Los Alamos National Laboratory

ENVIRONMENTAL RESTORATION

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ENTERED

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Los Alamos, New Mexico 87544
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Date: February 27, 1996
Refer to: EM/ER:96-081

RECEIVED
FEB 28 1996

Mr. David Neleigh
NM Federal Facilities Section
EPA, Region 6, 6PD-N
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

SUBJECT: RESPONSE TO THE NOTICE OF DEFICIENCY (NOD) FOR POTENTIAL RELEASE SITES IN TECHNICAL AREA (TA) 36

Dear Mr. Neleigh:

Enclosed is the Los Alamos National Laboratory's response to the Environmental Protection Agency's NOD on the Resource Conservation and Recovery Act Facility Investigation report for potential release sites in TA-36 (former operable unit 1130). A certification form signed by the appropriate officials is also enclosed. This response is due to your office on February 28, 1996.

Please contact Gene Gould at (505) 667-0402 or Everett Trollinger at (505) 667-5801 if you have any questions about this response to the NOD.

Sincerely,

Jorg Jansen, Program Manager
Environmental Restoration

Sincerely,

Theodore J. Taylor, Program Manager
Los Alamos Area Office

JJ/TT/bp

Enclosure(s): Response to NOD for PRSs in TA-36
Certification

2322

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CERTIFICATION

I certify under penalty of law that these documents and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violation.

Document Title: Response To The Notice Of Deficiency For Potential Release Sites In Technical Area 36

Name: _____ Date: 2-26-96

Jorg Jansen, Program Manager
Environmental Restoration Project
Los Alamos National Laboratory

or

Tom Baca, Program Director
Environmental Management
Los Alamos National Laboratory

Name: _____ Date: 2/27/96

Joseph Vozella,
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Environment Projects
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or

Theodore J. Taylor
Program Manager
Environment Restoration Program
DOE-Los Alamos Area Office

Los Alamos National Laboratory Response to EPA NODs for RFI Report for PRSs 36-003(a), 36-003(b), 36-005, and C-36-003

General Comment:

Comment

1. *The format used for this report did not follow guidance from EPA. It is preferable to discuss the details for each solid waste management unit (SWMU) in full.*

Response

This RFI Report, submitted September 29, 1995, followed the format that was in place during its preparation. Reports submitted after October 1, 1995, followed the new guidance.

Comment

2. *The calculation of the upper tolerance limits and the approach to ecological risk screening should follow the guidance given the Los Alamos National Laboratory (LANL) by EPA in the September 1995, meeting.*

Response

For the recalculation of the upper tolerance limits and the effects on the tables and text, see Attachment A of this response. Attachment A includes revisions of Chapters 3 and 4 of the RFI Report. Use the following information as the guide to the revisions in Attachment A of this NOD response:

- Replace Sections 3.0 through 3.2.1.3 in the RFI Report with the revised text in Attachment A.
- Following Table 3.2 in revised text, return to original RFI Report at Section 3.2.2 for the remaining sections in Chapter 3.
- Replace Sections 4.1.2.3 and 4.1.3 in the RFI Report, including tables, with the revised text.
- Replace Sections 4.2.3, 4.2.3.1, 4.2.3.2, 4.2.3.3, and 4.2.4 in the RFI Report, including tables, with the revised text. The Ecotoxicological Screening Assessment 4.2.3.4 in the RFI Report is not revised.
- Replace Sections 4.3.2.3, 4.3.3, and 4.3.4 in the RFI Report, including tables, with the revised text.
- Replace Sections 4.4.2.3, 4.4.3, and 4.4.4 in the RFI Report, including tables, with the revised text.

For the approach to the ecological risk screening, see the following statement:
In accordance with conversations between Laboratory Environmental Restoration Project personnel and EPA Region 6 Officials, further ecological risk assessment at this site will be deferred until the site can be assessed as part of the new Ecological Exposure Unit (Ecozone) approach that is being developed by Laboratory in conjunction with EPA and the NMED.

Comment

3. *Figures should be presented which indicate all the sample location numbers so these may be correlated with sampling results.*

Response

Replacement figures are Attachment B of this NOD response.
Replace Figure 1-7 with 1-7 (Revised)
Replace Figure 1-8 with 1-8 (Revised)
Replace Figure 1-9 with 1-9 (Revised)
Replace Figure 1-10 with 1-10 (Revised)

Comment

4. *Data comparison tables represent information based on analyte. A much better and preferred presentation of data is by sampling location, so that all the potential contaminants for a location may be identified at one glance.*

Add the following tables from Attachment C of this document to the end of Chapter 1 of the RFI Report:

1) Table 1-1, Summary of Sampling and Analyses for PRSs 36-003(a) and 36-003(b), Septic Systems.
2) Table 1-2, Summary of Sampling and Analyses for PRS 36-005, Boneyard.
3) Table 1-3, Summary of Sampling and Analyses for PRS C 36-003, Photo Outfall.

Comment

6. *Sampling plans in this RFI report are using the high explosive (HE) field test kit inappropriately. This kit should be used in determining areas which are highly HE contaminated. It is not to be used for eliminating samples from analysis by EPA SW 846 method 8330. The test kit detection levels are not adequate for eliminating sites from HE analysis. If HE is a potential contaminant then a set number of samples should be submitted for laboratory analysis of HE (SW 846 method 8330).*

Response

All samples were analyzed for HE. The spot test was used only for health and safety purposes following the HE corridor protocol. If high explosives had been noted in the spot test, additional samples would have been taken. No samples were eliminated due to the HE spot test results.

Specific Comments:

Comment

1. ***4.1 PRS 36-003(a), p. 4-1 through 4-5.*** *Insufficient information is presented in regards to the sampling conducted at the drainfield for this site. In addition, there should be a figure which indicates sample locations and depths. EPA understands that LANL may choose to present a remediation plan for the septic tank; however, these sites will not be completed until all the components of the septic system have been addressed. Based on results from the drainfield, the seepage pit should also be sampled.*

Response

The Summary of Sampling for PRSs 36-003(a), 36-003(b), 36-005, and C 36-003, Table 4-1A, indicates depths of samples taken from the leachfield. Add Table 4-1A, Attachment D, after Table 4-1.

See text changes in Section 4.0:

The proposed actions for PRSs 36-003(a), 36-003(b), 36-005, and C-36-003 are presented in Table 4-1. **The sample summary for PRSs 36-003(a), 36-003(b), 36-005, and C-36-006 is presented in Table 4-1A.**

Add the following text after the second paragraph in Section 4.1.2.

The decision to sample and remediate the seepage pit was to depend on the sample results from the leachfield. The leachfield managed the same type of waste for 24 years before the seepage pit was installed and administrative controls were put into place. The assumption was made that the leachfield would be at least as contaminated as the seepage pit, and if the leachfield did not require remediation, the seepage pit would not require sampling or remediation. Results from samples indicate that cyanide, mercury, and zinc were present above background levels but well below SALs, and bis(2-ethylhexyl) phthalate, di-n-butyl phthalate, and methylene chloride were present above EQLs but also below SALs. A multiple chemical evaluation was prepared for these constituents, and the sum of the maximum normalized concentrations totaled 0.1347, which is less than the target value of 1 indicating that adverse health effects are unlikely (see Section 4.1.2.3 in the revised text). The seepage pit is inferred to be no more contaminated than the leachfield and will not be sampled.

Comment

2. ***4.2.2 Field Investigation, SWMU 36-003(b).*** *LANL indicates that the actual outfall could not be located. Figure 1-8 indicates a potential location for the outfall which appears to drain to an area other than the area for which surface samples were collected. Therefore, it does not appear that LANL sampled in the correct area to determine if a release occurred from the outfall. LANL should provide additional information regarding how the sampling locations for the outfall were determined and why no samples were collected closer to the area where the outfall was projected to have occurred.*

Response

The revised figure has more accurate information regarding the placement of the tank and the drainage area samples. The field team indicated that samples were taken from the shallow drainage area that was below the area thought to be the location of the outfall.

See text changes in Section 4.2.2.1:

Additionally, a geophysical survey, based on a 10-ft grid, was conducted to locate the exact discharge point of the system. ~~The pipe was not located, and sampling was conducted based on previous mapping.~~ **The outfall pipe was not located, but the geophysical survey did indicate a possible utility in the area, which corresponded to the area thought to be the location of the outfall. Therefore, samples that were to be taken from the location of the outfall were taken from the drainage below the assumed outfall to have a better possibility of detecting contaminants from the outfall. Refer to Figure 1-9 (Revised) and Table 4-1A.**

Comment

3. ***4.3.3 Conclusions and Recommendations, SWMU 36-005, p. 4-13.*** *It is difficult to evaluate the results of this sampling when no figure is provided which has sampling locations. The VOC levels found are very low and probably limited additional sampling is required. In addition, Appendix B which is a sampling plan for this SWMU should have been mentioned under this Section (4.3.3).*

Response

See Figure 1-9 (Revised), which has sampling locations identified. Appendix B (revised) of the RFI Report includes the sampling plan.

See text changes in Section 4.3.3:

Preliminary analytical results from the RFI sampling effort indicate the Boneyard contains unexpected levels of VOCs in the surface soils. The presence of unexpected VOCs in the surface soils implies that these compounds may be present at higher concentrations in the subsurface soils (the subsurface soils were not sample in the Phase I investigation). **Refer to Appendix B for the revised sampling and analysis plan for Phase I and for Phase II if necessary.**

Replace Section 4.3.4 with the following text.

~~A Phase II investigation will be conducted at the Boneyard to better define the nature and extent of potential contamination. The Phase I data will be assessed with the Phase II data in developing conclusions and recommendations in the Phase II report for PRS 36-005.~~

Phase I investigation will be continued at the Boneyard to collect subsurface data to confirm the level of VOCs above SALs and to provide information for a risk screening evaluation. All Phase I data will be assessed in developing conclusions and recommendations in the addendum to this report for PRS 36-005. If the information from the entire Phase I investigations is not adequate for final recommendations, a Phase II investigation will be conducted. See the Sampling and Analysis Plans,

Appendix B, for the sampling strategy for the continuation of Phase I and for Phase II, if it is required.

Comment

4. ***C-36-003, Table 4-7, p. 4-19.*** *A screening action level should be available for Chromium.*

Response

The screening action level for chromium was inadvertently omitted. The screening action level is 210 mg/kg. Refer to the revised section and Table 4.13.

Comment

5. ***4.4.3 Conclusions and Recommendations, C-36-003, p. 4-16.*** *It is difficult to correlate analytical results with Figure 1-10. A more detailed figure should be provided for samples located at the outfall. It appears that sample location 36-3108 is in several locations while these are probably duplicate samples.*

Response

Refer to Figure 1-10 (Revised) and Table 4-1A to indicate what samples were taken. Samples taken from the same sample location were water samples and soil samples taken at various depths. Table 4-1A indicates which samples are duplicates.

Comment

6. ***Appendix A, C-36-003, p. A-176.*** *An examination of the results from the water sample indicate that antimony and thallium are above the action levels for water. Are these results being used for the NPDES permit? These results should be discussed in the RFI report. Also, data is poorly organized within the Appendix. For example, for PRS C-36-003, Location ID 36-3108, on page A-176, results are jumbled for each sample ID, whereas all the results from one sample ID should be together.*

Response

Phase I sample results have been forwarded to ESH-18, Water Quality Group, but currently these perimeters are not regulated by the NPDES permit. This is an inactive outfall.

The Laboratory notes that the data is poorly organized within the Appendix. The data are available for review in the ER Project's Facility for Information Management, Analysis, and Display (FIMAD).

Appendix B Comments:

Comment

7. ***B.1.3 Sampling, PRS 36-005.*** *Is LANL collecting enough samples to support a risk assessment? If field screening is positive for organic vapors a sample will be collected every foot until field screening indicates negative for vapors, and the last sample will be submitted for analysis. LANL should also submit the last positive field screen sample for analysis.*

Response

The Laboratory has proposed collecting additional samples and using all sample results to provide risk assessors with information to perform a risk screening, a multiple constituent analysis, and if required, a risk assessment. All samples proposed in the sample plan are submitted for analysis.

Comment

8. ***Table B-1, p. B-4.*** *High explosives are potential contaminants at this site, and as EPA has previously indicated the HE spot test kit does not have a detection level sufficient to eliminate samples from HE analysis using SW 846 method 8330. LANL should provide information related to the HE results from the first sampling.*

Response

The high explosive (HE) spot test is used following the HE corridor protocol for health and safety. If the spot test indicates the presence of HE, additional samples will be taken. The HE analyses were performed using SW 8330, and RDX was detected at 1.72, mg/kg, which has a SAL of 64 mg/kg.

Comment

9. ***B.2.3 Soil and Sediment Sampling Plan, SWMU C-36-003.*** *Location 36-3112 is not indicated on Figure B-2.*

Response

Replace Appendix B, Sampling and Analysis Plans, of the RFI Report with the revised plans, Attachment E of this response. The revised Figure B-2 shows all sampling locations.

Comment

10. ***Table B-2.*** *This table indicates that the six sampling locations which are to be field screened for PCBs will also have laboratory analysis for PCBs, VOC, metals, and SVOCs. Text is unclear on this analysis.*

Response

Replace Appendix B, Sampling and Analysis Plans, of the RFI Report with the revised plans, Attachment E of this response. The revised plan indicates the screening and sampling information in Table B-3, which is consistent with the text.

ATTACHMENT A

3.0 RESULTS OF QUALITY ASSURANCE/QUALITY CONTROL ACTIVITIES

Samples were collected, processed, and analyzed in accordance with the Environmental Restoration Quality Assurance/Quality Control (QA/QC) program documented in the Site-Specific Quality Assurance Project Plan (QAPjP), Annex II of the RFI Work Plan for OU 1130 (LANL 1994, 1088). The QA objectives for measured data of precision, accuracy, representativeness, completeness, and comparability are based on the ER Program Generic QAPjP (LANL 1991, 0412).

A variety of QA/QC samples are used to determine the usability of the data generated from the various analyses. These samples included laboratory blanks, duplicates (field and laboratory), spikes, surrogates, and laboratory control samples. The assessment of QA/QC samples and the potential effect these results may have on data usability were evaluated for all samples.

The QA/QC data associated with this investigation indicated that a majority of the sample analytical data (≈99%) were acceptable and defensible. The QA/QC mechanisms were generally effective in ensuring the reliability of measured data within expected limits of sampling and analytical error. Of the more than 11,600 pieces of analytical data, ≈7% (≈812) were qualified as UJ or J and only <1% (<116) of the total (R data) was not used in the screening assessment.

The elimination of R qualified data did not affect the data requirements specified in the data quality objectives, which insures the data is sufficient for decision-making. This determination was made by a statistical analysis - 95% confidence limits of the mean, assuming normality. The maximum, rather than the mean, is the statistic of interest in a screening assessment. Because the distribution of the maximum is difficult to estimate, an analysis of the mean is presented. The distance from the upper confidence limit (UCL) of the mean to the threshold of interest (SAL) is great enough to state with confidence that this data is sufficient to make the necessary screening decisions. The data sufficiency is presented in Table 3-1.

TABLE 3-1
1130 DATA SUFFICIENCY

PRS	Chemical	95% UCL Range	SAL (mg/kg)
36-003(a)	Copper (water)	7.89< μ <9.61	1300 (μg/L)
	Mercury (soil)	0.02< μ <0.11	23
	Zinc (water)	0< μ <82.55	11000 (μg/L)
36-005	Dichorobenzene (1,2) [o-]	0< μ <8.09	2300
	Hexachloroethane	0< μ <19.9	32
	Methylphenol [2-]	0< μ <19.9	3300
	Selenium	0< μ <2.03	380
C-36-003	Cyanide (soil)	132 mg/kg*	1300

* 4 of 5 soil samples were R-flagged. However, the remaining value was so far below its SAL that it is considered sufficient on its own.

3.1 Inorganic Analyses

The QA/QC problems associated with the inorganic data for the PRSs investigated at TA-36 are summarized in Table 3-2. Table 3-3 correlates the sample numbers and sample request numbers for the PRSs.

Several inorganic analytes had percent recoveries in the blind QC samples and laboratory control samples that were not within the acceptable limits for these QC samples. The data associated with the QC samples were qualified either UJ or J because of the bias, unless the percent recovery was <10% or >200%. The latter occurred for copper and zinc in six samples from PRS C-36-003(a), for selenium in eighteen samples from PRS 36-005, and cyanide in five samples from PRS C-36-003(b) and five samples from C-36-003. These analytical data were qualified as unusable (R) and not used in the screening assessment. The data usability for the UJ or J qualified data was not affected and the data are considered valid.

In addition, cyanide and mercury were analyzed for several samples after the holding times were exceeded. These data were qualified as either UJ, J or R, depending on the length of the exceedance. Those data qualified as R were not used in the screening assessment, while those data qualified as UJ or J were considered valid estimated values and the usability of the data was not affected.

3.2 Organic Analyses

The QA/QC problems associated with the organic data (semivolatile, volatile, and high explosives) for the PRSs investigated at TA-36 are summarized in Table B-1 in Appendix B.

The organic analytical data had several QC samples that were outside of the acceptable limits resulting in either UJ, J, or R qualified data. The QC samples included blind QC samples, internal standards, and surrogates.

Semivolatile organic data had percent recoveries that were outside of the acceptable limits for several blind QC samples. These QC problems resulted in the most of the data being qualified as UJ or J and did not affect data usability. However, three semivolatiles in nine samples from PRS 36-005 had percent recoveries <10%, which resulted in the data being qualified as unusable (R). These data were not included in the screening assessment for this PRS.

No QA/QC problems associated with the SVOC data from C-36-003 were found

The majority of the volatile organic data were not affected by QA/QC problems. Several analytes were qualified as UJ because of internal standards that had counts below the acceptance limits. Only target compounds associated with the affected internal standards were qualified, but the usability of the data was not affected.

No VOCs were analyzed for samples collected at this site.

The high explosive data for several samples from PRSs 36-003(a) and 36-005 had percent recoveries in the blind QC samples that were outside of the acceptable limits. The data affected by the blind QC samples were qualified as UJ and their usability was unaffected.

High explosives were not analyzed for PRS C-36-003(b) and C-36-003.

3.3 Radiochemistry Analyses

The QA/QC problems associated with the radionuclide data for the PRSs investigated at TA-36 are summarized in Table B-1 in Appendix B.

