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Los Alamos
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memorandum

To/MS: Distribution
From/MS: T.E. Gene Gould, EES-15, MS J495
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Date: June 30, 1997

T. Rube for

Earth and Environmental Science Division
EES-15, Environmental Science Group
Los Alamos, New Mexico 87545

SUBJECT: EXTERNAL REVIEW - NOD RESPONSE FOR TECHNICAL AREAS 18 AND 27

In May 1997 and initial response to the subject NOD was submitted to HRMB. In that response, a commitment was made to provide additional information by July 15 regarding many of the comments. The attached NOD response contains that additional information.

The completed responses contained in the May 5 NOD response are included in this document. Text in the original edition that specified the additional information or text revisions that would be prepared have been deleted. All additions to the responses are noted with a vertical bar in the margin.

Complete responses are not provided for several of the comments. These will be completed before the response is delivered to HRMB.

- The supporting documentation (log books, drill logs, etc.), referred to in Comment 1.b.i, have been assembled, but are not provided with this review copy. A list of the documentation is provided in Attachment B, and the assembled documentation will be provided to HRMB as part of the response.

- The checkplot (Attachment C), referred to in Comment 1.b.iii, is still in preparation at FIMAD. It will consist of two sheets; one covering the area within and west of TA-18, the other the area east of TA-18. The maps will indicate all PRSs, sampling locations where constituents were detected above screening action levels, and the analytical suites (e.g., VOCs) of those constituents.

- Specific variances from sampling procedures, referred to by Comment 1.c.i, is still in preparation. Information is provided in the comment response regarding some of the variances, and a list of where the text needs to be modified to reflect the remainder. Attachment F to the response notes variances in the analyses performed.

Please provide review comments, if possible, by July 9 to Merlin Wheeler. (Comment resolution forms are attached). If you have any questions regarding this material, please contact Merlin at 661-5224.

Received by EM-01
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TEG/nr

Attachments: (1) NOD Response
(2) Comment resolution forms

Distribution:

Joe Rochelle, MS A187 w/ Attachments 1 and 2
Mike Gilgosch, LAAO, MS A316 w/ Attachments 1 and 2
Pat Shanley, ESH-19, MS K498 w/ Attachments 1 and 2
Tracy Glutzmuler, EM/ER, MS M992 w/ Attachments 1 and 2
Merlin Wheeler, ICF Kaiser, MS M892 w/o Attachments
OU 1093 Project File w/ Attachment 1
RPF, MS M707 w/ Attachment 1
EES-15 File w/o Attachments

RESPONSE TO ATTACHMENT A (SUMMARY OF CONCLUSIONS) OF NOD FOR RFI REPORT FOR POTENTIAL RELEASE SITES IN TECHNICAL AREAS 18 AND 27

The following table summarizes the detailed responses provided in LANL's response to Attachment B.

PRS	LANL's PROPOSED ACTION	DOES HRMB CONCUR	HRMB's RATIONALE	LANL's RESPONSE
18-002(a)	NFA	No	Discrete samples not obtained; holding times exceeded for contaminants of concern; additional information sampling required.	Composite samples were proposed in the approved RFI work plan. Statistical evaluation of results supports use of composite samples. Effect of exceeding holding times will be documented. Additional soil and groundwater sampling proposed to support NFA.
18-002(b)	NFA	No	Discrete samples not obtained; holding times exceeded contaminants of concern; additional information sampling required.	Composite samples were proposed in the approved RFI work plan. Statistical evaluation of results supports use of composite samples. Effect of exceeding holding times will be documented. Additional soil and groundwater sampling proposed to support NFA.
18-002(c)	NFA	No	Discrete samples not obtained; holding times exceeded for contaminants of concern.	Composite samples were proposed in the approved RFI work plan. Statistical evaluation of results supports use of composite samples. Effect of exceeding holding times will be documented. Additional soil and groundwater sampling proposed to support NFA.
18-003(a)	AC	No	Contaminants of potential concern (COPCs) > Screening Action Levels (SALs); no baseline risk assessment conducted; additional information/sampling required.	COPCs detected in contents of settling pit. Interim action conducted to empty tank in summer 1996. Additional TA-18-wide groundwater sampling proposed to support NFA proposal.
18-003(b)	AC	No	COPCs > SALs; no baseline risk assessment conducted; additional information/sampling required.	COPCs in soil were compared to industrial PRGs; potential cancer risk approximately 10^{-5}. Interim action conducted to empty tank in summer 1996. Additional TA-18-wide groundwater sampling proposed to support NFA proposal.

NFA - no further action.
AC - accelerated cleanup.

PRS	LANL's PROPOSED ACTION	DOES HRMB CONCUR	HRMB's RATIONALE	LANL's RESPONSE
18-003(c)	AC	No	COPCs > SALs; no baseline risk assessment conducted; additional information/sampling required.	COPCs in soil were compared to industrial PRGs; cancer risk approximately 10^{-5}. Interim action conducted to empty tank in summer 1996. Additional TA-18-wide groundwater sampling proposed to support NFA proposal.
18-003(d)	AC	No	COPCs > SALs; no baseline risk assessment conducted; additional information/sampling required.	COPCs detected in contents of septic tank. Interim action conducted to empty tank in summer 1996. Additional TA-18-wide groundwater sampling proposed to support NFA proposal. Corrective action initiated in December 1996 to address nature and extent of groundwater contamination.
18-003(e)	NA	NA	Not applicable: accelerated cleanup performed August 1995.	Expedited cleanup performed August 1995.
18-003(f)	NFA	No	COPCs > SALs; no baseline risk assessment conducted; additional information required.	COPCs in soil were compared with industrial PRGs; cancer risk approximately 10^{-5}. Existing data support NFA proposal.
18-003(g)	AC	No	COPCs > SALs; no baseline risk assessment conducted; additional information/sampling required.	COPCs detected in septic tank. Interim action conducted to empty tank in summer 1996. Additional TA-18-wide groundwater sampling proposed to support NFA proposal.
18-003(h)	NFA	No	Site inadequately characterized.	Phenols in septic tank exceed groundwater standard. Additional TA-18-wide groundwater sampling to support NFA proposal will monitor for phenols.
18-004(a)	NFA	No	Additional information/sampling required.	No media to sample in accessible portion of pipe; sampling will be deferred until site decommissioning.
18-004(b)	NFA	No	Site inadequately characterized; additional information/sampling required.	PRS could not be located for sampling without excavation, which is not possible for operational/security reasons. Sampling will be deferred until site decommissioning.
18-005(a)	NFA	No	Additional information/sampling required.	Sampling conducted in accordance with approved RFI work plan at locations that characterize site. Data adequate to support NFA proposal.

NFA - no further action.
AC - accelerated cleanup.

PRS	LANL's PROPOSED ACTION	DOES HRMB CONCUR	HRMB's RATIONALE	LANL's RESPONSE
18-008	NFA	No	NFA proposed based on PRS not located; PRS recently located.	PRS located after RFI report was submitted. Site remediated in accordance with UST requirements. NFA justified.
18-010(b)	NFA	No	Additional information/sampling required	Sampling conducted in accordance with approved RFI work plan. Documentation for elimination of COPCs supplied in this response. Existing data support NFA proposal.
18-010(c)	NFA	No	Additional information/sampling required.	Sampling conducted in accordance with approved RFI work plan. Documentation for elimination of COPCs supplied in this response. Existing data support NFA proposal.
18-010(d)	NFA	No	PAHs > SALs	Sampling conducted in accordance with approved RFI work plan. PAHs are the result of runoff from asphalt, not site-related activities. Documentation for elimination of COPCs supplied in this response. Existing data support NFA proposal.
18-010(e)	NFA	No	PAHs > SALs	Sampling conducted in accordance with approved RFI work plan. PAHs are the result of runoff from asphalt, not site-related activities. Documentation for elimination of COPCs supplied in this response. Existing data support NFA proposal.
18-010(f)	NFA	No	Additional information/sampling required.	Sampling conducted in accordance with approved RFI work plan. Documentation for elimination of COPCs supplied in this response. Existing data support NFA proposal.
18-011	NFA	No	Additional information/sampling required.	Sampling conducted in accordance with approved RFI work plan. This response clarifies sampling locations. Existing data support NFA proposal.
18-012(a)	NFA	No	Additional information/sampling required.	Sampling conducted in accordance with approved RFI work plan. Clarification of basis for elimination of COPCs supplied in this response. Existing data support NFA proposal.

NFA - no further action.

PRS	LANL's PROPOSED ACTION	DOES HRMB CONCUR	HRMB's RATIONALE	LANL's RESPONSE
18-012(b)	NFA	No	PAHs > SALs; additional information/sampling required.	Sampling conducted in accordance with approved RFI work plan. Inorganic COPCs>SAL compared with industrial PRGs; HI = 0.2; cancer risk approximately 10^{-6}. PAHs are the result of runoff from asphalt areas, not site-related activities. Documentation for elimination of organic COPCs supplied in this response. Existing data support NFA proposal.
18-012(c)	NFA	No	Site inadequately characterized; additional information/sampling required.	Sample locations adequately characterize site. Inorganic COPC was compared to industrial PRG, cancer risk approximately 10^{-6}. Existing data support NFA proposal.
18-013	NFA	No	COPCs > SALs; used industrial PRGs as SALs; no baseline risk assessment conducted.	COPCs (based on comparison to Region 9 residential PRGs) compared with industrial PRGs; cancer risk approximately 10^{-6}. Existing data support NFA proposal.
27-002	NFA	No	Discrete samples not obtained; holding times exceeded contaminants of concern; additional information/sampling required.	Composite samples were proposed in the approved RFI work plan. Statistical evaluation of results supports use of composite samples. Effect of exceeding holding times will be documented. COPCs were compared to industrial PRGs; HI=0.5; cancer risk approximately 10^{-8}. Additional soil and groundwater sampling proposed to support NFA.

NFA - no further action.

RESPONSE TO ATTACHMENT B (NOTICE OF DEFICIENCY COMMENTS) OF
NOD FOR RFI REPORT FOR POTENTIAL RELEASE SITES
IN TECHNICAL AREAS 18 AND 27

1. GENERAL COMMENTS

1.a Approach/Conceptual Model

Comment 1.a.i. *LANL shall treat Potential Release Sites (PRSs) within close proximity of one another and affecting the same media as non-isolated units. For instance, information gathered for one PRS should be used in the assessment of other nearby PRSs. (Concept similar to collective drainage approach)*

LANL Response:

A meeting held with HRMB on April 21 clarified that the comment requests aggregation of data from proximate PRSs that have a potential for affecting the same media. LANL believes this concept can be applied to two situations within TA-18—outfalls that discharge near or into the stream channel in Pajarito or Threemile canyons, and the combined effects of all PRSs on groundwater quality in the shallow alluvial aquifer within and down-gradient from TA-18.

The combined effects of outfall discharges were explicitly addressed through the collection of multiple sediment samples down-gradient from the easternmost outfall at TA-18—PRS 18-003(e). The data for these samples were presented in the RFI report, but there was no explicit discussion of the implications of the data regarding combined effects. Revised text is included below. The combined effects of multiple PRSs on groundwater are addressed in the response to Comment 1.a.ii.

A third paragraph is added to Section 4.6.4.3.4, Data Interpretation, as follows:

The ephemeral stream that runs through TA-18 receives runoff from several storm drains and outfalls that drain the asphalt-covered areas, driveways, buildings, building roofs, parking areas, and storage areas at this site. Sediment samples were collected and analyzed for several PRSs, including 18-010 (b,c,d,e), 18-012(a),and 18-012(b). The sample results for each PRS have been summarized in the respective sections of this report. Overall, several inorganics were detected above background UTLs, including antimony, cadmium, copper, lead, manganese, mercury, silver, and zinc. The highest detected concentrations for the inorganics detected above background were approximately an order of magnitude or more below their respective SALs. In addition, there was not a trend of higher concentrations at sample locations as one went downchannel. For example, mercury was detected at a concentration of 2.8 mg/kg at the outfall of PRS 18-012(b), but was detected at 0.4-0.7 mg/kg at a sample location approximately 10 ft further down the drainage channel. Furthermore, mercury was reported at concentrations <0.05 mg/kg in the ephemeral stream channel samples collected at PRS 18-010(e), which are the samples farthest downchannel at TA-18. Other inorganics showed similar decreases or only slight increases in concentrations from upchannel to downchannel sample locations. The only organics detected in the sediments were polynuclear aromatic hydrocarbons (PAHs) and some phthalates. The PAHs are typical of runoff from asphalted and tarred areas, and the phthalates are probably the residual from plastics. The farthest downchannel samples at PRS 18-010(e) did not detect any organics in the sediments. Based on the sediment data from these PRSs, and in particular the samples downchannel from PRS 18-003(e), the runoff from the storm drains and outfalls within TA-18 does not appear to result in an accumulation of potential contaminants in the stream channel.

Comment 1.a.ii. *NMED has a regulatory interest not only in the PRSs themselves, but also in any groundwater contamination beneath them. This RCRA Facility Investigation (RFI) report recommends no further action for many PRSs based on the observation that the PRS being investigated is not the source of identified contaminant concentrations in groundwater. New Mexico Environment Department (NMED)*

cannot support the No Further Action (NFA) recommendation proposed for these sites without adequate commitment from LANL to assess the cumulative risk to groundwater.

LANL Response:

The groundwater characterization to date in the area addressed by the RFI report for former OU 1093 has been in accordance with that proposed in the approved RFI work plan. LANL acknowledges that data resulting from the RFI indicates the presence of some contaminants at levels above the respective MCL, and in one instance [PRS 16-003(d)] above the New Mexico Water Quality Commission standards for groundwater. LANL has implemented a corrective action at PRS 16-003(d) to better define the nature and extent of contamination. The RFI data also indicate the presence of high explosive (HE) constituents in groundwater or springs up-gradient from TA-16. HE constituents were detected in groundwater within and down-gradient from TA-16 and in water samples from wetland areas within and down-gradient from TA-16. The reported concentrations are significantly below the screening action levels (SALs) in use when the RFI report was prepared. The significance of the reported HE concentrations will be re-evaluated as part of summarizing the effect of replacing previous SALs with EPA Region 9 preliminary remedial goals (PRG) and applicable water quality standards. LANL believes that existing groundwater data do not support the HRMB conclusion, as presented in the transmittal letter for the NOD, that "significant and systemic groundwater contamination exists in the shallow alluvial groundwater."

However, as noted previously, the existing data do indicate the presence of low concentrations of potential contaminants and are not sufficient to establish the source of these constituents. The Hydrogeologic Workplan (LANL 1996, 1378) proposes the construction and sampling of nine alluvial wells and one piezometer transect up-gradient from, within, and down-gradient from TA-16 in Pajarito and Threemile canyons. The general objectives of these wells, as described in Section 4.3.2.4 of the Hydrogeologic Workplan, is to determine the nature and extent of contaminants in the alluvial groundwater in Pajarito and Threemile canyons and to obtain information related to water budget and recharge to deeper aquifers. There was no schedule provided in the Hydrogeologic Workplan for construction of these wells. In order to address HRMB's concerns regarding the nature and extent of groundwater contamination within former OU 1093, LANL proposes to construct and sample these wells as soon as agreement can be reached with HRMB regarding the proposed location and purpose of each well.

Reference:

LANL (Los Alamos National Laboratory), December 6, 1996, "Hydrogeologic Workplan," Revision 1.0, Los Alamos National Laboratory Report, ER ID No. 55430, Los Alamos, New Mexico. (LANL 1996, 1378)

A Sampling and Analysis Plan for Groundwater Investigations in Threemile and Pajarito Canyon is provided as Attachment A to this NOD Response. The investigation will be conducted in two stages: the first stage will include construction of one new monitoring well, in Threemile Canyon, and sampling of existing groundwater and surface water monitoring points; the second stage will involve construction of additional wells, as needed, and refinement of the sampling plan.

Comment 1.a.iii. *LANL must determine the source and extent of contamination for those PRSs whose analytical results exceeded background and Screening Action Levels (SALs). The New Mexico Water Quality Control Commission (WQCC) regulations, among others, focus on presence of contaminants rather than on specific PRSs. Under these regulations, LANL has the responsibility to investigate further to ensure that no other areas of significant contaminant concentrations exist.*

CONTAMINANTS EXCEEDING BACKGROUND AND SALs	*PRSs ADDRESSED IN THIS RFI REPORT*
High Explosives	*2(a)*
Inorganics	*3(a-c, f),*
Organics	*3(a-c, d, g), 10(d-e), 12(b-c), 13*
	HSWA: 2(b-c), 3(h), 4(a), 5(a), 27-002
COPCs < SALs based on this RFI	*NON-HSWA: 4(b), 8, 10(b-c, f), 11,*

12(a)

LANL Response:

LANL will replace the SAL values used in this report for evaluation of groundwater quality with water quality standards, where applicable, including those promulgated by the New Mexico Water Quality Commission (see response to Comment 1.a.v). The summary of the changes, if any, resulting from the use of new SAL values will be evaluated.

Additional proposed investigation of the alluvial groundwater will provide information regarding the extent of any groundwater contamination in the area addressed by this RFI report (see response to Comment 1.a.ii).

LANL believes that concurrence must be reached with HRMB, the NMED Groundwater Quality Bureau, and LANL as to the extent of any investigations required by the New Mexico Water Quality Commission regulations.

Comment 1.a.iv. *LANL shall recalculate upper tolerance limits based on the 95th confidence level of the 95th percentile of distribution. LANL shall respond to this comment by providing a summary of the newly calculated Upper Tolerance Limits (UTLs), the former UTLs, and any effects it has on the data comparisons made in this report.*

LANL Response:

The recalculation of the soil background UTLs resulting in the 95th percentile rather than the 99th percentile resulted in lower background values for most inorganics (Table 1). The exceptions are cadmium, mercury, selenium, and thallium, which either remained the same or are slightly higher than the old soil background UTLs. The results of the current background UTLs on the data comparisons are presented in Table 1, as well as the re-evaluation of background and SALs on a PRS-by-PRS basis. The inorganics detected at concentrations greater than the soil background UTLs were analyzed statistically to determine if the inorganics are greater than background and to subsequently carry the additional inorganics forward to the SAL comparison stage for further evaluation. Because the soil background UTLs are considerably less than the SALs for the inorganic chemicals, except for arsenic and beryllium, there was generally no effect of the current soil background UTLs on the conclusions for each PRS. The lower soil background UTLs, in conjunction with the current SALs, did require that several multiple chemical evaluations (MCE) be recalculated. The only recalculated MCE that resulted in retaining inorganics as COPCs was the MCE for PRS 27-002. The normalized sum for this evaluation was greater than 1.0 and chromium and lead were retained as COPCs. However, this was not the result of lower background UTLs but rather due to a lower SAL for chromium. The hazard quotients for these inorganics and the overall hazard index are less than 1.0.

The addition of sediment background UTLs also results in the retention of more inorganics because these values are lower than the respective soil background UTLs (Table 1). The results of the current background UTLs on the data comparisons are presented in Table 1, as well as the re-evaluation of background and SALs on a PRS-by-PRS basis. The inorganics that were found to be greater than the sediment background UTLs were analyzed statistically to determine if the inorganics are greater than background and, if found to be greater, subsequently carried forward to the SAL comparison stage. As was the case for the soil background UTLs, the sediment background UTLs are considerably less than the SALs for the inorganic chemicals, except for arsenic and beryllium. As a result, several additional

inorganics were detected at concentrations above the background UTLs, but there was generally no effect of the sediment background UTLs on the conclusions for each PRS. The exceptions were PRS 18-012(b) and PRS 18-012(c), which had detections of arsenic and beryllium, respectively, above their sediment background UTLs (Table 1). Because the sediment UTLs for these inorganics are greater than their respective SALs, arsenic and beryllium were retained as COPCs and evaluated further. These inorganics were compared to their industrial PRGs in order to obtain an estimate of the cancer risk for each inorganic. The cancer risks were estimated to be $3X10^{-6}$ for arsenic and $2X10^{-6}$ for beryllium, which are at the lower end of the EPA's target risk range of 10^{-4} to 10^{-6}. Therefore, there is not an unacceptable risk for these inorganics under the industrial scenario and they are eliminated as COPCs.

The replacement of the site-specific soil background values obtained from the up-canyon wells with the current soil background UTLs did not markedly affect the data comparisons. Most of the site-specific values are less than the current soil background UTLs, except for chromium and thallium (Table 2). The results of the current background UTLs on the data comparisons are presented in the re-evaluation of background and SALs on a PRS-by-PRS basis. Chromium was originally eliminated at three PRSs [18-003(b), 18-003(g), and 18-012(b)] in three samples because the detected concentrations were less than the site-specific soil background values, but greater than the current soil background UTL. The analyses to determine if they were statistically greater than background eliminate two of three values from further evaluation. The remaining value from PRS 18-003(b) (46.3 mg/kg) is less than the chromium SAL (210 mg/kg) and is eliminated from further evaluation for this reason. Thallium is not affected by the replacement with the current soil background UTLs because it was not detected above background (site-specific or otherwise) at any of the PRSs. Therefore, the replacement of the site-specific soil background values with the current soil background UTLs did not affect the conclusions.

The site-specific sediment background values used in the wetlands are similar to the respective site-wide sediment background UTLs (Table 3). Barium, beryllium, lead, and nickel site-specific sediment background values are 0.4 to 11 mg/kg less than their sediment background UTLs, while chromium and zinc site-specific sediment background values are 0.2 to 6.9 mg/kg higher than their sediment background UTLs. This does not affect which inorganics are carried forward to the SAL comparison stage because each of these inorganics had detected concentrations greater than either background value (Table 4). Therefore, the replacement of the site-specific sediment background values with the current sediment background UTLs does not affect the conclusions.

In addition to the comparison of site data to background UTLs, the process of background comparisons now includes statistical analyses of the site data sets. The statistical comparisons are performed for the inorganics that exceed their UTLs to determine whether statistically significant differences exist between the observed site and background datasets. The Gehan/Wilcoxon Rank Sum test, the Quantile test, and the Slippage test are used for these evaluations (Gilbert 1987, 0312). The Gehan modification of the Wilcoxon 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 the observed number of site concentrations being greater than the maximum background concentration, given that the site data originates from the same distribution as the background data. Among the three tests, most types of differences between distributions can be determined. Observed significance levels (p-values) are reported for the tests. The p-value is the probability of observing data at least as different from the typical background data as the actual, observed site data, if the site concentration distribution is the same as background. If a p-value is less than 0.05, then there is reason to suspect that there is a difference between the background and site distributions; otherwise, no difference is indicated and the site concentrations are not statistically different than background. These tests are only performed for PRSs that have at least four samples, and only for the analytes that have adequate background datasets. For example, mercury data is not subjected to these tests because the background dataset is almost entirely composed of non-detected data.

