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SNL: ER: OU #1334

MEMORANDUM

TO: Benito Garcia, NMED, Chief, HRMB
THROUGH: Neil Weber, NMED, Chief, DOE Oversight
FROM: Lloyd Aker, NMED, SNL/ITRI POC, DOE Oversight
DATE: November 16, 1995
RE: SNL OU 1334 RFI Work Plan

The following represent AIP comments regarding Sandia National Laboratories' (SNL) draft RCRA Facility Investigation (RFI) Work Plan for Operable Unit (OU) 1334, Central Coyote Test Area, dated October 1994. These comments are provided for the purpose of communicating the results of our technical review. They are not provided for the purpose of representing the regulatory position of the New Mexico Environment Department.

The work plan addresses investigations to be conducted at seven Environmental Restoration (ER) Sites: 9, 11, 57A, 57B, 61A, 61C, and 68.

General Comments

1. Page 4-7, Section 4.1.3.4, SNL states "limited confirmatory sampling may be initiated to demonstrate that a SWMU is eligible for an administrative NFA."

If evidence for a site is insufficient to support an administrative NFA proposal, a site investigation (including sampling) is generally required. NMED/AIP staff question the objectivity of any investigation where conclusions are derived prior to conducting it.

2. Many maps in the work plan are not to scale or are drawn at only approximate scale. Scaled maps should be provided in the work plan.

3. Background sample fractions should be collected and analyzed for gross α, gross β, and gamma spectrum.

ER Site 9, Burial Site/Open Dump

1. Page 5-5, Section 5.1.3, SNL states "Because of the limited precipitation, low permeability surface soil, limited mobility of the potential contaminants, and low infiltration rates (SNL/NM February 1994), groundwater is not considered a primary pathway

and will not be investigated unless a hazardous source is identified."

ER Site 9 is located adjacent to the Mazanita Mountains. Surface soils at the site are generally coarse-grained, and therefore, should, in contrast to SNL's assertion, exhibit relatively high permeabilities and infiltration rates. In addition, some potential contaminants at this site, such as VOCs, can exhibit considerable mobility.

For a given ER site, any decision by the regulatory agencies to require the installation of ground-water monitoring wells will depend on historical site activities and the results of individual RFI investigations.

2. Page 5-7, Section 5.1.4, SNL states "Level III analyses will be performed on all samples to support a baseline risk assessment if initial sampling shows COC concentrations above action levels or background concentrations."

Detections of any contaminants above background warrant further field investigation (including sampling) until the severity of the problem is demonstrated to the satisfaction of the regulatory agencies. The use of action levels to support an NFA determination is not appropriate, unless a site has been fully characterized.

3. Page 5-7, Section 5.1.4, SNL states "If a hazardous source is identified, additional data may be required to characterize the underlying soil media...."

The waste piles can be sampled for TCLP metals and organics for the purpose of waste characterization. However, total metals and organics must be sampled to investigate potential releases of hazardous wastes or hazardous waste constituents to underlying soil or other media.

4. Page 5-9, Section 5.1.6.3, SNL states "The background concentrations and activities will be compared to metal and radionuclide concentrations in soil and sediment at ER Site 9 to assess if a release has occurred to the environment."

Only 12 background samples, to be collected at six locations, are proposed.

AIP staff believe that background can not be reliably established based on so few samples. Results of SNL's sitewide background investigation have not been accepted by EPA or the NMED. Characterization data should be compared to approved sitewide background concentrations to determine whether contamination is present.

5. Page 5-12, Section 5.1.6.3, Debris Mounds 2 and 3, SNL states "The debris exposed in mounds 2 and 3 appears to be **principally**

(emphasis added) nonhazardous solid wastes and will not be sampled."

We caution that generators are responsible for determining if their wastes are hazardous (40CFR 262.11).

6. What is the origin of the "shallow crater-like feature" northeast of Debris Mound 1? Has it been sampled?

7. According to Figure 5-5, Debris Mounds 2 and 3 extend to distances of 100 ft or more. One sample to be collected beneath each mound is not enough to investigate a potential release to the environment. Additional samples should be collected beneath each mound, spaced no more than 25 ft apart.

Wastes within the area defined as Debris Mound 3 appear to actually occur as discrete piles. Although a maximum spacing of 25 ft was recommended above, site conditions should influence the selection of judgemental sampling locations for this specific debris mound.

Site history is not well known; therefore, samples collected beneath the mounds should also be analyzed for volatile organics (VOCs), gross α, gross β, and gamma spectrum. During a visit to the site, it was noted that numerous rusty containers and aerosol cans, a 55-gal empty drum which originally contained methyl alcohol, and pieces of fiberboard (asbestos?) are present at Debris Mound 2. Data derived from field screening techniques (such as for VOCs) are not acceptable for site characterization purposes.

The sample located furthest downstream in the arroyo (Figure 5-5, locations denoted by triangles) should be moved close to Debris Mound 2 (just downstream of it), or alternatively, another sample collected.

8. Page 5-12, Debris Mound 1, SNL states "Characterization of Debris Mound 1 includes debris sampling to determine if the mound contains regulated hazardous waste and soil sampling beneath the mound to determine the extent of waste migration if a hazardous source is identified."

It is unclear if soil beneath Debris Mound 1 will actually be sampled. Sampling must be conducted beneath Debris Mound 1, even if TCLP tests demonstrate that the "average" mound debris is not a hazardous waste for the purpose of its removal and disposal.

According to Figure 5-5, Debris Mound 1 extends to a maximum distance of about 200 ft. The nine samples collected from the bottom of the trenches are not enough to investigate a potential release to the environment. Additional samples should be

collected beneath Debris Mound 1, spaced no more than 25 ft apart.

Each sample collected beneath the mound should also be analyzed for VOCs, gross α, gross β, and gamma spectrum. Field screening data are not acceptable for site characterization purposes.

9. Page 5-12, Debris Mound 1, Debris Sampling - Does "three grab samples collected from the entire vertical profile at each trench location" refer to the collection of composite samples?

10. Page 5-12, Section 5.1.6.4
The contingency sampling plan may not be adequate. Holding times for VOC and SVOC samples may be exceeded for some samples if the plan is strictly followed. See also comment #2.

11. Page 5-14, Table 5-2
The arroyo channel sediments should also be sampled for VOCs, gross α, gross β, and gamma spectrum.

12. Page 5-5, Section 5.1.3, SNL states "The depth to groundwater at the site is approximately 138 ft bgl, according to a December 1991 measurement at the Schoolhouse well located approximately 1 mi west of ER Site 9 (IT May 1994a)."

For this geologic environment, the Schoolhouse well is located too far away for the purpose of estimating depth to ground water at ER Site 9. In addition, given that bedrock crops out within a few hundred feet east of the site, ground water at Site 9 could occur at depths much shallower than 138 ft.