Total uranium data for soil samples collected at PRS C-36-003(b) had percent recoveries for the laboratory control sample that were outside of contractual required limits. In addition, the total uranium data for soil samples collected at PRS 36-005 had percent recoveries for the blind QC sample below the acceptable limit. These data were qualified as J, their usability unaffected, and are considered to be valid estimated values.

Radionuclides were not analyzed for at PRS C-36-003(a) and C-36-003.

TABLE 3-2
DATA QUALITY EVALUATION FOR TA-36 SAMPLES

SUITE	REQUEST NUMBER	COMMENTS
Inorganics	18191 (six samples)[1]	Aluminum, antimony, barium, beryllium, cadmium, cobalt, lead, manganese, nickel, and vanadium in each sample had percent recoveries in the blind QC sample below the control limit (<75%). Data are qualified as UJ or J and usability unaffected; data valid.
	18494 (nine samples)	Thallium in each sample had percent recoveries in the blind QC sample below the control limit (<75%). Data are qualified as UJ or J and usability unaffected; data valid.
	18759 (thirteen samples)	Aluminum and chromium in each sample had percent recoveries in the blind QC sample below the control limit (<75%). Data are qualified as UJ or J. Beryllium in each sample had percent recovery in the blind QC sample above the upper control limit (>125%). Data are qualified as J. Data usability for all qualified data is unaffected; data valid.
	18757 (nine samples)	Aluminum, barium, chromium, copper, nickel, and vanadium in each sample had percent recoveries in the blind QC sample below the control limit (<75%). Data are qualified as UJ or J and usability unaffected; data valid.
	18761 (five samples)	Arsenic in each sample had percent recoveries in the blind QC sample below the control limit (<75%). Data are qualified as UJ or J and usability unaffected; data valid.
	19059 (five samples)	Aluminum, chromium, thallium, and vanadium in each sample had percent recoveries in the blind QC sample below the control limit (<75%). Data are qualified as UJ or J and usability unaffected; data valid.
	19061 (five samples)	Aluminum, chromium, thallium, and vanadium in each sample had percent recoveries in the blind QC sample below the control limit (<75%). Data are qualified as UJ or J and usability unaffected; data valid.
	20275 (six samples)	Aluminum, chromium, and vanadium in each sample had percent recoveries in the blind QC sample below the control limit (<75%). Data are qualified as UJ or J and usability unaffected; data valid.
	18191 (six samples)	Copper and zinc in each sample had percent recoveries in the blind QC sample below the lower acceptance limit (<10%). Data are qualified as R and usability is affected. Data are not used in the screening assessment.
	18494 (nine samples)	Selenium in each sample had percent recoveries in the blind QC sample above the upper acceptance limit (>200%). Data are qualified as R and usability is affected. Data are not used in the screening assessment.

[1] Number in parenthesis is the total number of samples in each batch.

TABLE 3-2
DATA QUALITY EVALUATION FOR TA-36 SAMPLES
(continued)

SUITE	REQUEST NUMBER	COMMENTS
Inorganics	18757 (nine samples)[1]	Selenium in each sample had percent recoveries in the blind QC sample above the upper acceptance limit (>200%). Data are qualified as R and usability is affected. Data are not used in the screening assessment.
	19059 (five samples)	Total cyanide in each sample had percent recoveries in the blind QC sample below the lower acceptance limit (<10%) and exceeded holding time. Data are qualified as R and usability is affected. Data are not used in the screening assessment.
	19061 (five samples)	Total cyanide in each sample had percent recoveries in the blind QC sample below the lower acceptance limit (<10%) and exceeded holding time. Data are qualified as R and usability is affected. Data are not used in the screening assessment.
	19059 (five samples)	Selenium in each sample had percent recovery in the laboratory control sample below the lower control limit (<80%). Data are qualified as UJ and usability is unaffected; data valid.
	19061 (five samples)	Selenium in each sample had percent recovery in the laboratory control sample below the lower control limit (<80%). Data are qualified as UJ and usability is unaffected; data valid.
	19059 (five samples)	The 28-day holding time was exceeded for mercury analysis in each sample. Data are qualified as UJ or J and usability is unaffected; data valid.
	19061 (five samples)	The 28-day holding time was exceeded for mercury analysis in each sample. Data are qualified as UJ or J and usability is unaffected; data valid.
	20273 (three samples)	The 14-day holding time was exceeded for total cyanide analysis in each sample. Data are qualified as UJ and usability is unaffected; data valid.
	20275 (six samples)	The 14-day holding time was exceeded for total cyanide analysis in each sample. Data are qualified as UJ or J and usability is unaffected; data valid.
	20297 (four samples)	The 28-day holding time was exceeded by 41 days for mercury analysis in each sample. Data are qualified as R and usability is affected. Data are not used in the screening assessment.
	20297 (four samples)	Total cyanide was not analyzed for these samples and therefore no data are available.

[1] Number in parenthesis is the total number of samples in each batch.

TABLE 3-2
DATA QUALITY EVALUATION FOR TA-36 SAMPLES
(continued)

SUITE	REQUEST NUMBER	COMMENTS
SVOC	18304 (nine samples)[1]	Anthracene, benzo(a)pyrene, bis(2-chloroethyl)ether, 4-chloro-3-methyl phenol, naphthalene, 1,2,4-trichlorobenzene, and 2,4,6-trichlorophenol in each sample had percent recoveries in the blind QC sample below the control limit (<80%). Data are qualified as UJ and usability is unaffected; data valid.
	20211 (six samples)	Anthracene, benzo(b)fluoranthene, bis(2-ethylhexyl)phthalate, 4-bromophenylphenyl ether, chrysene, dibenzofuran, 1,2- and 1,3-dichlorobenzene, 2,4-dinitrotoluene, di-n-octyl phthalate, 2- and 4-methylphenol, naphthalene, phenol, pyrene, 1,2,4-trichlorobenzene, and 2,4,6-trichlorophenol in each sample had percent recoveries in the blind QC sample below the control limit (<80%). Data are qualified as UJ and usability is unaffected; data valid.
	18304 (nine samples)	1,2-Dichlorobenzene, hexachloroethane, and 2-methylphenol for each sample had percent recoveries in the blind QC sample below the lower acceptance limit (<10%). Data are qualified as R and usability is affected. Data are not used in the screening assessment.
VOC	18345 (three samples)	The area counts for the last one or two internal standard were below the acceptance limit for each sample. The associated target compounds (bromobenzene, n-, sec-, and tert-butylbenzene, 2- and 4-chlorotoluene, 1,2-dibromo-3-chloropropane, 1,2- , 1,3-, and 1,4-dichlorobenzene, isopropylbenzene, 4-isopropyltoluene, propylbenzene, 1,1,2,2-tetrachloroethane, 1,2,3-trichloropropane, 1,2,4-trimethylbenzene,and 1,3,5-trimethylbenzene) are qualified as UJ and usability is unaffected; data valid.
	18390 (six samples)	The area counts for the last internal standard were below the acceptance limit for each sample. The associated target compounds (bromobenzene, bromoform, n-, sec-, and tert-butylbenzene, chlorobenzene, chlorodibromomethane, 2- and 4-chlorotoluene, 1,2-dibromoethane, 1,2-dibromo-3-chloropropane, 1,2- , 1,3-, and 1,4-dichlorobenzene, ethylbenzene, isopropylbenzene, 4-isopropyltoluene, propylbenzene, 4-methyl-2-pentanone, 1,1,1,2- and 1,1,2,2-tetrachloroethane, tetrachloroethylene, toluene, 1,2,3-trichloropropane, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and xylenes{mixed}) are qualified as UJ and usability is unaffected; data valid.

[1] Number in parenthesis is the total number of samples in each batch.

TABLE 3-2
DATA QUALITY EVALUATION FOR TA-36 SAMPLES
(continued)

SUITE	REQUEST NUMBER	COMMENTS
VOC	18442 (five samples)[1]	The area counts for the last internal standard were below the acceptance limit for four samples. The associated target compounds (bromobenzene, n- and tert-butylbenzene, 2- and 4-chlorotoluene, 1,2-dibromo-3-chloropropane, 1,2- , 1,3-, and 1,4-dichlorobenzene, isopropylbenzene, 4-isopropyltoluene, propylbenzene, 1,1,2,2-tetrachloroethane, 1,2,3-trichloropropane, 1,2,4-trimethylbenzene,and 1,3,5-trimethylbenzene) are qualified as UJ and usability is unaffected; data valid.
	20281 (four samples)	The area counts for the internal standard 1,4-dichlorobenzene-d4 were below the acceptance limit. The associated target compounds (bromobenzene, n-, sec-, and tert-butylbenzene, 2- and 4-chlorotoluene, 1,2-dibromo-3-chloropropane, 1,2-, 1,3-, and 1,4-dichlorobenzene, isopropylbenzene, 4-isopropyltoluene, propylbenzene, 1,2,3-trichloropropane, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene) are qualified as UJ and usability is unaffected; data valid.
HE	18308 (nine samples)	m-Nitrotoluene in each sample had percent recovery in the blind QC sample below the lower control limit (<50%). The laboratory detected but could not confirm the presence of 0- and p-nitrotoluenes in the blind QC sample. The data for these three analytes are qualified as UJ and usability is unaffected; data are valid.
	18392 (thirteen samples)	Tetryl(methyl-2,4,6-trinitrophenylnitramine) in each sample was not detected in the blind QC sample. However, the spiking level was close to the EQL and the data are qualified as UJ. Data usability is unaffected; data valid.
	18393 (nine samples)	Nitrobenzene had percent recovery in the blind QC sample for each sample below the lower control limit (<50%). Data are qualified as UJ and usability is unaffected; data valid.
	18442 (five samples)	m-,o-, and p-Nitrotoluenes and tetryl(methyl-2,4,6-trinitrophenylnitramine) had percent recovery in the blind QC sample for each sample below the lower control limit (<50%). Data are qualified as UJ and usability is unaffected; data valid.
Radionuclides	19211 (nine samples)	Total uranium in each sample had percent recovery in the blind QC sample below the lower control limit (<75%). Data are qualified as J and usability is unaffected; data valid.
	19639 (five samples)	Total uranium result in each sample deviated from the known value by 29% in the laboratory control sample, which is outside the contractual requirement of +/- 20%. Data are qualified as J and usability is unaffected; data valid.

[1] Number in parenthesis is the total number of samples in each batch.

TABLE 3-3

SAMPLE REQUESTS CORRELATED WITH PRSs AND SAMPLE NUMBERS

REQUEST	PRS	SAMPLE ID
18191	36-003(a)	AAB1873
		AAB1874
		AAB1875
		AAB1876
		AAB1877
		AAB1878
18304	36-005	AAB1852
		AAB1853
		AAB1854
		AAB1855
		AAB1856
		AAB1857
		AAB1858
		AAB1859
		AAB1860
18345	36-005	AAB1834
		AAB1835
		AAB1836
		AAB1837
		AAB1838
		AAB1839
		AAB1840
		AAB1841
		AAB1842
18390	36-005	AAB1843
		AAB1861
		AAB1862
		AAB1863
		AAB1864
		AAB1865
		AAB1866
		AAB1867
		AAB1868
		AAB1869
		AAB1870
		AAB1871
		AAB1872

TABLE 3-3

SAMPLE REQUESTS CORRELATED WITH PRSs AND SAMPLE NUMBERS (continued)

18494	36-005	AAB1852
		AAB1853
		AAB1854
		AAB1855
		AAB1856
		AAB1857
		AAB1858
		AAB1859
		AAB1860
18757	36-005	AAB1834
		AAB1835
		AAB1836
		AAB1837
		AAB1838
		AAB1839
		AAB1840
		AAB1841
		AAB1842
18759	36-005	AAB1843
		AAB1861
		AAB1862
		AAB1863
		AAB1864
		AAB1865
		AAB1866
		AAB1867
		AAB1868
		AAB1869
		AAB1870
		AAB1871
		AAB1872
18761	36-003(b)	AAB1879
		AAB1880
		AAB1881
		AAB1882
		AAB1884
19059	C-36-003	AAB1911
		AAB1912
		AAB1913
		AAB1914
		AAB1915

TABLE 3-3

SAMPLE REQUESTS CORRELATED WITH PRSs AND SAMPLE NUMBERS (concluded)

19061	36-003(b)	AAB1885
		AAB1886
		AAB1887
		AAB1888
		AAB1889
20211	36-003(a)	AAB1895
		AAB1900
		AAB1901
		AAB1903
		AAB1904
20273	36-005	AAB1893
		AAB1897
		AAB1898
20275	36-003(a)	AAB1895
		AAB1900
		AAB1901
		AAB1903
		AAB1904
20297	36-003(a)	AAB1892
		AAB1894
		AAB1909
		AAB1910

4.1.2.3 Screening Assessment for PRS 36-003(a)

In general, some of the inorganics analyzed as part of the analytical suite are not subjected to the data comparison because they are not considered to be COPCs at any of the PRSs or AOCs investigated. These inorganics include calcium, iron, magnesium, potassium, and sodium and occur naturally in soils.

Background Comparison

Inorganics

The screening assessment was performed separately for the septic tank contents as opposed to the leachfield. A comparison of inorganics with background UTLs was not done for those analytes detected within the septic tank because such a comparison is not appropriate but reported in Table 4.2; 14 inorganics were retained as COPCs in the septic tank, and subsequently carried forward to the SAL comparison stage.

Inorganic chemicals detected in the leachfield surface soil samples were compared with their natural background UTLs. Four inorganics - beryllium, cyanide, mercury, and zinc - were detected above background UTLs. The inorganics that were either undetected or less than the background UTLs were eliminated as COPCs.

Further background comparisons were performed for the inorganics that exceeded their background UTLs to determine whether statistically significant differences existed between the site and background datasets. The Willcoxon/Gehan test, the Quantile test, and the Slippage test were used for these evaluations. The Gehan Rank Sum test is best suited for assessing complete shifts in distribution, whereas the Quantile test is better suited for assessing partial shifts. The Slippage test determines the probability of any one site concentration being greater than the maximum background concentration, given the site data originates from the same distribution as the background data. Between the three tests, most types of differences between distributions can be captured. Of the inorganics observed at values greater than their respective UTLs, beryllium was reported at levels that were consistent within background concentrations (Annex A). Observed significance levels (P-values) for these tests are 0.9989, 0.7345, and 1.00, respectively. If a P-value is less than some small probability, typically 0.05, then there is some reason to suspect that there is a difference between the background and site distributions; otherwise, no difference is indicated. In this case, the site beryllium data are shown to be from the same distribution as the background beryllium data, and will no longer be considered a COPC for this site. The remaining three inorganics - cyanide, mercury, and zinc - had concentrations that exceeded the statistical background datasets, and were carried forward to the SAL comparison stage.

TABLE4-2
INORGANICS WITH CONCENTRATIONS GREATER THAN BACKGROUND UTL FOR PRS 36-003(a)

Septic Tank

Sample ID	Depth (in.)	Aluminum (µg/L)	Arsenic (µg/L))	Barium (µg/L)	Cadmium (µg/L)	Chromium (µg/L)
LANL UTL	NA	NA	NA	NA	NA	NA
SAL*	NA	**37000**	**50**	**1000**	**5**	**50**
AAB1873	NA	ND	ND	ND	ND	15.6
AAB1874	NA	ND	ND	ND	ND	22.9
AAB1875	NA	48.3	ND	31.4 (D)	ND	16.5 (D)
AAB1876	NA	29100 (J)	ND	2300 (J)	21 (J)	451
AAB1877	NA	42000 (J)	ND	3350 (J)	30 (J)	780
AAB1878	NA	20600 (J)	16.7	1670 (J)	15.4 (J)	402

Sample ID	Depth (in.)	Copper (µg/L)	Lead (µg/L)	Manganese (µg/L)	Mercury (µg/L)	Nickel (µg/L)
LANL UTL	NA	NA	NA	NA	NA	NA
SAL*	NA	**1300**	**50**	**180**	**2**	**100**
AAB1873	NA	ND	5.3 (J)	ND	ND	ND
AAB1874	NA	ND	3.7 (D)	ND	ND	ND
AAB1875	NA	8.7 (D)	8.8 (J)	12.6 (D)	ND	ND
AAB1876	NA	3760 (R)	290 (J)	1000 (J)	66.4	102 (J)
AAB1877	NA	5070 (R)	270 (J)	855 (J)	11.5 (D)	128 (J)
AAB1878	NA	2160 (R)	142 (J)	395 (J)	3.79	60.7 (J)

Sample ID	Depth (in.)	Selenium (µg/L)	Silver (µg/L)	Vanadium (µg/L)	Zinc (µg/L)
LANL UTL	NA	NA	NA	NA	NA
SAL*	NA	**50**	**50**	**260**	**11000**
AAB1873	NA	ND	ND	ND	74.9 (R)
AAB1874	NA	ND	11.3	ND	93.7 (R)
AAB1875	NA	ND	14 (D)	9.2 (D)	52.7 (D)
AAB1876	NA	24.2	10800	392 (J)	8970 (R)
AAB1877	NA	ND	17900	659 (J)	12900 (R)
AAB1878	NA	ND	18300	364 (J)	6360 (R)

NA = not applicable N/A = Not available ND = Non detect
Shading = chemical exceeded SAL/no SAL * Water SAL

TABLE 4-2
INORGANICS WITH CONCENTRATIONS GREATER THAN BACKGROUND UTL FOR PRS 36-003(a)
(continued)

Leachfield

Sample ID	Depth (in.)	Cyanide* (mg/kg)	Mercury (mg/kg)	Zinc (mg/kg)
LANL UTL	NA	N/A	0.1	50.8
SAL	NA	**1300**	**23**	**23000**
AAB1892	30-38	0	0.23 (D)	44.1 (D)
AAB1893	24-32	ND	0.17	44
AAB1894	38-40	0	0.13 (R)	66.1
AAB1895	30-40	1.6 (J)	ND	21
AAB1897	24-32	0.43 (D)	0.18	40.8
AAB1901	32-38	0.97 (J)	ND	22.8
AAB1906	4.5-5 ft.	0.56 (D)	0.05 (D)	45.8
AAB1907	60-66	0.67	ND	37.6
AAB1910	6.5-7 ft	0	ND	59

NA = not applicable N/A = Not available ND = Non detect
* Cyanide is assumed to be in free form which is a very conservative assumption

Radionuclides

No radionuclides were detected above background UTLs; therefore were eliminated as COPCs

Evaluation of Organic Constituents

Five organics were detected in the septic tank, and were carried forward to the SAL comparison stage.