Reference:

Gilbert, R. O., 1987. Statistical Methods for Environmental Pollution Monitoring. Van Nostrand Reinhold, New York, New York. (Gilbert 1987, 0312)

TABLE 1
COMPARISON OF OLD AND CURRENT BACKGROUND UPPER TOLERANCE LIMITS (UTLs)*

Analytes	Current Background UTLs (mg/kg)	Old Background UTLs (mg/kg)	Effects on Data Comparisons
Aluminum	38700	123000	No Effect
Antimony	1.0	2.5	No Effect
Arsenic	7.82	11.6	No Effect
	3.9 (sediment)		PRS 18-012(b); Sample Location 16-1666; Sample ID AAB5292; Sample value of 7.6 mg/kg is above the current sediment background UTL.
Barium	315	1140	PRS 27-002; Sample Location 27-1009; Sample ID AAB2478; Sample value 487 mg/kg above current background UTL.
	141 (sediment)		PRS 18-012(b); Sample Location 18-1666; Sample ID AAB5292; Sample value of 384 mg/kg is above the current sediment background UTL; PRS 18-010(b); Sample Locations 18-1714, 18-1715, 18-1716, 18-1717, 18-1718, 18-1719, and 18-1720; Sample IDs AAB5205, AAB5206, AAB5207, AAB5208, AAB5209, AAB5210, and AAB5211; Sample values 294 mg/kg, 247 mg/kg, 196 mg/kg, 207 mg/kg, 195 mg/kg, 177 mg/kg, and 180 mg/kg are above the current sediment background UTL; Wetlands; Sample Locations 36-2004, 36-2005, 36-2007, 36-2008,36-2009, 36-2011, and 36-2014; Sample Ids AAA5910, AAA5911, AAA5914, AAA5917, AAA5918, AAA5920, and AAA5925; Sample values 210 mg/kg, 240 mg/kg, 210 mg/kg, 150 mg/kg, 240 mg/kg, 160 mg/kg, and 200 mg/kg are above the current sediment background UTL.
Beryllium	1.95	3.31	No Effect
	1.4 (sediment)		PRS 18-012(c); Sample Location 18-1048; Sample ID AAB5844; Sample value of 1.6 mg/kg is above the current sediment background UTL.
Cadmium	2.7	2.7	No Effect
Chromium	19.3	34.2	PRS 18-003(b); Sample Location 18-1135; Sample ID AAB4505; Sample value of 46.2 mg/kg above current background UTL; PRS 18-003(d); Sample Location 18-1195; Sample IDs AAB4591, AAB4595; Sample values of 26.3 and 32.7 mg/kg above current background UTL; PRS 39-003(f); Sample Location 18-1255; Sample ID AAB4677; Sample value 31.8 mg/kg above current background UTL; PRS 39-003(g); Sample Location 18-1275; Sample ID AAB4695; Sample value 34.3 mg/kg above the current background UTL; PRS 18-002(b); Sample Locations 18-1075, 18-1076, 18-1078, 18-1079; Sample IDs AAB4442, AAB4449, AAB4461, AAB4469; Sample values of 27.2, 29.2, 21.8, and 46.5 mg/kg are above the current background UTL.

TABLE 1
COMPARISON OF OLD AND CURRENT BACKGROUND UPPER TOLERANCE LIMITS (UTLs)*
Continued

Analytes	Current Background UTLs (mg/kg)	Old Background UTLs (mg/kg)	Effects on Data Comparisons
Chromium	8.8 (sediment)	34.2	PRS 18-012(b); Sample Location 18-1666; Sample ID AAB5292; Sample value 35.2 mg/kg above the current sediment background UTL; PRS 18-012(c); Sample Location 18-1048; Sample ID AAB5844; Sample value 10 mg/kg is above the current sediment background UTL; Wetlands; Sample Locations 36-2001, 36-2004, 36-2005, 36-2007, 36-2008, 36-2009, 36-2013, and 18-2004; Sample IDs AAA5904, AAA5910, AAA5911, AAA5914, AAA5917, AAA5918, AAA5924, and AAA5938; Sample values 10 mg/kg, 16 mg/kg, 10 mg/kg, 11 mg/kg, 8.9 mg/kg, 9.9 mg/kg, 9.5 mg/kg, and 9.0 mg/kg are above the current sediment background UTL.
Cobalt	19.2	51.1	No Effect
	5.2 (sediment)		PRS-010(b); Sample Location 18-1754; Sample ID AAB5222; Sample value 13.1 mg/kg is above the current sediment background UTL.
Copper	15.5	15.7	No Effect
	9.85 (sediment)		PRS-010(b); Sample Locations 18-1297, 18-1298, and 18-1754; Sample IDs AAB4712, AAB4713, and AAB5222; Sample values 9.5 mg/kg, 10.2 mg/kg and 13.1 mg/kg are above the current sediment background UTL; PRS 18-010(e); Sample Location 18-1732, 18-1733, and 18-1736; Sample IDs AAB5249, AAB5250, and AAB5253; Sample values 14.4 mg/kg, 11.9 mg/kg and 11.8 mg/kg are above the current sediment background UTL.
Iron	21300	35600	No Effect
Lead	23.3	39	PRS 18-013; Sample Location 18-1682; Sample ID AAB5309; Sample value 33.8 mg/kg is above the current background UTL; PRS 27-002; Sample Locations 27-1015, 27-1016, 27-1032, 27-1033, 27-1057, and 27-1059; Sample IDs AAB2492, AAB2499, AAB2501, AAB4367, AAB4374, AAB4409, and AAB4420; Sample values of 32.2, 36.4, 37, 27.2, 31.5, 25.8, and 29.3 mg/kg are above the current background UTL.

TABLE 1
COMPARISON OF OLD AND CURRENT BACKGROUND UPPER TOLERANCE LIMITS (UTLs)*
Continued

Analytes	Current Background UTLs (mg/kg)	Old Background UTLs (mg/kg)	Effects on Data Comparisons
Lead	13.8 (sediment)	39	PRS 18-012(b); Sample Location 18-1667; Sample ID AAB5293; Sample value 30.5 mg/kg is above the current sediment background UTL; ; PRS 18-012(c); Sample Location 18-1048; Sample ID AAB5844 and AAB5845; Sample values 19 mg/kg and 15 mg/kg are above the current sediment background UTL; PRS 18-010(b); Sample Locations 18-1714, 18-1715, 18-1716, 18-1718, 18-1719, and 18-1720; Sample IDs AAB5205, AAB5206, AAB5207, AAB5209, AAB5210, and AAB5211; Sample values of 26, 28, 25, 26, 34, and 27 mg/kg are above the current sediment background UTL; PRS 18-010(c); Sample Location18-1727; Sample ID AAB5228; Sample value 31 mg/kg is above the current sediment background UTL; PRS 18-010(e); Sample Location 18-1732, 18-1733, 18-1734, 18-1735, and 18-1736; Sample IDs AAB5249, AAB5250, AAB5251, AAB5252, and AAB5253; Sample values 62.1 mg/kg, 29 mg/kg, 26.4 mg/kg, 35.4 mg/kg, and 22.1 mg/kg are above the current sediment background UTL; Wetlands; Sample Locations 36-2000, 36-2004, 36-2005, 36-2006, 36-2007, 36-2008,36-2009, 36-2010, 36-2011, 36-2012, 36-2013, 36-2014, 36-2015, and 36-2017; Sample IDs AAA5903, AAA5910, AAA5911, AAA5912, AAA5914, AAA5917, AAA5918, AAA5919, AAA5920, AAA5923, AAA5924, AAA5925, AAA5926, and AAA5930; Sample values 20 mg/kg, 41 mg/kg, 27 mg/kg, 16 mg/kg, 35 mg/kg, 27 mg/kg, 25 mg/kg, 25 mg/kg, 18 mg/kg, 30 mg/kg, 38 mg/kg, 20 mg/kg, and 16 mg/kg are above the current sediment background UTL
Manganese	490 (sediment)	1030	PRS 18-012(b); Sample Location 18-1667; Sample ID AAB5294; Sample value 1030 mg/kg is above the current sediment background UTL; PRS 18-010(b); Sample Locations 18-1718 and 18-1720; Sample IDs AAB5209 and AAB5211; Sample values of 567 mg/kg and 658 mg/kg are above the current sediment background UTL
Mercury	0.1	0.1	No Effect
Nickel	15.2	26.7	PRS 18-003(b); Sample Location 18-1135; Sample ID AAB4505; Sample value 22.6 mg/kg is above the current background UTL; PRS 18-003(d); Sample Location 18-1195; Sample ID AAB4595; Sample value 16.4 is above the current background UTL; PRS 18-002(b); Sample Locations 18-1076 and 18-1079; Sample IDs AAB4449 and AAB4469; Sample values of 15.7 and 23.3 mg/kg are above the current background UTL

TABLE 1
COMPARISON OF OLD AND CURRENT BACKGROUND UPPER TOLERANCE LIMITS (UTLs)*
Continued

Analytes	Current Background UTLs (mg/kg)	Old Background UTLs (mg/kg)	Effects on Data Comparisons
Nickel	10 (sediment)	26.7	Wetlands; Sample Locations 36-2004, 36-2005, 36-2007, 36-2008,36-2009, 36-2010, 36-2011, 36-2013, and 36-2014; Sample IDs AAA5910, AAA5911, AAA5914, AAA5917, AAA5918, AAA5919, AAA5920, AAA5924, and AAA5925; Sample values 14 mg/kg, 12 mg/kg, 14 mg/kg, 12 mg/kg, 13 mg/kg, 11 mg/kg, 11 mg/kg, 12 mg/kg, and 12 mg/kg are above the current sediment background UTL.
Selenium	1.7	1.7	No Effect
Silver	Not Available	Not Available	PRS 18-003(a); Sample Location 18-1100; Sample ID AAB4471; Sample value 1.31 mg/kg is carried forward to the SAL comparison stage because there is currently no background UTL for this inorganic; Wetlands; Sample Location 36-2004; Sample ID AAA5910; Sample value 1.8 mg/kg is carried forward to the SAL comparison stage because there is currently no background UTL for this inorganic.
Thallium	1.0	0.9	No Effect
Vanadium	41.9	66.2	No Effect
Zinc	50.8	101	PRS 18-003(c); Sample Locations 18-1159 and 18-1166; Sample IDs AAB4546 and AAB 4560; Sample values of 56 and 51.5 mg/kg are above the current background UTL; PRS 18-003(d); Sample Locations 18-1182, 18-1187, and 18-1188; Sample IDs AAB4588, AAB4589, and AAB4590; Sample values of 60.8, 56.2 , and 54.4 mg/kg are above the current background UTL; PRS 18-003(g); Sample Location 18-1275; Sample ID AAB4692; Sample value 51.5 mg/kg is above the current background UTL; PRS 18-013; Sample Locations 18-1681, 18-1682, and 18-1683; Sample IDs AAB5308, AAB5309, and AAB5310; Sample values of 79.3, 89.8, and 64.4 mg/kg are above the current background UTL; PRS 18-002(a); Sample Locations 18-1303, 18-1307, 18-1310 through 18-1315, 18-1322 through 18-1327, and 18-1331 through 18-1337; Sample IDs AAB 4862, AAB4871, AAB4880, and AAB4889; Sample values of 52.2, 53, 62.7, and 73.9 mg/kg are above the current background UTL; PRS 18-002(b); Sample Location 18-1463; Sample ID AAB5023; Sample value 52.9 mg/kg is above the current background UTL.

TABLE 1
COMPARISON OF OLD AND CURRENT BACKGROUND UPPER TOLERANCE LIMITS (UTLs)*
Continued

Analytes	Current Background UTLs (mg/kg)	Old Background UTLs (mg/kg)	Effects on Data Comparisons
Zinc	62.1 (sediment)	101	PRS 18-012(c); Sample Location 18-1048; Sample ID AAB5844; Sample value 63 mg/kg is above the current sediment background UTL; PRS 18-010(b); Sample Locations 18-1714, 18-1715, 18-1716, 18-1718, 18-1719, 18-1720, 18-1747, 18-1749, and 18-1750; Sample IDs AAB5205, AAB5206, AAB5207, AAB5209, AAB5210, AAB5211, AAB5219, AAB5220, and AAB5221; Sample values of 95, 51, 61, 60, 65.73, 95.1, 81, and 70.4 mg/kg are above the current sediment background UTL; PRS 18-010(c); Sample Locations 18-1724 and 18-1727; Sample IDs AAB5227 AAB5228; Sample values of 68.5 and 87.7 mg/kg are above the current sediment background UTL; PRS 18-010(d); Sample Location 181728; Sample ID AAB5233; Sample value 104 mg/kg is above the current sediment background UTL; PRS 18-010(e); Sample Locations 18-1732, 18-1733, and 18-1734; Sample IDs AAB5249, AAB5250, and AAB5251; Sample values 204 mg/kg, 63.2 mg/kg and 62.9 mg/kg are above the current sediment background UTL; Wetlands; Sample Locations 18-2009, 36-2001, 36-2004, 36-2005, 36-2007, 36-2014, and 36-2019; Sample IDs AAA5948, AAA5904, AAA5910, AAA5911, AAA5914, AAA5925, and AAA5932; Sample values of 69 mg/kg, 90 mg/kg, 110mg/kg, 68 mg/kg, 84 mg/kg, 68 mg/kg, and 64 mg/kg are above the current sediment background UTL.

* Background UTLs are for the A,B, and C soil horizons.

TABLE 2
COMPARISON OF BACKGROUND UTLs TO SITE-SPECIFIC BACKGROUND VALUES FOR SOILS

Analyte	Site-Specific Background Values (mg/kg)	Old Soil Background UTLs (mg/kg)	Current Soil Background UTLs (mg/kg)
Arsenic	2.9	11.6	7.8
Barium	116	1140	315
Beryllium	0.48	3.31	1.95
Chromium	54.2	34.2	19.3
Cobalt	3.04	51.1	19.2
Copper	15.3	15.7	15.5
Lead	9.2	39	23.3
Manganese	375	1030	714
Mercury	0.05	0.1	0.1
Nickel	12.2	26.7	15.2
Selenium	0.49	1.7	1.7
Thallium	1.7	0.9	1.0
Vanadium	17.3	66.2	41.9
Zinc	41.8	101	50.8

TABLE 3
COMPARISON OF BACKGROUND UTLs TO SITE-SPECIFIC BACKGROUND VALUES FOR SEDIMENTS

Analyte	Site-Specific Background Values (mg/kg)	Current Sediment Background UTLs (mg/kg)
Arsenic	ND[a]	3.9
Barium	130	141
Beryllium	1.0	1.4
Chromium	9.0	8.8
Cobalt	ND	5.2
Copper	ND	9.85
Lead	13	13.8
Manganese	ND	490
Mercury	ND	0.1[b]
Nickel	7.9	10
Selenium	ND	1.7
Thallium	ND	1.0
Vanadium	ND	21.3
Zinc	69	62.1

[a] ND = not detected in sediment
[b] Site-wide sediment background value is not available; therefore, soil background UTL is used.

TABLE 4
COMPARISON OF INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR THE WETLANDS

Sample ID	Location ID	Depth (in.)	Barium (mg/kg)	Beryllium (mg/kg)	Chromium (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Silver (mg/kg)	Zinc (mg/kg)
SAL	N/A	N/A	5300	Not Applicable	210	400	1500	380	23000
sediment UTL	N/A	N/A	141	1.4	8.8	13.8	10	Not Available	62.1
site-specific background	N/A	N/A	130	1.0	9.0	13	7.9	Not Available	69
AAA5903	36-2000	6-18	110	0.8	7.8	20	7.6	1.0(U)	57
AAA5904	36-2001	6-18	110	0.9	10	18	6.0	1.0(U)	90
AAA5910	36-2004	6-18	210	1.4	16	41	14	1.8	110
AAA5911	36-2005	6-18	240	1.0	10	27	12	1.0(U)	68
AAA5912	36-2006	6-18	68	0.6	5.8	16	6.0	1.0(U)	46
AAA5914	36-2007	6-18	210	1.3	11	35	14	1.0(U)	84
AAA5917	36-2008	6-18	150	1.0	8.9	27	12	1.0(U)	55
AAA5918	36-2009	6-18	240	1.0	9.9	25	13	1.0(U)	61
AAA5919	36-2010	6-18	140	0.9	8.1	25	11	1.0(U)	50
AAA5920	36-2011	6-18	160	0.9	7.6	18	11	1.0(U)	46
AAA5923	36-2012	6-18	100	0.8	8.4	20	7.0	1.0(U)	55
AAA5924	36-2013	6-18	130	1.0	9.5	30	12	1.0(U)	50
AAA5925	36-2014	6-18	200	1.3	13	28	12	1.0(U)	68
AAA5926	36-2015	6-18	100	0.7	6.9	20	6.9	1.0(U)	39
AAA5930	36-2017	6-18	80	0.7	4.6	16	2.0(U)	1.0(U)	55
AAA5932	36-2019	6-18	72	0.6	4.7	13	4.0	1.0(U)	64
AAA5938	18-2004	6-18	110	1.0	9.0	11.0(U)	7.9	1.0(U)	46

Note: Boxes with darkened borders indicate concentrations detected at or above the background UTL

Comment 1.a.v. *LANL shall clarify which land use scenarios were used to generate SALs for each of the Multiple Chemical Evaluations (MCEs) performed in this report. LANL shall base its SALs on US Environmental Protection Agency (USEPA) Region IX residential Potential Remediation Goals (PRGs). LANL may, in addition to performing the MCE based on residential risk, present an evaluation of risk based on a most likely exposure scenario. In response to this Notice of Deficiency (NOD) comment, LANL shall submit a table of revised SALs, SALs applied in the RFI report, and discuss any resulting differences which may affect the decisions made in this RFI report. For those SALs absent from the USEPA Region IX PRGs, LANL shall calculate the SAL using Subpart S guidance. LANL shall provide an explanation of the methodology and the calculations used to derive the SALs.*

LANL Response:

The soil screening action levels (SALs) for non-radiological chemicals currently in use are based on the EPA Region 9 preliminary remediation goals (PRGs) for residential soil (EPA 1996, 1351). These replace SALs in use when the RFI report was prepared that were based on methodology presented in Subpart S of 40 CFR 264. It should be noted that, under the current approach, there are no screening values for water that are explicitly equal to EPA Region IX PRGs. Instead, reported constituent concentrations in water will be compared to the appropriate and/or applicable water quality standard(s) for a given analyte.

The Region 9 PRGs are derived by incorporating current EPA toxicity values (i.e., reference doses (RfDs) and carcinogenic slope factors) from the IRIS (EPA 1994, 1167) or HEAST (Miller 1994, 1169) databases, as well as from EPA's National Center for Environmental Assessment, with standard exposure parameters to estimate contaminant concentrations in environmental media that are protective of humans over a lifetime. The PRGs correspond to a fixed level of risk (10^{-6}) for carcinogens and a non-carcinogenic hazard quotient of one. For those chemicals for which Region 9 PRGs are not available, SALs will be calculated using the methodology in EPA's "Corrective Action for Solid Waste Management Units," Subpart S (EPA 1990, 0432) provided that sufficient, adequate, and approved toxicity data are available to calculate RfDs or cancer slope factors. For those chemicals that do not have sufficient, adequate, and approved toxicity data to calculate an RfD or cancer slope factor, a surrogate will be used to obtain a SAL, based on similarity in structure and/or toxicology. For example, phenanthrene has no SAL available, but because it is similar in structure to pyrene, the SAL for pyrene will be used in the data comparison for phenanthrene. SALs are updated annually as new toxicity information and/or applicable or relevant and appropriate requirements (ARARs) become available.

Several Notice of Deficiency (NOD) Comments from the New Mexico Environment Department on the RFI Report for TA-18 indicated that USEPA Region 9 residential PRGs are to be used as screening action levels (SALs) in the screening assessment of the Phase I data at TA-18. Because these PRGs had not yet been officially adopted by the Environmental Restoration (ER) Project as SALs at the time of the writing of this report, the SALs used in the screening assessment were based on the equations and assumptions presented in Appendix J of the approved Installation Work Plan (LANL 1993, 1017). The methodology for calculating the action levels was obtained from EPA's "Corrective Action for Solid Waste Management Units (SWMUs) at Hazardous Waste Management Facilities," Subpart S (EPA 1990, 0432), a proposed regulation under RCRA. In response to the NOD comments, Tables 5 through 8 below compare the old and current background upper tolerance limits (UTLs) (99th percentile versus 95th percentile) as well as the old and current SALs. The estimated site-specific background values are also presented as well as a comparison of the water quality standards to the old water SALs. The current values (UTLs, SALs, and water quality standards) are used to re-screen the data from each potential release site (PRS) discussed in the RFI report. The results of the reassessment are presented below by PRS, and the effects on the conclusions, if any, are also presented.