ER Site 11, Explosive Burial Mounds
1. Page 5-20, Section 5.2.3, SNL states "Because of the limited precipitation, low permeability surface soil, limited mobility of contaminants, and low infiltration rates (SNL/NM February 1994), groundwater is not considered a primary pathway and will not be investigated unless a hazardous source is identified."

ER Site 11 is located relatively close to the Mazanita Mountains. See comment #1, ER Site 9.

2. Page 5-22, Section 5.2.4, SNL states "Level III analyses will be performed on all samples to support a baseline risk assessment if initial sampling shows COC concentrations above action levels or background concentrations."

See comment #2, ER Site 9.

3. Page 5-24, Section 5.2.6.3, SNL states "The background concentrations and activities will be compared to metal and

radionuclide COCs in soil within and adjacent to the fenced areas at ER Site 11 to determine if COCs have been released to the environment."

Only 10 background samples, to be collected at five locations, are proposed. See comment #4, ER Site 9.

4. Page 5-24, Section 5.2.6.3, SNL states " Surface and near-surface soil samples will be collected to determine if the surface depressions may have released potential COCs to the environment by any potential burn tests."

Site history is not well known. Therefore, samples collected in the bottoms of the depressions should also be analyzed for VOCs, gross α, gross β, and gamma spectrum. Data derived from field screening techniques are not acceptable for site characterization purposes.

5. Page 5-27, Section 5.2.6.3, in reference to Former Debris Mounds, SNL states "Two judgemental soil sample locations will be selected equidistant along the longest axis..."

According to Figure 5-6, Debris mounds 2, 3, 4, 1, and 5 extend to distances of about 50, 60, 75, 100, and 100 ft; respectively. Two samples collected from the bottom of each mound are not enough to investigate a potential release to the environment. Additional samples should be collected beneath each debris mound, spaced no more than 25 ft apart. Because the widths of Debris Mounds 2 and 5 are large, additional samples should be collected on both sides of centerline.

Samples collected beneath the mounds should also be analyzed for VOCs, gross α, gross β, and gamma spectrum. Field screening data are not acceptable for site characterization purposes.

6. Page 5-27, Section 5.2.6.4
The contingency sampling plan may not be adequate. See also comment #2, ER Site 9.

7. No sampling was specifically mentioned to verify cleanup of the radiological point source near Debris Mound 1.

ER Site 57A - Workman Site: Firing Area
1. Page 5-37, Section 5.3.1, SNL states "The underground bunker contained two 5-gal and one 20-gal containers of liquid waste ..."

What was this liquid waste(s) and was it hazardous?

2. Page 5-37, Section 5.3.2, in reference to radiological area sources, SNL states "These anomalies appear to result from the

presence of manmade materials, rather than from tests conducted with radioactive materials."

From a health-based perspective, AIP staff see no difference between radiological contamination left from tests, or the abandonment of (manmade) radioactive materials.

3. Page 5-39, Section 5.3.3, SNL states "Because of the limited precipitation, low permeability surface soil, limited mobility of contaminants, and low infiltration rates (SNL/NM February 1994), groundwater is not considered a primary pathway and will not be investigated until (sic) the hazardous source is identified."

ER Site 57A is located relatively close to the Mazanita Mountains. See comment #1, ER Site 9.

4. Page 5-40, Section 5.3.5.1
No sampling plan is presented for the purpose of verifying cleanup of the radiological contamination.

5. Page 5-43, Section 5.3.6.3, SNL states "The background concentrations and activities will be compared to metal and radionuclide COCs in soil surrounding features at ER Site 57A to assess if a release has occurred to the environment."

Only 10 background samples, to be collected at five locations, are proposed. See comment #4, ER Site 9.

6. Page 5-46, Section 5.3.6.3, Utility Poles
No sampling is planned along and beneath the high pressure pipes.

7. Page 5-46, Section 5.3.6.3, Gun Mounts
The gun mounts should be centered in the grid, and at least one sample collected on each side of the gun mounts.

8. Page 5-46, Section 5.3.6.3, Underground Bunker, SNL states "If a drainline is connected to the drain, contingency sampling may be required."

If a drainline is connected to the drain, AIP staff recommend that contingency sampling **shall be** required.

9. Page 5-46, Section 5.3.6.3, Debris Sampling
No sampling plan is proposed to investigate the scattered debris shown in Figure 5-19. Also, please describe the scattered debris.

10. Page 5-46, Section 5.3.6.4
The contingency sampling plan may not be adequate. See also comment #2, ER Site 9.

11. Page 5-50, Table 5-6
Sample fractions should also be collected and analyzed for gross α, gross β, and gamma spectrum at the wind tunnel and other concrete pads; utility poles, underground bunker, Debris Mound 1, Debris Mound 2, and Debris Mound 3.

VOC samples should also be collected beneath Debris Mounds 1, 2, and 3; and beneath the machine shop area at the wind tunnel pad.

12. Although a significant concern, no sampling is specifically planned for the machine shop area.

A pipe, sticking out of the ground, is located on the east side of the wind tunnel/machine shop pad. What was the purpose of this pipe?

13. Signs posted around Building 9900 read "Flammable Liquid" and "Danger No Smoking". What was the flammable liquid?

14. Soils in the open center part of Pad 4 need to be sampled.

15. What, if anything, is under the steel plate north of Pad 2? Could this be another underground bunker?

ER Site 57B - Workman Site: Target Area
1. Page 5-56, Section 5.4.3, SNL states "Because of the limited precipitation, low permeability surface soil, limited mobility of potential contaminants, and low infiltration rates (SNL/NM February 1994), groundwater is not considered a primary pathway and will not be investigated until (sic) a hazardous source has been identified."

ER Site 57B is located adjacent to the Mazanita Mountains. See comment #1, ER Site 9.

2. Page 5-58, Section 5.4.4, SNL states "Level III analyses will be performed on all samples to support a baseline risk assessment, if initial sampling shows COC concentrations above an action level or background concentrations."

See comment #2, ER Site 9.

3. Page 5-58, Section 5.4.5
Section 5.4.2 says that all field radiological measurements were "approximately at the background activity level (Appendix F)."

Where was the radiological point source located? No sampling plan is presented for the purpose of verifying cleanup of the radiological point source.

Also, see comment #4, Site 9, regarding background activity levels.

4. Page 5-60, Section 5.4.6.3, SNL states "The background concentrations will be compared to COCs in soil present at ER Site 57B to assess if a release has occurred to the environment."

Only 10 background samples, to be collected at five locations, are proposed. See comment #4, ER Site 9.

5. Page 5-64, Section 5.4.6.4
The contingency sampling plan may not be adequate. See also comment #2, ER Site 9.

6. Page 5-65, Table 5-8
Sample fractions should also be collected and analyzed for gross α, gross β, and gamma spectrum beneath the pits and the area between the tower bases.

VOC and SVOC samples should also be collected beneath the pits.

7. At least two samples should be collected from the bottom of each pit at depths of 0-6 inches, 18-24, and 114-120 inches. Composite samples should not be collected for any sample fraction.

