ESH-17-119

TABLE 6

Notifications (if Column C = yes):

Name/Organization	Date/time

5. Was ESH-7 (Occurrence Investigation) contacted? If so, when? by whom?

Comments (attach additional sheets if needed):

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Prepared by:

_____ _____ _____ _____/_____/_____

Signature Print name Z-Number Date

Peer review by (if required):

_____ _____ _____ _____/_____/_____

Signature Print name Z-Number Date

Group management review by:

_____ _____ _____ _____/_____/_____

Signature Print name Z-Number Date