References:

EPA (US Environmental Protection Agency), August 1, 1996. "Region 9 Preliminary Remediation Goals (PRGs), 1996," San Francisco, California. (EPA 1996, 1351)

EPA (US Environmental Protection Agency), May 1994. "Integrated Risk Information System (IRIS)," Office of Science and Technology, National Technical Information Service, Springfield, Virginia. (EPA 1994, 1167)

EPA (US Environmental Protection Agency), July 27, 1990. "Corrective Action for Solid Waste Management Units (SWMUs) at Hazardous Waste Management Facilities," proposed rule, Title 40, Parts 264, 265, 270, and 271, Federal Register, Vol. 55., pp. 30798-30884 (EPA 1990, 0432)

LANL (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, 1017)

Miller, I. C., March 1994. "Health Effects Assessment Summary Tables Annual Update, FY-1994," 9200.6-303(94-1), EPA 540-R-94-020, prepared by Oak Ridge National Laboratory for the Environmental Protection Agency, Oak Ridge, Tennessee. (Miller 1994, 1169)

TABLE 5
COMPARISON OF OLD, CURRENT, AND SITE-SPECIFIC BACKGROUND UTLS AND OLD AND CURRENT SALS FOR INORGANIC CHEMICALS DETECTED IN SOILS AND SEDIMENTS AT TA-18

Analyte	Site-Specific Background (mg/kg)		Old Background Soil UTL (mg/kg)	Current Background UTL (mg/kg)		Old SAL (mg/kg)	Current SAL (mg/kg)
	Soil	Sediment		Soil	Sediment		
Aluminum	12100	NA[a]	123000	38700	11800	NA	77000
Antimony	NA	NA	2.5	1.0	1.0[b]	32	31
Arsenic	2.9	NA	11.6	7.8	3.9	NA	NA
Barium	116	130	1140	315	141	5600	5300
Beryllium	0.48	1.0	3.31	1.95	1.4	NA	NA
Cadmium	NA	NA	2.7	2.7	2.7[b]	80	38
Chromium	54.2	9.0	34.2	19.3	8.8	NA	210
Cobalt	3.04	NA	51.1	19.2	5.2	NA	4600
Copper	15.3	NA	15.7	15.5	9.85	3000	2800
Iron	13200	NA	35600	21300	14400	NA	NA
Lead	9.2	13	39	23.3	13.8	400	400
Manganese	375	NA	1030	714	490	11000	3200
Mercury	0.05	NA	0.1	0.1	0.1[b]	24	23
Nickel	12.2	7.9	26.7	15.2	10	1600	1500
Selenium	0.49	NA	1.7	1.7	1.7[b]	400	380
Silver	NA	NA	1.61	NA	NA	400	380
Thallium	1.7	NA	0.9	1.0	1.0[b]	6.4	5.4
Vanadium	17.3	NA	66.2	41.9	21.3	560	540
Zinc	41.8	69	101	50.8	62.1	24000	23000

[a] NA = not available
[b] If sediment background UTLs are not available, the soil background UTL is used.

TABLE 6
COMPARISON OF OLD AND CURRENT SALS FOR ORGANIC CHEMICALS DETECTED IN SOILS AND SEDIMENTS AT TA-18

Analyte	Old SAL (mg/kg)	Current SAL (mg/kg)
Acenaphthene	4800	2200[a]
Acetone	6000	2100
2-Amino-4,6-dinitrotoluene (DNT)	NA[b]	65[c]
4-Amino-2,6-dinitrotoluene (DNT)	NA	65[c]
Anthracene	24000	18000[a]
Benzo(a)anthracene	1.0	0.61
Benzo(a)pyrene	0.1	0.061
Benzo(b)fluoranthene	1.0	0.61
Benzo(k)fluoranthene	1.0	6.1
Benzo(g,h,i)perylene	NA	1900[d]
Bis(2-chloroethyl)ether	0.12	0.043
Bis(2-ethylhexyl)phthalate	50	32
2-Butanone	4000	7100
Butyl benzyl phthalate	16000	13000
4-Chloro-3-methylphenol	NA	3300[e]
2-Chloronaphthalene	64000	4300
Chrysene	96	61
Dibenzo(a,h)anthracene	0.1	0.061
Dibenzofuran	NA	250
1,2-Dichlorobenzene	1600	1100
Diethyl phthalate	6400	52000
Di-n-butyl phthalate	8000	6500
Di-n-octyl phthalate	1600	1300
2,4-Dinitrotoluene	1.0	130
2,6-Dinitrotoluene	1.0	65
Fluoranthene	3200	2600[a]
Fluorene	3200	2300[a]
Hexachloroethane	80	32
HMX	4000	3300
Indeno(1,2,3-cd)pyrene	1.0	0.61
Methylene chloride	5	7.8
4-Methylphenol	400	330
Naphthalene	3200	1000[a]
Nitrobenzene	5.3	18
Phenanthrene	NA	18000[f]
Pentachlorophenol	5.8	2.5
Pyrene	2400	1900[a]
RDX	64	4
Tetryl(methyl-2,4,6-trinitrophenylnitramine) (TETRYL)	NA	NA
1,2,4-Trichlorobenzene	160	570
Trichloroethene	3.2	3.2

TABLE 6 (continued)
COMPARISON OF OLD AND CURRENT SALS FOR ORGANIC CHEMICALS DETECTED IN SOILS AND SEDIMENTS AT TA-18

Analyte	Old SAL (mg/kg)	Current SAL (mg/kg)
Trichlorofluoromethane	24000	380
2,4,6-Trichlorophenol	64	40
1,1,2-Trichloro-1,2,2-trifluoroethane	NA	21000
2,4,6-Trinitrotoluene	40	15
Xylenes (mixed)	160000	5300

[a] The EPA Region 9 theoretical saturation concentration for soil (designated as "sat" in the 1996 EPA Region 9 PRG Table) has been replaced by an alternative value, also calculated by Region 9. This alternative value is intended to represent a "health-based" concentration, assuming that the model used to evaluate inhalation of vapors is valid at this concentration.
[b] NA = not available
[c] Toxicity criteria are not available for 2-amino-4,6-dinitrotoluene and 4-amino-2,6-dinitrotoluene; therefore, the toxicity criteria for 2,6-dinitrotoluene were used as surrogates based on similarity of chemical structure.
[d] Toxicity criteria are not available for benzo(g,h,i)perylene; therefore, the toxicity criteria for pyrene were used as surrogates based on similarity of chemical structure.
[e] Toxicity criteria are not available for 4-chloro-3-methylphenol; therefore, the toxicity criteria for 3-methylphenol were used as surrogates based on similarity of chemical structure.
[f] Toxicity criteria are not available for phenanthrene; therefore, the toxicity criteria for anthracene were used as surrogates based on similarity of chemical structure.

TABLE 7
COMPARISON OF OLD SALS AND WATER QUALITY STANDARDS FOR ANALYTES DETECTED IN GROUNDWATER AND SURFACE WATER AT TA-18

Analyte	Site-Specific Groundwater Background (µg/L)	Old SAL (µg/L)	Water Quality Standards (µg/L)	
			Groundwater	Surface Water
Aluminum	22562	NA	5000 (IU)	50 (DW) / 5000 (LW)
Antimony	NA	6	NA	6 (DW)
Arsenic	4.8	50	100 (HH)	50 (DW & DWS) / 200 (LW)
Barium	214	2000	1000 (HH)	2000 (DW)
Beryllium	1.8	4	NA	4 (DW)
Cadmium	NA	5	10 (HH)	5 (DW) / 10 (DWS) / 50 (LW)
Chromium	19.1	100	50 (HH)	100 (DW) /50 (DWS) /1000 (LW)
Cobalt	7.4	NA	NA	1000 (LW)
Copper	25	1300	1000 (DWS)	1300 (DW) /500 (LW)
Iron	15827	NA	1000 (HH)	300 (DW)
Lead	14.1	50	50 (HH)	15 (DW) / 50 (DWS) / 100 (LW)
Manganese	523	180	200 (DWS)	50 (DW)
Mercury	NA	2	2 (HH)	2 (DW) /10 (LW) /0.012 (WH)
Nickel	NA	100	200 (IU)	100 (DW)
Silver	NA	170	50 (HH)	100 (DW) / 50 (DWS)
Thallium	3.9	2	NA	2 (DW)
Vanadium	27.5	240	NA	100(LW)
Zinc	64.3	10000	10000 (DWS)	5000 (DW) /25000 (LW)
Acetone	NA	3500	NA	NA (610)"
2-Amino-4,6-DNT	0.18	NA	NA	NA
4-Amino-2,6-DNT	0.5	NA	NA	NA
2-Butanone	280	1700	NA	NA (1900)
Carbon disulfide	NA	3500	NA	NA (21)
Chloroform	NA	100	NA	100 (DW)
1,2-Dichloroethane	NA	5	10 (HH)	5 (DW)
Di-n-butyl phthalate	NA	3500	NA	NA (3700)
1,3-Dinitrobenzene	0.62	3.5	NA	NA (3.7)
2,4-Dinitrotoluene	0.09	NA	NA	NA (73)
HMX	2.84	1800	NA	NA (1800)
Nitrobenzene	0.93	18	NA	NA (3.4)
m-Nitrotoluene	NA	350	NA	NA (370)
o-Nitrotoluene	3.66	350	NA	NA (370)
p-Nitrotoluene	0.82	350	NA	NA (370)
RDX	2.15	3.2	NA	NA (0.61)
TETRYL	0.12	350	NA	NA
1,3,5-Trinitrobenzene	1.3	1.8	NA	NA (1.8)
2,4,6-Trinitrotoluene	0.12	12	NA	NA (2.2)

NA = not available
IU = Groundwater Standard for Irrigation Use
HH = Groundwater Standard for Human Health
DWS = Groundwater Standard for Domestic Water Supply
DW = Drinking Water Standard
LW = Livestock Watering Standard
DWS = Domestic Water Supply
WH = Wildlife Habitat Standard
" EPA Region 9 PRG for tap water is presented in parentheses.

TABLE 8
COMPARISON OF INORGANIC SITE-SPECIFIC SEDIMENT AND SURFACE WATER VALUES TO SITE-WIDE SEDIMENT UTLs AND WATER QUALITY STANDARDS IN THE WETLANDS

Analyte	Site-Specific Sediment Background (mg/kg)	Site-Wide Sediment UTLs (mg/kg)	Site-Specific Surface Water Values (µg/L)	Water Quality Standards (µg/L)
Barium	130	141	62	2000(DW)/1000(LW)
Beryllium	1.0	1.4	ND	4.0(DW)
Chromium	9.0	8.8	ND	100(DW)/50(DWS)/ 1000(LW)
Lead	13	13.8	3.0	15(DW)/50(DWS)/ 100(LW)
Nickel	7.9	10	ND	100(DW)
Zinc	69	62.1	ND	5000(DW)

ND = Not Detected
DW = Drinking Water Standard
LW = Livestock Watering Standard
DWS = Domestic Water Supply Standard

Since the submission of the RFI report in November 1995, the contents of the settling pit and septic tanks [PRSs 18-003(a, b, c, d, f, and g)] have been removed as part of approved interim actions at these sites. Therefore, the comparison of tank contents to the current SALs or water quality standards is not relevant and is not included in the following re-evaluation of the PRSs.

PRS 18-003(a)

Silver is retained following the background comparison because it was detected in one subsurface soil sample at 1.31 mg/kg and there is currently no background UTL for this inorganic (Table 5). This inorganic was initially eliminated in the RFI report because it was below the old soil background UTL of 1.61 mg/kg. It is less than its SAL of 380 mg/kg and is not submitted to a multiple chemical evaluation (MCE) because it is the only noncarcinogen retained. Therefore, it is eliminated from further evaluation. All other chemicals detected at this PRS were found in the settling pit.

The application of current background UTLs and SALs, and the water quality standards, did not affect the conclusions for this PRS.

PRS 18-003(b)

Chromium was initially detected above the old soil background UTL (34.2 mg/kg), but eliminated in the RFI report because it was below the site-specific background value (54.2 mg/kg). Nickel was detected at a concentration of 22.6 mg/kg and subsequently eliminated because it was below the old background UTL (26.7 mg/kg). Based on the comparison to the current background UTLs (19.2 mg/kg and 15.2 mg/kg, respectively), chromium and nickel were each detected in one sample above the UTLs. Statistical comparisons of the site data sets to the background data sets for these inorganics indicated that they were not statistically greater than background (p-values >0.05; see response to comment 1.a.iv for a discussion of statistical evaluation). Therefore, chromium and nickel are not carried forward to the SAL comparison stage.

Aluminum, iron, and zinc were detected in the filtered groundwater samples at concentrations of 518 µg/L, 374 µg/L, and 203 µg/L, respectively, which are below the respective groundwater standards for these inorganics (Table 7). Manganese was detected in a filtered groundwater sample at a concentration of 441 µg/L, which is above the groundwater standard for this inorganic (Table 7). However, the manganese concentration is below the concentration detected in the up-gradient wells (523 µg/L), indicating that existing conditions at this site exceed the standard.

Beryllium, lead, and manganese were detected in an unfiltered groundwater sample at concentrations of 5.8 µg/L, 79 µg/L, and 1440 µg/L, respectively, which are above the groundwater and drinking water standards for these inorganics (Table 7). However, because the sample was not filtered, it is not

representative because the standards are based on the dissolved metals. Arsenic, barium, chromium, copper, nickel, and zinc were detected in the groundwater at concentrations of 19.4 µg/L, 734 µg/L, 43.6 µg/L, 39.4 µg/L, 32.1 µg/L, and 228 µg/L, respectively. Although the sample was not filtered, these concentrations were below the respective groundwater and drinking water standards for these inorganics (Table 3). Cobalt and vanadium were also detected in the unfiltered groundwater sample at concentrations of 15.3 µg/L and 65.9 µg/L, respectively. These inorganics do not have groundwater or drinking water standards, but do have standards for livestock watering (Table 7). The detected concentrations were below the livestock watering standards for these inorganics.

The COPCs retained by the screening assessment [benzo(a)pyrene, bis(2-chloroethyl)ether, and dibenzo(a,h)anthracene] were undetected in the subsurface soil, but were retained because of QC problems, same or similar compounds detected in the settling pit [PRS 18-003(a)], and SALs below detection limits. Because the sample values for these analytes were all nondetects and the sampling was biased towards the most likely contaminated areas, a baseline risk assessment was not conducted. In lieu of a baseline risk assessment, the COPCs retained by the screening assessment were compared to the EPA Region 9 PRGs for an industrial scenario (EPA 1996). This preliminary risk evaluation was done to provide an indication of whether the concentrations of these COPCs pose a potential risk to human health, i.e., cancer risk was greater than EPA's target risk range of 10^{-4} to 10^{-6} (EPA 1990), which is an acceptable and conservative approach for screening sites (EPA 1996). The comparisons found that the individual industrial PRG values (0.26 mg/kg, 0.097 mg/kg, and 0.26 mg/kg, respectively) were less than the detection limits for the COPCs (0.36 mg/kg to 0.41 mg/kg for each analyte). Individual cancer risks were calculated by dividing the median detection limit (0.37 mg/kg) and maximum detection limit (0.41 mg/kg) for each COPC by the respective industrial PRG (EPA 1996). This resulted in estimated cancer risks of $2X10^{-6}$, $4X10^{-6}$, and $2X10^{-6}$ for benzo(a)pyrene, bis(2-chloroethyl)ether, and dibenzo(a,h)anthracene, respectively. The cumulative risk obtained by adding the individual cancer risks resulted in an overall estimated risk of $8X10^{-6}$, which is in the middle of USEPA's target risk range, indicating that there is no unacceptable risk to human health under the industrial scenario. In addition, since these analytes were not detected in the drainfield, the risk (if any) is likely to be much lower than the conservative estimate presented here, and these analytes have not been detected in the groundwater monitoring wells located throughout TA-18.

The organic, 1,2-dichloroethane, was detected in one groundwater sample at a concentration equivalent to the New Mexico Water Quality Control Commission (NMWQCC) Groundwater Standard for human health (10 µg/L) and above the USEPA and New Mexico Drinking Water Standards of 5 µg/L (Table 3).

The application of current background UTLs and SALs, and the water quality standards, did not affect the conclusions for this PRS.

PRS 18-003(c)

No inorganics were initially detected above the old soil background UTLs. Zinc was detected at a concentration of 61.5 mg/kg above its current background UTL (50.8 mg/kg) in one subsurface soil sample, but was below the old background UTL (101 mg/kg). Statistical comparison of the site data set to the background data set for zinc indicated that it was not statistically greater than background (p-values >0.05; see response to comment 1.a.iv for a discussion of statistical evaluation). Therefore, zinc is not carried forward to the SAL comparison stage.

Lead, manganese, and zinc were detected in the filtered groundwater samples at concentrations of 6.8 µg/L, 125 µg/L, and 33.8 µg/L, respectively, which are below the respective groundwater standards for these inorganics (Table 7). Aluminum and iron were detected in the filtered groundwater samples at concentrations of 7090 µg/L and 6000 µg/L, respectively, which are above the respective groundwater standards (Table 7). However, the aluminum and iron concentrations are below the concentrations detected in the up-gradient wells (22,562 µg/L and 15,627 µg/L, respectively), indicating that existing conditions at this site exceed the standards. Barium, nickel, and zinc were detected in an unfiltered groundwater sample at concentrations of 308 µg/L, 11.3 µg/L, and 83.5 µg/L, respectively, which are below the groundwater and drinking water standards for these inorganics (Table 7). Lead was detected in an unfiltered groundwater sample at a concentration of 25.8 µg/L, which is below the groundwater standard but above the drinking water standard for this inorganic (Table 7). However, because the sample was not filtered, it is not representative since the standards are based on the dissolved metal. Vanadium was also detected in the unfiltered groundwater sample at a concentration of 29.1 µg/L. This

inorganic does not have a groundwater or drinking water standard, but does have a standard for livestock watering (Table 7). The detected concentration was below the livestock watering standard for this inorganic.

The MCEs were recalculated because of the current SALs (Table 9). The normalized sum for the noncarcinogenic effects category is 0.2, which is below the target value of 1.0. The normalized sum for the carcinogenic effects category is 0.4, which is below the target value of 1.0. Therefore, the analytes in the MCE are not retained as COPCs at this PRS.

As a result of the current SALs, 2,4-dinitrotoluene and 2,6-dinitrotoluene are no longer above their respective SALs (130 mg/kg and 65 mg/kg) (Table 6) and are eliminated because of the MCE (see below). Benzo(a)pyrene, bis(2-chloroethyl)ether, and pentachlorophenol are were detected in the subsurface soil at concentrations greater than their current SALs (Table 6). The organic, 1,2-dichloroethane, was detected at a concentration (6 µg/L) below the NMWQCC Groundwater Standard for human health (10 µg/L) and above the USEPA and New Mexico Drinking Water Standards of 5 µg/L (Table 7).

The soil COPCs retained by the screening assessment, benzo(a)pyrene, bis(2-chloroethyl)ether, and pentachlorophenol, require further evaluation. Because there was only one detected concentration of each COPC and the sampling was biased towards the most likely contaminated areas, a baseline risk assessment was not conducted. In lieu of a baseline risk assessment, the COPCs retained by the screening assessment were compared to the EPA Region 9 PRGs for an industrial scenario (EPA 1996). This preliminary risk evaluation was done to provide an indication of whether the concentrations of these COPCs pose a potential risk to human health, i.e., cancer risk was greater than EPA's target risk range of 10^{-4} to 10^{-6} (EPA 1990), which is an acceptable and conservative approach for screening sites (EPA 1996). The comparisons found that the individual industrial PRG values (0.26 mg/kg, 0.097 mg/kg, and 7.9 mg/kg, respectively) were either less than or similar to the detected concentrations for the COPCs (1.0 mg/kg, 1.4 mg/kg, and 6.6 mg/kg, respectively). Individual cancer risks were calculated by dividing the median concentration and the maximum detected concentration of each COPC by the respective industrial PRG (EPA 1996). This resulted in estimated cancer risk ranges greater than or equivalent to 10^{-6} for each COPC ($2X10^{-6}$ to $4X10^{-6}$, $4X10^{-6}$ to $1X10^{-5}$, and $3X10^{-7}$ to $1X10^{-6}$ for benzo(a)pyrene, bis(2-chloroethyl)ether, and pentachlorophenol, respectively). The cumulative risk obtained by adding the individual cancer risks resulted in an overall estimated risk range of $6X10^{-6}$ to $2X10^{-5}$, which is in the middle of USEPA's target risk range, indicating that there is no unacceptable risk to human health under the industrial scenario. In addition, none of these analytes have been detected in the groundwater monitoring wells located throughout TA-18.

TABLE 9
MULTIPLE CHEMICAL EVALUATION - PRS 18-003(c)

Analyte	Maximum Sample Values (mg/kg)	Soil SALs (mg/kg)	Normalized Values
Soil - Noncarcinogenic			
Anthracene	1.1	18000	0.00
Benzo(g,h,i)perylene	5.4	1900	0.003
2-Chloronaphthalene	1.8	4300	0.00
4-Chloro-3-methylphenol	6.0	3300	0.002
Dibenzofuran	9.3	250	0.04
1,2-Dichlorobenzene	0.7	1100	0.001
Diethyl phthalate	6.2	52000	0.00
2,4-Dinitrotoluene	6.6	130	0.05
2,6-Dinitrotoluene	4.1	65	0.06
Hexachloroethane	0.9	32	0.03
4-Methylphenol	3.9	330	0.01
Naphthalene	3.6	1000	0.004
Pyrene	1.2	1900	0.001
1,2,4-Trichlorobenzene	1.0	570	0.002
		Total	0.2
Soil - Carcinogenic			
Chrysene	4.9	61	0.08
2,4,6-Trinitrotoluene	5.3	15	0.35
		Total	0.4

The application of current background UTLs and SALs, and the water quality standards, did not affect the conclusions for this PRS.

PRS 18-003(d)

No inorganics were initially detected above the old soil background UTLs. Chromium was detected at concentrations of 26.3 mg/kg and 32.7 mg/kg, nickel was detected at a concentration of 16.4 mg/kg, and zinc was detected at concentrations of 60.8 mg/kg, 56.2 mg/kg, and 54.4 mg/kg, which are above their respective current background UTLs (19.3 mg/kg, 15.2 mg/kg, and 50.8 mg/kg) (Table 5). The chromium, nickel, and zinc had been eliminated because they were below the old background UTLs (34.2 mg/kg, 26.7 mg/kg, and 101 mg/kg). Statistical comparisons of the site data sets to the background data sets for these inorganics indicated that they were not statistically greater than background (p-values >0.05; see response to comment 1.a.iv for a discussion of statistical evaluation). Therefore, chromium, nickel, and zinc are not carried forward to the SAL comparison stage.

Antimony, barium, nickel, and zinc were detected in filtered groundwater samples at concentrations of 3.8 µg/L, 374 µg/L, 2.8 µg/L, and 307 µg/L, respectively. These concentrations were below the respective groundwater and/or drinking water standards for these inorganics (Table 7). Manganese was detected in a filtered groundwater sample at a concentration of 190 µg/L, which is below the groundwater standard, but above the drinking water standard for this inorganic (Table 7). However, the manganese concentration is below the concentration detected in the up-gradient wells (523 µg/L), indicating that existing conditions at this site exceed the standards. The MCE does not need to be recalculated as a result of the current SALs.