8. No sampling of the debris mound and beneath the debris mound is mentioned. If these wastes are removed, and are shown in the process as being strictly nonhazardous construction demolition debris, then sampling will probably not be necessary (for this specific case).

9. What was the purpose of the small concrete pad (dated 4-1-44) that is located south of the south tower base?

10. What was the purpose of the small concrete pad that is located northwest of the northern extent of the debris pile (near the power pole)?

ER Site 61A - Schoolhouse Mesa Test Site: Blast Area
1. Page 5-70, Section 5.5.3, SNL states "Because of the limited precipitation, low permeability surface soil, limited mobility of the potential contaminants, and low infiltration rates (SNL/NM February 1994), groundwater is not considered a potential pathway and will not be investigated unless a hazardous source is identified."

ER Site 61A is located adjacent to the Mazanita Mountains. See comment #1, ER Site 9.

2. Page 5-72, Section 5.5.4, SNL states "Level III analyses will be performed on all samples to support a baseline risk assessment if initial sampling shows COC concentrations above an action level or background concentrations."

See comment #2, ER Site 9.

3. Page 5-72, Section 5.5.5, SNL states "Radiological point source and area source anomalies are distributed over the ER 61A site (Figure 5-28)."

No sampling plan is presented for the purpose of verifying cleanup of the radiological sources. Point sources are not shown on Figure 5-28.

4. Page 5-74, Section 5.5.6.3, SNL states "The background concentrations and activities will be compared to metal and radionuclide concentrations in soil and sediment at ER Site 61A to determine if a release has occurred to the environment."

Only 12 background samples, to be collected at six locations, are proposed. See comment #4, ER Site 9.

5. Page 5-79, Section 5.5.6.3, Debris Mounds 1 and 2, SNL states "Characterization of debris mounds 1 and 2 includes debris sampling to determine if the mounds contain regulated waste and soil sampling beneath the mounds to determine the extent of waste migration if a hazardous source is identified."

It is unclear if soil beneath Debris Mounds 1 and 2 will actually be sampled. Sampling must be conducted beneath the two debris mounds, even if TCLP tests demonstrate that "average" mound debris is not a hazardous waste for the purpose of removing and disposing the debris.

According to Figure 5-2, the two debris mounds extend to a maximum distances of about 200 to 300 ft. The proposed number of soil samples to be collected from beneath each mound are not enough to investigate a potential release to the environment. Additional samples should be collected beneath each mound, spaced no more than 25 ft apart. However, digging along Debris Mound 1 may reveal that this feature is nothing more than a berm along the road, created as a result of clearing the immediate area.

Samples collected beneath each mound should also be analyzed for VOCs, gross α, gross β, and gamma spectrum. Field screening data are not acceptable for site characterization purposes.

6. Page 5-79, Section 5.5.6.3, Positive Gamma Areas
The approximate soil sampling locations are not shown in Figure 5-32.

7. Page 5-79, Section 5.5.6.3, Concrete Blocks
On page 5-67, SNL states "Fragments of plastic materials and small HE compound fragments (Figure 5-29b) are scattered around the concrete blocks (61-72)."

Soils surrounding the blocks should be sampled for high explosives, gross α, gross β, and gamma spectrum regardless of what is found in the chip samples of concrete.

8. Page 5-75, Table 5-10
Sample fractions should also be collected and analyzed for gross α, gross β, and gamma spectrum at the cleared area, the positive gamma areas, and at sampling locations proposed for arroyo channel sediment.

9. Page 5-79, Section 5.5.6.4
The contingency sampling plan may not be adequate. See also comment #2, ER Site 9.

10. The sampling grid shown in Figure 5-33 should be expanded in all directions, and the number of samples increased.

11. Dark grey pieces of plastic (?) debris, metal shrapnel, and orange resinous materials are scattered over the entire area. What are these materials? Are these materials hazardous and/or radioactive?

ER Site 61C - Schoolhouse Mesa Test Site: Schoolhouse Building
1. Page 5-83, Figure 5-34
Was the CEARP soil data acquired from sampling conducted in 1988 or 1989?

2. Page 5-85, Section 5.6.2, SNL states "Five composite samples were analyzed for HE compounds, VOCs, metals, and radionuclides."

Composite samples are not generally accepted for the purpose of site characterization.

3. Page 5-85, Section 5.6.2, SNL states "Gamma spectrometry screens of soil samples were (sic) indicated normal background activities for potassium-40,..."

See comment #4, ER Site 9, in regard to background activities.

4. Page 5-85, Section 5.6.2, SNL states "Aluminum, barium,...silver and radium concentrations were less than the method detection limit."

The preceding sentence lists detections for each of these metals. Also, the value for cadmium (107 μg/L) does not match that of Table 5-11, page 5-86, listed as 1.7 μg/L. Which is correct? Obviously, cadmium concentrations of 107 μg/L in ground water would be a concern.

5. Page 5-85, Section 5.6.2
Where exactly was the one "lb" of HE compounds located?

6. Table 5-11, Page 5-86
The Schoolhouse well (so called "East Well") has been sampled numerous times by SNL's Sitewide Ground-Water Surveillance Group. Why was only relatively old, selected data included in the RFI work plan?

The reported concentration for nitrate as nitrogen (5.2 mg/L, Table 5-11) is relatively high, and thus is a concern. Other sampling at the Schoolhouse well has produced similar results. Monitor wells should be installed at the Schoolhouse site to investigate potential ground-water contamination.

Soil samples should be collected from deep boreholes drilled in the drainfield/leachfield area.

5. Page 5-85, Section 5.6.2, SNL states "Calcium, iron, manganese, potassium, and sodium were determined to be within the range of background for groundwater in this region"

See comment #4, ER Site 9, in regard to accepted background concentrations for these ground-water constituents.

6. Page 5-87, Section 5.6.3, SNL states "Because of the limited precipitation, low permeability surface soil, limited mobility of the potential contaminants, and low infiltration rates (SNL/NM February 1994), groundwater is not considered a primary pathway and will not be investigated until a hazardous source has been identified."

ER Site 61C is located adjacent to the Mazanita Mountains. See also comment #1, ER Site 9.

Ground water occurs at a relatively shallow depth at this site. Ground water should be investigated at this site as part of the RFI.

7. Page 5-89, Section 5.6.4, SNL states "Level III analyses will be performed on all samples to support a baseline risk assessment if initial sampling shows COC concentrations above an action level or background concentration."

See comment #2, ER Site 9.

8. Page 5-89, Section 5.6.5.1, SNL states "Air sampling may also be conducted at the site to support a baseline risk assessment if COCs are detected above action levels or background concentrations.

Results of air sampling are not acceptable for the purpose of site characterization.

9. Page 5-93, Section 5.6.5.3, SNL states "The background concentrations will be compared to metal and radionuclide COCs in soil surrounding features at ER Site 61C to assess if a release has occurred to the environment."

Only 12 background samples, to be collected at six locations, are proposed. See comment #4, ER Site 9.