Evaluation of the leachfield data indicated three organics - bis(2-ethylhexyl)phthalate, di-n-butylphthalate, and methylene chloride - were detected above EQLs, and were submitted to the SAL comparison stage. Two of the organics - bis(2-ethylhexyl)phthalate and di-n-butylphthalate - are common laboratory contaminants, but no QC qualifiers were reported with these sample numbers nor were any field blanks taken to determine if these chemicals were a result of laboratory contamination. Therefore, they were carried forward to the SAL comparison stage.

TABLE 4-3
PRS 36-003(a) SOIL CONCENTRATIONS OF ORGANIC ANALYTES WITH VALUES GREATER THAN EQL

Septic Tank

Sample ID	Depth (in.)	2-Butanone (µg/L)	Carbon disulfide (µg/L)	Chlorobenzene (µg/L)
SAL	NA	**1900**	**21**	**100**
EQL	NA	10	10	10
AAB1876	N/A	49	210	ND
AAB1877	N/A	ND	28	ND
AAB1878	N/A	ND	38	6

NA = not applicable N/A = Not available ND = Non detect
Shading = chemical exceeded SAL/no SAL

TABLE 4-3
PRS 36-003(a) SOIL CONCENTRATIONS OF ORGANIC ANALYTES WITH VALUES GREATER THAN EQL (continued)

Septic Tank

Sample ID	Depth (in.)	Chloromethane (µg/L)	Dichlorobenzene(1,4) [p-] (µg/L)
SAL	NA	**1.5**	**75**
EQL	NA	10	0.33
AAB1876	N/A	ND	44 (D)
AAB1877	N/A	ND	34
AAB1878	N/A	13	23 (D)

Leachfield

Sample ID	Depth (in.)	Bis(2-ethylhexyl) phthalate (mg/kg)	Di-n-butylphthalate (mg/kg)	Methylene chloride (mg/kg)
SAL	NA	**32**	**6500**	**11**
EQL	NA	0.33	0.33	10
AAB1893	24-32	ND	0.61	ND
AAB1895	30-40	ND	ND	0.015
AAB1897	24-32	ND	0.42	ND
AAB1898	33-42	2.1	ND	ND

NA = not applicable N/A = Not available ND = Non detect
Shading = chemical exceeded SAL/no SAL

Screening Assessment

In the SAL comparison stage for the septic tank, 10 chemicals had concentrations greater than their SALs. The inorganics that were below SALs were submitted to the MCE since there is not a complete exposure pathway. Septic tank contents (i.e., water and sludge were compared against water SALs). Eleven chemicals (10 inorganics and 1 organic) were detected above their respective SALs and were retained as COPCs in the septic tank.

Three drainfield inorganics - cyanide, mercury, and zinc - were detected below their respective SALs on that basis were submitted to the MCE.

Multiple Chemical Evaluation

The multiple chemical evaluation indicated four analytes, cyanide, di-n-butylphthalate, mercury, and zinc, in the noncarcinogenic effects category. The sum of the maximum normalized concentrations totaled 0.0142, which was less than the target value of 1 indicating adverse health effects are unlikely. These chemicals were eliminated as COPCs. For carcinogenic effects, bis(2-ethylhexyl)phthalate, and methylene chloride were submitted to the MCE. The sum of the maximum normalized concentrations totaled 0.0670, which was less than the target value of 1 indicating adverse health effects are unlikely. Therefore, these chemicals were eliminated as COPCs. No evaluation of radionuclide effects was performed because no analytes were detected.

TABLE 4-4
MULTIPLE CHEMICAL EVALUATION FOR NONCARCINOGENIC CHEMICALS IN LEACHFIELD SOILS AT PRS 36-003(a)

NONCARCINOGENIC

ANALYTE	MAXIMUM NORMALIZED CONCENTRATIONS
Cyanide	0.0012
Di-n-butylphthale	0.0001
Mercury	0.0100
Zinc	0.0029
Total	0.0142

CARCINOGENIC

ANALYTE	MAXIMUM NORMALIZED CONCENTRATIONS
Bis(2-ethylhexyl)phthalate	0.0656
Methylene chloride	0.0014
Total	0.0670

4.1.3 Conclusions and Recommendations

Results of the screening assessment identified 11 COPCs in the septic tank that exceeded their respective SALs. The contents of the tank will be handled under a VCA.

The drainfield was adequately characterized and no COPCs were retained from the screening assessment. No release from the septic tank is indicated based on an analysis of the data. Data from sampling locations near the tank indicated nondetects. No additional sampling or cleanup is warranted in the area surrounding the septic tank.

The decision to sample and remediate the seepage pit was made based on the fact that levels of contaminants present in the seepage pit were no greater in the pit than in the leachfield. No unacceptable risk to human health as been determined from the leachfield by the results of the sampling and COPC comparisons. Therefore, the seepage pit will not be sampled nor remediated.

All data were determined to meet the data requirements for decision-making purposes.

4.2.3 Screening Assessment for PRS 36-003(b)

In general, some of the inorganics analyzed as part of the analytical suite are not subjected to the data comparison because they are not considered to be COPCs at any of the PRSs investigated. These inorganics include calcium, iron, magnesium, potassium, and sodium and occur naturally in soils.

Background Comparison

Inorganics

The screening assessment was performed separately for the septic tank contents as opposed to the leachfield. A comparison of inorganics with background UTLs was not done for those analytes detected within the septic tank because such a comparison is not appropriate but reported in Table 4.5; 15 inorganics were retained as COPCs in the septic tank, and subsequently carried forward to the SAL comparison stage.

Five inorganics - antimony, copper, lead, mercury, and total uranium (as an inorganic) - were detected in the outfall drainage area above natural background UTLs. Further statistical background tests indicated all the chemicals exceeded background datasets and were submitted to the SAL comparison stage.

TABLE 4.5
INORGANICS WITH CONCENTRATIONS GREATER THAN BACKGROUND UTL FOR PRS 36-003(b)

Septic Tank

Sample ID	Depth (in.)	Aluminum (µg/L)	Arsenic (µg/L))	Barium (µg/L)	Beryllium (µg/L)	Cadmium (µg/L)
LANL UTL	NA	NA	NA	NA	NA	NA
SAL*	NA	**37000**	**50**	**1000**	**4**	**5**
AAB1879	NA	ND	ND	ND	ND	ND
AAB1880	NA	ND	ND	ND	ND	ND
AAB1881	NA	22.4 (D)	4.9 (D)	43.2 (D)	ND	ND
AAB1882	NA	747000	154 (J)	14500	67.9	21.4
AAB1884	NA	1090000	132 (J)	10600	83.4	75.2

Sample ID	Depth (in.)	Chromium (µg/L)	Cobalt (µg/L)	Copper (µg/L)	Lead (µg/L)	Manganese (µg/L)
LANL UTL	NA	NA	NA	NA	NA	NA
SAL*	NA	**50**	**2200**	**1300**	**50**	**180**
AAB1879	NA	ND	ND	ND	ND	ND
AAB1880	NA	ND	ND	ND	ND	ND
AAB1881	NA	ND	ND	2 (D)	4.1 (D)	ND
AAB1882	NA	668	388	2670	12700	22500
AAB1884	NA	925	440	4960	7633 (D)	22800

NA = not applicable N/A = Not available ND = Non detect
* Water SAL Shading = chemical exceeded SAL/no SAL

TABLE 4.5
INORGANICS WITH CONCENTRATIONS GREATER THAN BACKGROUND UTL FOR PRS 36-003(b)
(continued)

Septic Tank

Sample ID	Depth (in.)	Mercury (µg/L)	Nickel (µg/L))	Silver (µg/L)	Vanadium (µg/L)	Zinc (µg/L)
LANL UTL	NA	NA	NA	NA	NA	NA
SAL*	NA	**2**	**100**	**50**	**260**	**11000**
AAB1879	NA	ND	ND	ND	ND	40.4
AAB1880	NA	ND	ND	ND	ND	44.2
AAB1881	NA	ND	ND	ND	13.3 (D)	109 (D)
AAB1882	NA	30	744	1880	733	50700
AAB1884	NA	81.8 (D)	794	818	861	41900 (D)

Outfall Drainage Area

Sample ID	Depth (in.)	Antimony (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Total Uranium (mg/kg)
LANL UTL	NA	1	30.7	23.3	0.01	5.45
SAL	NA	**31**	**2800**	**400**	**23**	**230***
AAB1885	0-6	6.3	33.1	27.5	0.15 (J)	63.2 (J)
AAB1886	0-6	ND	318	38.4	0.16 (J)	84.5 (J)
AAB1887	0-6	ND	17.1	17.2	0.07 (J)	11.2 (J)
AAB1888	0-6	ND	34.3	24.9	0.16	32.3 (J)
AAB1889	0-6	ND	7.1	6.4	ND	8.99 (J)

NA = not applicable N/A = Not available ND = Non detect * SAL for uranium as an inorganic

Radionuclides

Uranium was detected in the septic tank had a maximum concentration of 533 mg/kg, and was retained as a COPC. The MCE was not applicable for septic tank contents.

Drainage area radionuclide data was evaluated for the presence of DOE introduced radionuclides. The evaluation process examined each reported radionuclide based on its origin, i.e., whether it is naturally occurring or man-made. Based on the use of the site, it was determined depleted uranium (DU) and not natural uranium was the only radionuclide detected. Total uranium was carried forward to the SAL comparison stage for depleted uranium.

TABLE 4.6
RADIONUCLIDES WITH SOIL CONCENTRATIONS GREATER THAN BACKGROUND UTL FOR PRS 36-003(b)

Septic Tank

Sample ID	Depth (in.)	Uranium (µg/L)
LANL UTL	NA	NA
SAL	NA	**20***
AAB1879	NA	128
AAB1880	NA	130
AAB1881	NA	130
AAB1882	NA	143
AAB1884	NA	533 (D)

Outfall Drainage Area

Sample ID	Depth (in.)	Uranium (mg/kg)
LANL UTL	NA	5.45
SAL	NA	**130***
AAB1885	0-6	63.2 (J)
AAB1886	0-6	84.5 (J)
AAB1887	0-6	11.2 (J)
AAB1888	0-6	32.3 (J)
AAB1889	0-6	8.99 (J)

NA = not applicable Shading = chemical exceeded SAL/no SAL
* Water SAL * SAL for total uranium is for DU

Evaluation of Organic Constituents

No organics were detected in the septic tank.

Evaluation of the outfall drainage data indicated only one organic - RDX - detected above EQL, and was submitted to the SAL comparison stage.

TABLE 4.7
PRS 36-003(b) SOIL CONCENTRATIONS OF ORGANIC ANALYTES WITH VALUES GREATER THAN EQL

Outfall Drainage Area

Sample ID	Depth (in.)	RDX (mg/kg)
SAL	**NA**	**4**
EQL	NA	0.164
AAB1888	0-6	0.51

NA = not applicable

Screening Assessment

Septic tank contents were evaluated separately from the drainfield. Fifteen COPCs (14 inorganics and 1 radionuclide) were identified based on the SAL comparison because they either exceeded SAL or had no SAL. Uranium was detected at elevated levels in the tank with a maximum concentration of 533 µg/L. The inorganic (cobalt) in the septic tank that was below SAL was not submitted for an MCE because the tank did not provide a complete exposure pathway that could result in a human health risk.

In the drainage area, antimony, copper, lead, mercury, and total uranium were detected below their respective SALs on that basis were submitted to the MCE.

One radionuclide, total uranium (DU), in the drainage area was detected below the DU SAL of 130 mg/kg, but was not submitted to the MCE because it was the only analyte in the radionuclide effects category. No radionuclides were retained as COPCs.

One organic carcinogenic compound, RDX, was detected in the drainage area below its SAL of 4 mg/kg. RDX was not submitted to the MCE because it did not meet the criteria for submittal; therefore, it was eliminated as a COPC.

Multiple Chemical Evaluation

The multiple chemical evaluation showed five analytes, antimony, copper, lead, mercury, and total uranium in the noncarcinogenic effects category. The sum of the maximum normalized concentrations totaled 0.7872, which was less than the target value of 1 indicating adverse health effects are unlikely. Therefore, these analytes were eliminated as COPCs. No evaluation of carcinogenic nor radionuclide effects was performed because no analytes were eligible for the MCE analysis.

TABLE 4.8
MULTIPLE CHEMICAL EVALUATION FOR NONCARCINOGENIC CHEMICALS IN DRAINFIELD SOILS AT PRS 36-003(b)

NONCARCINOGENIC ANALYTE	MAXIMUM NORMALIZED CONCENTRATIONS
Antimony	0.2032
Copper	0.1136
Lead	0.0960
Mercury	0.0070
Total Uranium	0.3674
Total	0.7872

4.2.4 Conclusions and Recommendations

Results of the screening assessment identified 15 COPCs in the septic tank that either exceeded their respective SALs or had no SAL. The contents of the tank will be handled under a VCA as a best management practice to remove all possible sources of contaminants from the environment.

The drainfield was adequately characterized and no COPCs were retained based on the screening assessment. No release from the septic tank is indicated based on an analysis of the data. Data from sampling locations near the tank indicated nondetects.

4.3.2.3 Screening Assessment for PRS 36-005

In general, some of the inorganics analyzed as part of the analytical suite are not subjected to the data comparison because they are not considered to be COPCs at any of the PRSs or AOCs investigated. These inorganics include calcium, iron, magnesium, potassium, and sodium and occur naturally in soils.

Background Comparison

Inorganics

Three inorganic chemicals - silver, thallium, and total uranium -were detected in the surface soil samples and were compared with their natural background UTLs. The inorganics that were either undetected or less than the background UTLs were eliminated as COPCs.

Further background comparisons were performed for these inorganics that exceeded their background UTLs to determine whether statistically significant differences existed between the site and background datasets. The Willcoxon/Gehan test, the Quantile test, and the Slippage test were used for these evaluations. The Gehan test is best suited for assessing complete shifts in distribution, whereas the Quantile test is better suited for assessing partial shifts. The Slippage test determines the probability of any one site concentration being greater than the maximum background concentration, given the site data originates from the same distribution as the background data. Between the three tests, most types of differences between distributions can be captured. Of the inorganics observed at values greater than their respective UTLs, uranium (evaluated as an inorganic and radionuclide), was reported at levels that were consistent within background concentrations (Annex B). Observed significance levels (P-values) for these tests are 1.000, 0.9975, and 0.1753, respectively. If a P-value is less than some small probability, typically 0.05, then there is some reason to suspect that there is a difference between the background and site distributions; otherwise, no difference is indicated. In this case, the site uranium data are shown to be from the same distribution as the background uranium data, and will no longer be considered a COPC for this site. The remaining two inorganics -silver and thallium - had concentrations that exceeded the statistical background datasets, and were carried forward to the SAL comparison stage.

TABLE 4.9
INORGANICS WITH CONCENTRATIONS GREATER THAN BACKGROUND UTL IN SOILS FOR PRS 36-005

Sample ID	Depth (in.)	Silver (mg/kg)	Thallium (mg/kg)
LANL UTL	NA	NA	1
SAL	NA	**380**	**6.1**
AAB1843	0-6	ND	ND
AAB1870	0-6	1.1 (D)	ND
AAB1872	0-6	ND	1.24

NA = Not applicable ND = Not detected

Radionuclides

One radionuclide isotope - uranium-235 - was detected above background UTL (Table 4.10) and was submitted to the SAL comparison stage.

TABLE 4.10
RADIONUCLIDES WITH SOIL CONCENTRATIONS GREATER THAN BACKGROUND UTL FOR PRS 36-005

Sample ID	Depth (in.)	Uranium-235 (pCi/g)
LANL UTL	NA	0.084
SAL	NA	**10**
AAB1834	0-6	0.224
AAB1839	0-6	0.2063
AAB1843	0-6	ND
AAB1855	0-6	0.19
AAB1857	0-6	0.2087

NA = not applicable ND = Not detected

Evaluation of Organic Constituents

Eight organics were detected above EQLs and was submitted to the SAL comparison stage. The organics that were undetected were eliminated as COPCs.

TABLE 4.11
PRS 36-005 SOIL CONCENTRATIONS OF ORGANIC ANALYTES WITH VALUES GREATER THAN EQL

Sample ID	Depth (in.)	Acetone (mg/kg)	4-Methyl-2-pentanone (mg/kg)	Methylene Chloride (mg/kg)	RDX (mg/kg)
SAL	NA	**2000**	**5200**	**11**	**4**
EQL	NA	10	10	10	0.176
AAB1834	0-6	ND	ND	0.011	ND
AAB1839	0-6	ND	ND	0.012	1.72
AAB1840	0-6	ND	ND	0.007	ND
AAB1841	0-6	ND	ND	0.008	ND
AAB1843	0-6	0.52	ND	0.13 (J)	ND
AAB1853	0-6	ND	ND	0.008	ND
AAB1854	0-6	ND	ND	0.01	ND
AAB1857	0-6	ND	ND	0.016	ND
AAB1858	0-6	ND	0.02	ND	ND
AAB1859	0-6	ND	ND	0.01	ND
AAB1860	0-6	ND	ND	0.01	ND

NA = Not applicable ND = Not detected

TABLE 4.12
PRS 36-005 SOIL CONCENTRATIONS OF ORGANIC ANALYTES WITH VALUES GREATER THAN EQL
(continued)

Sample ID	Depth (in.)	Toluene (mg/kg)	Trichloroethene (mg/kg)	1,2,4-Trimethylbenzene (mg/kg)	Xylenes (o + m + p) mixed (mg/kg)
SAL	NA	**1900**	**7.1**	**8**	**990**
EQL	NA	10	10	0.33	10
AAB1834	0-6	ND	ND	ND	ND
AAB1839	0-6	ND	ND	ND	ND
AAB1840	0-6	ND	ND	ND	ND
AAB1841	0-6	ND	ND	ND	ND
AAB1843	0-6	ND	ND	ND	ND
AAB1853	0-6	ND	ND	ND	ND
AAB1854	0-6	ND	ND	ND	ND
AAB1857	0-6	0.009	0.035	0.07	0.061
AAB1858	0-6	0.028	0.11	0.12	0.143
AAB1859	0-6	ND	ND	ND	ND
AAB1860	0-6	0.008	0.031	0.055	0.055

NA = Not applicable ND = Not detected

Screening Assessment

Two inorganics in the surface soil - silver and thallium - were below their SALs and on that basis were submitted to the MCE for noncarcinogenic effects.