The organic, 1,2-dichloroethane, was detected at a concentration (13 µg/L) above NMWQCC Groundwater Standard for human health (10 µg/L) and the USEPA and New Mexico Drinking Water Standards of 5 µg/L (Table 7).

The application of current background UTLs and SALs, and the water quality standards, did not affect the conclusions for this PRS.

Antimony was the only inorganic detected above the old soil background UTLs in the RFI report. Chromium was detected at a concentration of 31.6 mg/kg in one subsurface soil sample, which is above the current background UTL (19.3 mg/kg) (Table 1), but was below the old background UTL (34.2 mg/kg). Statistical comparison of the site data set to the background data set for chromium indicated that it was not statistically greater than background (p-values >0.05; see response to comment 1.a.iv for a discussion of statistical evaluation). Therefore, chromium is not carried forward to the SAL comparison stage, while antimony is still carried forward as described in the RFI Report.

Aluminum, iron, and manganese were detected in unfiltered groundwater samples at concentrations of 1280 µg/L, 187 µg/L, and 211 µg/L, respectively, which are below or slightly above the groundwater standards for these inorganics (Table 7). These inorganics were also detected in the up-gradient wells above the concentrations detected at the PRS, indicating that existing conditions at this site exceed the standards. Arsenic, barium, copper, nickel, and zinc were detected in an unfiltered groundwater sample at concentrations of 28.1 µg/L, 974 µg/L, 67.6 µg/L, 44.6 µg/L, and 313 µg/L, respectively, which are below NMWQCC groundwater standards as well as the USEPA and New Mexico Drinking Water Standards for these inorganics (Table 7). Chromium, lead, and manganese were detected in an unfiltered groundwater sample at concentrations of 80.5 µg/L, 90.8 µg/L, and 2390 µg/L, respectively, which are above the NMWQCC groundwater standards, and, in the case of lead and manganese, also above the USEPA and New Mexico Drinking Water Standards (Table 7). Beryllium, which does not have a groundwater standard, was detected at a concentration of 10.6 µg/L. This concentration is above the USEPA and New Mexico Drinking Water Standards for this inorganic (Table 7). Cobalt and vanadium, which also do not have groundwater standards, were detected at concentrations of 27 µg/L and 115 µg/L, respectively. The cobalt concentration is below its livestock watering standard, while the vanadium concentration is slightly above its livestock watering standard (Table 7). However, since the samples were not filtered, the results are not representative because the standards are based on the dissolved metal.

The COPCs retained by the screening assessment [benzo(a)pyrene, bis(2-chloroethyl)ether, and dibenzo(a,h)anthracene] were undetected in the subsurface soil, but were retained because of QC problems and SALs below detection limits. Because the sample values for these analytes were all nondetects and the sampling was biased towards the most likely contaminated areas, a baseline risk assessment was not conducted. In lieu of a baseline risk assessment, the COPCs retained by the screening assessment were compared to the EPA Region 9 PRGs for an industrial scenario (EPA 1996). This preliminary risk evaluation was done to provide an indication of whether the concentrations of these COPCs pose a potential risk to human health, i.e., cancer risk was greater than EPA's target risk range of 10^{-4} to 10^{-6} (EPA 1990), which is an acceptable and conservative approach for screening sites (EPA 1996). The comparisons found that the individual industrial PRG values (0.26 mg/kg, 0.097 mg/kg, and 0.26 mg/kg, respectively) were less than the detection limits for the COPCs (0.36 mg/kg to 1.8 mg/kg for each analyte). Individual cancer risks were calculated by dividing the median detection limit (0.37 mg/kg) and the maximum detection limit (1.8 mg/kg) for each COPC by the respective industrial PRG (EPA 1996). This resulted in cancer risk ranges greater than 10^{-6} for each COPC ($1X10^{-6}$ to $7X10^{-6}$, $4X10^{-6}$ to $2X10^{-5}$, and $1X10^{-6}$ to $7X10^{-6}$ for benzo(a)pyrene, bis(2-chloroethyl)ether, and dibenzo(a,h)anthracene, respectively). The cumulative risk obtained by adding the individual cancer risks resulted in an overall risk range of $6X10^{-6}$ to $3X10^{-5}$, which is in the middle of USEPA's target risk range, indicating that there is no unacceptable risk to human health under the industrial scenario. In addition, since these analytes were not detected in the drainfield, the risk (if any) is likely to be much lower than the conservative estimate presented here, and these analytes have not been detected in the groundwater monitoring wells located throughout TA-18. The MCE does not need to be recalculated as a result of the current SALs.

Acetone was detected at a concentration of 20.6 µg/L in the groundwater. No water quality standards are available for acetone, but the concentration is below the EPA Region 9 PRG for tap water for this organic (Table 7).

The application of current background UTLs and SALs, and the water quality standards, did not affect the conclusions for this PRS.

PRS 18-003(g)

No inorganics were initially detected in the soil above the old soil background UTLs. Chromium and zinc were detected at concentrations of 34.3 mg/kg and 51.5 mg/kg, which are above their respective current background UTLs (19.3 mg/kg and 50.8 mg/kg) (Table 5), but were below the old background UTLs (34.3 mg/kg and 101 mg/kg). Statistical comparisons of the site data sets to the background data sets for these inorganics indicated that they were not statistically greater than background (p-values >0.05; see response to comment 1.a.iv for a discussion of statistical evaluation). Therefore, chromium and zinc are not carried forward to the SAL comparison stage.

The organic, 1,1,2-trichloro-1,2,2-trifluoroethane, was detected in one subsurface soil sample at a concentration of 0.013 mg/kg. The old SALs did not include a SAL for this compound, but the current EPA Region 9 PRG Table does provide a value that can be used as a SAL (Table 6). The current SAL for this compound is 21,000 mg/kg, which is several orders of magnitude above the detected concentration. Therefore, this compound can be eliminated from further evaluation.

The application of current background UTLs and SALs, and the applicable and appropriate water quality standards, did not affect any other conclusions for this PRS.

PRS 18-003(h)

The results of the screening assessment using the current New Mexico groundwater standards rather than the old SALs are presented in the response to Comment 2.b.vii(1).

PRS 18-012(a)

The application of current background UTLs and SALs did not affect the data comparisons or the conclusions for this PRS.

PRS 18-012(b)

Antimony, cadmium, chromium, copper, lead, mercury, silver, and zinc were detected above the old soil background UTLs, and above the current sediment background UTLs. Chromium was initially eliminated because it was detected below the site-specific background value of 54.2 mg/kg. Arsenic and barium were detected at concentrations of 7.6 mg/kg and 384 mg/kg, respectively, which are above the current background UTLs for sediments (3.9 mg/kg and 140 mg/kg) (Table 5), but were below the old soil background UTLs (11.6 mg/kg and 1140 mg/kg). No sediment background values were available at the time of the RFI report. Statistical comparisons of the site data sets to the background data sets for these inorganics could not be performed because too few samples were collected. Similar comparisons for mercury could not be conducted because of the high number of nondetects in the mercury background data set. As a result of the comparison to the current sediment background UTLs, all of the inorganics detected in the sediment are carried forward to the SAL comparison stage. Arsenic is retained as a COPC because the SAL is below the background UTL.

All of the inorganics that were carried forward to the SAL comparison stage were below the current SALs, except for arsenic as mentioned above. As a result of the current background UTLs and SALs, the MCE for the noncarcinogens was recalculated (Table 10). The normalized sum is 1.2, which is above the target value of 1.0. The same inorganics as initially discussed in the RFI report, antimony, copper, lead, and mercury, are retained as COPCs in addition to arsenic. Because only a few samples were collected at this PRS and the sampling was biased towards the most likely contaminated areas, a baseline risk assessment is not conducted. In lieu of a baseline risk assessment, the COPCs retained by the screening assessment (arsenic, antimony, cadmium, lead, and mercury) were compared to the EPA Region 9 PRGs for an industrial scenario. This preliminary risk evaluation was done to provide an indication of whether the concentrations of these COPCs pose a potential risk or hazard to human health, i.e., cancer risk was greater than the 10^{-4} to 10^{-6} target risk range, or the hazard quotients were less than or greater than one (EPA 1990). This is an acceptable and conservative approach for screening sites (EPA 1996).

Comparison of the maximum detected values for the noncarcinogenic inorganics (11.6 mg/kg, 2.7 mg/kg, 164 mg/kg, and 2.6 mg/kg, respectively) to their respective industrial PRGs from the EPA Region 9 PRG Table (680 mg/kg, 850 mg/kg, 1000 mg/kg, and 510 mg/kg) indicates that these metals are well below the individual PRG values. In addition, the cumulative hazard analysis for the four inorganics, which is determined by adding the fractional contributions of each inorganic (i.e., the maximum detected value divided by the PRG), results in a hazard index of 0.2. The hazard index is below the target value of 1.0, indicating no hazard to human health under the industrial scenario. Comparison of the maximum detected concentration of arsenic (7.6 mg/kg) to the industrial PRG (2.4 mg/kg) from the EPA Region 9 PRG Table found that the individual PRG value was less than the maximum detected concentration. The cancer risk was estimated by dividing the maximum concentration of the COPC by the industrial PRG (EPA 1996). This resulted in a cancer risk of $3X10^{-6}$ for arsenic, which is at the lower end of USEPA's target risk range, indicating that there is no unacceptable risk to human health under the industrial scenario.

In general, the polycyclic aromatic hydrocarbons (PAHs), the group to which benzo(a)pyrene, benzo(b) fluoranthene, chrysene, pyrene, etc. belong, have been sporadically detected at many PRSs throughout the Laboratory. There is typically no specific source of PAHs attributable to the process activities at these PRSs. It has been found that PAHs are associated with asphalt runoff (e.g., paved areas and roofs) as well as from incomplete combustion (e.g., incinerators, forest fires, or vehicle exhaust) (Clement International Corporation 1990, ER ID No. 55663; Bradley et al. 1994, 1144; Menzie et al. 1992, ER ID No. 55635; Butler et al. 1994, ER ID No. 55634; Edwards 1983, ER ID No. 55636). In most cases, these chemicals are detected in areas influenced by these types of non-PRS-related sources, e.g., storm water outfalls, ditches next or near paved driveways or roads, etc. The PAHs are eliminated, in many cases, based on available site information, because only those chemicals believed or suspected of being associated with a release from a PRS as a result of site activities are retained and subjected to the screening assessment process.

The outfall at PRS 16-012(b) receives discharge from several sources, including floor drains, sinks, a welding quench tank, and runoff from the asphalt and tar roofs (LANL 1993, 1085; LASL 1955, 16-0002). Because the only likely source of PAHs is the runoff from the asphalt roofs, a non-PRS-related activity, the PAHs detected at the outfall are eliminated as COPCs and should not be subjected to the risk-based screening assessment.

The application of current background UTLs and SALs did not affect the conclusions for this PRS.

TABLE 10
MULTIPLE CHEMICAL EVALUATION - PRS 16-012(b)

Analyte	Maximum Sample Values (mg/kg)	Soil SALs (mg/kg)	Normalized Values
Soil - Noncarcinogenic			
Antimony	11.6	31	0.37
Barium	384	5300	0.07
Cadmium	2.7	38	0.07
Copper	418	2800	0.15
Lead	164	400	0.41
Mercury	2.8	23	0.12
Silver	2.6	380	0.01
Zinc	618	23000	0.03
		Total	1.2

Note: bolded analytes are retained as COPCs.

PRS 16-012(c)

No inorganics were initially detected above the old soil background UTLs. Beryllium, chromium, lead, and zinc were detected at concentrations of 1.6 mg/kg, 10 mg/kg, 19 mg/kg, and 63 mg/kg, which are above the respective background UTLs for sediment (1.4 mg/kg, 8.8 mg/kg, 13.8 mg/kg, and 62.1 mg/kg) (Table 5). These inorganics had been eliminated because they were below the old soil

background UTLs (3.31 mg/kg, 34.2 mg/kg, 39 mg/kg, and 101 mg/kg) and no sediment background values were available at the time of the RFI report. Statistical comparisons of the site data sets to the background data sets for these inorganics could not be performed because too few samples were collected. Therefore, chromium, lead, and zinc are carried forward to the SAL comparison stage, while beryllium is retained as a COPC because the SAL is below the background UTL. The data comparison of the other inorganics to background was not affected by the sediment background values.

All of the inorganics that were carried forward to the SAL comparison stage were below their current SALs (Table 5),except for beryllium as mentioned above. As a result of the current background UTLs and SALs, the MCE for the noncarcinogens was recalculated (Table 11). The normalized sum is 0.1, which is below the target value of 1.0. Therefore, chromium, lead, and zinc are eliminated from further evaluation.

Because only a few samples were collected at this PRS and the sampling was biased towards the most likely contaminated areas, a baseline risk assessment was not conducted. In lieu of a baseline risk assessment, the COPC retained by the screening assessment (beryllium) was compared to the EPA Region 9 PRG for an industrial scenario. This preliminary risk evaluation was done to provide an indication of whether the concentrations of these COPCs pose a potential risk to human health, i.e., cancer risk was greater than the 10^{-4} to 10^{-6} target risk range (EPA 1990), which is an acceptable and conservative approach for screening sites (EPA 1996).

Comparison of the maximum detected concentration of beryllium (1.6 mg/kg) to the industrial PRG (1.1 mg/kg) from the EPA Region 9 PRG Table based on a cancer risk of 10^{-6}found that the individual PRG value was less than the maximum detected concentration. The estimated cancer risk was calculated by dividing the maximum concentration of the COPC by the industrial PRG (EPA 1996). This resulted in a estimated cancer risk of $2X10^{-6}$ for beryllium, which is at the lower end of USEPA's target risk range, indicating that there is no unacceptable risk to human health under the industrial scenario.

TABLE 11
MULTIPLE CHEMICAL EVALUATION - PRS 18-012(c)

Analyte	Maximum Sample Values (mg/kg)	Soil SALs (mg/kg)	Normalized Values
Soil - Noncarcinogenic			
Chromium	10	210	0.05
Lead	19	400	0.05
Zinc	63	23000	0.003
		Total	0.1

The application of current background UTLs and SALs did not affect the conclusions for this PRS.

PRS-013

Lead and zinc were the only inorganics detected above their old soil background UTLs and were carried forward to the SAL comparison stage in the RFI report. The comparison to the current background UTLs resulted in one additional lead concentration and two additional zinc concentrations being above the UTLs (Table 5). However, these soil concentrations were less than the concentrations originally found to be above background. Statistical comparisons between the background data sets and the site data sets indicated that lead and zinc were greater than background (p-values <0.05; see response to comment 1.a.iv for a discussion of statistical evaluation). As a result, no additional inorganics were carried forward to the SAL comparison and the MCE was recalculated (Table 12).

The organics originally retained as COPCs, benzo(a)pyrene, benzo(a)anthracene, and benzo(b)fluoranthene, are still retained using the current SALs (Table 5). However, benzo(a)anthracene and benzo(b)fluoranthene are retained because they are at concentrations greater than their current SALs, rather than retained by the MCE as described in the RFI report. The remaining organics are less than the current SALs and are submitted to the MCE (Table 12).

The normalized sum for the noncarcinogenic MCE was 0.1 and for the carcinogenic MCE was 0.03, which are below the target value of 1.0. Therefore, the analytes in the MCE analyses are eliminated from further evaluation.

Because only a few samples were collected at this PRS and the sampling was biased towards the most likely contaminated areas, a baseline risk assessment was not conducted. In lieu of a baseline risk assessment, the COPCs retained by the screening assessment [benzo(a)pyrene, benzo(a)anthracene, and benzo(b)fluoranthene] were compared to the EPA Region 9 PRGs for an industrial scenario based on a cancer risk of 10^{-6}. This preliminary risk evaluation was done to provide an indication of whether the concentrations of these COPCs pose a potential risk to human health, i.e., the cancer risk was outside of USEPA's target risk range for health protectiveness of 10^{-4} to 10^{-6} (EPA 1990), which is an acceptable and conservative approach for screening sites (EPA 1996). The comparisons found that the individual PRG values were greater than the maximum detected concentrations of the COPCs, except for benzo(a)pyrene. Individual cancer risks were calculated by dividing the maximum detected concentration of each COPC (0.74 mg/kg, 0.8 mg/kg, and 0.97 mg/kg, respectively) by the respective industrial PRG (0.26 mg/kg, 2.6 mg/kg, and 2.6 mg/kg) (EPA 1996). This resulted in estimated cancer risks of $3X10^{-6}$, $3X10^{-7}$, and $4X10^{-7}$ for benzo(a)pyrene, benzo(a)anthracene, and benzo(b)fluoranthene, respectively. In addition, the cumulative risk obtained by adding the individual cancer risks resulted in an overall estimated risk of $4X10^{-6}$, which is at the lower end of USEPA's target risk range, indicating that there is no unacceptable risk to human health under the industrial scenario. In addition, none of these analytes have been detected in the groundwater monitoring wells located throughout TA-18.

TABLE 12
MULTIPLE CHEMICAL EVALUATION - PRS 18-013

Analyte	Maximum Sample Values (mg/kg)	Soil SALs (mg/kg)	Normalized Values
Soil - Noncarcinogenic			
Anthracene	0.56	18000	0.00
Fluoranthene	2.9	2600	0.001
Lead	49.1	400	0.12
Phenanthrene	2.3	18000	0.00
Pyrene	2.4	1900	0.001
Zinc	110	23000	0.005
		Total	0.1
Soil - Carcinogenic			
Bis(2-ethylhexyl)phthalate	0.62	32	0.02
Chrysene	0.72	61	0.01
		Total	0.03

The application of current background UTLs and SALs did not affect the conclusions for this PRS.

PRS 18-002(a)

No inorganics were initially detected above the old soil background UTLs. Zinc was detected at concentrations of 52.2 mg/kg, 53 mg/kg, 62.7 mg/kg, and 73.9 mg/kg, which are above the current background UTL (50.8 mg/kg) (Table 5), but below the old background UTL (101 mg/kg). Statistical comparison of the site data set to the background data set indicated that zinc was not statistically greater than background (p-values >0.05; see response to comment 1.a.iv for a discussion of statistical evaluation). Therefore, zinc is not carried forward to the SAL comparison stage. The data comparison of the other inorganics to background was not affected by the current background values.

Zinc was detected below the current SAL and was submitted to an MCE for noncarcinogens.

The organics, 2,4-dinitrotoluene, 2,6-dinitrotoluene, and nitrobenzene, were detected in the surface soil. In the RFI report, 2,4-dinitrotoluene and 2,6-dinitrotoluene were less than their SALs and nitrobenzene was greater than its SAL. The nitrobenzene was subsequently eliminated by comparing the detected concentrations to the industrial PRG. The comparison to the current SALs for each compound shows that all three are below their SALs (Table 5) and are submitted to the MCE for noncarcinogens (Table 13).

The normalized sum for the noncarcinogenic MCE was 0.4, which is below the target value of 1.0. Therefore, the analytes in the MCE are eliminated from further evaluation.

TABLE 13
MULTIPLE CHEMICAL EVALUATION - PRS 18-002(a)

Analyte	Maximum Sample Values (mg/kg)	Soil SALs (mg/kg)	Normalized Values
Soil - Noncarcinogenic			
2,4-Dinitrotoluene	0.6	130	0.005
2,6-Dinitrotoluene	0.6	65	0.009
Nitrobenzene	7.1	18	0.39
Zinc	73.9	23000	0.003
		Total	0.4

The application of current background UTLs and SALs did not affect the conclusions for this PRS.

PRS 18-002(b)

Cadmium and copper were detected above the old soil background UTLs. Chromium was detected at concentrations of 27.2 mg/kg, 29.2 mg/kg, 21.8 mg/kg and 46.5 mg/kg, nickel was detected at concentrations of 15.7 mg/kg and 23.3 mg/kg, and zinc was detected at a concentration of 52.9 mg/kg, which are above their respective current background UTLs (19.3 mg/kg, 15.2 mg/kg, and 50.8 mg/kg) (Table 5). The chromium, nickel, and zinc had been eliminated because they were below the old background UTLs (34.2 mg/kg, 26.7 mg/kg, and 101 mg/kg). Statistical comparisons of the site data sets to the background data sets for these inorganics indicated that they were not statistically greater than background (p-values >0.05; see response to comment 1.a.iv for a discussion of statistical evaluation). Therefore, chromium, nickel, and zinc are not carried forward to the SAL comparison stage. The data comparison of the other inorganics to background was not affected by the application of the current background values. The MCE was not recalculated as a result of the current SALs.

The application of current background UTLs and SALs did not affect the conclusions for this PRS.

Chromium, copper, lead, and nickel were detected above the old soil background UTLs. Barium was detected at a concentration of 487 mg/kg, which is above the current background UTL (316 mg/kg) (Table 5), but was below the old background UTL (1140 mg/kg). Statistical comparison of the site data set to the background data set indicated that barium was not statistically greater than background (p-values >0.05; see response to comment 1.a.iv for a discussion of statistical evaluation). Therefore, barium is not carried forward to the SAL comparison stage. Eight additional detections of lead were found following the comparison to the current background UTL (23.3 mg/kg) (Table 5). These concentrations were originally eliminated because they were less than the background UTL (39 mg/kg) available at the time of the report. Statistical comparison of the site data set to the background data set indicated that lead was statistically greater than background (p-values <0.05; see response to comment 1.a.iv for a discussion of statistical evaluation). Therefore, lead is carried forward to the SAL comparison stage as presented in the RFI Report. The background data comparison for the other inorganics was not affected by the application of the current background values.

The organics, 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, HMX, RDX, and 2,4,6-trinitrotoluene, were detected in the surface soil. In the RFI report, all of the organics were less than their SALs and submitted to an MCE (Table 14). The comparison to the current SALs for each compound shows that 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, HMX, and 2,4,6-trinitrotoluene are below their SALs (Table 6), while RDX (30.3 mg/kg) is greater than its current SAL (4 mg/kg) (Table 6). Three organics, 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, and HMX, are submitted to the MCE for noncarcinogens. 2,4,6-Trinitrotoluene is not submitted to the MCE because it is the only carcinogen below its SAL and is eliminated from further evaluation.