10. Page 5-93, Section 5.6.5.3, Sink Drain Line
The drainline/leachfield must be located before samples are collected. The proposed trenches may not be adequate. Trenching should be conducted until the drainline/leachfield are delineated. Samples should be collected in those areas most likely to have received wastes.

Field screening data are not acceptable for site characterization purposes.

11. Page 5-96, Section 5.6.5.4
The contingency sampling plan may not be adequate.

12. Page 5-99, Table 5-13
In addition to those shown in Table 5-13, soil samples collected from the sink drainline, the Schoolhouse Building, the drainage to the arroyo channel, and the arroyo channel sediment should also be analyzed for VOCs, gross α, gross β, and gamma spectrum.

13. Was there a septic system located at the Schoolhouse which could have contributed to elevated nitrate?

14. What was machined at the schoolhouse? Were radiological materials machined or used at the schoolhouse?

ER Site 68 - Old Burn Site
1. Page 5-104, Section 5.7.1
What is a SNAP reactor?

2. Page 5-106, Section 5.7.2
The CEARP data, representing sample composites, are not suitable for the purpose of site characterization. Detection limits are not given in Table 5-14. Field and laboratory quality control results are also not presented.

3. Page 5-106, Section 5.7.2, SNL states "Acetone is a common laboratory contaminant, and the toluene values were less than 10 μg/kg, suggesting that these VOC detections may be false positives."

The toluene detections should be considered valid, unless verified otherwise.

4. Page 5-110, Section 5.7.3, SNL states "Because of the limited precipitation, low permeability surface soil, limited mobility of the potential contaminants, and low infiltration rates (SNL/NM February 1994), groundwater is not considered a potential pathway and will not be investigated unless a hazardous source is identified."

ER Site 68 is located adjacent to the Mazanita Mountains. See comment #1, ER Site 9.

5. Page 5-111, Section 5.7.4, SNL states "Level III analyses will be performed on all samples to support a baseline risk assessment if initial sampling shows COC concentrations above an action level or background concentrations."

See comment #2, ER Site 9.

6. Page 5-111, Section 5.7.5, Radiological Anomalies
Where are the 240 radiological point sources located at ER Site 68? No sampling plan is presented for the purpose of verifying cleanup of the point sources.

7. Page 5-114, Section 5.7.6.3, SNL states "The background concentrations and activities will be compared to metal and radionuclide COCs in soil and sediment surrounding and within features at ER Site 68 to assess if a release has occurred to the environment."

Only 16 background samples, to be collected at eight locations, are proposed. See comment #4, ER Site 9.

8. Page 5-114, Section 5.7.6.3, Borrow Pits
Composite samples are not suitable for the purpose of site characterization.

9. Page 5-114, Section 5.7.6.3, Burn Pan
Composite samples are not suitable for the purpose of site characterization.

At least 4 discrete soil samples should be collected beneath the burn pan at two depths (0-6 inches and 18-24 inches). These samples should be collected, even if sediments in the burn pan

are found to be nonhazardous for the purpose of their removal and disposal.

10. Page 5-116, Section 5.7.6.3, Debris Mounds
The proposal to collect only one sample beneath each debris mound may be inadequate, depending on the dimensions of each individual mound. Samples should be collected beneath each debris mound, spaced no more than 25 ft apart.

11. Page 5-116, Section 5.7.6.3, Drainage Ditch and Overflow Basin, and Plastic-Lined Pit.

The proposed sampling for these three features is inadequate. The overflow basin and the plastic-lined pit should be investigated in a similar way to that done for the burn pan. At least 4 discrete soil samples should be collected beneath the overflow basin and the plastic-lined pit.

Additional samples should be collected along the bottom of the drainage ditch, spaced no further than 25 ft apart.

12. Page 5-116, Section 5.7.6.4
The contingency sampling plan may not be adequate. See also comment #2, ER Site 9.

13. Page 5-117, Table 5-16

The proposed sample fractions for some features are inadequate, and should also include the following:

Sample fractions should be collected and analyzed for gross α, gross β, and gamma spectrum beneath the borrow pits, burn pan, drainage ditch, overflow basin, plastic-lined pit, and at sampling locations proposed for arroyo channel sediment.

Sample fractions should be collected and analyzed for VOCs beneath the borrow pits, burn pan, drainage ditch, overflow basin, plastic-lined pit, and at sampling locations proposed for arroyo channel sediment. Field screening data are not acceptable for site characterization purposes.

Sample fractions should be collected beneath the burn pan and analyzed for total SVOCs (not TCLP SVOCs).

Sample fractions should be collected beneath the burn pan and analyzed for total metals (not TCLP metals).

14. There is a debris mound (12 ft by 3 ft) not shown on the Site 68 maps. The mound is located immediately east of the utility poles, and contains burned pieces of pipe(?).

15. There is a relatively large debris mound located about 1000 ft northeast of ER Site 68, across the arroyo. This debris mound, definitely a concern, is not shown on the maps of Site 68.

16. Page 5-110, Section 5.7.3, SNL states "The depth to groundwater at the site is approximately 199 ft bgl based on measurements at the KAFB 1902 well located approximately 0.5 mi north of ER Site 68 (IT May 1994a)."

For this geologic environment, KAFB-1902 is located too far away for the purpose of estimating depth to ground water at ER Site 68. In addition, given that limestone bedrock crops out within a few hundred feet west of the Burn Pan, ground water at Site 68 could occur at depths much shallower than 199 ft.

Reviewed by: William P. Moats, NMED, DOE Oversight
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Sandia National Laboratories

Albuquerque, New Mexico 87185-1348

date: May 25, 1995

to: John Gould, MS-0184 (DOA/KAO)

from: Carole Lojek, MS-1348 (7585) CAL

subject: Preliminary Response to NMED Comments on the Draft OU 1334 RFI Work Plan

Per a request from Ms. Nancy Morlock, Environmental Protection Agency (EPA), Region 6, enclosed with this letter is the Sandia National Laboratories (Sandia) Environmental Restoration (ER) Project's preliminary response to the New Mexico Environment Department (NMED) comments on the Draft RCRA Facility Investigation (RFI) Work Plan for Operable Unit (OU) 1334 submitted in October 1994 (Attachment A). NMED comments were received in a letter from Mr. Benito Garcia (NMED) to Mr. John-Olav Johnsen (DOE/KAO) dated March 16, 1995 (Attachment B). Two SNL ER Project personnel and three NMED-AIP personnel discussed the comments with Ms. Morlock via teleconference on April 13, 1995. Please forward ER's preliminary response to the EPA and NMED as appropriate.

If you have any further questions or comments regarding Sandia's preliminary response to the NMED comments on the Draft RFI Work Plan for OU 1334, please contact Ms. Carole Lojek (848-0409), Task Leader for OU 1334 or Mr. Dick Fate (848-0408).