Eight organics - acetone, 4-methyl-2-pentanone, methylene chloride, RDX, toluene, trichloroethene, 1,2,4-trimethylbenzene, and mixed xylene (o + m + p) - were detected below their SALs and were submitted to the MCE for carcinogenic and noncarcinogenic effects. No organic chemicals exceeded their SAL.

Isotopic uranium-235 was detected below its SAL of 10 pCi/g; however, it was not submitted to the MCE because it is the only analyte in the radionuclide effects category therefore it was eliminated as a COPC.

Multiple Chemical Evaluation

The multiple chemical evaluation indicated eight analytes in the noncarcinogenic effects category. The maximum normalized concentrations of these analytes totaled 0.2371, which was less than the target value of 1 indicating that adverse health effects are unlikely. Therefore, these analytes were eliminated as COPCs. Carcinogenic effects were evaluated for methylene chloride and RDX. The maximum normalized concentration totaled 0.4418, which less than the target value of 1 indicating that adverse health effects are unlikely. Therefore, these two organics were eliminated as COPCs. No evaluation of radionuclide effects was performed because no analytes were eligible for the MCE.

TABLE 4.13
MULTIPLE CHEMICAL EVALUATION FOR CHEMICALS IN SOILS AT PRS 36-005

NONCARCINOGENIC

ANALYTE	MAXIMUM NORMALIZED CONCENTRATION
Silver	0.0029
Thallium	0.2033
Acetone	0.0003
4-Methyl-2-pentanone	0.0000
Toluene	0.0000
Trichloroethene	0.0155
1,2,4-Trimethybenzene	0.0150
Xylene (o + m + p) mixed	0.0001
Total	0.2371

CARCINOGENIC

Methylene chloride	0.0118
RDX	0.4300
Total	0.4418

Conclusions and Recommendations

No COPCs were retained from the screening assessment, and the data were determined to meet the data requirements for decision-making purposes. Additional Phase I sampling will be performed to determine the depth of the unexpected VOCs in the Boneyard. Phase II sampling may be required based on the results of the Phase I investigations to determine the extent and nature of volatile contamination in the subsurface. Refer to Appendix B for the revised sampling and analysis plan for the completion of Phase I and for Phase II, if it is required.

4.4.2.3 Screening Assessment for PRS C-36-003

In general, some of the inorganics analyzed as part of the analytical suite are not subjected to the data comparison because they are not considered to be COPCs at any of the PRSs or AOCs investigated. These inorganics include calcium, iron, magnesium, potassium, and sodium and occur naturally in soils.

Background Comparison

Inorganics

Nine inorganic chemicals detected in the surface soil samples were compared with their natural background UTLs. The inorganics that were either undetected or less than the background UTLs were eliminated as COPCs.

Further background comparisons were performed for the nine inorganics to determine whether statistically significant differences exist between the site and background datasets. The Wilcoxon/Gehan Rank Sum test, the Quantile test, and the Slippage test were used for these evaluations. The Willcoxon Rank Sum test is best suited for assessing complete shifts in distribution, whereas the Quantile test is better suited for assessing partial shifts. The Slippage test determines the probability of any one site concentration being greater than the maximum background concentration, given the site data originates from the same distribution as the background data. Between the three tests, most types of differences between distributions can be captured. Of the retained inorganics observed at values greater than their respective UTLs, only manganese was reported at levels that were consistent within background concentrations (Annex C). Observed significance levels (P-values) for manganese for these tests are 0.83, 0.67, and 1.00, respectively. If a P-value is less than some small probability, typically 0.05, then there is some reason to suspect that there is a difference between the background and site distributions; otherwise, no difference is indicated. In this case, the site manganese data are shown to be from the same distribution as the background manganese data, and will no longer be considered a COPC for this site while the other inorganics were observed to be greater than background datasets and were carried forward to the SAL comparison stage.

TABLE 4.14
INORGANICS WITH CONCENTRATIONS GREATER THAN BACKGROUND UTL FOR PRS C-36-003

Surface Soil

Sample ID	Depth (in.)	Chromium[1] (mg/kg)	Copper (mg/kg)	Cyanide[2] (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)
LANL UTL	NA	19.3	30.7	N/A	23.3	0.1
SAL	NA	**210**	**2800**	**1300**	**400**	**23**
AAB1911	0-6	68.5 (J)	2770	1.59 (R)	193	ND
AAB1912	0-6	63.2 (J)	1680	ND	324	1.54 (J)
AAB1913	0-6	883 (J)	211	132	142	1.92 (J)
AAB1914	0-6	331 (J)	71.9	2.06 (R)	48.3	0.887 (J)
AAB1915	0-6	55.2 (J)	70.4	ND	34.3	1.15 (J)

TABLE 4.14
INORGANICS WITH CONCENTRATIONS GREATER THAN BACKGROUND UTL FOR PRS C-36-003
(Continued)

Sample ID	Depth (in.)	Nickel (mg/kg)	Silver (mg/kg)	Zinc (mg/kg)
LANL UTL	NA	16.6	N/A	50.8
SAL	NA	**1500**	**380**	**23000**
AAB1911	0-6	207	148	1470
AAB1912	0-6	16.6	242	956
AAB1913	0-6	17.1	328	198
AAB1914	0-6	ND	413	107
AAB1915	0-6	5.3	355	65.4

NA = not applicable N/A = Not available ND = Non detect
Shading = chemical exceeded SAL/no SAL
[1] Total chromium
[2] Cyanide is assumed to be in free form which is a very conservative assumption.

Outfall Water

Sample ID	Depth (in.)	Chromium (µg/L)
LANL UTL	NA	N/A
SAL	NA	**50**
AAB1918	NA	22
AAB1919	NA	17.1

NA = not applicable N/A = Not available

Radionuclides

No radionuclides were detected above background UTLs; therefore radionuclides were eliminated as COPCs.

Evaluation of Organic Constituents

Seventeen organics were detected above EQLs, and were submitted to the SAL comparison stage. The organics that were undetected were eliminated as COPCs.

TABLE 4.15
PRS C-36-003 SOIL CONCENTRATIONS OF ORGANIC ANALYTES WITH VALUES GREATER THAN EQL

Sample ID	Depth (in.)	Acenaphthene (mg/kg)	Anthracene (mg/kg)	Benzo(a)anthracene (mg/kg)
SAL	NA	**360**	**19**	**0.61**
EQL	NA	0.33	0.33	0.33
AAB1911	0-6	ND	ND	1.1
AAB1912	0-6	0.83	1.7	4.8
AAB1913	0-6	3.5	9.6	32
AAB1914	0-6	ND	1.1	4.4
AAB1915	0-6	ND	ND	0.64

Sample ID	Depth (in.)	Benzo(a) pyrene (mg/kg)	Benzo(b) fluoranthene (mg/kg)	Benzo(g,h,i) perylene (mg/kg)
SAL	NA	**0.061**	**0.61**	**N/A**
EQL	NA	0.33	0.33	0.33
AAB1911	0-6	1.3	1.2	0.78
AAB1912	0-6	3.7	3.9	1.8
AAB1913	0-6	26	18	14
AAB1914	0-6	3.4	3.9	2.4
AAB1915	0-6	0.78	0.63	0.45

Sample ID	Depth (in.)	Benzo(k) fluoranthene (mg/kg)	Bis(2-ethylhexyl) phthalate (mg/kg)	Chrysene (mg/kg)
SAL	NA	**6.1**	**32**	**24**
EQL	NA	0.33	0.33	0.33
AAB1911	0-6	1.4	ND	1.4
AAB1912	0-6	4.4	1.2	5.4
AAB1913	0-6	40	ND	29
AAB1914	0-6	4.9	3.3	5.1
AAB1915	0-6	0.86	ND	0.8

TABLE 4.15
PRS C-36-003 SOIL CONCENTRATIONS OF ORGANIC ANALYTES WITH VALUES GREATER THAN EQL
(continued)

Sample ID	Depth (in.)	Di-n-butyl phthalate (mg/kg)	Dibenzofuran (mg/kg)	Dibenzo(a,h) anthracene (mg/kg)
SAL	NA	**6500**	**260**	**0.061**
EQL	NA	0.33	0.33	0.33
AAB1911	0-6	1.7	ND	ND
AAB1912	0-6	ND	0.63	1.4
AAB1913	0-6	ND	2.3	9.3
AAB1914	0-6	3	ND	1.6
AAB1915	0-6	1.5	ND	ND

Sample ID	Depth (in.)	Fluoranthene (mg/kg)	Fluorene (mg/kg)	Indeno(1,2,3-cd)perylene (mg/kg)
SAL	NA	**2600**	**300**	**0.61**
EQL	NA	0.33	0.33	0.33
AAB1911	0-6	2.8	ND	0.88
AAB1912	0-6	9.4	0.97	2.7
AAB1913	0-6	57	3.9	19
AAB1914	0-6	9.7	ND	3.5
AAB1915	0-6	1.6	ND	0.52

Sample ID	Depth (in.)	Phenanthrene (mg/kg)	Pyrene (mg/kg)
SAL	NA	**N/A**	**2000**
EQL	NA	0.33	0.33
AAB1911	0-6	1.8	2.2
AAB1912	0-6	7.4	8.4
AAB1913	0-6	36	52
AAB1914	0-6	5.5	8.2
AAB1915	0-6	0.77	1.2

NA = Not applicable N/A = Not available ND = Not detected
Shading = chemical exceeded SAL/no SAL

Screening Assessment

Two inorganics - chromium and silver - were detected above their SALs and on that basis were retained as COPCs. Six inorganics -copper, cyanide, lead, mercury, nickel, silver, and zinc- were detected below their respective SALs and that basis were submitted to the MCE. Chromium was detected in the outfall water of the drain below its SAL of 50 µg/kg, but was not submitted to the MCE because it was the only chemical in water.

Nine organic chemicals were detected either above their SALs or had no SALs and were retained as COPCs. Eight chemicals were detected below their respective SALs and on that basis were submitted to the MCE for either carcinogenic or noncarcinogenic effects.

TABLE 4.16
PRS C-36-003 CARCINOGENS IN SOIL THAT EXCEED SALs

SAMPLE ID	LOCATION ID	DEPTH (in.)	Benzo(a) anthracene (mg/kg)	Benzo(a) pyrene (mg/kg)	Benzo(b) fluoranthene (mg/kg)
SAL	N/A	N/A	0.61	0.061	0.61
AAB1911	36-3108	0-6	1.1	1.3	1.2
AAB1912	36-3108	0-6	4.8	3.7	3.9
AAB1913	36-3109	0-6	32	26	18
AAB1914	36-3110	0-6	4.4	3.4	3.9
AAB1915	36-3111	0-6	0.64	0.78	0.63

SAMPLE ID	LOCATION ID	DEPTH (in.)	Benzo(k) fluoranthene (mg/kg)	Chromium (mg/kg)	Chrysene (mg/kg)
SAL	N/A	N/A	6.1	210	24
AAB1911	36-3108	0-6	1.4	68.5 (J)	1.4
AAB1912	36-3108	0-6	4.4	63.2 (J)	5.4
AAB1913	36-3109	0-6	40	883 (J)	29
AAB1914	36-3110	0-6	4.9	331 (J)	5.1
AAB1915	36-3111	0-6	0.86	55.2 (J)	0.8

N/A = Not Applicable

TABLE 4.16
PRS C-36-003 CARCINOGENS IN SOIL THAT EXCEED SALs
(continued)

SAMPLE ID	LOCATION ID	DEPTH (in.)	Dibenzo(a,h) anthracene (mg/kg)	Indeno(1,2,3-cd)pyrene (mg/kg)
SAL	**N/A**	**N/A**	**0.061**	**0.61**
AAB1911	36-3108	0-6	ND	0.88
AAB1912	36-3108	0-6	1.4	2.7
AAB1913	36-3109	0-6	9.3	19
AAB1914	36-3110	0-6	1.6	3.5
AAB1915	36-3111	0-6	ND	0.52

N/A = Not Applicable ND = Not detected

TABLE 4.17
PRS C-36-003 NONCARCINOGENS IN SOIL THAT EXCEED SALs

SAMPLE ID	LOCATION ID	DEPTH (in.)	Benzo(g,h,i) perylene (mg/kg)	Phenanthrene (mg/kg)	Silver (mg/kg)
SAL	**N/A**	**N/A**	**No SAL**	**No SAL**	**380**
AAB1911	36-3108	0-6	0.78	200	1470
AAB1912	36-3108	0-6	1.8	13.3	956
AAB1913	36-3109	0-6	14	4.46	198
AAB1914	36-3110	0-6	2.4	5.5	107
AAB1915	36-3111	0-6	0.45	0.77	65.4

N/A = Not Applicable ND = Not detected

Multiple Chemical Evaluation

The multiple chemical evaluation indicated 12 analytes in the noncarcinogenic effects category. The maximum normalized concentrations of these analytes totaled 2.2659, resulting in performance of an MCE on a sample-by-sample basis. The maximum normalized concentration for sample # AAB1911 totaled 1.6757, which was greater than the target value of 1 indicating that adverse health effects are likely. Therefore, these three analytes - copper, lead, and nickel were retained as COPCs because they contributed more than 0.1 to the total normalized concentration on a sample-by-sample basis. The organics anthracene and bis(2-ethylhexyl)phthalate were evaluated for carcinogenic effects. The maximum normalized concentration totaled 0.6084, which less than the target value of 1 indicating that adverse health effects are unlikely and were eliminated. No evaluation of radionuclide effects was performed because no analytes were eligible for the MCE.

TABLE 4.18
MULTIPLE CHEMICAL EVALUATION FOR CHEMICALS IN SOILS AT PRS C-36-003

NONCARCINOGENIC

ANALYTE	MAXIMUM	Sample# AAB1911	Sample# AAB1912	Sample# AAB1913	Sample# AAB1914	Sample# AAB1915
Copper[1]	0.9893	0.9893	0.6000	0.0754	0.0257	0.0251
Cyanide	0.1015	R	ND	0.1015	(R)	ND
Lead	0.8100	0.4825	0.8100	0.3550	0.1208	0.0858
Mercury	0.0835	ND	0.0670	0.0835	0.0386	0.0500
Nickel	0.1380	0.1380	0.0111	0.0114	ND	0.0035
Zinc	0.0639	0.0634	0.0412	0.0085	0.0046	.0028
Acenaphthene	0.0097	ND	.0023	0.0097	ND	ND
Di-n-butyl phthalate	0.0003	0.0003	ND	ND	0.0005	0.0002
Dibenzofuran	0.0088	ND	0.0024	0.0088	ND	ND
Fluoranthene	0.0219	0.0011	0.0036	0.0219	0.0037	0.0006
Fluorene	0.0130	ND	0.0032	0.0130	ND	ND
Pyrene	0.0260	0.0011	0.0042	0.0260	0.0041	0.0006
Total	2.2659	**1.6757**	1.5450	0.7147	0.1980	0.1686

[1] Analytes set in bold typeface are those that are identified as COPCs based on sample-by-sample basis

TABLE 4.19
MULTIPLE CHEMICAL EVALUATION FOR CHEMICALS IN SOILS AT PRS C-36-003

CARCINOGENIC

ANALYTE	MAXIMUM NORMALIZED CONCENTRATION
Anthracene	0.5053
Bis(2-ethylhexyl)phthalate	0.1031
Total	0.6084

4.4.4 Conclusions and Recommendations

Of the chemicals detected in the surface soil, 14 COPCs (9 PAHs and 5 inorganics) were retained based on the human health screening assessment. Additional evaluation of these chemicals was performed as dictated by LANL policy for possible exclusion from the final list of retained chemicals at this site.

Because chromium exceeded its SAL, a 95% UCL of the mean was calculated resulting in an estimate of 607 mg/kg for total chromium with the data lognormally distributed. Site-specific PRGs for chromium based on the speciated forms were calculated to determine if the detected concentrations warranted corrective action. The ratio of 1/7 of Cr VI and 6/7 of Cr III was used to calculate the speciated levels and PRGs of chromium. This ratio is based on the USEPA Region IX PRG table (September 1995) for total chromium. The 95% UCL of the distribution for Cr VI and

Cr III was determined to be 103 mg/kg and 620 mg/kg, respectively (upper confidence limit is affected by variability of the data, which is affected by speciation, therefore the UTLs are not additive to obtain 607 mg/kg). The SAL for carcinogenic Cr VI is 30 mg/kg and when compared to its UCL of 103 mg/kg - the SAL is exceeded. Chromium III has no SAL.

The PRGs for the 95% UCL values for speciated chromium were calculated based on a nonintrusive industrial scenario for ingestion and inhalation exposure routes (Table 4.20). The site- specific PRG for carcinogenic effects was based on 1E-06 risk and a hazard index of 1 for noncarcinogens (Annex D). The Cr VI PRG was calculated to be 3.87E+00 mg/kg (3.87 ppm) for carcinogenic effects (inhalation) and 1.02E+04 (10200 ppm) for the noncarcinogenic component (oral). The Cr III PRG was calculated to be 2.04E+06 (2,040,000 ppm) for an oral exposure route. Adding the contribution for oral noncarcinogenic and carcinogenic effects the PRG for Cr III is 2.05E+06 (2,050,200 ppm). At PRS C-36-003, Cr VI is the driver of the cleanup at a level of 3.87 mg/kg, which is based on a 1E-06 risk.

Site-specific PRGs for noncarcinogens were calculated for the remaining inorganics - copper, lead, nickel, and silver (Annex D). The PRGs are as follows: copper, 8.18E+04 mg/kg (81800 ppm); lead, 1000 mg/kg (EPA Region VI guidance); nickel, 4.09E+04 mg/kg (40900 ppm); and silver, 1.02E+04 mg/kg (10200 ppm) (Table 4.20). These chemicals are far below the site-specific PRGs, and are therefore eliminated as COPCs.