The normalized sum for the noncarcinogenic MCE was 1.4, which is above the target value of 1.0. Therefore, chromium and lead are retained as COPCs and the other analytes in the MCE are eliminated from further evaluation.

TABLE 14
MULTIPLE CHEMICAL EVALUATION - PRB 27-002

Analyte	Maximum Sample Values (mg/kg)	Soil SALs (mg/kg)	Normalized Values
Soil - Noncarcinogenic			
2-Amino-4,6-dinitrotoluene	0.47	65	0.007
4-Amino-2,6-dinitrotoluene	0.68	65	0.01
Chromium	104	210	0.5
Copper	35.3	2800	0.01
HMX	1.9	3300	0.00
Lead	322	400	0.81
Nickel	53.1	1500	0.04
		Total	1.4

As a result of the comparison to the current SALs, RDX, chromium, and lead are retained as COPCs and require further evaluation.

In lieu of a baseline risk assessment and in order to provide an indication of whether the concentrations of these COPCs pose a potential risk to human health [i.e., the cancer risk was outside of USEPA's target risk range for health protectiveness of 10^{-4} to 10^{-6} or hazard quotients greater than 1.0 (EPA 1990)], the COPCs retained by the screening were compared to the EPA Region 9 PRGs for an industrial scenario. This is an acceptable and conservative approach for screening sites (EPA 1996). The comparisons found that the individual industrial PRG values (17 mg/kg, 450 mg/kg, and 1000 mg/kg for RDX, chromium, and lead, respectively) were greater than the maximum detected concentrations of chromium and lead (104 mg/kg and 322 mg/kg), but less than the maximum detected concentration of RDX (30.3 mg/kg). Individual cancer risk and hazard quotients were calculated by dividing the maximum

detected concentration of each COPC by the respective industrial PRG (EPA 1996). This resulted in an estimated cancer risk for RDX of $2X10^{-6}$ and hazard quotients less than one for chromium and lead (0.2 and 0.3, respectively). Because of the large amount of data collected and the relatively large area of this PRS, the exposure point concentration is better represented by calculating the 95% upper confidence limit (UCL) of the arithmetic mean. The 95% UCLs for the COPCs are 0.7 mg/kg, 8 mg/kg, and 29.5 mg/kg for RDX, chromium, and lead, respectively. Using the 95% UCL for RDX, chromium, and lead, the cancer risk for RDX is $4X10^{-6}$ and the hazard quotients are 0.02 and 0.03 for chromium and lead, respectively. The cumulative risk did not change because only one carcinogen is of concern, while the hazard indices for chromium and lead range from 0.05 to 0.5, indicating that there is no unacceptable risk to human health under the industrial scenario.

PRS 18-005(a)

The application of current background UTLs and SALs did not affect the data comparisons or the conclusions for this PRS.

PRS 18-011

The application of current background UTLs and SALs did not affect the data comparisons or the conclusions for this PRS.

PRS 18-010(b)

Manganese and zinc were detected above the old soil background UTLs. Barium in seven sediment samples, cobalt in one sediment sample, copper in two sediment samples, lead in six sediment samples, manganese in three sediment samples, and zinc in two soil and seven sediment samples were detected at concentrations above the current sediment and soil background UTLs (Table 5). These concentrations were originally eliminated because they were less than the background UTLs available at the time of the report. Statistical comparison of the site data sets to the background data sets indicated that barium, cobalt, copper, lead, and manganese were not statistically greater than background (p-values >0.05), while zinc was statistically greater than background (p-values <0.05; see response to comment 1.a.iv for a discussion of statistical evaluation). Therefore, zinc is carried forward to the SAL comparison stage and other inorganics are eliminated from further evaluation.

The zinc was detected below its current SALs (Table 5) and was submitted to an MCE for noncarcinogens (Table 15).

Because the PAHs (fluoranthene and phenanthrene) most likely originate from the asphalt-paved ditch and runoff from the paved area, they should not be carried forward to the SAL comparison stage. The remaining organics are less than the current SALs (Table 6) and are submitted to an MCE (Table 15). Bis(2-ethylhexyl)phthalate was not submitted to an MCE because it is the only carcinogen detected and is eliminated from further evaluation.

The normalized sum for the noncarcinogenic MCE is 0.01, which is less than the target value of 1.0. Therefore, the analytes in the MCE are eliminated from further evaluation.

TABLE 15
MULTIPLE CHEMICAL EVALUATION - PRS 18-010(b)

Analyte	Maximum Sample Values (mg/kg)	Soil SALs (mg/kg)	Normalized Values
Soil Noncarcinogenic			
Butyl benzyl phthalate	0.9	13000	0.00
Di-n-butyl phthalate	26	6500	0.004
Zinc	206	23000	0.009
		Total	0.01

The application of current background UTLs and SALs did not affect the conclusions for this PRS.

PRS 18-010(c)

Copper and mercury were detected above the old soil background UTLs. Lead and zinc were detected at concentrations above their current sediment background UTLs in two sediment samples (13.8 mg/kg and 62.1 mg/kg) (Table 5), but were less than the old background UTLs (39 mg/kg and 101 mg/kg). Statistical comparisons cannot be done because too few samples were collected at this PRS. Lead and zinc are carried forward to the SAL comparison stage.

All inorganics that were detected above their current background UTLs were below their current SALs (Table 5). Lead and zinc, along with copper and mercury, were submitted to an MCE for noncarcinogens (Table 16).

Because the PAHs (fluoranthene, phenanthrene, and pyrene) are most likely from runoff of the paved area that is drained by this outfall, they should not be carried forward to the SAL comparison stage. As a result, no organics are submitted to the MCE.

The normalized sum for the noncarcinogenic MCE is 0.1, which is less than the target value of 1.0. Therefore, the analytes in the MCE are eliminated from further evaluation.

TABLE 16
MULTIPLE CHEMICAL EVALUATION - PRS 18-010(c)

Analyte	Maximum Sample Values (mg/kg)	Soil SALs (mg/kg)	Normalized Values
Soil Noncarcinogenic			
Copper	23.8	2600	0.009
Lead	31	400	0.08
Mercury	0.18	23	0.008
Zinc	87.7	23000	0.004
		Total	0.1

The application of current background UTLs and SALs did not affect the conclusions for this PRS.

PRS 18-010(d)

The concentrations of inorganics detected above the old soil background UTLs (lead and zinc) are also above the current sediment background UTLs (Table 5) Statistical comparisons cannot be done because too few samples were collected at this PRS. As a result, lead and zinc are carried forward to the SAL comparison stage. Lead and zinc were below their current SALs (Table 5) and, therefore, were submitted to an MCE for noncarcinogens (Table 17).

Because the PAHs detected in the sediments are most likely from runoff of the paved area that is drained by this outfall, they should not be carried forward to the SAL comparison stage. As a result, no organics are submitted to the MCE.

The normalized sum for the noncarcinogenic MCE is 0.1, which is less than the target value of 1.0. Therefore, the analytes in the MCE are eliminated from further evaluation.

TABLE 17
MULTIPLE CHEMICAL EVALUATION - PRS 18-010(d)

Analyte	Maximum Sample Values (mg/kg)	Soil SALs (mg/kg)	Normalized Values
Soil-Noncarcinogenic			
Lead	45.3	400	0.11
Zinc	104	23000	0.005
		Total	0.1

The application of current background UTLs and SALs did not affect the conclusions for this PRS.

PRS 18-010(e)

Cadmium, lead, mercury, and zinc were detected above the old soil background UTLs. Copper in three sediment samples, lead in four additional sediment samples, and zinc in two additional sediment samples were detected at concentrations above their current sediment background UTLs (9.85 mg/kg, 13.8 mg/kg, and 62.1 mg/kg) (Table 5). These concentrations were originally eliminated because they were less than the background UTLs available at the time of the report (15.7 mg/kg, 39 mg/kg, and 101 mg/kg). Statistical comparisons of the site data sets to the background data sets indicated that copper, lead, and zinc are statistically greater than background (p-values <0.05; see response to comment 1.a.iv for a discussion of statistical evaluation). Similar comparisons for mercury could not be conducted because of the high number of nondetects in the mercury background data set. As a result, copper, lead, and zinc are carried forward to the SAL comparison stage.

All concentrations of inorganics that were detected above their current background UTLs are below their current SALs (Table 5). Cadmium, copper, lead, mercury, and zinc were submitted to an MCE for noncarcinogens (see below).

Because the PAHs detected in the sediments are most likely from runoff of the paved area drained by this outfall, they should not be carried forward to the SAL comparison stage. The remaining organic, bis(2-ethylhexyl)phthalate, is less than the current SAL (Table 5), but was not submitted to an MCE because it is the only carcinogen. Therefore, it is eliminated from further evaluation.

The normalized sum for the noncarcinogenic MCE is 0.3, which is less than the target value of 1.0. Therefore, the analytes in the MCE are eliminated from further evaluation.

TABLE 18
MULTIPLE CHEMICAL EVALUATION - PRS 18-010(e)

Analyte	Maximum Sample Values (mg/kg)	Soil SALs (mg/kg)	Normalized Values
Soil - Noncarcinogenic			
Cadmium	3.8	38	0.1
Copper	14.4	2800	0.005
Lead	62.1	400	0.16
Mercury	0.22	23	0.01
Zinc	204	23000	0.009
		Total	0.3

The application of current background UTLs and SALs did not affect the conclusions for this PRS.

PRS 18-010(f)

The application of current background UTLs and SALs did not affect the data comparisons or the conclusions for this PRS.

PCO Wells

All samples collected and analyzed for inorganics from the PCO wells before January 1995 were filtered following sampling, while all samples subsequently collected were not filtered. The relationship of the filtered and unfiltered sample results to the water quality standards are discussed separately. However, the water quality standards is based on the dissolved metal, except for mercury. The results are presented in Tables 19 and 20.

Unfiltered Sample Results

Aluminum was detected at concentrations above the groundwater standard for irrigation use and the livestock watering standard of 5000 µg/L in two unfiltered groundwater samples. Aluminum was detected at concentrations above the USEPA Secondary Maximum Contaminant Level for drinking water of 50 µg/L in three unfiltered groundwater samples. The detected concentrations of aluminum were less than or similar to the concentrations detected in the up-gradient wells (Table 7), indicating that the natural variation of aluminum in this area is above the groundwater standard, i.e., the existing condition exceeds the standard.

Chromium was detected at a concentration above the groundwater standard for human health and the surface water standard for domestic water supply of 50 µg/L in one unfiltered groundwater sample. Chromium was below the USEPA and New Mexico drinking water standards of 100 µg/L and below the livestock watering standard of 1000 µg/L.

Iron was detected at concentrations above the groundwater standard for human health of 1000 µg/L in three unfiltered groundwater samples. Iron was detected at concentrations above the USEPA Secondary Maximum Contaminant Level for drinking water of 300 µg/L in four unfiltered groundwater samples. The detected concentrations of iron were generally less than the concentrations detected in the up-gradient wells (Table 7), indicating that the natural variation of iron in this area is above the groundwater standard, i.e., the existing condition exceeds the standard.

Manganese was detected at concentrations above the groundwater standard for domestic water supply of 200 µg/L in four unfiltered groundwater samples. Manganese was detected at concentrations above the USEPA Secondary Maximum Contaminant Level for drinking water of 50 µg/L in four unfiltered groundwater samples. The detected concentrations of manganese were less than the concentrations detected in the up-gradient wells in two samples and greater than the concentrations detected in the up-gradient wells in two other samples (Table 3). This indicates that the natural variation of manganese in this area is above the groundwater standard, i.e., the existing conditions exceeds the standard.

Because the groundwater samples collected from the PCO wells were not filtered, the results cannot be considered representative of the dissolved fraction of the above inorganics. Therefore, concentrations greater than the water quality standards should not be considered a concern.

TABLE 19
INORGANICS IN UNFILTERED GROUNDWATER DETECTED ABOVE WATER QUALITY STANDARDS IN THE PCO WELLS

Analyte	Well ID	Sample ID	Results (µg/L)	Water Quality Standards (µg/L)	
				Groundwater	Surface Water
Aluminum	PCO-1	AAB2539	5251	5000 (for irrigation)	50 (drinking water); 5000 (livestock watering)
	PCO-1	AAB2540	3790		
	PCO-2	AAB2541	25900		
Chromium	PCO-2	AAB2541	55.3	50 (for human health)	100 (drinking water); 50 (domestic water supply); 1000 (livestock watering)
Iron	PCO-1	AAB2539	5077	1000 (for human health)	300 (drinking water)
	PCO-1	AAB2540	4370		
	PCO-2	AAB2541	26400		
	PCO-3	AAB2542	993		
Manganese	PCO-1	AAB2539	384	200 (for domestic water supply)	50 (drinking water)
	PCO-1	AAB2540	382		
	PCO-2	AAB2541	1460		
	PCO-3	AAB2542	8800		

Filtered Sample Results

Aluminum was detected at a concentration above the groundwater standard for irrigation use and the livestock watering standard of 5000 µg/L in one filtered groundwater sample. Aluminum was detected at a concentration above the USEPA Secondary Maximum Contaminant Level for drinking water of 50 µg/L in one filtered groundwater sample. The detected concentrations of aluminum were less than the concentrations detected in the up-gradient wells (Table 7), indicating that the natural variation of aluminum in this area is above the groundwater standard, i.e., the existing condition exceeds the standard.

Iron was detected at a concentration above the groundwater standard for human health of 1000 µg/L in one filtered groundwater sample. Iron was detected at a concentration above the USEPA Secondary Maximum Contaminant Level for drinking water of 300 µg/L in one filtered groundwater sample. The detected concentrations of iron were less than the concentrations detected in the up-gradient wells (Table 7), indicating that the natural variation of iron in this area is above the groundwater standard, i.e., the existing condition exceeds the standard.

Manganese was not detected at concentrations above the groundwater standard for domestic water supply of 200 µg/L in the filtered groundwater samples. Manganese was detected at concentrations above the USEPA Secondary Maximum Contaminant Level for drinking water of 50 µg/L in four filtered groundwater samples. The detected concentrations of manganese were less than the concentration detected in the up-gradient wells (Table 3), indicating that the natural variation of manganese in this area is above the groundwater standard, i.e., the existing conditions exceeds the standard.

The water quality standards for mercury are based on the total or unfiltered concentration of this inorganic. Mercury was not detected at a concentration above the groundwater standard for human health of 2 µg/L in the filtered groundwater samples. Mercury was not detected above the drinking water standard and domestic water supply standard of 2 µg/L or above the livestock watering standard of 10 µg/L in the filtered groundwater samples. Mercury was detected at a concentration above the surface water standard for wildlife habitat of 0.012 µg/L in one filtered groundwater sample.

Total Dissolved Solids (TDS) were measured at a concentration equivalent to the groundwater standard for domestic water supply of 1,000,000 µg/L in one groundwater sample. The TDS was measured at concentrations above the USEPA Secondary Maximum Contaminant Level for drinking water of 500,000 µg/L in three groundwater samples.

TABLE 20
INORGANICS IN FILTERED GROUNDWATER DETECTED ABOVE WATER QUALITY STANDARDS IN THE PCO WELLS

Analyte	Well ID	Sample ID	Results (µg/L)	Water Quality Standards (µg/L)	
				Groundwater	Surface Water
Aluminum	PCO-2	AAA9572	7140	5000 (irrigation)	50 (drinking water); 5000 (livestock watering)
Iron	PCO-2	AAA9572	4700	1000 (human health)	300 (drinking water)
Manganese	PCO-1	AAA9571	91	200 (domestic water supply)	50 (drinking water)
	PCO-2	AAA9572	79		
	PCO-3	AAA9589	142		
	PCO-3	AAA9590	143		
Mercury	PCO-3	AAA9590	0.44	2.0 (human health)	2.0 (drinking water, domestic water supply); 10 (livestock watering); 0.012 (wildlife habitat)
Total Dissolved Solids	PCO-3	AAA5986	1,000,000	1,000,000 (domestic water supply)	500,000 (drinking water)
	PCO-3	AAA5987	930,000		
	PCO-3	AAA5988	978,000		

Bis(2-ethylhexyl)phthalate, 1,3-dinitrobenzene, HMX, nitrobenzene, and m-nitrotoluene were detected in groundwater samples from the PCO-2 well, while 1,3-dinitrobenzene was detected in one sample from the PCO-1 well and chloroform was detected in one sample from the PCO-3 well. The chloroform concentration was below the groundwater and drinking water standards of 100 µg/L (Table 21). Bis(2-ethylhexyl)phthalate does not have a groundwater standard, but was detected above the drinking water standard of 6 µg/L (Table 21). The remaining organics do not have groundwater or surface water quality standards, but were all detected at concentrations below the EPA Region 9 PRG for tap water (Table 21). The HE compounds, 1,3-dinitrobenzene, HMX, and nitrobenzene, were detected at concentrations less than the concentrations detected in the up-gradient wells (Table 7).

TABLE 21
ORGANICS DETECTED IN GROUNDWATER AND COMPARED TO WATER QUALITY STANDARDS IN THE PCO WELLS

Analyte	Well ID	Sample ID	Results (µg/L)	Water Quality Standards (µg/L)	
				Groundwater	Surface Water
Bis(2-ethylhexyl)phthalate	PCO-3	AAA5987	16	NA[a]	6.0 (drinking water)
Chloroform	PCO-3	AAA9589	5	100 (human health	100 (drinking water)
1,3-Dinitrobenzene	PCO-1	AAA9571	0.04	NA	NA (3.7)[b]
	PCO-2	AAA9572	0.14		
HMX	PCO-2	AAA9572	1.3	NA	NA (1800)
Nitrobenzene	PCO-2	AAA9572	0.15	NA	NA (3.4)
m-Nitrotoluene	PCO-2	AAA9572	1.0	NA	NA (370)

[a] NA = not available
[b] Number in parentheses is the EPA Region 9 PRG for tap water.

LACEF Wells

All samples collected and analyzed for inorganics from the LACEF wells before January 1995 were filtered following sampling, while all samples subsequently collected were not filtered. The relationship of the filtered and unfiltered sample results to the appropriate and applicable water quality standards is discussed separately. However, the water quality standards are based on the dissolved metal, except for mercury, and, therefore, the filtered samples are the appropriate comparisons. The result are presented in Tables 22 and 23.

Unfiltered Sample Results

Aluminum was detected at concentrations above the groundwater standard for irrigation use, the livestock watering standard of 5000 µg/L, and above the USEPA Secondary Maximum Contaminant Level for drinking water of 50 µg/L in four unfiltered groundwater samples. The detected concentrations of aluminum were less than the concentrations detected in the up-gradient wells (Table 7), indicating that the natural variation of aluminum in this area is above the groundwater standard, i.e., the existing condition exceeds the standard.

Iron was detected at concentrations above the groundwater standard for human health of 1000 µg/L and above the USEPA Secondary Maximum Contaminant Level for drinking water of 300 µg/L in four unfiltered groundwater samples. The detected concentrations of iron were less than the concentrations detected in the up-gradient wells (Table 7), indicating that the natural variation of iron in this area is above the groundwater standard, i.e., the existing condition exceeds the standard.

Manganese was detected at concentrations above the groundwater standard for domestic water supply of 200 µg/L in three unfiltered groundwater samples. Manganese was detected at concentrations above the USEPA Secondary Maximum Contaminant Level for drinking water of 50 µg/L in four unfiltered groundwater samples. The detected concentrations of manganese were less than the concentrations detected in the up-gradient wells (Table 7), indicating that the natural variation of manganese in this area is above the groundwater standard, i.e., the existing condition exceeds the standard.

Because the groundwater samples collected from the LACEF wells were not filtered, the results cannot be considered representative of the dissolved fraction of the above inorganics. Therefore, concentrations greater than the water quality standards should not be considered a concern.

TABLE 22
INORGANICS IN UNFILTERED GROUNDWATER DETECTED ABOVE WATER QUALITY STANDARDS IN THE LACEF WELLS

Analyte	Well ID	Sample ID	Results (µg/L)	Water Quality Standards (µg/L)	
				Groundwater	Surface Water
Aluminum	MW-1	AAB2533	12900	5000 (irrigation)	50 (drinking water); 5000(livestock watering)
	MW-2	AAB2534	13300		
	MW-3	AAB2535	16700		
	MW-4	AAB2536	17400		
Iron	MW-1	AAB2533	7990	1000 (human health)	300 (drinking water)
	MW-2	AAB2534	8550		
	MW-3	AAB2535	11700		
	MW-4	AAB2536	9540		
Manganese	MW-1	AAB2533	146	200 (domestic water supply)	50 (drinking water)
	MW-2	AAB2534	205		
	MW-3	AAB2535	304		
	MW-4	AAB2536	237		

Filtered Sample Results

Aluminum was not detected at concentrations above the groundwater standard for irrigation use and the livestock watering standard of 5000 µg/L in the filtered groundwater sample. Aluminum was detected at

concentrations above the USEPA Secondary Maximum Contaminant Level for drinking water of 50 µg/L in three filtered groundwater samples. The detected concentrations of aluminum were less than the concentrations detected in the up-gradient wells (Table 7), indicating that the natural variation of aluminum in this area is above the groundwater standard, i.e., the existing condition exceeds the standard.

Iron was not detected at concentrations above the groundwater standard for human health of 1000 µg/L in the filtered groundwater sample. Iron was detected at concentrations above the USEPA Secondary Maximum Contaminant Level for drinking water of 300 µg/L in three filtered groundwater samples. The detected concentrations of iron were less than the concentrations detected in the up-gradient wells (Table 7), indicating that the natural variation of iron in this area is above the groundwater standard, i.e., the existing condition exceeds the standard.

The water quality standards for mercury are based on the total or unfiltered concentration of this inorganic. Mercury was not detected at a concentration above the groundwater standard for human health of 2 µg/L in the filtered groundwater samples. Mercury was not detected above the drinking water standard and domestic water supply standard of 2 µg/L or above the livestock watering standard of 10 µg/L in the filtered groundwater samples. Mercury was detected at a concentration above the surface water standard for wildlife habitat of 0.012 µg/L in one filtered groundwater sample.