Attachments

1. Attachment A: Preliminary Response to NMED Comments on the Draft OU 1334 RFI Work Plan
2. Attachment B: NMED Review of SNL/NM RFI Work Plan for OU 1334, Central Coyote Test Area
3. Attachment C: RPOP-08-811 "Radiological Surveys of Soil Samples"

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JUN 06 1995

Ms. Nancy Morlock
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Dear Ms. Morlock;

Enclosed is the Sandia National Laboratories Environmental Restoration Project's preliminary response to the New Mexico Environment Department's comments on the Draft RCRA Facility Investigation (RFI) Work Plan for Operable Unit 1334.

If you have any questions, please contact John Gould at (505) 845-6089.

Sincerely,

George K. Lasker
for Michael J. Zamorski
Acting Area Manager

Enclosures

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JUN 8 1995

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Attachment A: Preliminary Response to NMED Comments on the Draft OU 1334 RFI Work Plan

DRAFT

General Comments

1. This RFIW is particularly clear and easy to follow, and the supporting documentation appears to be well referenced.

SNL Response: The OU 1334 staff appreciate the complement.

2. Data Needs/DQOs listed in the Workplan state that " The primary data need for" [the ER Sites] "is characterization of the waste management unit as a potential source of hazardous waste or hazardous constituents". As stated in the summary tables for Nonintrusive and Intrusive Sampling for ER Sites: 9, 57A, 61A, and 68, TCLP analysis will be performed.

   Although TCLP data is valuable for waste management decisions, it is not appropriate for the determination of nature and extent of contamination.

SNL Response: The intent of collecting waste samples for TCLP analyses at Sites 9, 57A, 61A, and 68 to characterize source materials for potential waste disposal. TCLP analysis will be performed on debris in mounds at Site 9, debris in mounds and concrete pads that may be removed as waste at Site 57A, debris in mounds and concrete that may be removed as waste at Site 61A, and sediment in the burn pan that may ~~be removed as waste~~ at Site 68.

1

It should be emphasized that in each of these cases, environmental media samples will be collected below the waste piles to determine if a release has occurred, and these samples will be analyzed for total constituents as indicated in the sampling plans for these sites.

The consensus reached at the April 13, 1995 meeting was that if Sandia removes source material at these sites through a VCM prior to or during RFI sampling, then the sampling plans as stated are sufficient and no changes to the RFI Work Plan are needed. If, however, source material remains onsite after RFI sampling, then samples of the waste materials will be analyzed for total constituents. EPA's and NMED's concern in this case is the potential for constituents in the waste to be released at some point in the future, even if current sampling does not indicate that a release has occurred so far.

It is Sandia's contention that waste analysis at these four sites is dependent on the timing of the RFI with respect to VCMs to remove waste. For small waste piles, such as those at Sites 57A, 61A, and 68, Sandia will likely remove the wastes simultaneous with or prior to sampling. For sites with large waste piles, such as Site 9, sampling will likely occur before the waste is removed. Sandia will inform EPA and NMED of the scheduled RFI and VCM activities and indicate which sampling scenario will be used for each site.

DRAFT

Specific Comments

3. Page 4-5, §4.1.3.2, SWMUs Proposed for Administrative NFA. The Bullet number one reads "The site never contained constituents of Concern".

The statement should read, "The site has never been used for the generation, treatment, storage or disposal of RCRA solid or hazardous wastes, radionuclides, or other CERCLA hazardous substances".

SNL Response: The wording used in the Draft OU 1334 RFI Work Plan is quoted from the RCRA Facility Assessment Guidance (EPA October 1986), which is also referenced in Chapter 4 of the Sandia ER "Program Implementation Plan (PIP) for Albuquerque Potential Release Sites". NMED-AIP personnel said that the above terminology was provided by Barbara Driscoll (EPA), but the reference was not known. The consensus reached at the April 13, 1995 meeting was that the intent of Sandia's statement is clear as it currently reads. It was also suggested that if there is a need to address this issue further, it should be discussed at the time of the next PIP revision.

4. Page 5-4, §5.1.2, "One point-source anomaly (9E1) was detected at 18 microrem per hour (uR/hr) . . .". These units are not synonymous.

SNL Response: The unit "R" stand for Roentgen, whereas the unit "REM" stands for Roentgen Equivalent Man. REM is equal to R times a quality factor that depends on the type of radiation being measured. The measurements discussed in this section are of gamma radiation in air using a NaI scintillometer. For gamma radiation in air, the quality factor is 1, so the units of R and REM are equivalent. The use of the symbols uR and microrem was somewhat confusing. For clarity, Sandia will use the symbol uREM/hr in future documentation.

5. Page 5-9 §5.1.6.3 Site Background Samples "Surface and near-surface soil samples will be collected to characterize site-specific background . . . at three locations adjacent to the arroyo channel and at three locations within the arroyo channel."

Page 5-5, top of the page. "The radioactive material is attributed to activities conducted at ER Site 61A."

How can these background determination locations be selected so as to avoid the possibility that they have been contaminated by activities conducted at ER Site 61A.

SNL Response; Although Site 61A lies upslope and upstream of Site 9, investigations to date indicate that there are areas east of Site 9, including the upstream channel of the arroyo, which are unaffected by Site 61A operations. The surface radiation survey conducted in February 1994 by RUST Geotech identified radiation anomalies which appear to parallel the inactive road north of Site 9 and includes the arroyo channel approximately 200 feet upstream of Site 9. There are no radiation anomalies in the arroyo beyond a distance of 200 feet upstream from Site 9.

The operational area of Site 61A is physically evident in the field based on the presence of plastic and metal debris scattered on the ground and historical aerial photographs showing a cleared area. This area is centered around three concrete blocks located approximately in the center of the site. None of the plastic and metal debris are seen in the arroyo channel towards the southeast and east boundaries of the site, indicating that site operations did not extend into these areas. Historical aerial photographs of Site 61A also do not show any evidence of man-made activities or disturbances occurring to the southeast and east of the cleared area.

Based on available radiation survey data, field observations, and historical aerial photography, Sandia is confident that the upstream portion of the arroyo channel near Site 9 and the southeast portion of Site 61A represent background conditions. To further evaluate whether site-specific background soil sample data are representative of background conditions, Sandia will compare all metal and radionuclide background data with site-wide data from the "Background Concentrations of Constituents of Concern to the Sandia National Laboratories/New Mexico Environmental Restoration Project" report.

6. Page 5-12 §5.1.6.3 Debris Sampling "The nature of potential COCs will be determined from three grab samples collected from the entire vertical profile at each trench location."

What will the entire depth of each trench be? Please define the vertical extent represented by each grab sample.

Page 5-12 §5.1.6.3 Debris Sampling "If radioactivity and VOCs are below indicated levels, three debris samples will be taken evenly spaced from a random start in each trench."

Please provide more detail on how the sample locations will be determined.

SNL Response: The trenches will be excavated to the bottom of the debris mounds to a depth where the interface between the debris and the natural soil is evident. The depth at which this will occur is unknown but is expected to be on the order of five feet.