TABLE 4.20
SITE-SPECIFIC PRGS FOR PRS C-36-003

COPC	Sample Value (mg/kg)	PRG[1] (mg/kg)	Rationale
Chromium VI[2]	883 (J) 95% UCL is 103	3.87	Carcinogen; based on 1E-06 acceptable risk
Chromium III	95% UCL is 620	2,050,200	Noncarcinogen; based on hazard index of 1
Copper	2700	81800	Noncarcinogen; based on hazard index of 1
Lead[4]	324	1000	Based on EPA Region VI guidance
Nickel	207	40900	Noncarcinogen; based on hazard index of 1
Silver	413	10200	Noncarcinogen; based on hazard index of 1

[1] Based on nonintrusive industrial scenario and risk of 1E-06 risk-based PRG for carcinogens and a hazard index of 1 for noncarcinogens
[2] Bolding and shading means the chemical exceeded PRG
[3] Based on USEPA Region IX PRG [4] PRG for lead in soil has been adopted by the Laboratory for an industrial exposure scenario based on information obtained from EPA Region VI.

Nine detected PAHs were evaluated further according to LANL policy. PAHs found in the soils are most likely due to run-off from an asphalt paved area (i.e., asphalt parking lot in the sampling area and PRS) - a non-Laboratory operation. It is the position of LANL that cleanup of PAHs will not occur if they can be traced to a current, nonrelease source (e.g., asphalt parking lot, roof run-off, etc.) and not a Laboratory related activity. LANL will cleanup PAHs only related to a release; this site is not a release resulting from the Laboratory. Therefore, these PAHs (9) are not being retained as COPCs.

In summary, Table 4.21 presents the initial COPCs retained at this site from the screening assessment and then their status after further evaluation. The only chemical remaining of human health concern is hexavalent chromium. Phase II sampling is proposed for this site and will focus on determining the nature and extent of PCB contamination, which was tentatively identified from the Phase I sampling.

TABLE 4.21
COPCS IN SOILS
AT PRS C-36-003

ANALYTE	FAILED SCREENING ASSESSMENT	RATIONALE FOR RETENTION OR ELIMINATION AS A FINAL COPC
Chromium*	Exceeded SAL	Retained; exceeded PRG
Silver	Exceeded SAL	Below PRG
Benzo(a)anthracene	Exceeded SAL	PAH; non-Laboratory related so eliminated
Benzo(a)pyrene	Exceeded SAL	PAH; non-Laboratory related so eliminated
Benzo(b)fluoranthene	Exceeded SAL	PAH; non-Laboratory related so eliminated
Benzo(g,h,i)perylene	Exceeded SAL	PAH; non-Laboratory related so eliminated
Benzo(k)fluoranthene	Exceeded SAL	PAH; non-Laboratory related so eliminated
Chrysene	Exceeded SAL	PAH; non-Laboratory related so eliminated
Dibenzo(a,h)anthracene	Exceeded SAL	PAH; non-Laboratory related so eliminated
Indeno(1,2,3-cd)perylene	Exceeded SAL	PAH; non-Laboratory related so eliminated
Phenanthrene	Exceeded SAL	PAH; non-Laboratory related so eliminated
Copper	Identified from MCE	Below PRG
Lead	Identified from MCE	Below PRG
Nickel	Identified from MCE	Below PRG

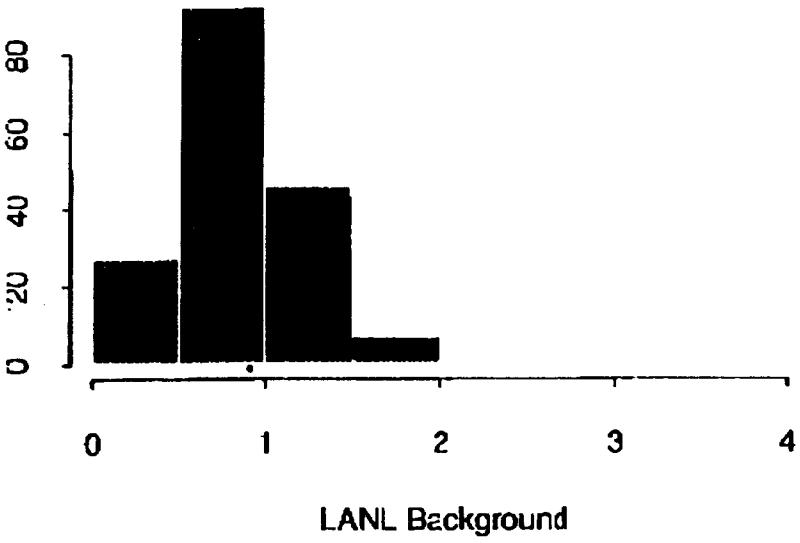
* Bolding indicates chemical exceeded PRG and is a final COPC.

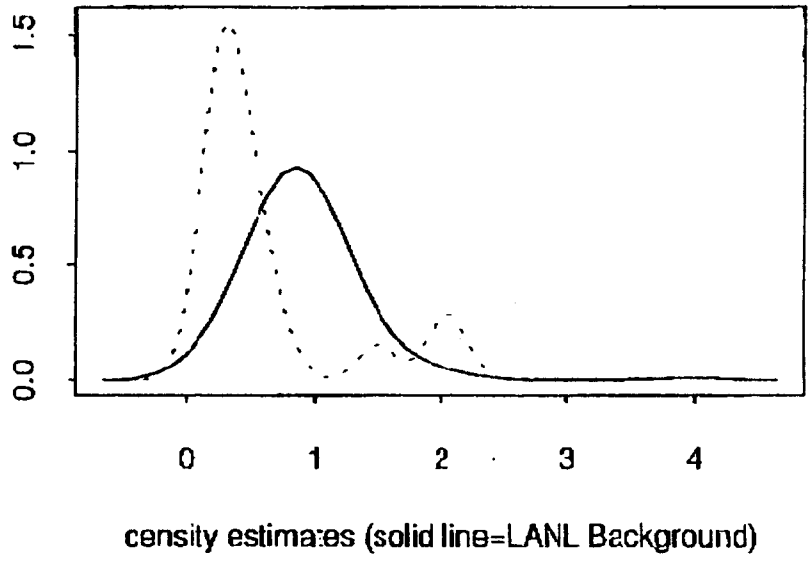
ANNEX A

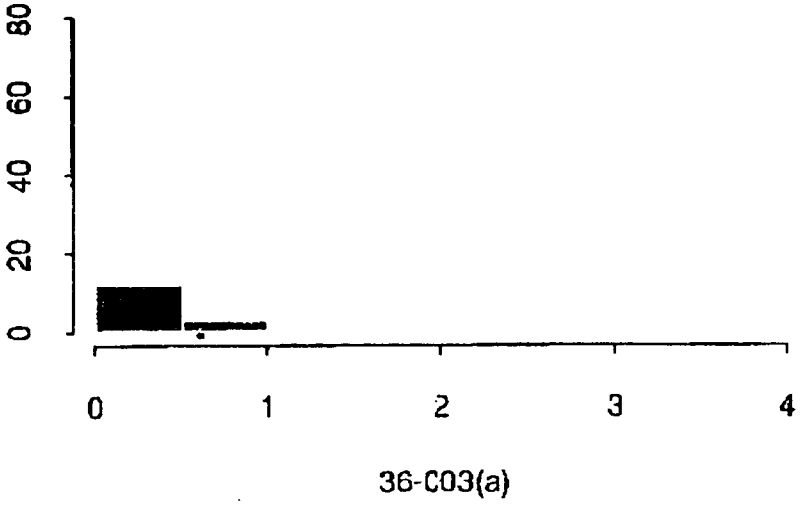
PRS 36-003(a)

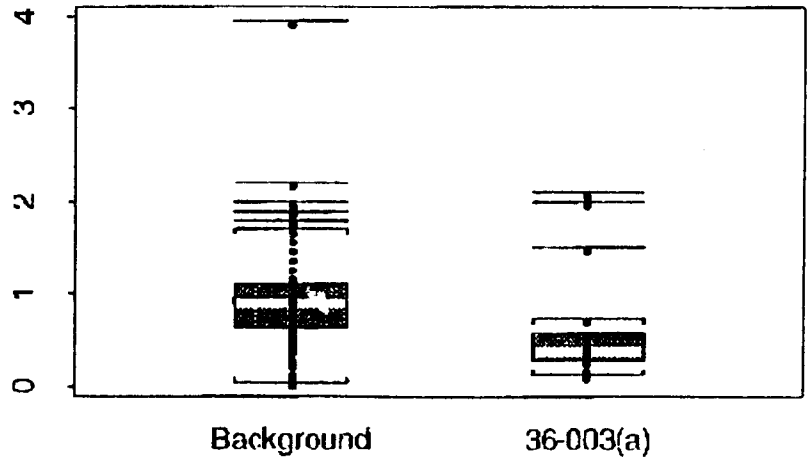
BACKGROUND STATISTICAL TEST RESULTS

Comparison of Beryllium at 36-003(a) to LANL Background







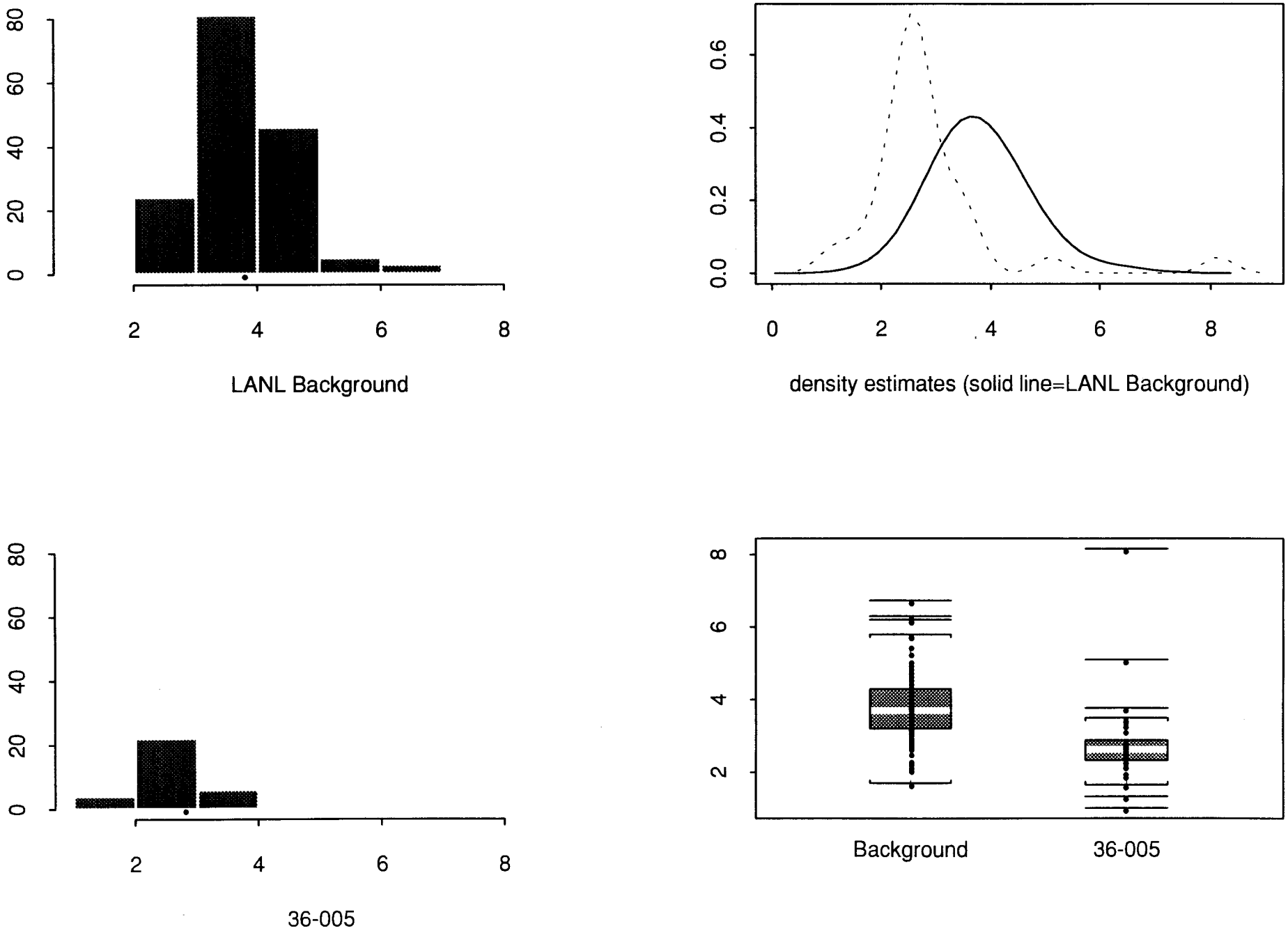


ANNEX B

PRS 36-005

BACKGROUND STATISTICAL TEST RESULTS

Comparison of Uranium at 36-005 to LANL Background

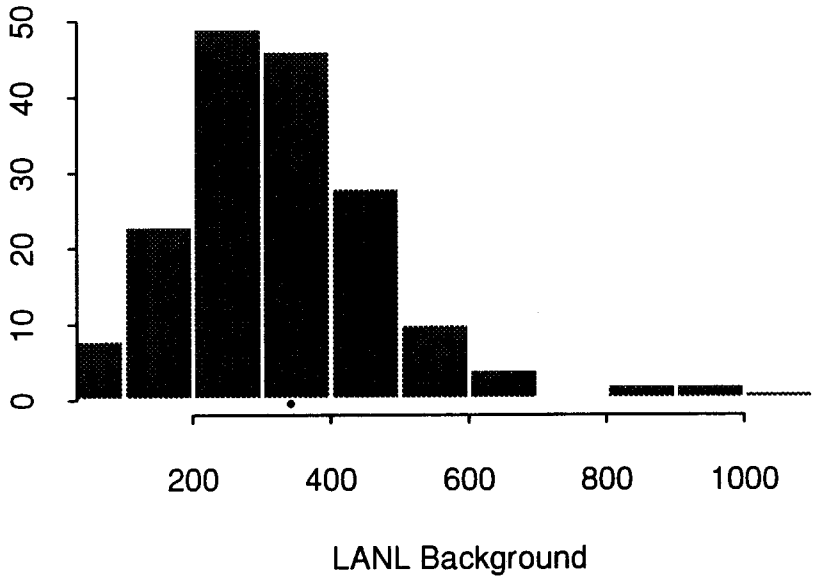


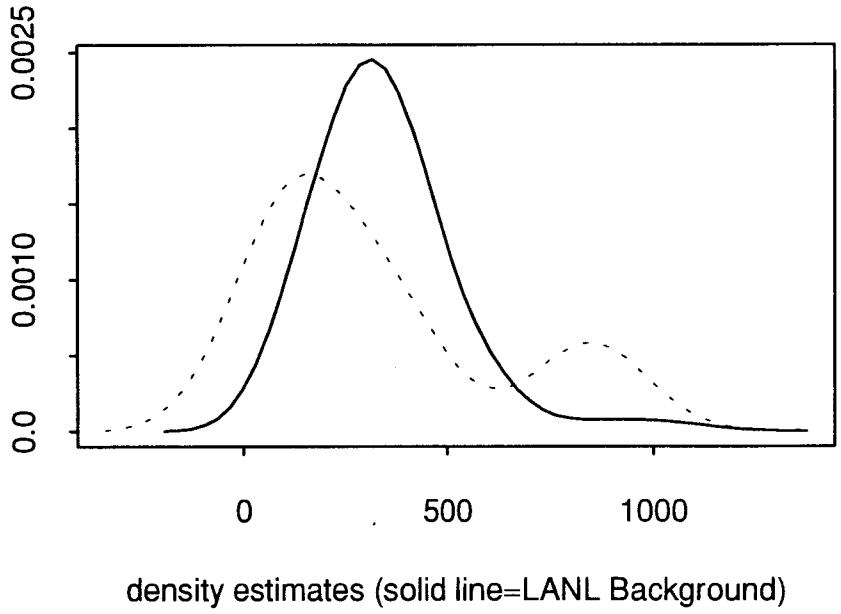
ANNEX C

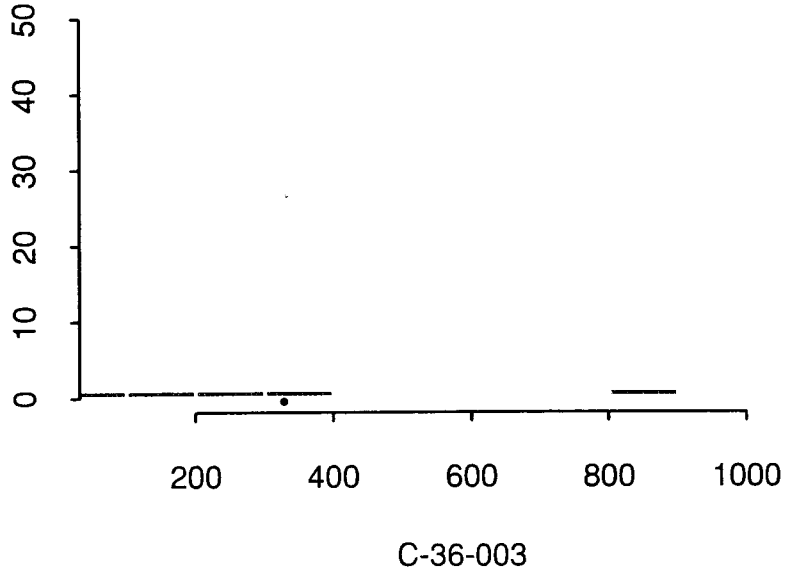
PRS C-36-003

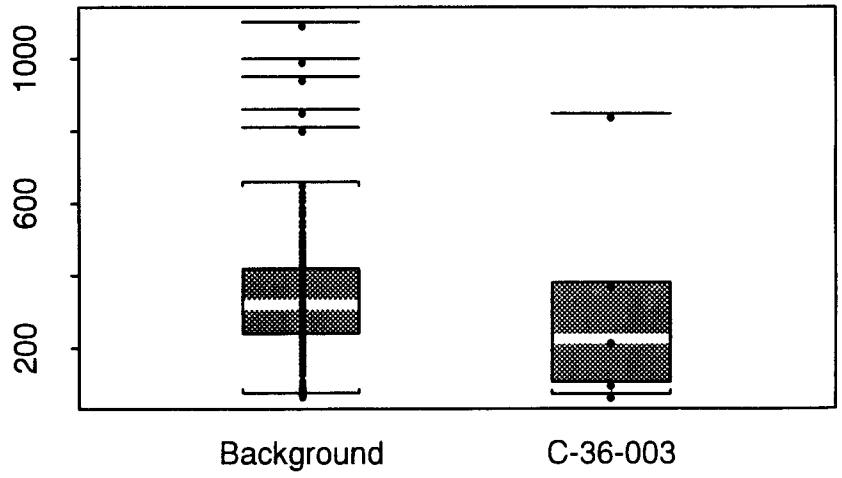
BACKGROUND STATISTICAL TEST RESULTS

Comparison of Manganese at C-36-003 to LANL Background









ANNEX D

PRS C-36-003

RISK-BASED CLEANUP LEVEL ASSUMPTIONS AND CALCULATIONS

ANNEX D
METHODOLOGIES FOR DEVELOPING SITE-SPECIFIC PRELIMINARY REMEDIATION GOALS

1.0 APPROACH TO PRG DEVELOPMENT

Preliminary remediation goals (PRG) were calculated for several analytes from the PRSs investigated for this report to determine if these analytes posed an unacceptable risk to human health. Risk-based cleanup levels were calculated for those chemicals that failed the screening assessment comparison to background concentrations and SALs, including the analysis of multiple chemicals as documented in this RFI Report for these two sites.