Total Dissolved Solids were measured at a concentration above the groundwater standard for domestic water supply of 1,000,000 µg/L in one groundwater sample. Total Dissolved Solids were measured at concentrations above the USEPA Secondary Maximum Contaminant Level for drinking water of 500,000 µg/L in three groundwater samples.

TABLE 23
INORGANICS IN FILTERED GROUNDWATER DETECTED ABOVE WATER QUALITY STANDARDS IN THE LACEF WELLS

Analyte	Well ID	Sample ID	Results (µg/L)	Water Quality Standards (µg/L)	
				Groundwater	Surface Water
Aluminum	MW-1 MW-4 MW-3	AAA9577 AAA9580 AAA9582	649 737 521	5000 (for irrigation)	50 (drinking water); 5000 (livestock watering)
Iron	MW-1 MW-4 MW-3	AAA9577 AAA9580 AAA9582	662 635 510	1000 (for human health)	300 (drinking water)
Mercury	MW-2	AAA9584	0.12	2.0 (for human health)	2.0 (drinking water and domestic water supply); 10 (livestock watering); 0.012 (wildlife habitat)
Total Dissolved Solids	MW-1 MW-2 MW-4	AAA9539 AAA9542 AAA9544	941,000 667,000 2,000,000	1,000,000 (domestic water supply)	500,000 (drinking water)

4-Amino-2,6-dinitrotoluene, carbon disulfide, nitrobenzene, and m-nitrotoluene were detected in groundwater samples from the MW-1 well, MW-4 well, MW-3 well, and MW-1 and 2 wells, respectively. HMX and RDX were detected in groundwater samples from all four MW wells. Some of these detections were eliminated from the RFI report because they were less than the site-specific background concentrations. These organics do not have groundwater or surface water quality standards, but were all detected at concentrations below the EPA Region 9 PRG for tap water (Table 24). 1,2-Dichloroethane was detected in the MW-4 well at a concentration above the groundwater standard of 100 µg/L and the drinking water standard of 5 µg/L (Table 9). 1,2-Dichloroethane was also detected in the MW-3 well at a concentration below the groundwater standard, but above the drinking water standard (Table 24). The HE compounds, 4-amino-2,6-dinitrotoluene, HMX, nitrobenzene, and RDX, were detected at concentrations less than or slightly higher than the concentrations detected in the up-gradient wells (Table 7).

TABLE 24
ORGANICS DETECTED IN GROUNDWATER AND COMPARED TO WATER QUALITY STANDARDS IN THE LACEF WELLS

Analyte	Well ID	Sample ID	Results (µg/L)	Water Quality Standards (µg/L)	
				Groundwater	Surface Water
4-Amino-2,6-dinitrotoluene	MW-1	AAA9563	0.07	NA[a]	NA (65)[b]
Carbon disulfide	MW-4	AAA9566	14	NA	NA (24)
1,2-Dichloroethane	MW-3	AAA9565	6	10 (human health)	5.0 (drinking water)
	MW-4	AAA9566	12		
HMX	MW-1	AAA5957	3.1	NA	NA (1800)
	MW-1	AAA9539	4.25		
	MW-1	AAA9563	3.4		
	MW-1	AAB2533	2.5		
	MW-2	AAA5958	2.3		
	MW-2	AAA9542	3.3		
	MW-2	AAA9564	3.2		
	MW-2	AAB2534	2.7		
	MW-3	AAA5959	0.3		
	MW-3	AAA9543	4.5		
	MW-3	AAA9565	3.8		
	MW-3	AAB2535	2.7		
	MW-4	AAA5960	3.2		
	MW-4	AAA5961	3.45		
	MW-4	AAA9544	0.9		
	MW-4	AAA9545	3.2		
	MW-4	AAA9566	3.4		
	MW-4	AAA9567	3.3		
	MW-4	AAB2536	2.7		
Nitrobenzene	MW-3	AAA9565	0.09	NA	NA (3.4)
m-Nitrotoluene	MW-1	AAA9563	0.3	NA	NA (370)
	MW-2	AAA9564	0.2		

TABLE 24 (continued)
ORGANICS DETECTED IN GROUNDWATER AND COMPARED TO WATER QUALITY STANDARDS IN THE LACEF WELLS

Analyte	Well ID	Sample ID	Results (µg/L)	Water Quality Standards (µg/L)	
				Groundwater	Surface Water
RDX	MW-1	AAA5957	0.9	NA	NA (17)
	MW-1	AAA9539	1.6		
	MW-1	AAA9553	1.0		
	MW-1	AAB2533	0.6		
	MW-2	AAA5958	1.0		
	MW-2	AAA9542	1.3		
	MW-2	AAA9554	0.9		
	MW-2	AAB2534	0.6		
	MW-3	AAA9543	3.0		
	MW-3	AAA9555	0.9		
	MW-3	AAB2535	0.55		
	MW-4	AAA5960	1.1		
	MW-4	AAA5961	1.1		
	MW-4	AAA9544	0.5		
	MW-4	AAA9545	1.0		
	MW-4	AAA9556	0.9		
	MW-4	AAA9557	0.9		
	MW-4	AAB2536	0.6		

[a] NA = not available
[b] Number in parentheses is the EPA Region 9 PRG for tap water.

Wetlands

Inorganic concentrations were compared to site-specific background values for sediment and surface water from the wetlands in the RFI report. Barium, beryllium, chromium, lead, nickel, silver, and zinc were detected above the site-specific background values for sediment and/or surface water in the report. The site-wide sediment background UTLs that have been calculated since the report was submitted are slightly different from the site-specific values, and therefore result in some samples being added and others being deleted from the background comparisons. A comparison of the site-specific sediment and surface water background values presented in the RFI Report to the site-wide sediment background UTLs is provided in Table 6. The comparison of the detected inorganics in the surface water to the surface water quality standards is presented in Table 25. The background comparison based on the current sediment background UTLs is summarized in Table 26. The application of the current SALs and water quality standards does not affect the data comparison for the inorganics in the wetlands.

TABLE 25
INORGANICS DETECTED IN SURFACE WATER AND COMPARED TO WATER QUALITY STANDARDS IN THE WETLANDS

Analyte	Wetland ID	Sample ID	Results (µg/L)	Surface Water Quality Standards (µg/L)
Barium	WL-3	AAA5933	51	2000 (DW) 1000 (LW)
	WL-3	AAA5934	50	
	WL-1	AAA5945	56	
	WL-1	AAA5946	82	
	WL-1	AAA5947	55	
	WL-8	AAA5901	73	
	WL-8	AAA5902	77	
	WL-7	AAA5907	69	
	WL-7	AAA5908	72	
	WL-7	AAA5909	60	
	WL-6	AAA5915	66	
	WL-6	AAA5916	74	
	WL-5	AAA5921	70	
	WL-5	AAA5922	80	
	WL-4	AAA5927	100	
	WL-4	AAA5928	100	
Lead	WL-3	AAA5933	3	15 (DW) 50 (DWS) 100 (LW)
	WL-3	AAA5934	2	
	WL-8	AAA5901	1	
	WL-8	AAA5902	5.5	
	WL-7	AAA5907	12	
	WL-7	AAA5908	4	
	WL-7	AAA5909	6	
	WL-6	AAA5915	2.5	
	WL-6	AAA5916	2	
	WL-5	AAA5921	3	
	WL-5	AAA5922	3	
	WL-4	AAA5927	3	
	WL-4	AAA5928	2	

DW = Drinking Water Standard
LW = Livestock Watering Standard
DWS = Domestic Water Supply

TABLE 26
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR THE WETLANDS

Sample ID	Location ID	Depth (ft.)	Barium (mg/kg)	Beryllium (mg/kg)	Chromium (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Silver (mg/kg)	Zinc (mg/kg)
SAL	N/A	N/A	5300	Not Applicable	210	400	1500	380	23000
sediment UTL	N/A	N/A	141	1.4	8.8	13.8	10	Not Available	62.1
site-specific background	N/A	N/A	130	1.0	9.0	13	7.9		69
AAA5903	36-2000	6-18	110	0.8	7.8	20	7.6	1.0(U)	57
AAA5904	36-2001	6-18	110	0.9	10	18	6.0	1.0(U)	90
AAA5910	36-2004	6-18	210	1.4	16	41	14	1.8	110
AAA5911	36-2005	6-18	240	1.0	10	27	12	1.0(U)	68
AAA5912	36-2006	6-18	68	0.6	5.8	16	6.0	1.0(U)	46
AAA5914	36-2007	6-18	210	1.3	11	35	14	1.0(U)	84
AAA5917	36-2008	6-18	150	1.0	8.9	27	12	1.0(U)	55
AAA5918	36-2009	6-18	240	1.0	9.9	25	13	1.0(U)	61
AAA5919	36-2010	6-18	140	0.9	8.1	25	11	1.0(U)	50
AAA5920	36-2011	6-18	160	0.9	7.6	15	11	1.0(U)	46
AAA5923	36-2012	6-18	100	0.8	8.4	20	7.0	1.0(U)	55
AAA5924	36-2013	6-18	130	1.0	9.5	30	12	1.0(U)	50
AAA5925	36-2014	6-18	200	1.3	13	28	12	1.0(U)	68
AAA5926	36-2015	6-18	100	0.7	6.9	20	6.9	1.0(U)	39
AAA5930	36-2017	6-18	80	0.7	4.6	16	2.0(U)	1.0(U)	55
AAA5932	36-2019	6-18	72	0.6	4.7	13	4.0	1.0(U)	64
AAA5938	18-2004	6-18	110	1.0	9.0	11.0(U)	7.9	1.0(U)	46

Note: Boxes with darkened borders indicate concentrations detected at or above the sediment background UTLs.

Some organics were detected in the sediment or surface water in the wetlands up-canyon from TA-18. Concentrations of these organics at downstream locations, acetone in sediment, and HMX and RDX in surface water, were compared to site-specific background values for the wetlands in the RFI report. Site-wide background UTLs do not exist for these organics.

Acetone was detected in several sediment samples, 2-butanone was detected in one sediment sample, and methylene chloride was detected in two sediment samples from the wetlands. These organics are common laboratory contaminants and, although they were not detected in any of the associated blanks, their presence in the sediments is unlikely. Some of the detections of acetone were eliminated in the RFI report because they were less than the site-specific background value (0.21 mg/kg) obtained from the up-canyon wetland areas. Acetone, 2-butanone, and methylene chloride were all detected at concentrations below their SALs (2100 mg/kg, 7100 mg/kg, and 7.8 mg/kg, respectively).

The other organics detected in the surface waters from the wetlands were high explosives and included HMX, o-nitrotoluene, RDX, and tetryl(methyl-2,4,6-trinitrophenylnitramine). All of the detections of HMX and RDX were eliminated in the RFI report because the concentrations were less than the site-specific background values (3.4 µg/L and 0.3 µg/L) obtained from the up-canyon wetland areas. The organics do not have any water quality standards, but were all detected at concentrations below the EPA Region 9 PRGs for tap water, except for tetryl(methyl-2,4,6-trinitrophenylnitramine), which does not have a PRG (Table 27).

TABLE 27
ORGANICS DETECTED IN SURFACE WATER AND COMPARED TO WATER QUALITY STANDARDS IN THE WETLANDS

Analyte	Wetland ID	Sample ID	Results (µg/L)	Surface Water Quality Standards (µg/L)
HMX	WL-3	AAA5933	2.7	NA (1800)[b]
	WL-3	AAA5934	3.4	
	WL-1	AAA5945	2.5	
	WL-1	AAA5946	1.4	
	WL-1	AAA5947	2.85	
	WL-8	AAA5901	1.0	
	WL-8	AAA5902	0.9	
	WL-7	AAA5907	0.8	
	WL-7	AAA5908	0.8	
	WL-7	AAA5909	0.9	
	WL-6	AAA5915	0.8	
	WL-6	AAA5916	1.0	
	WL-5	AAA5921	1.0	
	WL-5	AAA5922	1.5	
	WL-4	AAA5927	0.6	
o-Nitrotoluene	WL-8	AAA5901	0.2	NA (370)
	WL-8	AAA5902	0.3	

TABLE 27 (continued)
ORGANICS DETECTED IN SURFACE WATER AND COMPARED TO WATER QUALITY STANDARDS IN THE WETLANDS

Analyte	Wetland ID	Sample ID	Results (µg/L)	Surface Water Quality Standards (µg/L)
RDX	WL-3	AAA5934	0.3	NA (17)
	WL-1	AAA5945	0.3	
	WL-8	AAA5902	0.3	
	WL-7	AAA5909	0.2	
	WL-6	AAA5915	0.2	
	WL-6	AAA5916	0.2	
Tetryl(methyl-2,4,6-trinitrophenylnitramine	WL-8	AAA5901	0.7	NA
	WL-8	AAA5902	0.8	
	WL-7	AAA5907	0.6	
	WL-6	AAA5915	0.6	
	WL-6	AAA5916	0.5	
	WL-4	AAA5927	0.7	

[a] NA = not available
[b] Number in parentheses is the EPA Region 9 PRG for tap water.

References:

Bradley, L.J.N., B.H. Magee, and S.L. Allen, 1994. "Background Levels of Polycyclic Aromatic Hydrocarbons (PAH) and Selected Metals in New England Urban Soils," Journal of Soil Contamination, 3(4): 349-361. (Bradley et al., 1994, 1144)

Butler, J.D., V. Butterworth, S.C. Kellow, and H.G. Robinson, 1984. "Some Observations of the Polycyclic Aromatic Hydrocarbon (PAH) Content of Surface Soils in Urban Areas," *The Science of the Total Environment*, 33: 75-85. (Butler et al., 1984, ER ID No. 55634)

Clement International Corporation, August 1995. "Toxicological Profile for Polycyclic Aromatic Hydrocarbons," prepared under Contract No. 205-88-0608 for Agency for Toxic Substances and Disease Registry, ER ID No. 55663, US Public Health Service, Washington, DC. (Clement International Corporation 1990, ER ID No. 55663)

Edwards, N.T., 1983. "Polycyclic Aromatic Hydrocarbons (PAHs) in the Terrestrial Environment — A Review," *Journal of Environmental Quality*, 12(4): 427-441. (Edwards 1983, ER ID No. 55636)

EPA (US Environmental Protection Agency), March 8, 1990. "National Oil and Hazardous Substances Pollution Contingency Plan," Final Rule, 40 CFR Part 300, Federal Register, Vol. 55, No. 46, p. 8666. (EPA 1990, 0559)

EPA (US Environmental Protection Agency), August 1, 1996. "Region 9 Preliminary Remediation Goals (PRGs), San Francisco, California. (EPA 1996, 1351)

EPA (US Environmental Protection Agency), July 27, 1990. "Corrective Action for Solid Waste Management Units (SWMUs) at Hazardous Waste Management Facilities," Proposed Rule, Federal Register, Vol. 55, Number 145, Washington, DC. (EPA 1990, 1356)

LANL (Los Alamos National Laboratory), May 1993. "RFI Work Plan for Operable Unit 1093," Los Alamos National Laboratory Report LA-UR-93-422, Los Alamos, New Mexico. (LANL 1993, 1085)

LASL (Los Alamos Scientific Laboratory), May 27, 1955. "Engineering Drawing ENG-C-12711, Rev. 4, Sheet 81 of 101, prepared by Skidmore, Owings, and Merrill, SFA-GJ-52-2, ER ID Number 14744, Los Alamos, New Mexico.

Menzie, C.A., B.B. Potocki, and J. Santodonato, 1992. "Exposure to Carcinogenic PAHs in the Environment," *Environmental Science and Technology*, 26(7): 1278-1284. (Menzie et al., 1992, ER ID No. 55635)

Comment 1.a.vi. *LANL must perform a baseline risk assessment (BRA) for those PRSs where contaminant concentrations exceed SALs. The potential for human health or ecological risk due to additive inputs from multiple, nearby sources should be considered; many sites within TA18 may present carcinogenic, non-carcinogenic, or radiological risks which, in total, may present an unacceptable human health or ecological risk. Consideration should be given to whether additive effects will be sufficiently evaluated either within an ecological risk assessment or within the Watershed Management Plan, or by some other means. See comment 1. a.iii above.*

LANL Response:

The stated objectives of the RFI were to determine the presence or absence of contamination at each PRS under investigation, and if contaminants were detected, to evaluate the need for further investigation or remediation. Sampling locations were selected to present a high probability of detecting the maximum concentration of potential contaminants. No baseline risk assessment was planned or conducted using the Phase I RFI data. For all sites where reported concentrations of potential contaminants were above the respective SALs, the maximum concentrations were compared with a preliminary remedial goal based on industrial land use. These comparisons were made in lieu of a baseline risk assessment. For all PRSs within former OU 1093, these comparisons indicated that the

maximum risk was in the range of 10^{-4} to 10^{-6} and the hazard ratio was less than 1.0. However, these comparisons used previously calculated SALs and PRGs. LANL will re-evaluate these conclusions using Region 9 residential PRGs in place of SALs and Region 9 industrial PRGs in place of the former calculated values. (See response to Comment 1.a.v.) LANL believes that this approach satisfies the need to assess the human health risk associated with each individual PRS.

Ecological risk was evaluated for individual sites using the methodology existing when the RFI report was prepared. However, LANL has developed an eco-risk screening methodology that considers the effect of multiple sites over a habitat range. That will be applied to the PRSs addressed by the RFI report for former OU 1093.

The results of the eco-risk screening will be reported in an addendum to the 1093 RFI Report by September 30, 1997.

Comment 1.a.vii. *LANL obtained unfiltered inorganic groundwater samples for this RFI report using the procedures set out in Section 3.2.2 Comparison with Screening Action/Other Standards:*

> *"For surface water or groundwater, the SALs are based on regulatory levels...The SALs for surface water and groundwater are maximum contaminant levels (MCL) promulgated under the Safe Drinking Water Act...the State of New Mexico Water quality regulations (which take precedence over the Clean Water Act) stipulate that filtered samples shall be used for the comparison of inorganic concentrations against state water quality standards. In accordance with this, only the organic results from filtered samples were used in the SAL comparison for surface water and groundwater samples."*

Because these samples were unfiltered, the concentrations of contaminants were deemed "NC" or not comparable with the New Mexico WQCC standards. LANL, however, did not continue the evaluation by comparing the concentrations with any other standard applicable to unfiltered samples, such as the Safe Drinking Water Act's (SDWA) Maximum Contaminant Levels (MCLs). LANL must, at a minimum, compare the unfiltered samples to SDWA MCLs and Region IX PRGs.

LANL Response:

The intent of the Safe Water Drinking Act (SDWA) is to test the quality of treated drinking water for public consumption. Because the treated drinking water undergoes filtration before distribution to the public, filtration of samples for inorganic analysis should be done unless the water samples are collected at the point of distribution. The water samples collected from wells at TA-18 were not from the point of distribution so that the comparison of the non-filtered samples to inorganic maximum contaminant levels (MCLs) under the SDWA is inappropriate. However, for information purposes, the inorganic results of the non-filtered samples will be compared to SDWA MCLs and Region 9 PRGs for tap water and provided in a summary table as requested. This information will be included in the summary table described in the response to Comment 1.a.v.

The groundwater data (filtered and unfiltered) collected from the PRSs and the monitoring wells were re-evaluated as part of the rescreening of the sites using the current background UTLs, SALs, and water quality standards. See response to comment 1.a.v for discussion.

Comment 1.a.viii. *This RFI report does not include an assessment of ecological risk. An evaluation of risk posed to ecological receptors must be assessed prior to recommending No Further Action (NFA) for a PRS.*

LANL Response:

See response to Comment 1.a.vi.

1.b Supporting Documentation

Comment 1.b.i. *LANL shall include pertinent information such as a tabulated summary of Photo Ionization Detector Flame Ionization Detector (PID/FID) readings, auger logs, boring logs, well construction diagrams, well development methodology, and log books in the RFI report.*

LANL Response:

Documentation provided with the RFI report is generally consistent with that specified in the approved RFI report framework policy. LANL will provide copies of boring logs and well construction details for all monitoring wells placed as part of the RFI. Boring logs were not recorded for other auger holes. LANL will provide copies of the field log book entries made during the RFI.

At PRSs 18-003(a, b, c, and d), PID/FID readings were used to determine whether or not VOC analyses should be performed. In the response to Comment 1.c.iii, LANL acknowledges HRMB's position that such use of the PID data is inappropriate; the media in the tanks was subsequently analyzed for VOCs and SVOCs. At PRS 18-004(a), a PID was used to determine if any organic vapors could be detected in the pipe. None were detected, but no sampling decisions were based on the readings; there was no media to sample. With these exceptions, PID/FID were used exclusively to ensure appropriate industrial hygiene protection of site workers. With the noted exceptions, these data were not used for making sampling decisions or as any evidence of the presence or absence of contamination. Readings are often not associated with a particular sample—such as a PID reading in the breathing zone of a site worker during augering. Nearly all readings during the RFI were at or only slightly above ambient readings; in no instance was an upgrade in personnel protective equipment required by elevated PID/FID readings. Because the PID/FID data are not considered pertinent to site characterization, these data were not uploaded to FIMAD. The data exist exclusively in field log books. A substantial effort would be involved in tabulating these data from the log books. For these reasons, LANL believes that tabulation of the PID data as part of the RFI report for OU 1093 is not warranted.

SOPs 5.01 R0, 5.02 R0, already described in Appendix A of the RFI Report, provide well development methodology and well construction details requested by NMED. Though a diagram of a typical well does not appear in the Report, such does appear in the SOP. Core sample logs provide stratigraphic info for well boreholes. Well Completion Info forms provide specific details of well installation. Field notebooks provide a record of activity.

Information on well construction and development, well sampling, and well log books are provided in the attachments to this report. See Attachment B for a table describing this information and its location in the attachments.

Comment 1.b.ii. *LANL shall provide a checkplot presenting a compilation of all the sampling locations (including site-specific background sampling locations) and additional information including, but not limited to, the following:*

- *all springs, wells, and seeps within the same canyon system(s) or within a 1-mile radius of any PRS within the RFI;*
- *all contaminant concentrations greater than background, greater than SALs, and greater than SALs and less than USEPA Region IX PRGs;*
- *types of analyses conducted at each location;*
- *exposure scenario for the PRG standards; and*
- *site-specific background concentrations.*

LANL Response:

A meeting held on April 21 clarified that HRMB desires one or more maps, at a scale smaller than the figures used in the RFI report, to present an overview of the sampling results. A checkplot is submitted as part of this response in Attachment C.