Field screening for VOCs and radioactivity will be conducted during the trenching, and sampling will be directed based on anomalous results from these screening parameters. In the absence of VOC or radiation anomalies, or other field observations indicating the presence of hazardous constituents, random samples of the debris will be collected. As stated in the work plan, these random samples will be collected through the entire vertical extent of the debris mound. Assuming a five foot thickness for the debris pile, each sample will be approximately the width and depth of a hand trowel cut vertically through the side wall of the trench over the entire five foot vertical extent of the pile.

It should be noted that the purpose of the debris sampling at Site 9 is for waste characterization, not to determine the nature and extent of contamination in

environmental media. (See Sandia's response to General Comment 2 regarding waste characterization and TCLP analysis).

7. Page 5-74 Table 5-10 ER Site 61A Summary of Nonintrusive and Intrusive Sampling The table lists sampling depths of 0-6" and 18-24" for the cleared area, positive gamma areas and arroyo channel sediments.

Please supply a justification for the specific sampling depths.

SNL Response: Sandia's original intent was to evaluate the potential for contamination of the ground surface either by direct disposal on the ground or by air fall (0-6 inch interval), and to account for deposition of windblown loess on surface soils which would not be representative of the native ground surface, or of native soils though which contaminants could migrate into the subsurface (18 to 24 inch interval). Sandia also intended to use the 0-6 inch interval for risk assessment, but decided to collect an additional sample at the 18 to 24 inch interval in case the shallow sample was not representative.

Sandia's logic was based on the presence of a thin veneer of loess that post-dates the testing activity at Sites 68 and 71. At these sites, thorium alloy and depleted uranium metal fragments that were deposited on the ground surface by air fall are now found at a depth of one to three inches below the surface. This logic does not hold, however, for other OU 1334 sites such as Site 61A where test debris is present on the surface, indicating that little or no loess deposition has occurred since testing activities ceased.

Sandia's current position is that the 18 to 24 inch interval is not pertinent since the native soil appears to lie within a depth of three inches from the surface, and the mobility of contaminants is expected to be low due to the nature of the contaminants and the arid New Mexico climate. For these reasons, any contamination present would more likely be encountered at the 6 to 12 inch interval; the 18 to 24 inch sampling depth interval would probably lie below the depth of contamination. The consensus reached at the April 13, 1995 meeting was to replace the 18 to 24 inch sampling interval with the 6 to 12 inch sampling interval for shallow subsurface soil samples.

8. Page 5-106 §5.7.2. What are the limitations of the LRAD device with respect to soil depth in the detection of alpha-emitting contaminants?

SNL Response: The LRAD survey was conducted in conjunction with an earlier DOE/Sandia directive to utilize innovative technologies at ER sites. Alpha particles are shielded by such materials as a piece of paper or a thin soil covering. Therefore, alpha emitters can only be detected if they are present directly on the soil surface. Windblown loess which overlies the ground surface that existed at the time of the testing is known to be present at Sites 68 and 71 (See Sandia's response to Specific Comment 7 regarding loess and sampling intervals). Because of the "shielding" effect of this loess, alpha radiation from the testing at Sites 68 and 71 was not detectable using the LRAD method (i.e, the LRAD method was not effective due to site conditions).

A conventional gamma radiation survey using a sodium-iodide (NaI) scintillometer was also performed at Sites 68 and 71 in December 1993 by RUST Geotech. The gamma radiation survey data provided reliable data on the distribution of depleted uranium and thorium at the sites.

9. Page 5-116 Drainage Ditch and Overflow Basin, and Plastic-Lined Pit "If the basin and pit bottom is estimated, one soil sample will be collected in each 1-ft interval to a depth of 3 ft."

It is unclear how the elevation of the "pit bottom" will be estimated. Will it be by measuring the depth of the pit below ground surface? What will be done if the pit bottom cannot be estimated? One sample may not be enough to characterize a release from this site.

SNL Response: To investigate whether any contaminants have been released into the environment from these basins, trenches will be excavated through the overflow basin and plastic-lined pit to determine if the bottom is evident by field observation, such as the remnants of a bottom plastic liner, a discolored sediment layer, or a change in soil texture between basin fill and native soil. Sandia is assuming that the plastic-lined pit did not maintain its integrity, and that both basins may have held contaminated fluids at one time. If the bottoms are discernible, soil samples will be collected either directly from the bottom sediment layer, or the native soil immediately underlying the basins within the overflow basin and plastic-lined pit at two locations in each pit.

If the bottoms are not evident by field observations, soil samples will be collected at 0-1 foot, 1-2 foot, and 2-3 foot intervals. Sampling will be performed at two locations, for a total of six soil samples in the pit and six soil samples in the basin. The depth to bottom in either the pit or basin is not expected to be more than a few feet deep, so that sampling over the one to three foot depth interval will likely include the bottom sediment layer. However, if field evidence suggests that either the pit or basin are deeper than anticipated, the sampling intervals will be adjusted accordingly.

Based on this sampling strategy, a minimum of two and a maximum of six samples will be collected from each basin. In the April 13, 1995 meeting, Chris Hanlon-Meyer suggested that a sample be collected in the floor of both the basin and pit and analyzed for volatile organic compounds (VOCs), since fuel oil was potentially used in the pits. The samples will be collected at a depth of approximately three feet (actual depth depends on identification of the bottom of the pits) using hand augers or a Geoprobe. Sandia will make this revision in the Draft OU 1334 RFI Work Plan.

10. If NFA is not approved for sites 20, 21,22, 47, 62, 69, 70, 71, 88A, or 88B, then the RFI Work Plan should include or be amended to include investigation of these sites.

SNL Response: At the time of writing, Sites 47 and 88A have been tentatively accepted as Administrative NFAs. If Administrative NFAs are not approved for Sites 20, 21, 62, 69, and 71, Sandia plans to conduct confirmatory sampling at these five sites.

Confirmatory sampling has been completed at Sites 22, 70, and 88B. A Confirmatory Sampling NFA proposal for Site 22 was submitted to EPA on May 15, 1995, and NFA proposals for Sites 70 and 88B will be prepared and submitted to EPA after analytical results are received. Sandia agrees that any of these sites that are not ultimately approved for NFA will be added to the OU 1334 RFI Work Plan.

11. Appendix G, G.2.1. "Radiological surveys will be conducted using Geiger-Muller survey meters with NaI scintillometers. If elevated radiation measurements are detected, the radioactive exposure rate will be measured with a Reuter-Stokes Model RSS-111 Pressurized Ionization Chamber (or similar portable device). Judgmental samples will be collected from the locations where radioactivity is greater than 100 counts above background (cab) (FOP 92-14)."

    Is the text meant to indicate the combined or alternative use of Geiger-Muller-type gas-filled detectors and NaI (T1) scintillometer detectors and ratemeters in field-survey configurations? Are the units 'cab' per minute or per second? What detector system was used to establish the 100 cab threshold? How is the threshold limit and the minimum detectable equivalent activity in soil determined with each of the three systems cited (NaI, PIC, GM tube)? Please supply reference number FOP 92-14.

