

Identifier: **EP-ERSS-SOP-5087**
(was SOP-15.13)

Revision: **0.0**



Effective Date: **02/09/07**

Environment & Remediation Support Services

Standard Operating Procedure

for **BACKGROUND VALUE COMPARISONS –
RADIONUCLIDES**

APPROVAL SIGNATURES:

Subject Matter Expert:	Organization	Signature	Date
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1.0 PURPOSE AND SCOPE

The purpose of this procedure is to describe the process for performing background value comparisons and fallout value comparisons on radionuclides at the Los Alamos National Laboratory (Laboratory), Environment & Remediation Support Services (ERSS).

2.0 BACKGROUND AND PRECAUTIONS

2.1 Background

The Laboratory's ERSS has received verbal approval from the New Mexico Environmental Division's (NMED's) Hazardous and Radioactive Materials Bureau to use the soil, sediment, and tuff background and fallout values from the Laboratory's background data document.

2.2 Precautions

Fallout radionuclides (americium-241, cesium-137, plutonium-239, strontium-90, and tritium) do not have fallout values for the subsurface. Soil fallout values are typically not applicable below the surface (0-0.5 ft.) and are never applicable in tuff. The tritium soil fallout value is not applied to surface soil because it requires a transformation from pCi/mL to pCi/g using the sample soil moisture data. Tritium in surface soil is evaluated based on detection status (i.e., detected or not detected).

3.0 EQUIPMENT AND TOOLS

None.

4.0 STEP-BY-STEP PROCESS DESCRIPTION

4.1 Prepare for Background Value/Fallout Value Comparisons

- | | | |
|--------------------|----|--|
| ERSS Staff Members | 1. | Obtain current list of background values and fallout values from the Laboratory's background data document (LANL1998, 59730.2). |
| | 2. | From the background data sets, determine the sample preparation and analytical methods used to generate results from the background samples.

[NOTE: Background data sets are available upon request from the ERSS data stewards.] |

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3. Obtain the sample results for the site (i.e., solid waste management unit, area of concern, consolidated unit being evaluated) from the data steward, including at least the following fields of information:

- sample concentration results;
- reporting units of the sample concentrations;
- final (RFI) sample result qualifiers;
- sample analytical methods; and
- sample preparation methods.

[NOTE: The site data set may be provided to the user in the same format as it is recorded in the Environmental Restoration Database (ERDB). Data dictionaries and code definitions are available from the ERSS data stewards.]

4. Determine the comparability of the methods used to prepare and analyze the site samples and the background/fallout samples.

[NOTE: If site sample methods differ from the Laboratory's background sample methods, consult a chemist.]

5. Verify a chemist (or other Subject Matter Expert) has reviewed the analytical data report and made the determination of detection status.

4.2 Eliminate Radionuclides from Evaluation

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1. Eliminate those radionuclides included for QA/QC purposes and those that are not typically evaluated as potential historical contaminants.

[NOTE: If potassium-40 was identified for investigation at the site, it should be treated in the same manner as other naturally occurring radio-nuclides (i.e., compared to the appropriate background value).]

2. Eliminate the radionuclides that had no results reported as detected.

4.3 Select Appropriate Background/Fallout Values

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1. If the site samples were collected from soil media and a fallout radionuclide was detected in any subsurface samples, identify the radionuclide as a chemical of potential concern.

[NOTE: Soil media includes any soil or fill material. Soil is designated as all horizons (ALLH) and fill is designated as FILL.]

2. If the site samples were collected from soil media and a fallout radionuclide was detected in surface samples (0-0.5 ft.), compare to the Laboratory's soil fallout values.

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3. If the site samples were collected from tuff material, identify any detected fallout radionuclide as a chemical of potential concern.

[NOTE: Tuff samples are evaluated on the basis of detection status alone for fallout radionuclides. Although fallout values for tuff units are listed in the Laboratory's background data document (LANL 1998, 59730.2), the values listed are nominal minimum detectable activity levels and are not be used to determine chemicals of potential concern.]

4. If the site samples were collected from sediment samples, select sediment fallout values.

5. For site samples that contain naturally occurring radionuclides in soil media, compare to the soil background values.

6. For site samples that contain naturally occurring radionuclides in tuff units Qbt 2, Qbt 3, and/or Qbt 4, compare to the background values for Qbt 2, Qbt 3, and Qbt 4.

7. For site samples that contain naturally occurring radionuclides in tuff units Qbt 1v, compare to the background values for Qbt 1v.

8. For site samples that contain naturally occurring radionuclides in tuff units Qbt 1g, Qct, and/or Qbo, compare to the background values for Qbt 1g, Qct, and Qbo.

9. For site samples that contain naturally occurring radionuclides in sediment, compare to the sediment background values.

4.4 Compare the Site Data to Selected Background Values or Fallout Values

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1. If the maximum detected activity is greater than the background value (or fallout value), and exceeds the range of activities in the background/fallout data set, identify the radionuclide as a chemical of potential concern.

2. If the radionuclide is detected but has no background (or fallout value), identify the radionuclide as a chemical of potential concern.

3. If the maximum detected activity is not greater than the background value (or fallout value), eliminate the radionuclide as a chemical of potential concern.

4. Report the frequency of site concentrations for each radionuclide that is detected or detected and exceeds the background values (or fallout values) in the data review appendix of the investigation report.

5. Report the site concentrations of all radionuclides detected or detected above background values (or fallout values) for all samples collected in the data review appendix of the investigation report.

[NOTE: After the background/fallout value comparison has been completed further statistical test may be performed to evaluate the difference between site sample concentrations and background/fallout sample concentrations.]

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4.5 Records

- ERSS Staff Members 1. Submit the following records generated by this procedure to the Records Processing Facility:
- Investigation report with the data review appendix presenting the results of the background/fallout value comparisons.

5.0 PROCESS FLOW CHART

Flow chart is to be included at a later date.

6.0 ATTACHMENTS

None.

7.0 REVISION HISTORY

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Revision No. <i>[Enter current revision number, beginning with Rev.0]</i>	Effective Date <i>[DCC inserts effective date for revision]</i>	Description of Changes <i>[List specific changes made since the previous revision]</i>	Type of Change <i>[Technical (T) or Editorial (E)]</i>
0.0	02/09/07	Reformatted and renumbered, supersedes SOP-15.13	E

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