Comment 1.b.iii. *LANL shall provide a checkplot and table summarizing all the site-wide background sampling locations and results.*

LANL Response:

Site-wide background sampling is addressed in the publication "Natural Background Geochemistry and Statistical Analysis of Selected Soil Profiles, Sediments, and Bandelier Tuff" (Longmire et al 1995, 1266). LANL has provided NMED with a copy of this document. Representation of the results for all analytes for all sites on a single map is, at best, cumbersome. A map is presented as part of the revised Chapter 3, indicating locations of background sampling locations (see response to Comment 2.a.iv.)

Reference:

Longmire, P. A., D. E. Broxton, and S. L. Reneau (Eds.), October 1995. "Natural Background Geochemistry and Statistical Analysis of Selected Soil Profiles, Sediments, and Bandelier Tuff, Los Alamos, New Mexico," Los Alamos National Laboratory Report LA-UR-95-3466, Los Alamos, New Mexico. (Longmire et al. 1995, 1266)

Comment 1.b.iv. *LANL shall provide supporting documentation in defense of eliminating Contaminants of Potential Concern (COPCs) attributed to sources (asphalt paving, etc.) other than site activities or eliminated using "process information" or other such "knowledge" such as 18-010(b).*

LANL Response:

In general, polycyclic aromatic hydrocarbons (PAHs), the group to which benzo(a)pyrene, benzo(b) fluoranthene, chrysene, pyrene, etc. belongs, have been sporadically detected at many PRSs throughout the Laboratory. There is typically no specific source of PAHs attributable to the process activities at these PRSs. It has been found that PAHs are associated with asphalt runoff (e.g., paved areas and roofs) as well as from incomplete combustion (e.g., incinerators, forest fires, or vehicle exhaust) (Clement International Corporation 1990, ER ID No. 55663; Bradley et al. 1994, 1144; Menzie et al. 1992, ER ID No. 55635; Butler et al. 1984, ER ID No. 55634; Edwards 1983, ER ID No. 55636). In most cases, these chemicals are detected in areas influenced by these types of non-PRS-related sources, e.g., stormwater outfalls, ditches next or near paved driveways or roads, etc. The PAHs are eliminated, in many cases, based on available site information, because only those chemicals believed or suspected of being associated with a release from a PRS as a result of site activities are retained and subjected to the screening assessment process.

For other chemicals, available process information was based on the RFI work plan, conversations with site personnel, and a chemical inventory maintained by LANL that lists the hazardous chemicals used or stored at TA-18.

This issue is discussed further in responses to comments addressing specific PRSs.

References:

Bradley, L. J. N., B. H. Magee, and S. L. Allen, 1994. "Background Levels of Polycyclic Aromatic Hydrocarbons (PAH) and Selected Metals in New England Urban Soils," in Journal of Soil Contamination, Vol. 3(4), p. 349. (Bradley et al. 1994, 1144)

Butler, J. D., V. Butterworth, S. C. Kellow, and H. G. Robinson, 1984. "Some Observations of the Polycyclic Aromatic Hydrocarbon (PAH) Content of Surface Soils in Urban Areas," *The Science of the Total Environment*, ER ID No. 55634, Vol. 33, pp. 75-85. (Butler et al. 1984, ER ID No. 55634)

Clement International Corporation, August 1995. "Toxicological Profile for Polycyclic Aromatic Hydrocarbons," prepared under Contract No. 205-88-0608 for Agency for Toxic Substances and Disease Registry, ER ID No. 55663, US Public Health Service, Washington, DC. (Clement International Corporation 1990, ER ID No. 55663)

Edwards, N. T., 1983. "Polycyclic Aromatic Hydrocarbons (PAHs) in the Terrestrial Environment — A Review," *Journal of Environmental Quality*, ER ID No. 55636, Vol. 12, No. 4, pp. 427-441. (Edwards 1983, ER ID No. 55636)

Menzie, C.A., B. B. Potocki, and J. Santodonato, 1992. "Exposure to Carcinogenic PAHs in the Environment," *Environmental Science and Technology*, ER ID No. 55635, Vol. 26, No. 7, pp. 1278-1284. (Menzi et al. 1992, ER ID No. 55635)

Comment 1.b.v. *LANL shall present a complete view of the site including site history, process knowledge, site conditions such as improvements, etc. within the RFI report so that it can be presented as a "stand-alone" document.*

LANL Response:

It is LANL's position that some reference to the RFI Work Plan is unavoidable for a thorough understanding of the RFI report. The current approved RFI report framework policy, "Resource Conservation and Recovery Act Facility Investigation (RFI) Report Framework Policy," EM/ER:96-PCT-014, dated August 19, 1996 (Project Consistency Team, 1210), contains numerous references to the RFI Work Plan for additional detail. However, the RFI Report for former OU 1093 was prepared before that framework was approved and may not contain an appropriate level of detail with regard to site history and processes that may have created contamination.

Reference:

Project Consistency Team. "Project Consistency Team (PCT) Policy Memo Notebook," (Controlled), Environmental Restoration Project, Los Alamos National Laboratory, Los Alamos, New Mexico. (Project Consistency Team, 1210)

The following text, from the RFI Work Plan, is added to Section 1.1 of the report.

1.1.1 TA-27 Site History

Located in the center of OU 1093, this site served as TA-18's third firing site, called Far Point; the other two firing sites were within the present boundaries of TA-18. Established during the Manhattan Project in late 1944, Far Point was used by Group G-3 for full-scale tests of implosion weapon designs that required larger charges of high explosives (HE) than could be fired at the other two firing sites.

In late 1945, the site was upgraded with several structures from TA-18 and became known as Gamma Site, later redesignated TA-27. From west-to-east, the site's structures consisted of two small concrete control bunkers covered by earthen berms, a boardwalk, a series of instrumented manholes, and five round firing pits.

Shots fired at Gamma Site contained up to 2 tons of HE and utilized materials such as thorium, depleted uranium, and beryllium. In 1946, a bullet sensitivity test was conducted at Firing Pit 1 in which a 0.50-caliber machine gun was fired at a block of Composition B explosive. The block underwent a low-order explosion (i.e., the shot did not detonate completely) scattering undetonated HE up to 250 yards (LANL 1990, 0145).

The 1945 site upgrade included improving the access road from TA-18 with a layer of gravel. A faint trace of this early road can be seen south of present-day Pajarito Road. The entire site was abandoned and fenced off in early 1947. Excavation of gravel for road material was done between 1949 and 1962 throughout the length of Pajarito Canyon east of TA-18, even within TA-27.

The area was reopened in March 1960 to begin construction of a road to White Rock. The gravel road from TA-18 was shifted north, bisecting the old firing site. It was widened, paved, and opened to the public as Pajarito Road on July 11, 1962. An incident involving unexploded Army ordnance from a hillside north of TA-27 occurred at that time. Civilians entered the area before it was re-fenced and removed a dud bazooka round, which later exploded amid a group of children who were playing with it in Los Alamos (Brawley et al, 1962, 16-0057).

During the 1960s, all structures, concrete foundations, and other debris were removed and the ground surface was leveled. About 1969, the sanitary sewage lagoons and sewer line from TA-18 were built, the last major site activity. The sites of all former structures have been located in relation to present-day Pajarito Road. Firing Pits 4 and 5 were north of the road; all other structures were south of it. Only Firing Pit 4 has any surface expression; the other firing pits are buried (the material within and around Firing Pit 5 may have been removed during excavations for road gravel).

No Laboratory operations have taken place at this former site since 1947. It is presently within the fragment impact circle of TA-36's Firing Site 12, commonly referred to as Lower Slobbovia, and is potentially affected by operations there.

1.1.2 TA-36 Fragment Impact Circle

Part of OU 1093, particularly the area lying within former TA-27, is within the 900-m fragment impact circle designated for Lower Slobbovia. The fragment impact circle also includes part of OU 1148 (within TA-54) to the north of TA-36. Fragments from decades of firing at TA-36 and/or former TA-27 can be found within OU 1093. In July 1992, for example, a crew inspecting a power line route east of TA-27 near Building TA-36-136 found fragments of aluminum with mirror radioactivity from uranium contamination (LANL 1992, 16-0026).

1.1.3 TA-18 Site History

Pajarito Site is located at a fork in Pajarito Canyon where Threemile Canyon enters from the southwest. This site was the location of a former dude ranch, the Pajarito Club, built by Ashley Pond in 1914 and later abandoned. An earlier log homestead remains. The site was first developed in August 1943 during the Manhattan Project by Group P-5, the Radioactivity Group, to study rates of spontaneous fission from samples of radioactive materials.

In 1944, Group G-3 took over the site (named Pajarito Canyon Laboratory), enlarged it, and used it as a proving ground to study implosions. Three firing sites were constructed: a small firing site in Pajarito Canyon for experiments involving small explosive charges of a few pounds; a second one, called medium firing site, in Threemile Canyon for charges of several hundred pounds; and a third, located about a mile to the east of TA-18 at the end of a narrow unimproved road, for testing charges of up to 2 tons. Each site consisted of one or more firing locations and aboveground bunkers reinforced with steel plate, referred to as "battleships.". The third site, known as Far Point, was later incorporated into Gamma Site, later redesignated TA-27. A magazine (TA-18-15) and a trimming building (TA-18-19) were constructed east of the small firing site. Of the three firing site structures, only the two battleships remain. The central area at TA-18 originally consisted primarily of Building TA-18-1, which contained an electronics laboratory, shop, and photochemical laboratory.

Two additional magazines (TA-18-11 and -12) and an explosives assembly building (TA-18-10) were built north of Pajarito Road on the mesa above the site. These three structures, now removed, were within present-day TA-54, outside the boundary of OU 1093. The SWMU Report (LANL 1990, 0145) incorrectly lists them in TA-51. A lumber storage building (TA-18-13) and a carpentry shop (TA-18-14) were located south of Pajarito Road on the mesa above TA-18 (now in newly designated TA-65) between Pajarito Road and the north rim of Pajarito Canyon. Building TA-18-14 was later used as a radiation counting laboratory.

Explosives testing by G-Division ended in late 1945. In April 1946, the site was transferred to Group M-2, the Critical Assemblies Group. Since that time, TA-18's history has revolved around critical assembly work.

A 1946 fatal incident involving a hands-on criticality experiment, following a similar fatality in 1945, caused an immediate shutdown of manual criticality operations and indicated the urgent need for remotely controlled operation of such experiments. Kiva 1 (TA-18-23), an important addition to the site, was built in 1947 at the former small firing site. The 0.25-mile separation from its new control room in the east end of Building TA-18-1 provided a safe working distance from which to operate critical assemblies. An electrical generator building (TA-18-22) was also added at the northeast corner of the site, but it was removed in 1950.

The workload expansion at Pajarito Canyon Laboratory required the addition of an office building, TA-18-30, and a second Kiva, TA-18-32, in 1951. All control rooms were placed in Building TA-18-30. Buildings TA-18-28, -31, and -37 were constructed between 1949 and 1951. Kiva 3 (TA-18-116) was added in 1960.

From 1955 to 1972, fission reactor mockup studies for the Rover Program, a nuclear rocket propulsion program, were also conducted at TA-18 using the remotely controlled kivas. The completion of Kiva 3 allowed the uranium reactor mockup tests to be moved from Kiva 1 to Kiva 3. Zero-power mockups remained in Kiva 1 and non-Rover critical assembly work was done in Kiva 2. Reactor mockups consisted of various geometries and utilized materials such as deuterium oxide, uranium carbide, enriched uranium, graphite, niobium, and zirconium hydride (Paxton 1978, 16-0006). Beryllium oxide was also used in some mockups.

Termination of the Rover Program in 1973 resulted in a major downsizing and reorganization of TA-18 personnel. The work shifted to mockups of a plasma-core power reactor, which used fuel elements and beryllium (components left over from the Rover Program), enriched uranium foils, and uranium hexafluoride gas. Criticality work involving reactor safety and, later, nuclear detection technology, continued under various other groups.

During the 1970s and 1980s, Buildings TA-18-186, -187, -188, -189, -227, -256, -257, and -258 were added. TA-18's facilities and expertise in critical assemblies have made it a center of training in criticality safety for the DOE and other institutions. TA-18 presently continues its long history in nuclear criticality research, nuclear weapons safeguards and security, and treaty verification technology.

1.1.4 TA-18 Waste Management Practices

Separate individual industrial waste water and sanitary septic systems were constructed for Building TA-18-1; Kiva 2; Kiva 1; Building TA-18-30; Buildings TA-18-31 and -37; and Kiva 3. These facilities used septic tanks and drain fields with, in some cases, outfalls near the ephemeral stream channel. As additional buildings were constructed in the central area during the 1960s, they were connected to existing drain fields. Many of the septic systems were deactivated and replaced in 1969 by a centralized sanitary sewage system that discharged to the sewage lagoons at former TA-27. The kivas, however, presently remain on septic systems. The inactive septic systems remain in place and many contain both radioactive and hazardous constituents. Most of the PRSs in OU 1093 relate to these systems (LANL 1990, 0145; DOE 1987, 0264).

In 1992, TA-18's sanitary sewer system was disconnected from the sewage lagoons and connected to a new sanitary sewage treatment plant at TA-46.

With the addition of more buildings to the central area, storm sewers were constructed to remove runoff. These drained both paved areas and roofs and discharged through outfalls to the ephemeral stream channel in Pajarito Canyon.

Some interior building sinks and floor drains also discharged to outfalls or to drain fields associated with septic systems, such as those at Kivas 1, 2, and 3 and Buildings TA-18-30, -31, and -141.

Relatively small volumes of potentially contaminated solid waste have been generated onsite; no routine burials of solid waste are known to have occurred. Wastes have been routinely transported to Laboratory centralized disposal areas. Throughout TA-18's history, a variety of both radioactive and nonradioactive materials have been handled, but there are few documented instances of releases to the environment. Uranium-233, -235, and -238 and nickel-coated plutonium were used in the critical assembly work. One employee commented that during the Rover Program an exceptional quantity of beryllium and cadmium were used at TA-18 (Mynard 1992, 16-0007).

References:

Brawley, E. L., C. A. Burch, L. J. Cotton, R. W. Drake, J. P. Hogan, July 14, 1962. "Report of Investigation Bazooka Explosion," Atomic Energy Commission Investigation, ER ID Number 5607, Los Alamos, New Mexico (Brawley et al. 1962, 16-0057).

DOE (U.S. Department of Energy), October 1987. "Phase I: Installation Assessment, Los Alamos National Laboratory," Volumes 1 and 2, (draft), Comprehensive Environmental Assessment and Response Program, Albuquerque Operations Office, Albuquerque, New Mexico. (DOE 1987, 0264)

LANL (Los Alamos National Laboratory), November 1990. "Solid Waste Management Units Report," Volumes 1 through IV, Los Alamos National Laboratory Report No. LA-UR-90-3400, prepared by International Technology Corporation under Contract 9-XS6-0062R-1, Los Alamos, New Mexico. (LANL 1990, 0145)

LANL (Los Alamos National Laboratory), November 16, 1992. "Occurrence Report ALO-LA-LANL-LANL-1992-0002," Los Alamos National Laboratory, ER ID Number 12542, Los Alamos, New Mexico. (LANL 1992, 16-0026)

Mynard, C. R., December 21, 1992. "Interview with Manuel B. Diaz, 12/21/92," Los Alamos National Laboratory memorandum to file, MEE4-92-120, ER ID Number 14642, Los Alamos, New Mexico. (Mynard 1992, 16-0007)

Paxton, H. C., March 1978. "Thirty Years at Pajarito Canyon Site," Los Alamos Scientific Laboratory Report LA-7121-H, ER ID Number 5716, Los Alamos, New Mexico. (Paxton 1978, 16-0006)

Additional information is added to other sections as noted below.

PRS 18-003(g) - Add following new text (in bold) on p.4-52 before last sentence in sec. 4.1.6:
...into this septic tank. The original building is known to have had a small contamination incident that could have resulted in radioactive materials entering the septic system. The exit line...

PRS 18-012(b) - Add following new text (in bold) on p.4-71 following last sentence in sec. 4.2.3:
...south of Building 18-31. In 1955 a sealed radioactive calibration device in Building 18-30 developed a pin-hole leak, causing contamination of a portion of the building with polonium-210, which has a half-life of 140 days. Floor drains, unless sealed during cleanup, could have allowed a small amount of contamination to reach the outfall. However, none of the short-lived isotope would have remained after several years.

PRS 18-002(b,c) - Add following new text (in bold) on p. 4-105 following last sentence in sec. 4.4.2:
...and ballistic objects. It would have been located at one of the firing points of PRS 18-002(b) and cannot therefore be separately discussed or sampled. This structure and the firing points were

decommissioned and dismantled prior to construction of Building 18-32 in 1950. Some of the buried electrical conduits for the firing points may remain.

PRS 27-002 - Add following new text (in bold) on p.4-115 following last sentence of first paragraph in sec. 4.4.3:
...old iron marker stakes. **See section 1.1 for the history of this site, which was active 1944-47.**

PRS 18-010(b) - Change text on p. 4-137 next to last sentence in Section 4.6.1 (revised text in bold):
Change from - ...*currently is an occupied flammables storage locker*...
Change to - ... **currently is a flammables storage locker. A 1986 photograph of the structure is captioned "refueling platform with indication of spillage into storm drainage ditch." No current evidence of spillage can be seen.**

1.c Sampling and Analysis

Comment 1.c.i. *LANL shall provide a separate and distinct discussion of the variances from the approved RFI Workplan within the RFI report.*

LANL Response:

Variances from the RFI work plan were noted in the report. However, the discussion of these variances was not consistently located within the discussion of each PRS. LANL has amended the "Field Investigation" section for each PRS, as noted below, to identify the variances from the work plan, and the reason for the variance. Variances from the proposed analyses are provided in Attachment F.

Section 3.2.1 - Background Data Comparison. Add the following text at the end of 2nd paragraph under Background Wells:

Only two wells were drilled due to a drilling obstruction at the third location. The wells were sufficiently close together that data from the two completed holes was judged to be sufficient to characterize background levels of analytes at this location.

PRS 18-003(a,b), p 4-4 - See Appendix A: Groundwater Sampling, para. 2, and Tank/Sludge Sampling. See p. 4-1, paragraphs 4 and 5. See p. 4-2, paras. 3, 4.

PRS 18-003(c)), p 4-23 - See Appendix A: Groundwater Sampling, para. 2, and Tank/Sludge Sampling. See p. 4-1, paragraphs 4 and 5. See p. 4-2, paras. 3, 4.

PRS 18-003(d), p. 4-33 - See Appendix A: Groundwater Sampling, para. 2, and Tank/Sludge Sampling. See p. 4-1, paragraphs 4 and 5. See p. 4-2, paras. 3, 4.

PRS 18-003(f), p. 4-44 - See Appendix A: Groundwater Sampling, para. 2, and Tank/Sludge Sampling. See p. 4-1, paragraphs 4 and 5. See p. 4-2, paras. 2, 3, 4.

PRS 18-003(g), p. 4-52 - See Appendix A: Groundwater Sampling, para. 2, and Tank/Sludge Sampling. See p. 4-1, paragraphs 4 and 5. See p. 4-2, paras. 3, 4.

PRS 18-003(h), p. 4-58 - See Appendix A: Groundwater Sampling, para. 2, and Tank/Sludge Sampling. See p. 4-1, paragraphs 4 and 5. See p. 4-2, paras. 2, 3, 4.

PRS 18-004(a,b), p. 4-62 - Variance in sampling 18-004(a) is already discussed. See also NOD item 2.c.i.(2).

PRS 18-012(a), p. 4-67 -

PRS 18-012(b), p. 4-71 -

PRS 18-012(c), p. 4-82 - Add new text (in bold) to section 4.2.4.2 after first sentence:

...at the outfall. This differs from the RFI Work Plan, which anticipated at least one sample being collected downstream in the creek bottom. The vertical face of the creek bank at the outfall (pipe) made it more appropriate to collect one sample at the pipe and the other on the side of the bank immediately below the pipe.

PRS 18-013, p. 4-85 -

PRS 18-008, p. 4-91 - This PRS has been found, excavated, sampled, and disposed of since the RFI Report was published. A complete writeup is needed to document these activities and the sampling results, unless a separate document from the RFI Report is a more appropriate venue for this information. If the PRS is included in this report, Sections 4.3.1.2 to 4.3.1.4 need to be revised accordingly and a table of analytical results prepared.

PRS 18-002(a), p. 4-93 -

PRS 18-002(b,c), p. 4-105 -

PRS 27-002, p. 4-115 - Variances in sampling 27-002 are already discussed.

PRS 18-005, p. 4-130 -

PRS 18-011, p. 4-134 -

PRS 18-010(b), p. 4-137 -

PRS 18-010(c), p. 4-146 -

PRS 18-010(d), p. 4-153 -

PRS 18-010(e), p. 4-158 -

PRS 18-010(f), p. 4-167 -

PCO wells, p. 4-171 -

Wetlands, p. 4-186 -

Comment 1.c.ii. *LANL shall not use composite sampling for determining the presence or absence of contaminants or for determining the nature and extent of contamination. As a result of this lack of adequate and useable data, LANL shall re-sample at PRSs 18-002(a-c) and 27-002.*

LANL Response:

The collection of composite samples was proposed, and approved, in the RFI Work Plan. The intended purpose of collecting composite samples, as stated in Section 5.1.5.3.2 of the Work Plan was to increase the likelihood of detecting high concentrations of potential contaminants without significantly increasing costs over that associated with a smaller number of sampling locations. The approved work plan proposed a method of evaluating the significance of the use of composite samples through a statistical evaluation. The samples were collected in accordance with the approved work plan. The statistical evaluation was presented in the RFI report (Section 4.4, Paragraph 4) and concluded that the compositing of samples did not alter the evaluation as compared with the collection of discrete samples from a smaller number of locations. LANL sees no basis for resampling in order to obtain discrete samples from the firing site areas.

The firing sites at TA-18 and TA-27 for which composite sampling was implemented during the site investigations are 18-002(a), 18-002(b), and 27-002. Each of these sites has discernible firing pits. The locales surrounding the firing pits were sampled with single grab samples. It was expected that the highest levels of chemicals of potential concern (COPCs) would be present in the firing pit locales.