SNL Response: Field radiation surveys will be performed using both a Geiger-Muller detector and a NaI gamma scintillometer. FOP 92-14 has been superseded by RPOP-08-811 "Radiological Surveys of Soil Samples" (See Attachment B). RPOP-08-811 defines the procedure for determining background versus anomalous radiation levels at sample locations. Whatever the units of measure are for a particular instrument, an anomalous value is considered to be two standard deviations above the mean value of ten background readings. Exposure rate, gamma spectrometry, isotopic uranium, and thorium data will be obtained at sample locations having anomalous radiation field screening results.

12. Appendix G, G.2.2. See citation in item 5. The 18 uR/h value cited in the appendix as a representative background pertains to a 'surface anomaly' and is therefore not a measure of normal background radiation. RUST-Geotech reports a range of 10-13 uR/h on Schoolhouse Mesa. Using the value of 18 uR/h would seem to produce false negative field screening results.

SNL Response: The value of 18 uR/h cited in this section was intended to be an action level that triggers radiological sampling. This action level is equal to the mean background value plus a margin that provides a confidence level that readings exceeding the action level are indeed anomalous. The procedure for radiological surveys of soil samples has been revised to better define background versus anomalous radiation measurements (See Sandia's response to Specific Comment 11 regarding RPOP-08-811, "Radiological Surveys of Soil Samples"). This revised procedure became effective December 15, 1995, and is enclosed as Attachment C.

Attachment B: NMED Review of SNL/NM RFI Work Plan for OU 1334, Central Coyote Test Area

Dick
Paul
Carole
3/27/95

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MAR 24 1995

State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous & Radioactive Materials Bureau
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EDGAR T. THORNTON, III
DEPUTY SECRETARY

March 16, 1995

Mr. John-Olav Johnsen
DOE/AIP Coordinator
U.S. Department of Energy, KAO
P.O. Box 5400
Albuquerque, NM 87185-5400

RE: **Review of SNL/NM RFI Workplan for Operable Unit 1334, Central Coyote Test Area**

Dear Mr. Johnsen:

Attached is the Agreement in Principle Program's comments on the RFI workplan for Operable Unit 1334 as submitted to and reviewed by the Hazardous and Radioactive Materials Bureau's Permitting and Technical Compliance Programs. Please indicate your receipt of this document in writing within thirty (30) days.

If you have any questions regarding this matter please contact Dr. Bruce Swanton at (505) 827-4356.

Sincerely,

Barbara Hoditschek for
Benito J. Garcia, Chief
Hazardous and Radioactive Materials Bureau

cc w/attachment

Mr. Warren Cox, Manager
Environmental Restoration Program
Sandia National Laboratories

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M E M O R A N D U M

TO: BARBARA HODITSCHECK, RCRA PERMITTING PROGRAM MANAGER

RON KERN, RCRA TECHNICAL COMPLIANCE PROGRAM MANAGER

FROM: CHRIS HANLON-MEYER, DOE OVERSIGHT EM PROGRAM
BRUCE SWANTON, DOE OVERSIGHT EM PROGRAM MANAGER

DATE: March 16, 1995

RE: **REVIEW OF THE SANDIA NATIONAL LABORATORIES RCRA FACILITY INVESTIGATION WORK PLAN FOR CENTRAL COYOTE TEST AREA (OU 1334)**

The Hazardous and Radioactive Materials Bureau, under the Agreement in Principle (AIP) program, has reviewed the subject RCRA Facility Investigation Workplan (RFIW). The plan is a HSWA permit required document. As such, many of the technical comments are the result of permit requirements, specifically Section R, RFI Scope of Work.

ITEM

General Comments

1. This RFIW is particularly clear and easy to follow, and the supporting documentation appears to be well referenced.

2. Data Needs/DQOs listed in the Workplan state that "The primary data need for" [the ER Sites] "is characterization of the waste management unit as a potential source of hazardous wastes or hazardous constituents. As stated in the summary tables for Nonintrusive and Intrusive Sampling for ER Sites: 9, 57A, 61A, and 68, TCLP analysis will be performed.

   Although TCLP data is valuable for waste management decisions, it is not appropriate for the determination of nature or extent of contamination.

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or hazardous wastes, radionuclides, or other CERCLA hazardous substances."

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5. Page 5-9 §5.1.6.3 Site Background Samples "Surface and near-surface soil samples will be collected to characterize site-specific background...at three locations adjacent to the arroyo channel and at three locations within the arroyo channel."

   Page 5-5, top of the page. "The radioactive material is attributed to activities conducted at ER Site 61A."

   How can these background determination locations be selected so as to avoid the possibility that they have been contaminated by the activities conducted at ER Site 61A?

6. Page 5-12 §5.1.6.3 Debris Sampling "The nature of potential COCs will be determined from three grab samples collected from the entire vertical profile at each trench location."

   What will the entire depth of each trench be? Please define the vertical extent represented by each grab sample.

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Attachment C: RPOP-08-811 "Radiological Surveys of Soil Samples"

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Sandia National Laboratories	Procedure No: RPOP-08-811 Issue No: 01 Effective Date: DEC 15 1994

RADIOLOGICAL SURVEYS OF SOIL SAMPLES

RADIATION PROTECTION OPERATIONS DEPARTMENT
RADIATION PROTECTION OPERATING PROCEDURE

Prepared By: Hans D. Oldewage 12/12/94
Hans D. Oldewage — Date

Reviewed By: Robert L. Schwing 12/14/94
Robert L. Schwing — Date
Subject Matter Expert

Reviewed By: Steven D. Rima, CHP 12/13/94
Steven D. Rima, CHP — Date
RI-TECH, Inc.

Approved By: William G. Rhodes 12/14/94
William G. Rhodes — Date
Radiation Protection Operations Department Manager

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RADIOLOGICAL SURVEYS OF SOIL SAMPLES

1.0 PURPOSE

To provide guidance to Radiological Control Technicians in performing surveys of soil samples using 2x2 inch NaI detectors and/or G-M pancake probes.

This procedure specifically applies to screening radiation measurements on soil samples, or on core samples obtained during drilling operations, using a 2 x 2 inch NaI detector, or G-M pancake probe, in conjunction with an appropriate count rate instrument.

The following activities are described in Section 4.0 of this procedure:

4.1 Background Determination
4.2 Sample Measurements
4.3 Documentation of Survey Results

2.0 REFERENCES

2.1 GENERAL

Not Applicable

2.2 SPECIFIC

RPOP-03-300, "Portable Radiation Monitoring Instrumentation Operations," Issue 01.

RPOP-02-201, "Radiation Protection Operations Program Records Management Life Cycle," Issue 01.

RPOP-04-425, "Radiological Survey Documentation," Issue 01.

RPRI-04-01, "Radiation Protection Controlled Document Preparation, Review, Revision, and Approval," Issue 01.