2.0 SITE-SPECIFIC PRG EQUATIONS

Site-specific PRGs have been calculated using the modified U.S. Environmental Protection Agency (EPA) equations and Los Alamos National Laboratory (Laboratory) site-specific input parameters presented in this appendix. These are based on a healthy working adult under a continued laboratory operations land-use scenario.

Under the EPA nonintrusive industrial land-use scenario, risk resulting from exposure to chemicals in soil is assumed to result from direct ingestion and inhalation of particulates from soil. EPA default parameters are based on the type of industrial exposure activities expected after cleanup and the physical properties of the COPCs. One set of circumstances includes parameters such as exposure frequency and duration, which are adjusted to reflect a maintenance worker vs. a construction worker (or surface vs. subsurface contamination scenarios), depending on the type of continued laboratory operations activity expected (i.e., intrusive or nonintrusive, respectively). For PRS C-36-003, no intrusive work (i.e., digging to place/replace sewer lines or to construct buildings) is expected, therefore, intrusive default parameters were eliminated for this scenario

Calculation of PRGs are consistent with Risk Assessment Guidance for Superfund (RAGS) Part B (EPA 1991a, 0302) and also considers updates to the RAGS Part B equations (EPA 1991, 1994). The PRGs were developed using the most current sources of EPA-approved toxicity criteria, such as the Integrated Risk Information System (IRIS), the Health Effects Assessment Summary Table (HEAST), and the Environmental Criteria and Assessment Office (ECAO).

Equations 1 and 2 were used to calculate a spreadsheet of PRGs (for carcinogenic and noncarcinogenic chemicals, respectively) under the nonintrusive industrial exposure scenario (ingestion and inhalation). The equations for each class of chemicals are similar but use different site-specific input parameters. The methodologies calculates a soil concentration for carcinogens from a target cancer risk of 10^{-6} (i.e., 1 in 1,000,000). PRGs for noncarcinogenic chemicals are calculated for a child from a target hazard quotient of 1. The equations for soil combine across all pathways for direct exposure.

3.0 PRS C-36-003 LAND USE

The anticipated future use of PRS C-36-003 is primarily industrial/commercial in a continued Laboratory operation.

3.1 CLEANUP OF PRS C-36-003

Five COPCs — chromium VI and III, copper, lead, nickel, and silver — failed the screening assessment at and were carried forward for further evaluation based on comparison with site-specific PRGs. Calculation of site-specific PRGs was based on the Laboratory's expected land use. Table C-1 was used to calculate

the cleanup levels, and Table C-2 shows the site specific PRGs per COPC. All work is expected to be non-intrusive.

LEAD

Under the industrial/commercial exposure scenario, a pregnant female adult worker is the reasonable maximum exposed individual whereas for a recreational exposure scenario a child is considered the most sensitive individual (reasonable maximum exposed individual).

The PRG for lead in soil of 1,000 ppm has been adopted by the Laboratory for an industrial exposure scenario based on information obtained from EPA Region VI (EPA 1995). This soil PRG considers the fetal effects when a pregnant worker is exposed.

4.0 MULTIPLE-CHEMICAL PRG ANALYSIS

When two or more COPCs are present at a site at concentrations at or below their respective PRGs, a multiple-chemical PRG risk analysis is conducted for carcinogenic risk and noncarcinogenic health hazard. The multiple-chemical PRG risk analysis is estimated by adding together the fractional contributions (i.e., site-specific concentration / PRG) of each chemical. For carcinogenic cancer risk estimates, the fractional contribution of each is added together and multiplied by 10^{-6} target cancer risk:

$$\text{Multiple PRG Risk} = [(conc_X / PRG_X) + (conc_Y / PRG_Y) + (conc_Z / PRG_Z)] \times 10^{-6}$$

If the multiple chemical PRG risk is at or below the target value of 10^{-6}, the site will be considered to not present a carcinogenic risk.

For noncarcinogenic hazard estimates, the fractional contribution of each will be added together and compared with a target hazard index of 1:

$$\text{PRG Hazard Index} = [(conc_X / PRG_X) + (conc_Y / PRG_Y) + (conc_Z / PRG_Z)]$$

If the PRG hazard index is at or below the target hazard index of 1, then the site will be considered to not pose a toxic effect.

For PRS C-36-003 the fractional contribution for Cr III, copper, lead, nickel, and silver was calculated to be 0.4029, which is less than the target hazard index of 1. No systemic effects are likely from multiple chemicals.

Equation 1: Direct Exposures to Carcinogenic Constituents in Industrial Soil

$$C(\text{mg/kg}) = \frac{TR \times BW_a \times AT_c \times 365 \text{ d/y}}{EF_o \times ED_o \left[\frac{IRS_o \times CSF_o}{10^6 \text{ mg/kg}} + IRA_a \times CSF_i \times \left(\frac{1}{VF_s} + \frac{1}{PEF}\right) \right]}$$

Where:

C (mg/kg)	=	Preliminary remedial goal for soil based on exposure to carcinogenic constituents (mg/kg)
TR	=	Target cancer risk (unitless) Considered to be 1E-06 for carcinogens
BW_a	=	Body weight, adult (kg) Considered to be 70 kg (EPA 1991b)
AT_c	=	Averaging Time - cancer (years) Considered to be 70 years (EPA 1991b)
EF_o	=	Exposure Frequency - occupational (d/y) Considered to be 250 d/y (EPA 1991a)
ED_o	=	Exposure duration - occupational (years) Considered to be 25 years (EPA 1991b)
IRS_o	=	Soil ingestion - occupational (mg/day) Considered to be 50 mg/day (EPA 1991b)
CSF	=	Cancer slope factor-oral $(\text{mg/kg-d})^{-1}$ (IRIS, HEAST, or ECAO)
IRA_a	=	Inhalation rate - adult (mg/day) Considered to be 20 m^3/day (EPA 1991b)
CSF_i	=	Cancer slope factor-inhalation $(\text{mg/kg-d})^{-1}$ (IRIS, HEAST, or ECAO)
VF_s =		Volatilization factor for soil (mg/kg) Considered to be zero for chemicals with MW> 200 g/mole and Henry's Law Constant <1 x 10^{-5} atm-m^3/mole
PEF	=	Particulate emission factor (mg/kg) Considered to be 1.11 x 10^{+7} (m^3/kg) (LANL 1993)

Equation 2: Direct Exposures to Noncarcinogenic Constituents in Industrial Soil

$$C(\text{mg/kg}) = \frac{THQ \times BW_a \times ED_o \times 365 \text{ d/y}}{EF_o \times ED_o \left[\left(\frac{1}{RfD_o} \times \frac{IRS_o}{10^6 \text{ mg/kg}} \right) + \frac{1}{RfD_i} \times \left(\frac{IRA_a}{VF_s} + \frac{IRA_a}{PEF} \right) \right]}$$

Where:

C(mg/kg) (mg/kg) = Preliminary remedial goal for soil based on exposure to noncarcinogenic constituents

THQ = Target hazard quotient (unitless)
Considered to be 1

BW_a = Body weight, adult (kg)
Considered to be 70 kg (EPA 1991b)

ED_o = Exposure duration - occupational (years)
Considered to be 25 years (EPA 1991b)

EF_o = Exposure Frequency - occupational (d/y)
Considered to be 250 d/y (EPA 1991a)

RfD_o = Reference dose-oral (mg/kg-d) (IRIS, HEAST, or ECAO)

IRS_o = Soil ingestion - occupational (mg/day)
Considered to be 50 mg/day (EPA 1991b)

RfD_i = Reference dose inhalation (mg/kg-d) (IRIS, HEAST, or ECAO)

IRA_a = Inhalation rate - adult (mg/day)
Considered to be 20 m^3/day (EPA 1991b)

VF_s = Volatilization factor for soil (mg/kg)
Considered to be zero for chemicals with MW> 200 g/mole and Henry's Law Constant <1 x 10^{-5} atm-m^3/mole

PEF = Particulate emission factor (mg/kg)
Considered to be 1.11 x 10^{+7} (m^3/kg) (LANL 1993)

TABLE D-1
SPREADSHEET FOR CALCULATING PRGS FOR COMMERCIAL/INDUSTRIAL SOIL EXPOSURE

Chemical	Oral Reference Dose (RfD) (mg/kg/day)	Inhalation RfD (mg/kg/day)	Inhalation Slope Factor $(mg/kg/day)^{-1}$
PRS C-36-003			
Chromium VI	5E-03	NA	4.1E+01
Chromium III	1E+00	NA	NA
Copper	4E-02	NA	NA
Lead	See Annex 3.1 Discussion, Lead		
Nickel	2E-02	NA	NA
Silver	5E-03	NA	NA

NA = Not applicable

TABLE D-2
PRG SUMMARY TABLE

Chemical	Nonintrusive Industrial Soil Scenario			
	Noncancer PRG[1] (mg/kg)	Cancer PRG[2] (mg/kg)	PRG (lower of two) (mg/kg)	Multiple Chemical PRG
PRS C-36-003				
Chromium VI	1.02E+04	3.87E+00	3.87E+00	NA[3]
Chromium III	2.04E+06	NA	2.04E+06	0.0003[4]
Copper	8.18E+04	NA	8.18E+04	0.0330
Lead	1.0E+03	NA	1.0E+03	0.3240
Nickel	4.09E+04	NA	4.09E+04	0.0051
Silver	1.02E+04	NA	1.02E+04	0.0405

[1] Noncancer PRGs based on hazard index of 1.
[2] Based on 1E-06 risk-based PRG for carcinogens, site specific PRG.
[3] Cr VI is a carcinogen, no additive effects since it is a single chemical.
[4] Based on 95% UCL 103 mg/kg
NA = Not applicable N/A = Not available ND = Not detected

REFERENCES

EPA (US Environmental Protection Agency), December 1991a. "Risk Assessment Guidance for Superfund, Volume I—Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals)," Interim, EPA/540/R-92/003, Publication 9285.7-01B, Office of Research and Development, Washington, DC. (EPA 1991, 0302)

EPA (US Environmental Protection Agency), March 25, 1991b. 'Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplemental Guidance "Standard Default Exposure Factors," Interim Final,' OSWER Directive 9285.6-03, Office of Emergency and Remedial Response, Toxics Integration Branch, Washington, DC. (EPA 1991, 0746)

EPA (US Environmental Protection Agency Region IX), August 1994. Region IX Preliminary Remediation Goals (PRGs), Second Half 1994. Memo from Standford J. Smucker, Ph.D., Regional Toxicologist (H-9-3), Technical Support Section to PRG Table Mailing List. (EPA 1994a)

LANL 1993: Los Alamos National Laboratory, November 1993. "Installation Work Plan for Environmental Restoration," Revision 3, Los Alamos National Laboratory Report LA-UR-93-3987, Los Alamos, New Mexico. (LANL 1993)

ATTACHMENT B

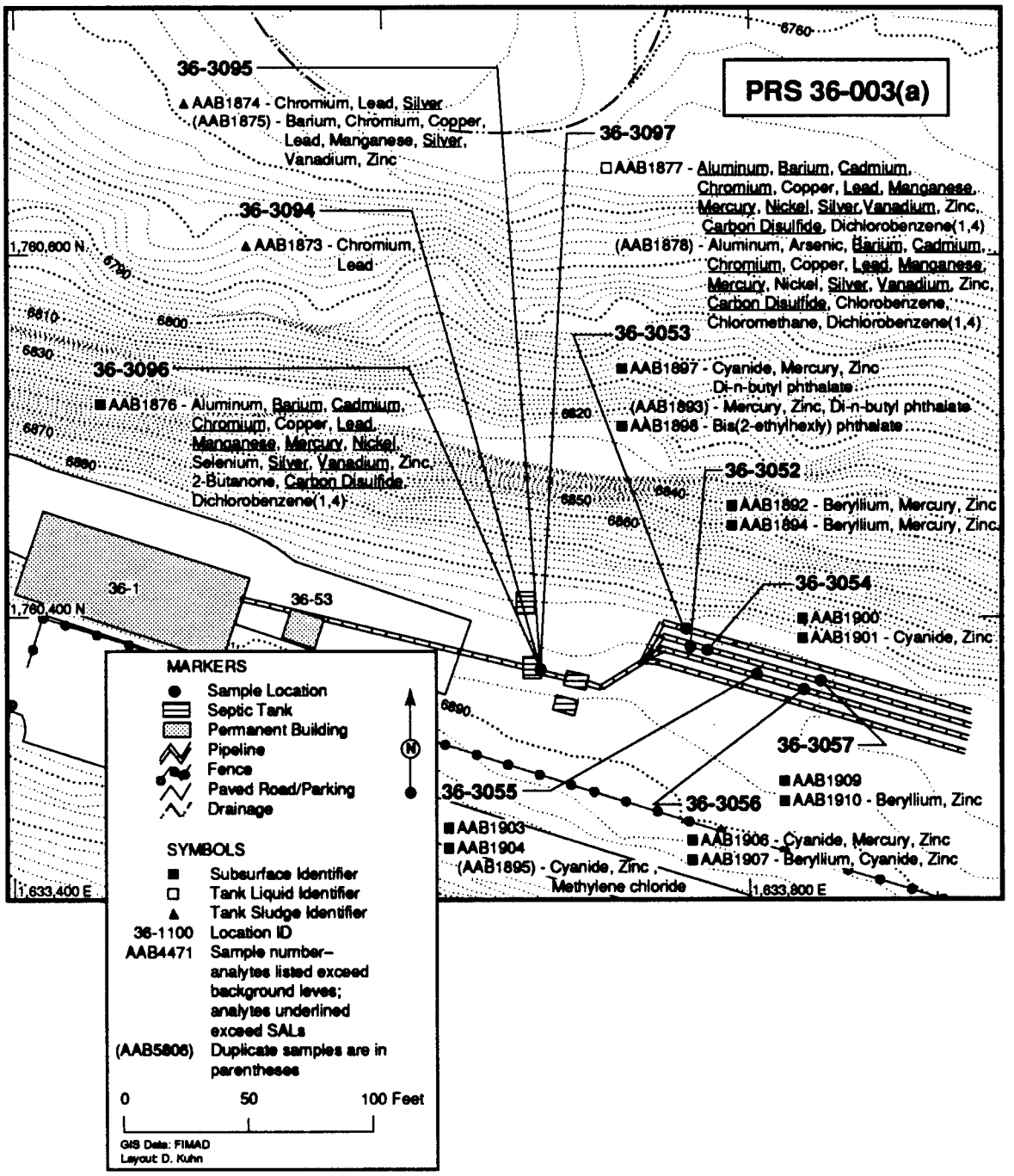


Figure 1-7(Revised). PRS 36-003(a), Septic System, showing sampling locations and results.

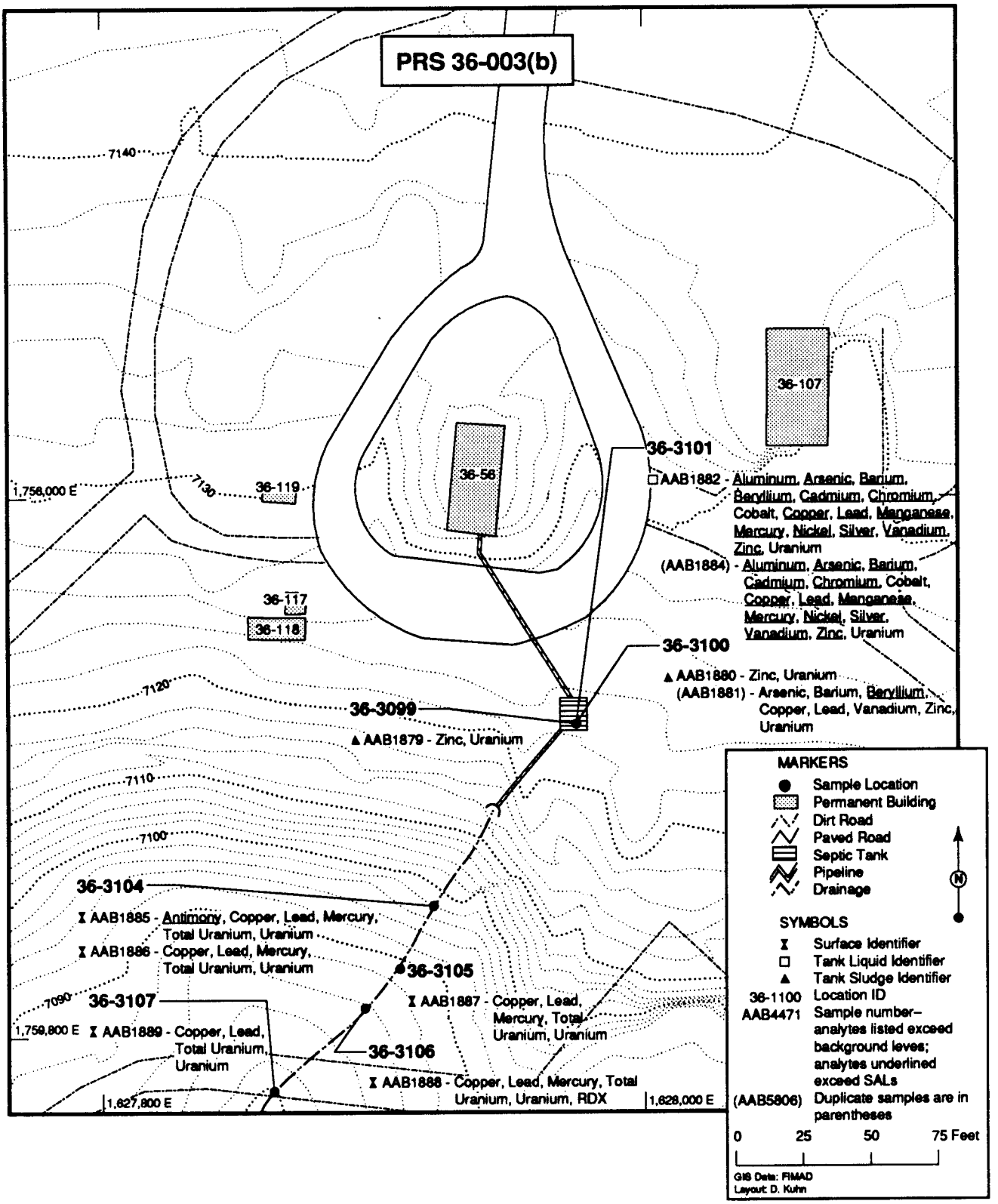


Figure 1-8 (Revised). PRS 36-003(b), Septic System, with sampling locations and results.