3.0 GENERAL

3.1 EQUIPMENT

3.1.1 Eberline ESP-2 (or equivalent) with 2 x 2 NaI detector.

3.1.2 Eberline ASP-1 w/HP-260 pancake probe (or equivalent).

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3.2 SAFETY CONSIDERATIONS

As specified in the applicable Health and Safety Plan, and/or Radiological Work Permit.

3.3 RESPONSIBILITIES

Radiation Protection Operations Department Team Supervisors

- The RPOD Team Supervisors are responsible for assuring that Radiological Control Technicians are qualified to perform this procedure and documented as such. They are also responsible for review and approval of all survey documentation generated as a result of this procedure.

Radiological Control Technicians (RCTs)

- RCTs are responsible for following this procedure. In addition, if any RCT is unable to follow this procedure due to mistakes, extenuating circumstances, or for any other reason, the RCT shall immediately stop, notify the appropriate Team supervisor or designee, and initiate a Document Change Notice per RPRI-04-01.

Radiological Training Project Leader

- The Radiological Training Project Leader is responsible for assuring that training on this procedure is developed, kept up-to-date, and offered to RCTs needing it. The Project Leader is also responsible for documentation of training completion.

3.4 PREREQUISITES

3.4.1 Prior to sampling or drilling, CONSULT with the responsible Environmental Restoration (ER) Program Task Leader (or other requestor) to determine the frequency (i.e., depth interval, fraction of samples, etc.) that measurements are to be made, and any other sampling criteria.

3.4.2 Prior to use each day, PERFORM an operational check of the instrument(s), in accordance with RPOP-03-300.

3.5 RECORDS

Radiological survey records are generated during the process of implementing this procedure. The original copy of the records are the record copy for the Radiation Protection program. The record copy is given to the Radiation Protection Recorded Information Records Center for processing, including arrangement and filing. Copies of the records may be made for information purposes.

These records are used by the Radiation Protection program to document radiological surveys.

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The records are stored, arranged, indexed, retrieved, scheduled, retained, and disposed of in accordance with RPOP-02-201.

3.6 PRECAUTIONS AND LIMITATIONS

The results of this screening alone should not be used to determine protective clothing, respiratory protection, or waste management requirements, but should be used as a screening tool to indicate the need for additional surveys or analyses. Protective clothing and respiratory protection requirements should be based on equipment and area contamination survey results, and on air sampling results.

3.7 REVISIONS

All revisions to this procedure shall be controlled by the Radiation Protection Engineering Department.

3.8 ATTACHMENTS

Attachment 1 Background Determination Log

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4.0 PROCEDURE

4.1 Background Determination

4.1.1 At least once per day, or prior to performing measurements, DETERMINE instrument background in accordance with a. or b. as applicable. If a change in background is suspected at any time during counting, then attempt to determine the cause, and if necessary, perform this step again.

a. For the NaI detector, PERFORM 10 one-minute integrated counts at the location where the samples will be counted. RECORD the information on the Background Determination Log (Attachment 1.)

b. For the G-M detector, PERFORM a one-minute integrated count at the location where the samples will be counted. RECORD the information on the Background Determination Log (Attachment 1.)

NOTE: Since all soil samples will contain a small amount of natural radioactivity, it is impractical to use "free-air" background as the control measurement when measuring soil samples (soil samples will naturally read higher than the free-air background). To minimize this problem, perform background and sample measurements on the ground, if possible. In this manner, only added radioactivity, or an increase in natural activity due to geological reasons, should be detected during screening.

4.1.2 CALCULATE the mean, observed standard deviation, and the action level (typically Bkg. + 2σ). The action level is used to determine "detectable" vs. "no-detectable" activity.

NOTE: Formulas are shown in Attachment 1, but most calculators contain statistics functions which simplify the observed standard deviation calculation. If a statistics calculator is used, ensure that the "σ_{n-1}" key is used rather than the "σ" key.

4.1.3 Since the goal of these measurements is not to quantify radioactivity, but rather to decide if it may be present above background, no attempt is made to correct the count rate to dpm, uCi, etc.

4.2 SAMPLE MEASUREMENTS

If possible, COUNT the sample on the ground in the same location that the background measurements were performed.

4.2.1 Core Samples:

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a. PERFORM a scan of the core, with the detector within ½ inch of the core, at a rate of 1 to 2 inches/second.

b. If no audible increase is detected, PERFORM a one-minute integrated count, approximately at the core center.

c. If an audible increase is detected, PERFORM a one-minute integrated count at the location with the highest reading.

4.2.2 Soil Samples in Containers:

a. PERFORM a 1 minute integrated count with the detector on contact with the container (inside the hole of the maranelli beaker, if used).

4.3 DOCUMENTATION OF SURVEY RESULTS

4.3.1 RECORD the results in accordance with RPOP-04-425.

4.3.2 For NaI measurements, use the "Radiation Survey" column. LINE OUT "mrem/h-r", and WRITE "cpm" in the heading.

4.3.3 RECORD pancake probe readings in the "Beta-Gamma Contamination" column. WRITE "N/A" in the activity block.

4.3.4 RECORD the sample number, or the approximate sample depth, for each measurement in the "Item Description" block.

4.3.5 COMPARE the survey results to the Action Level calculated in Step 4.1.2.

NOTE: If the action level is exceeded (i.e., there is detectable radioactivity in the core), INFORM the requestor. Samples should be taken for gamma spectroscopy, or other laboratory analysis as appropriate, to quantify the radioactivity. If not already being done, control any wastes generated from the contaminated region(s) as radioactive, pending further investigation.

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BACKGROUND DETERMINATION LOG

Date: _____

Project Location _____ RCT Signature _____

Project Description: _____

Inst. Type _____ Inst. S/N _____ Time _____	Inst. Type _____ Inst. S/N _____ Time _____	Inst. Type _____ Inst. S/N _____ Time _____
Background Readings 1) _____ 2) _____ 3) _____ 4) _____ 5) _____ 6) _____ 7) _____ 8) _____ 9) _____ 10) _____	Background Readings 1) _____ 2) _____ 3) _____ 4) _____ 5) _____ 6) _____ 7) _____ 8) _____ 9) _____ 10) _____	Background Readings 1) _____ 2) _____ 3) _____ 4) _____ 5) _____ 6) _____ 7) _____ 8) _____ 9) _____ 10) _____
Mean Background X_m =	Mean Background X_m =	Mean Background X_m =
Standard Deviation σ_{n-1} =	Standard Deviation σ_{n-1} =	Standard Deviation σ_{n-1} =
Action Level A.L. =	Action Level A.L. =	Action Level A.L. =
Comments	Comments	Comments

Standard Deviation:

$$\sigma_{n-1} = \frac{\Sigma\sqrt{(X_m - X_i)}}{n-1}$$

NOTE: for a single count: $\sigma = \sqrt{X_m}$

where:

X_m = Mean Background
X_i = Individual Background Measurement
n = Number of Measurements

Action Level (typical) = $X_m + 2\sigma$ (Sample Screening) or AL = $1\frac{1}{2} \cdot X_m$ (for area surveys)

RPOP-031.A
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