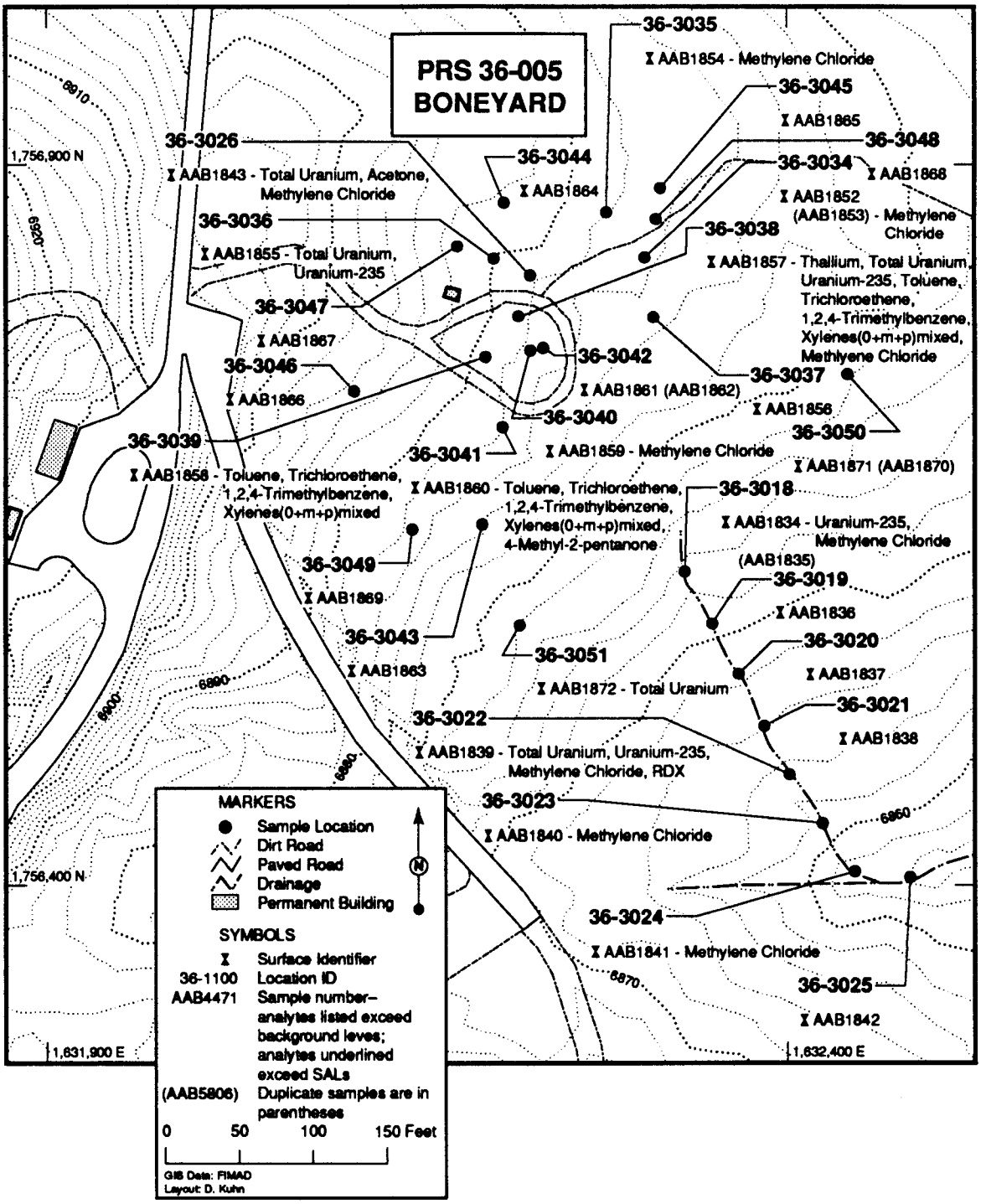


Figure 1-9 (Revised). PRS 36-005, Boneyard, with sampling locations and results.

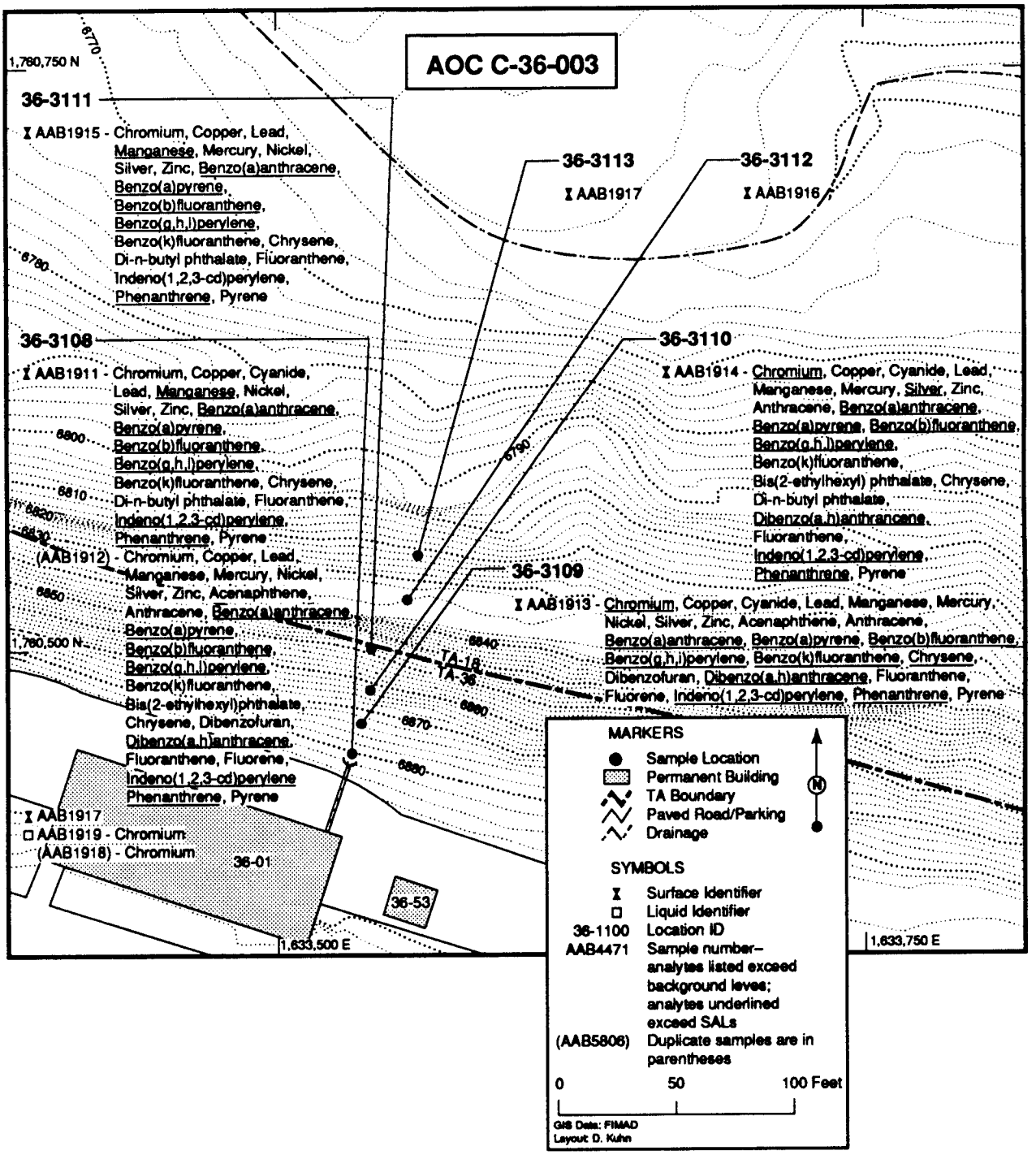


Figure 1-10 (Revised). PRS C-36-003, Photo Outfall, with sampling locations and results

ATTACHMENT C

TABLE 1-1

SUMMARY OF SAMPLING AND ANALYSES FOR PRSs 36-003(a) AND 36-003(b), SEPTIC SYSTEMS

Description	Sampled Media	Samples						Field Screening					Laboratory Analyses										
		Structure		Surface		Subsurface																	
	soil/sediments	primary	duplicate	primary	duplicate	primary	duplicate	Beta-gamma	Alpha	Organic Vapor	Combustible gas/oxygen	Explosives (Spot Test)	Gross Gamma	Gamma spectroscopy	Total uranium	Isotopic uranium	Plutonium	Metals (SW 6010/7000)*	Mercury	Cyanides	VOCs (SW 8260)*	SVOCs (SW 8270)*	Explosives (SW 8330)*
Drainage channels	x			8	1			x	x	x		y	x	z	x	z		x			x	x	x
Elevated rad	x			8	1			x	x	x		y	x	z	x	z		x			x	x	x
Current/recent storage	x			8	1			x	x	x		y	x	z	x	z		x			x	x	x
Other	x			8	1			x	x	x		y	x	z	x	z		x			x	x	x
Off Boneyard	x			2	1			x	x	x		y	x	z	x	z		x			x	x	x

x : All samples
y : Selected samples (see text)
z : Samples will be analyzed if total potential contaminants of concern are detected above screening action levels.
Note: Additional samples may be taken based on field surveys and observations.
* : Applicable EPA SW 846 methods.

TABLE 1-2

SUMMARY OF SAMPLING AND ANALYSES FOR PRS 36-005, BONEYARD

Unit	Description	Sampled Media			Samples						Field Screening					Laboratory Analyses											
					Screening		Surface		Subsurface																		
		soil/tuff	soil	sediments	primary	duplicate	primary	duplicate	primary	duplicate	Beta-gamma	Alpha	Organic Vapor	PCB	Explosives (Spot Test)	Gross Gamma	Gamma spectroscopy	Total uranium	Isotopic uranium	Plutonium	Metals (SW 6010/7000)	Mercury	Cyanides	PCB	VOCs (SW 8260)	SVOCs (SW 8270)	Explosives (SW 8330)
PRS 36-005	Main drainage			x					4 *		x	x	x		x	x		x			x	x			x	x	x
Boneyard	Boneyard			x					7 *		x	x	x		x	x		x			x	x			x	x	x
	Downgradient of Boneyard			x					1 *		x	x	x		x	x		x			x	x			x	x	x
PRS C-36-003	Outfall			x			4																	x			
	Outfall								1**							x		x			x	x	x	x	x	x	x
Photo Outfall	Drainage						1									x		x			x	x	x	x	x	x	x
SCREENING	Outfall			x	2									x		y		y			y	y	y	y	y	y	y
	Drainage			x	1									x		y		y			y	y	y	y	y	y	y
	Crest of Canyon			x	3									x		y		y			y	y	y	y	y	y	y

x : All samples
y : Samples will be submitted for laboratory analysis if screening results are positive

* : If depth to tuff is greater than 1 foot, an additional sample will be collected at soil/tuff interface. Additional samples will be collected from within the boreholes if VOC screening results are positive.

**: If sample screens positive for PCB, additional samples will be collected from within the borehole until screening results are negative

TABLE 1-3

SUMMARY OF SAMPLING AND ANALYSES FOR PRS C-36-003, PHOTO OUTFALL

	Sampled Media		Samples						Field Screening					Laboratory Analyses										
			Structure		Surface		Subsurface																	
Description	soil/sediments	water	primary	duplicate	primary	duplicate	primary	duplicate	Beta-gamma	Alpha	Organic Vapor	Combustible gas/oxygen	Explosives (Spot Test)	Gross Gamma	Gamma spectroscopy	Total uranium	Isotopic uranium	Plutonium	Metals (SW 6010/7000)*	Mercury	Cyanides	VOCs (SW 8260)*	SVOCs (SW 8270)*	Explosives (SW 8330)*
Outfall	x		6	1					x	x	x								x		x		x	
Outfall		x	1	1					x	x	x								x		x		x	

x : All samples
y : Selected samples (see text)
* : Applicable EPA SW 846 methods

ATTACHMENT D

Table 4-1A
Summary of Sampling for PRSs 36-003(a), 36-003(b), 36-005, and C 36-003

PRS	*Location*	*Sample ID*	*Location ID*	*Date*	*Sample Type*	*Matrix*	*Sampling Technique*	*Ending Depth*
36-003(a)	Septic Tank	AAB1873	36-3094	7/21/94	Subsurface	Sludge	Scoop sampler	N/A
36-003(a)	Septic Tank	AAB1874	36-3095	7/21/94	Subsurface	Sludge	Scoop sampler	N/A
36-003(a)	Septic Tank	AAB1875D	36-3095	7/21/94	Subsurface	Sludge	Scoop sampler	N/A
36-003(a)	Septic Tank	AAB1876	36-3096	7/21/94	Subsurface	Liquid	Scoop sampler	N/A
36-003(a)	Septic Tank	AAB1877	36-3097	7/21/94	Subsurface	Liquid	Scoop sampler	N/A
36-003(a)	Septic Tank	AAB1878D	36-3097	7/21/94	Subsurface	Liquid	Scoop sampler	N/A
36-003(a)	Leachfield	AAB1892	36-3052	11/18/94	Subsurface	Soil	Split-spoon	38 inches
36-003(a)	Leachfield	AAB1894	36-3052	11/18/94	Subsurface	Soil	Split-spoon	40 inches
36-003(a)	Leachfield	AAB1897	36-3053	11/14/94	Subsurface	Soil	Split-spoon	32 inches
36-003(a)	Leachfield	AAB1893D	36-3053	11/14/94	Subsurface	Soil	Split-spoon	32 inches
36-003(a)	Leachfield	AAB1898	36-3053	11/14/94	Subsurface	Soil	Split-spoon	42 inches
36-003(a)	Leachfield	AAB1900	36-3054	11/15/94	Subsurface	Soil	Split-spoon	32 inches
36-003(a)	Leachfield	AAB1901	36-3054	11/15/94	Subsurface	Soil	Split-spoon	38 inches
36-003(a)	Leachfield	AAB1903	36-3055	11/15/94	Subsurface	Soil	Split-spoon	30 inches
36-003(a)	Leachfield	AAB1904	36-3055	11/15/94	Subsurface	Soil	Split-spoon	40 inches
36-003(a)	Leachfield	AAB1895D	36-3055	11/15/94	Subsurface	Soil	Split-spoon	40 inches
36-003(a)	Leachfield	AAB1906	36-3056	11/17/94	Subsurface	Soil	Split-spoon	60 inches
36-003(a)	Leachfield	AAB1907	36-3056	11/17/94	Subsurface	Soil	Split-spoon	72 inches
36-003(a)	Leachfield	AAB1909	36-3057	11/18/94	Subsurface	Soil	Split-spoon	72 inches
36-003(a)	Leachfield	AAB1910	36-3057	11/18/94	Subsurface	Soil	Split-spoon	84 inches
36-003(b)	Septic Tank	AAB1879	36-3099	8/5/94	Subsurface	Sludge	Scoop sampler	N/A
36-003(b)	Septic Tank	AAB1880	36-3100	8/5/94	Subsurface	Sludge	Scoop sampler	N/A
36-003(b)	Septic Tank	AAB1881D	36-3100	8/5/94	Subsurface	Sludge	Scoop sampler	N/A
36-003(b)	Septic Tank	AAB1882	36-3101	8/5/94	Subsurface	Liquid	Scoop sampler	N/A
36-003(b)	Septic Tank	AAB1884D	36-3101	8/5/94	Subsurface	Liquid	Scoop sampler	N/A
36-003(b)	Septic Tank-Outfall	AAB1885	36-3104	8/8/94	Surface	Soil	Spade/scoop	6 inches
36-003(b)	Septic Tank-Outfall	AAB1886	36-3104	8/8/94	Surface	Soil	Spade/scoop	6 inches
36-003(b)	Septic Tank-Outfall	AAB1887	36-3105	8/8/94	Surface	Soil	Spade/scoop	6 inches
36-003(b)	Septic Tank-Outfall	AAB1888	36-3106	8/8/94	Surface	Soil	Spade/scoop	6 inches
36-003(b)	Septic Tank-Outfall	AAB1889	36-3107	8/8/94	Surface	Soil	Spade/scoop	6 inches

D in the Sample ID column refers to duplicate samples

Table 4-1A
Summary of Sampling for PRSs 36-003(a), 36-003(b), 36-005, and C 36-003

PRS	Location	Sample ID	Location ID	Date	Sample Type	Matrix	Sampling Technique	Ending Depth
C-36-003	Photo Outfall	AAB1911	36-3108	7/14/94	Surface	Soil	Spade/scoop	6 inches
C-36-003	Photo Outfall	AAB1912D	36-3108	7/14/94	Surface	Soil	Spade/scoop	6 inches
C-36-003	Photo Outfall	AAB1913	36-3109	7/14/94	Surface	Soil	Spade/scoop	6 inches
C-36-003	Photo Outfall	AAB1914	36-3110	7/14/94	Surface	Soil	Spade/scoop	6 inches
C-36-003	Photo Outfall	AAB1915	36-3111	7/14/94	Surface	Soil	Spade/scoop	6 inches
C-36-003	Photo Outfall	AAB1916	36-3112	11/21/94	Surface	Soil	Spade/scoop	6 inches
C-36-003	Photo Outfall	AAB1917	36-3113	11/21/94	Surface	Soil	Spade/scoop	6 inches
C-36-003	Photo Outfall	AAB1918D	36-3108	7/25/94	Surface	Liquid	Dipped bottle	N/A
C-36-003	Photo Outfall	AAB1919	36-3108	7/25/95	Surface	Liquid	Dipped bottle	N/A
36-005	Boneyard	AAB1834	36-3018	8/3/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1835D	36-3018	8/3/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1836	36-3019	8/3/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1837	36-3020	8/3/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1838	36-3021	8/3/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1839	36-3022	8/3/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1840	36-3023	8/3/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1841	36-3024	8/3/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1842	36-3025	8/3/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1843	36-3026	8/4/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1852	36-3034	7/28/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1853D	36-3034	7/28/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1854	36-3035	7/28/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1855	36-3036	7/28/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1856	36-3037	7/28/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1857	36-3038	7/28/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1858	36-3039	7/28/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1859	36-3040	7/28/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1860	36-3041	7/28/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1861	36-3042	8/4/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1862D	36-3042	8/4/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1863	36-3043	8/4/94	Surface	Soil	Spade/scoop	6 inches

D in the Sample ID column refers to duplicate samples

Table 4-1A
Summary of Sampling for PRSs 36-003(a), 36-003(b), 36-005, and C 36-003

PRS	*Location*	*Sample ID*	*Location ID*	*Date*	*Sample Type*	*Matrix*	*Sampling Technique*	*Ending Depth*
36-005	Boneyard	AAB1864	36-3044	8/4/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1865	36-3045	8/4/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1866	36-3046	8/4/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1867	36-3047	8/4/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1868	36-3048	8/4/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1869	36-3049	8/4/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1870D	36-3050	8/4/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1871	36-3050	8/4/94	Surface	Soil	Spade/scoop	6 inches
36-005	Boneyard	AAB1872	36-3051	8/4/94	Surface	Soil	Spade/scoop	6 inches

D in the Sample ID column refers to duplicate samples

ATTACHMENT E

APPENDIX B (REVISED)

SAMPLING AND ANALYSIS PLANS

B.1.0 PRS 36-005: BONEYARD SAMPLING AND ANALYSIS PLAN

B.1.1 Data Needs and Data Quality Objectives

Analytical results of samples from the RFI Phase I investigation revealed low levels of VOCs in surface soil samples within the Boneyard. No subsurface samples were collected in the Phase I investigation. The presence of VOCs in surface soils (where VOCs are expected to dissipate into the atmosphere) identifies the new data quality objective of determining if VOCs are present in concentrations exceeding SALs in the subsurface. If VOC concentrations at the Boneyard exceed SALs, an additional data quality objective will be to characterize VOC contamination at the Boneyard sufficiently to conduct a risk assessment.

The data quality objective of determining the presence of VOCs in the subsurface soils will be met by a continuation of the Phase I investigation. If necessary, the data quality objective of characterizing the extent of VOC contamination will be conducted under a Phase II type investigation.

B.1.2 Field Screening

Field screening of all samples will be performed in order to define potential hazards and health and safety conditions for onsite workers. A portable field instrument will be used for detecting alpha-, beta-, and gamma-emitters, and a portable field organic vapor analyzer will be used for detecting VOCs. All surface sample locations will be screened for high explosives (HE) using a field spot-test kit.

B.1.3 Sampling

Phase I Sampling

Subsurface samples will be collected by drilling at the locations of the maximum concentrations of each of the 7 detected VOC compounds (locations 36-3026, 36-3038, and 36-3039 -- see Table 4-11). One sample will be collected at each location at a depth of one foot or the soil-tuff interface, whichever is shallower. If VOCs are detected by the portable field organic vapor analyzer, additional samples will be collected at one foot depth intervals until the final sample to be submitted screens negative for organic vapors. The proposed continuation of Phase I sampling and analysis for the Boneyard is summarized in Table B-1.

Proposed sampling locations are presented in Figure B-1. All sampling locations will be surveyed so that the sampling points can be accurately located on the FIMAD map.

Phase II Sampling

If any of the Phase I samples reveal concentrations of VOCs above SALs, Phase II sampling will be initiated to characterize the nature of subsurface contamination at the Boneyard. Subsurface samples will be collected at 7 random locations within the Boneyard. At each location one sample will be collected at a depth of one foot or the soil-tuff interface, whichever is shallower. If VOCs are detected by the portable field organic vapor analyzer, additional samples will be collected at one foot intervals until the final sample to be submitted screens negative for organic vapors. The proposed Phase II sampling and analysis for the Boneyard is summarized in Table B-2. All sampling locations will be surveyed so that the sampling points can be accurately located on the FIMAD map.

B.1.4 Laboratory Analyses

All samples will be analyzed for VOCs (in accordance with EPA SW846 guidance). If any sample screens positive for radiation, a sample will also be submitted for gamma spectroscopy analysis. If a field laboratory is available and meets QA/QC criteria, these samples may be analyzed on site. Otherwise, an offsite analytical laboratory will be used.

B.2.0 PRS C-36-003: PHOTO OUTFALL

B.2.1 Data Needs and Data Quality Objectives

Analytical results from the RFI Phase I investigation indicate that chromium is present at the Photo Outfall in concentrations exceeding the SAL (reported in revised Section 4.4.2.3 and Table 4-14). Arochlors were also tentatively identified at location 36-3108 in results from SVOC analyses. Polychlorinated biphenol (PCB) was not identified as a PCOC at this PRS and analyses were not conducted for the Phase I investigation samples. Therefore, a Phase II investigation will be conducted. The data quality objectives for the Phase II investigation are:

- To determine if the outfall is responsible for the arochlor detections at location 36-3108;
- To characterize PCB contamination at the Photo Outfall sufficiently to conduct a risk assessment; and
- To characterize the nature of chromium contamination sufficiently to assess the associated risk.

B.2.2 Field Screening

Field screening of all samples will be performed in order to define potential hazards and health and safety conditions for onsite workers. A portable field instrument will be used for detecting alpha-, beta-, and gamma-emitters, and a portable field organic vapor analyzer will be used for detecting VOCs. All surface sample locations will be screened for high explosives (HE) using a field spot-test kit.

A field screening test kit for PCBs will be used to bias the location of samples that will be used for determination of arochlor contamination around the outfall. Six field screening samples will be taken for PCBs in the following locations:

- one foot on either side of location 36-3108 and equidistant from the outfall;
- in the drainage immediately above the outfall; and
- three locations on the crest of the canyon upgradient to 36-3108 (to be determined in the field).

All subsurface samples collected at location 36-3108 will also be screened for PCBs.

B.2.3 Soil and Sediment Sampling Plan

A surface soil sample (0 to 6 inches in depth) will be collected and submitted for chromium speciation analyses at the two locations where chromium was found above SALs during the Phase I investigation (36-3109 and 36-3110 -- see Table 4-14 and Figure B-2).

A surface soil sample (0 to 6 inches in depth) will be collected and submitted for PCB analysis at location 36-3108, where arochlors were tentatively identified. If this sample screens positive for PCB, additional samples will be collected at one foot intervals into the tuff until the final sample to be submitted screens negative for PCBs with the field test kit. If visual inspection and field screening measurements indicate additional areas of potential contamination, more samples may be collected for analysis. Samples will also be collected and submitted for PCB analysis at each of the PCB screening location described in the previous section that screen positive for PCBs.

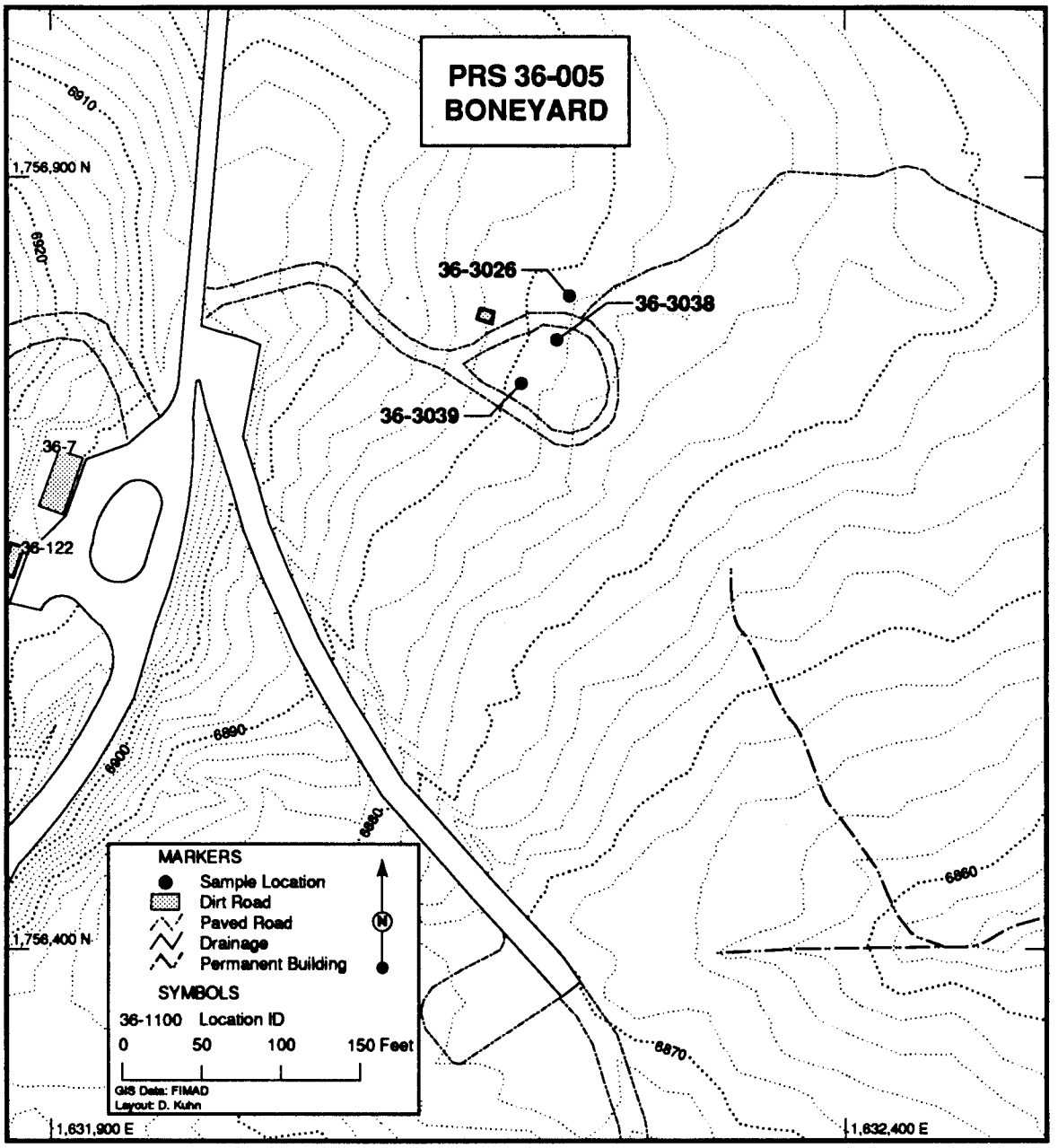


Figure B-1. PRS 36-005, Boneyard, showing sampling locations

Proposed samples and analysis for PRS C-36-003 are presented in Table B-3. All new sampling locations will be surveyed so that the sampling points can be accurately located on the FIMAD map.

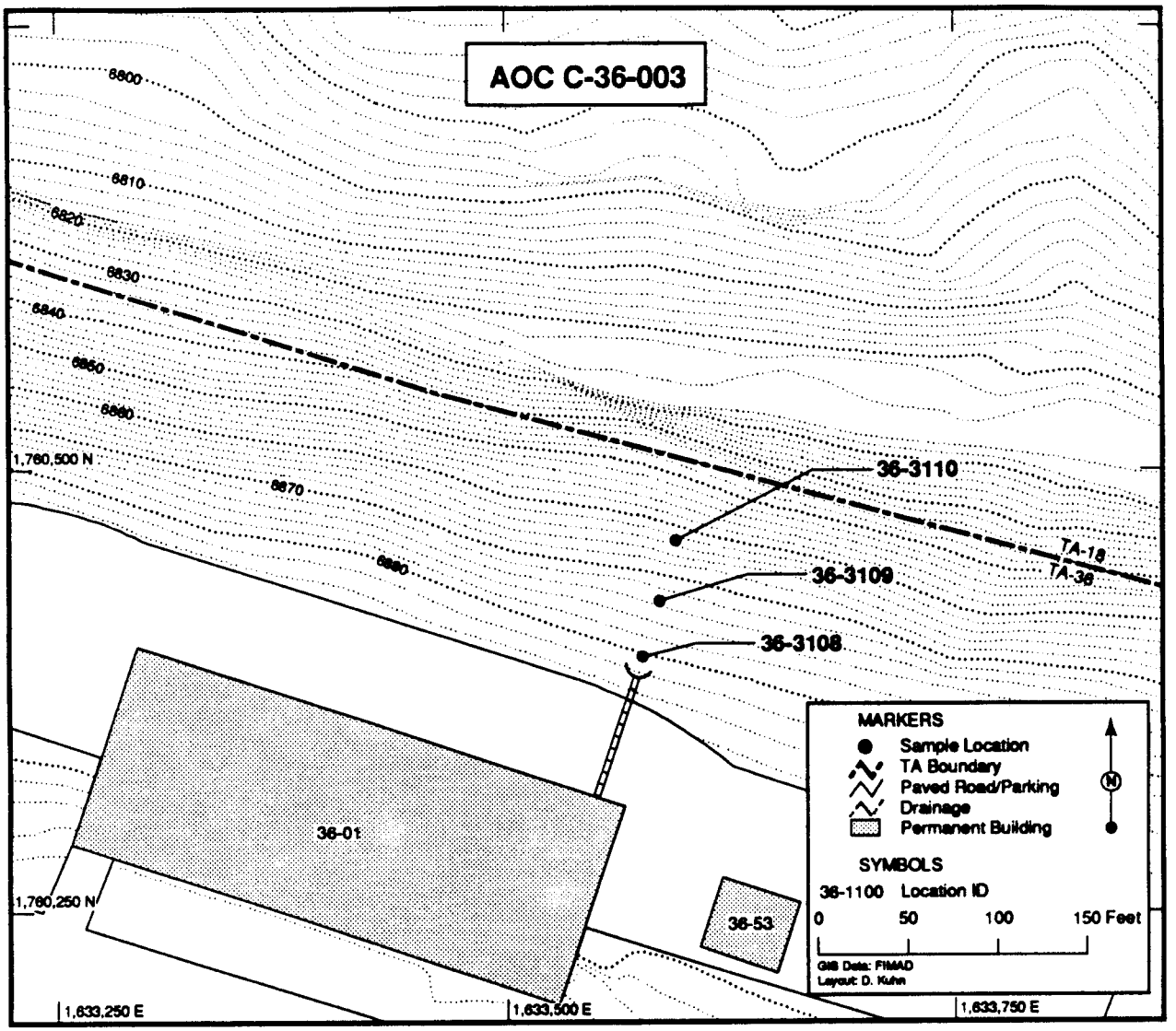


Figure B-2. PRS C-36-003, Photo Outfall, showing sampling locations

Table B-1

Phase I Sampling and Analyses for PRS 36-005, Boneyard

Unit	Description	Sampled Media			Samples: Sample Type			Field Screening				Laboratory Analyses					
		soil/tuff	soil	sediments	Screening	Surface	Subsurface	Beta-gamma	Alpha	Organic Vapor	Explosives (Spot Test)	Metals (SW 6010/7000)	Total Uranium	Mercury	VOCs (SW 8260)	SVOCs (SW 8270)	Gamma spectroscopy
PRS 36-005	Boneyard	x	x		3*		3*	x	x	x	x				x		

x : All samples
* : Additional samples will be collected from within the boreholes if VOC screening results are positive.

Table B-2

Phase II Sampling and Analyses for PRS 36-005, Boneyard

Unit	Description	Sampled Media			Samples: Sample Type			Field				Laboratory					
		soil/tuff	soil	sediments	Screening	Surface	Subsurface	Beta-gamma	Alpha	Organic Vapor	Explosives (Spot Test)	Metals (SW 6010/7000)	Total	Mercury	VOCs (SW 8260)	SVOCs (SW 8270)	Gamma spectroscopy
PRS 36-005	Boneyard	x	x		7		7*	x	x	x	x				x		

x : All samples
* : Additional samples will be collected from within the boreholes if VOC screening results are positive.

Table B-3

Phase II Sampling and Analyses for PRS C-36-003, Photo Out

Unit	Description	Sampled Media			Samples			Field Screening					Laboratory Analyses							
					Sample Type															
		soil/tuff	soil	sediments	Screening	Surface	Subsurface	Beta-gamma	Alpha	Organic Vapor	PCB	Explosives (Spot Test)	Metals (SW 6010/7000)	Chromium Speciation	Cyanides	PCB	VOCs (SW 8260)	SVOCs (SW 8270)	Gamma spectroscopy	Explosives (SW 8330)
PRS C-36-003	Locations 36-3109 and 36-3110	x		x	2	2		x	x	x		x		x						
Photo Outfall	Outfall 36-3108	x		x	1**	1	1**	x	x	x	x	x				x				
	Above Outfall		x		1	1*		x	x	x	x	x				y			y	y
	Either Side of Outfall		x		2	2*		x	x	x	x	x				y			y	y
	Crest of Canyon		x		3	3*		x	x	x	x	x				y			y	y

x : All samples
y : Samples will be submitted for these laboratory analyses if corresponding screening results are positive
* : If sample screens positive for PCB.
**: If sample screens positive for PCB, additional samples will be collected from within the borehole until screening results are negative