Other locales, selected from outlying areas of the firing ranges, were sampled using two- and four-grab composite samples. These locales were not expected to have particularly high concentrations of the COPCs.

A concern about the use of composite sampling is that, because of the "averaging" of two or four grabs, high and low concentrations will be obscured. The effect of this is that composite samples may show less variability (smaller variance and standard deviation) than single samples taken from the same locations. This impact on the standard deviations would not be as noticeable for sites that are largely homogeneous (Cothern and Ross 1994). That is, if the highs and lows are not vastly different from the mean values, there would be little difference between the variability of the composite and the single samples.

Because the conceptual model for these sites did not indicate any reason to expect large heterogeneity in the areas from which the composite samples were taken, compositing was proposed in the work plan as an approach that would allow more information to be gathered at reasonable cost. The actual comparison of the standard deviations observed for the single samples and for the composite samples shows that the single grabs do not have significantly greater variability than the composite samples. (This hypothesis was tested with Wilcoxon Signed Rank tests on the paired standard deviations observed for single and composite samples for each analyzed chemical. The Wilcoxon test does not assume normally distributed data, and does test for shifts in the distributions.) The similarity of the distributions observed for single-grab and composite samples reinforces the underlying conceptual model for these sites.

At firing site 18-002(a), no single grab samples were taken. The strongest additional support that can be given for the appropriateness of compositing is to show that the variability of the 2- and 4-way composites does not differ significantly. Again using the Wilcoxon test, significantly greater variability among the 2-way composites is not observed. That is, the composite samples of 4-grabs did not have less variability than the 2-grab composites. Again, the underlying hypothesis that large-scale heterogeneity does not exist at these sites and that compositing was appropriate is supported by these findings.

Reference:

Cothern, C.R., and N. P. Ross. *Environmental Statistics, Assessment, and Forecasting.* Lewis Publishers, 1994.

Comment 1.c.iii. *LANL shall not use field instrumentation to determine the types of analyses to be conducted at investigations aimed at determining the presence or absence of contamination. When field instrumentation is used for screening, LANL shall provide assurances (such as detection limits and calibration records) that appropriate Quality Assurance/Quality Control criteria were adhered to. In addition, LANL must obtain confirmatory samples when using field screening to determine the presence or absence of contamination.*

LANL Response:

Discussion:

The only instance where field screening was used for determining what analyses would be conducted was at PRS 18-003(a)—a holding tank—and the septic tanks associated with PRSs 18-003(b, c, and d), where PID readings were used to determine the need for VOC and SVOC analysis. Subsequent to the RFI report, the contents of all these tanks have been removed as detailed in the Interim Action Report (Environmental Restoration Project 1996, ER ID No. 55044), and those wastes have been fully characterized (including VOC and SVOC analysis).

Reference:

Environmental Restoration Project, September 1996. "Interim Action Completion Report for Potential Release Sites 18-003(a-d, g), Holding Tank and Septic Tanks, Field Unit 2," Los Alamos National

Laboratory Report LA-UR-96-3340, ER ID No. 56044, Los Alamos, New Mexico. (Environmental Restoration Project 1996, ER ID No. 56044)

Revised Text:

The following information is added to the respective tables of the report.

TABLE 4-4
Data Comparison for PRS 18-003(a)

Analyte	Location ID	Depth (in.)	Sample ID	Medium	Result	SAL[1]	Units	>SAL
1,2-cis-Dichloroethylene	18-1032	N/A	0218-96-0001	Liquid	1,200 ug/L	NE[2]		
Methylene Chloride	18-1032	N/A	0218-96-0001	Liquid	81.5 ug/L	100	ug/L	
Tetrachloroethylene	18-1032	N/A	0218-96-0001	Liquid	159 ug/L	20	ug/L	X
Trichloroethylene	18-1032	N/A	0218-96-0001	Liquid	49,200 ug/L	100	ug/L	X

1 - The SAL for the liquid is the most stringent NMWQCC standard for groundwater

2 - The NMWQCC has not established a groundwater quality standard for this constituent

TABLE 4-6
Data Comparison for PRS 18-003(b)

Analyte	Location No.	Depth (in.)	Sample ID	Medium	Result	SAL[1,2]	Units	>SAL
Trichloroethylene	18-1036	N/A	0218-96-0003	Liquid	6.16 ug/L	100	ug/L	
Acetone	18-1036	N/A	0218-96-0004	Sludge	0.0072 mg/kg	2,100	mg/kg	
Benzo(a)anthracene	18-1036	N/A	0218-96-0004	Sludge	3.3 mg/kg	0.61	mg/kg	X
Benzo(a)pyrene	18-1036	N/A	0218-96-0004	Sludge	2.79 mg/kg	0.061	mg/kg	X
Benzo(b)fluoranthene	18-1036	N/A	0218-96-0004	Sludge	3.93 mg/kg	0.61	mg/kg	X
Bis(2-Ethylhexyl)phthalate	18-1036	N/A	0218-96-0004	Sludge	3.27 mg/kg	32	mg/kg	
Chrysene	18-1036	N/A	0218-96-0004	Sludge	2.98 mg/kg	61	mg/kg	
1,4-Dichlorobenzene	18-1036	N/A	0218-96-0004	Sludge	0.0138 mg/kg	3.6	mg/kg	
Fluoranthene	18-1036	N/A	0218-96-0004	Sludge	7.29 mg/kg	2,600	mg/kg	
Phenanthrene	18-1036	N/A	0218-96-0004	Sludge	7.01 mg/kg	NE[3]	mg/kg	
Pyrene	18-1036	N/A	0218-96-0004	Sludge	8.05 mg/kg	1,900	mg/kg	
Trichloroethylene	18-1036	N/A	0218-96-0004	Sludge	0.0038 mg/kg	3.2	mg/kg	
Xylenes (mixed)	18-1036	N/A	0218-96-0004	Sludge	0.0014 mg/kg	5,300	mg/kg	

1 - The SAL for the liquid is the most stringent NMWQCC standard for groundwater.

2 - The SAL for the sludge is based LANL Soil SALs, which are equivalent to the EPA Region IX PRGs.

3 - EPA Region IX has not established a SAL for this constituent.

TABLE 4-12
Data Comparison for PRS 18-003(c)

Analyte	Location No.	Depth (in.)	Sample ID	Medium	Result	SAL[1]	Units	>SAL
Acetone	18-1040	N/A	0218-96-0006	Sludge	0.0152 mg/kg	2,100	mg/kg	
2-Butanone (Methyl Ethyl Ketone)	18-1040	N/A	0218-96-0006	Sludge	0.0053 mg/kg	7,100	mg/kg	
Xylenes (mixed)	18-1040	N/A	0218-96-0006	Sludge	0.0015 mg/kg	5,300	mg/kg	

1 - The SAL for the sludge is based LANL Soil SALs, which are equivalent to the EPA Region IX PRGs.

TABLE 4-16
Data Comparison for PRS 18-003(d)

Analyte	Location No.	Depth (in.)	Sample ID	Medium	Result	SAL	Units	>SAL
Bis(2-ethylhexyl)phthalate	18-1044	N/A	0218-96-0008	Sludge	0.874 mg/kg	32	mg/kg	
Fluoranthene	18-1044	N/A	0218-96-0008	Sludge	0.613 mg/kg	2,600	mg/kg	
Pyrene	18-1044	N/A	0218-96-0008	Sludge	0.548 mg/kg	1,900	mg/kg	

1 - The SAL for the sludge is based LANL Soil SALs, which are equivalent to the EPA Region IX PRGs.

Comment 1.c.iv. *LANL did not address EPA's comment on the RFI Workplan requiring 4 out of 32 wetland samples be obtained from a depth of 1 to 6 inches. [Letter from Honker (USEPA Region VI) to Vozella dated May 7, 1994]*

LANL Response:

LANL will collect the indicated samples. LANL proposes to collect one sample at each of four wetland areas: WL-5, WL-6, WL-7, and WL-8. Samples from these locations reported the highest frequency of inorganics above background or of organics. Details of the additional sampling will be included in the sampling plan proposed in the response to Comment 1.a.ii.

LANL will collect the indicated samples. The location, sampling procedures, and analyses to be conducted are included in the Sampling and Analysis Plan for Groundwater Investigations in Threemile and Pajarito Canyon (Attachment A)

Comment 1.c.v. *LANL shall provide the number or percentage of media samples from each PRS that were analyzed by a fixed laboratory and indicate whether the laboratory was off-site or on-site. HRMB requires 20% of the samples collected for fixed laboratory analysis be analyzed by an off-site laboratory.*

LANL Response:

All analytical data used for background and screening comparisons (as tabulated in Appendix D of the RFI Report) were provided by analysis at fixed laboratories. Field screening data or mobile laboratory data were used primarily for the purpose of biasing sampling locations (see exception noted in Comment 1.c.iii) and were not used for risk-based decisions. The Document of Understanding, Annex G, Sampling and Analysis Guidelines, allows for analysis at on-site and off-site laboratories provided appropriate data quality levels are met. All data used for decision-making purposes in the RFI Report for OU 1093, with the exception noted in Comment 1.c.iii, met required quality specifications.

1.d Typographical or Reporting Errors.

Comment 1.d.i. *PRS numbers were not indicated on several figures (Figures 4-2 through 4-5; and Figures 4-9 though 4-12).*

LANL Response:

See Appendix D for revised figures.

Comment 1.d.ii. *Names of wells and buildings were inconsistently used. For example, Building 18-32 is often indicated as Criticality Building or Facility on the figures.*

LANL Response:

See Appendix D for revised figures.

1.e Appendices

Comment 1.e.i. *LANL must conduct TCLP analyses for waste characterization and present the results in the RFI report when offsite disposal of wastes is proposed. [Programmatic Issues from NODs dated January 16, 1995]*

LANL Response:

Discussion:

The present RFI report framework policy does not require the submission of waste characterization data. All hazardous wastes are managed consistent with the Laboratory's RCRA operating permit. TCLP analyses are only conducted on wastes with a potential for exceeding TCLP values. For example, if no D-listed constituents were detected in samples associated with the waste at concentrations more than 20 times the TCLP regulatory levels, the waste cannot exceed TCLP values, and no TCLP analysis is conducted. All appropriate analyses, as required by the intended disposal location, are conducted before waste disposal.

Revised Text:

A second paragraph will be added to Section 1.3 of the RFI report to address the broader issue of hazardous waste management, as follows:

All wastes generated by field activities, and by any follow-on remediation work, are managed in compliance with the Laboratory's RCRA operating permit and DOE Orders addressing radioactive and mixed waste management. Wastes are stored, characterized, treated as necessary, and disposed in compliance with these requirements. The Laboratory conducts periodic self-assessments to ensure compliance with appropriate requirements, and is periodically audited by DOE and HRMB against the requirements.

Comment 1.e.ii. *LANL shall provide documentation indicating that appropriate Quality Assurance/ Quality Control (QA/QC) samples were obtained and analyzed per EPA guidance. To substantiate that the appropriate QA/QC samples were obtained, a discussion of the QA/QC samples obtained and analyzed must be presented along with a description of QA/QC problems encountered. (Programmatic Issues from NODs dated January 16, 1996)*

LANL Response:

Discussion:

A variety of QA/QC samples are used to determine the quality and usability of the data generated from the various analyses. Samples collected in the field included rinsate, field, and trip blanks, and field duplicates, while routine laboratory QA/QC samples include laboratory duplicates, internal standards, laboratory blanks, blind QC and matrix spikes, surrogates, and laboratory control samples. In addition, performance evaluation samples for inorganics were periodically submitted to the analytical laboratories for analysis. These samples were collected and analyzed according to the frequency outlined in EPA's functional guidelines for organic and inorganic data review (EPA 1994, 1205, 1206). A review of the technical quality of the data (baseline validation) requires that the data be compared to numerical acceptance criteria established either by the analytical laboratory or by EPA for the QA samples mentioned above. The data that do not meet these criteria are qualified to indicate to the data user those sample results that have potential questions associated with sample handling and analysis.

The QA/QC discussion for each PRG has been modified to conform to the current RFI format. This format requires that all QA/QC problems be presented and discussed for both usable and unusable data. The previous discussion included only those QA/QC problems that may have affected the usability of the data in the RFI report. As a result, the present discussion includes additional information that was not in the original RFI report (i.e., an assessment of all qualified data). In addition, the characterization of the data having questionable usability has been modified and a determination made as to whether the data are usable or unusable. In reviewing the QA/QC issues for this response, some discrepancies were found related to the number of samples having a particular QA problem or the omission of a discussion of a QA problem in the text versus the tables. These discrepancies have been corrected and the new or additional information incorporated in the modification of the text.

Revised Text:

PRSs 18-003(a and b)

Section 4.1.1.3.1 is modified as follows:

PRS 18-003(a)

~~INORGANICS.—The analytical results had no QA/QC problems that affected data usability.~~

INORGANICS. The QA/QC samples collected along with the field samples at this PRS included one field blank and one set of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. The inorganic data did not have any QA/QC problems and the data are usable as reported. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

Comparison of concentrations of inorganic COPCs detected inside the settling pit with background UTLs was not done because such a comparison is not appropriate (see Section 3.2.1). Because no inorganics were detected above background UTLs in the soil surrounding the settling pit, the data comparison table (Table 4-4) lists only those inorganics detected within the settling pit. These inorganics were retained as COPCs and carried forward to the SAL comparison stage. The inorganics outside the settling pit that were not detected above background UTLs were eliminated as COPCs.

Only lead was found to be present at a concentration greater than its SAL. Beryllium was also detected in the settling pit, but it did not have a corresponding SAL. These two inorganics were retained as COPCs. The inorganics below SALs were not subjected to an MCA because they were confined to the settling pit (Section 3.2.1).

~~ORGANICS.—Several samples had QA/QC problems that affected data usability (Table 4-3).~~

ORGANICS. The QA/QC samples collected along with the field samples at this PRS included one field blank and one set of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Two samples had QA/QC problems associated with the VOC data that resulted in data qualifiers being assigned to the results (Table 4-3). The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Several SVOCs that were reported as undetected had detection limits greater than their SALs (Appendix D). **The detection limits were the normal EQLs because no dilutions or matrix interference problems were encountered with these samples.** Therefore, the relationship between the sample value and the SAL for each analyte was unclear. These compounds were not detected in the settling pit and, based on available site information, their presence in the soil outside the settling pit was unlikely. These compounds were therefore eliminated as COPCs.

- The data for several semivolatile analytes detected in the settling pit were found to be biased low and data usability questionable.

- Available site information suggests that the presence of these analytes is likely; therefore they were retained as COPCs.

  The volatile organic data for the two samples from the settling pit were questionable because all of the data were (N) qualified. The qualifier was included because the samples were heterogeneous; percent moisture was not determined; and large quantities of some target compounds severely affected instrument performance, which caused the samples to eventually be analyzed outside of the holding time. Based on available site information and presumptive evidence, several analytes were assumed to be present in the settling pit and were retained as COPCs, even though they were

undetected. As a result of the sample heterogeneity and sample dilution, the detection limits were above the normal EQLs and a number of analytes had SALS below the detection limits.

Several organic compounds were detected in sludge and water samples collected from the settling pit, and one organic compound was detected in the soil near the pit. Seven SVOCs and four VOCs were found at concentrations greater than their SALs and were retained as COPCs (Table 4-4). In addition, five SVOCs and one VOC without SALs were detected and were retained as COPCs.

The detected organics, all but one of which were within the settling pit, were not subjected to an MCA (see Section 3.2.1) ; the single organic detected outside the pit did not meet the criteria for an MCA.

PRS 18-003(b)

~~INORGANICS.—At PRS 18-003(b), several samples had QA/QC problems that affected data usability (Table 4-3).~~

INORGANICS. The QA/QC samples collected along with the field samples at this PRS included one field blank, two trip blanks, and three sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Thirteen samples had QA/QC problems that resulted in data qualifiers being assigned to the results for some inorganic analytes (Table 4-5). The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Three soil samples from one request number had QA problems associated with the laboratory control samples (LCS) that resulted in selenium and thallium being qualified as UJ. The recoveries for these analytes were below the established lower limit of 80%. The data are usable because the recoveries were sufficient to quantify the analytes if they were present. In addition, the detection limits are 50-60% of the background UTLs and more than an order of magnitude below the SALs. As a result, the low bias due to the LCS recoveries does not affect the data comparison.

- Twelve samples (eleven soil samples and groundwater sample AAB4517) from four request numbers had QA problems associated with the blind QC samples that resulted in several analytes being qualified as UJ or J. These analytes included aluminum (6 samples), beryllium (3 samples), chromium (6 samples), cobalt (6 samples), potassium (3 samples), selenium (3 samples), and vanadium (3 samples). The recoveries for aluminum, beryllium, chromium, cobalt, and vanadium were below the established lower limit of 75%. The biases associated with these data, except for selenium and potassium, did not affect the data comparisons because the detected analytes were a factor of two or more below their background UTLs or SALs. In addition, the recoveries were sufficient to detect and quantify the undetected analytes if they were present. The recoveries for potassium and selenium were above the established upper limit of 125%. The potassium data are usable because the results are biased high. The selenium data had recoveries >200% and are qualified as R. However, because all of the selenium values are below the detection limit, the high bias does not affect the usability of the data as nondetects in the screening assessment.

- Four soil samples from two request numbers had problems with the holding times for mercury analyses. The holding time for mercury (28 days) was grossly exceeded, i.e., more than two times the holding time, in one sample and exceeded by less than twice the holding time in three other samples. The mercury data for the sample that grossly exceeded holding time were qualified as R, while the other mercury data were qualified as UJ. Although the R qualified data should not be used, there is sufficient acceptable mercury data to determine if this inorganic is present in the drainfield. The UJ qualified data are usable because the samples were properly stored, thereby minimizing degradation.

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 (see Section 3.2.1). The data comparison

table (Table 4-6) lists all of the inorganics detected within the septic tank as well as those detected in soil and groundwater above background.

Chromium and copper were detected in the subsurface soil adjacent to the septic tank and their concentrations compared with background UTLs. Although the detected chromium concentration (46.3 mg/kg) was greater than the UTL (34.2 mg/kg), it was less than the site-specific background value (54.2 mg/kg) and therefore was eliminated as a COPC. Only copper, along with the detected inorganics in the septic tank, were carried forward to the SAL comparison stage. The inorganics that were undetected or less than the background UTLs were eliminated as COPCs.

The inorganics detected in filtered samples of groundwater collected from below the drainfield were compared with site-specific background values. The concentrations of manganese detected in the groundwater (305 µg/L, 328 µg/L, and 441 µg/L) were greater than the SAL of 180 µg/L but less than the site-specific background value (523 µg/L), so manganese was eliminated as a COPC. Zinc was the only other inorganic detected in the filtered samples at a concentration above the site-specific background value, but the concentration was below the SAL. Copper was the only noncarcinogenic analyte in the soil detected below its SAL, so an MCA was not performed. As a result, no inorganic COPCs were retained.

~~ORGANICS.—At PRS 18-003(b), several soil samples had QA/QC problems that affected data usability (Table 4-5).~~

ORGANICS. The QA/QC samples collected along with the field samples at this PRS included one field blank, two trip blanks, and three sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Ten samples had QA/QC problems associated with the SVOC data and two samples had QA/QC problems associated with the VOC data that resulted in data qualifiers being assigned to the results (Table 4-5). The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- **Several SVOCs and VOCs that were reported as undetected had detection limits greater than their SALs (Appendix D). The detection limits were the normal EQLs because no dilutions or matrix interference problems were encountered with these samples. Therefore, the relationship between the sample value and the SAL for each analyte was unclear. Most of these compounds were eliminated as COPCs because of available site information and the types of compounds detected in other TA-18 septic systems. However, three analytes, benzo(a)pyrene, bis(2-chloroethyl)ether, and dibenzo(a,h)anthracene, that have detection limits greater than their SALs also had QA problems (see below) that resulted in the data being biased low. The three analytes were retained as COPCs because the same or similar compounds were detected in the settling pit [PRS 18-003(a)], which is connected to the septic tank at PRS 18-003(b).**

- ~~Three analytes, benzo(a)pyrene, bis(2-chloroethyl)ether, and dibenzo(a,h)anthracene, had problems with the blind QC sample that resulted in the data being biased low and data usability being questionable.~~

- **Nine SVOC soil samples from two request numbers had QA problems associated with the blind QC samples that resulted in several analytes being qualified as UJ or R. The analytes qualified as UJ included anthracene (9 samples), benzo(a)pyrene (3 samples), bis(2-chloroethyl)ether (3 samples), hexachloroethane (3 samples), 2-methylphenol (6 samples), naphthalene (9 samples), and 1,2,4-trichlorobenzene (9 samples). The data are usable because the recoveries were sufficient to detect and quantify the analytes if they were present. The analytes qualified as R included 1,2-dichlorobenzene (9 samples) and 2-methylphenol (3 samples) and are unusable because the recoveries were <10%, making quantification difficult. The unusable data did not affect the sufficiency of the data for decision-making purposes because other acceptable samples were available for the screening assessment.**

- ~~Two analytes in one soil sample and five analytes in one groundwater sample had additional problems with the internal standards that resulted in the data being biased low and data usability being questionable.~~

- Two SVOC samples (soil sample AAB4483 and groundwater sample AAB4617) from two request numbers had QA problems associated with the area counts for one or more internal standards that resulted in several analytes being qualified as UJ. The data for the target compounds associated with the internal standards are usable because recoveries were sufficient to detect and quantify the analytes and the sensitivity and responsiveness of the instrument were not compromised. Some of these analytes were retained as COPCs because the same or similar compounds were detected in the settling pit (PRS 18-003(a)).

- Two VOC soil samples from two request numbers had QA problems associated with the recovery of a surrogate compound that resulted in all of the analytes being qualified as UJ. The recovery of 4-bromofluoromethane was 1-2% below the established lower limit of 74%. The data are usable because the recoveries were sufficient to detect and quantify the analytes if they were present and the recoveries for the other surrogate compounds were acceptable.

- One VOC soil sample from one request number had QA problems associated with the area count for one of the internal standards that resulted in several analytes being qualified as UJ. The data for the target compounds associated with the internal standard are usable because recoveries were sufficient to detect and quantify the analytes, and the sensitivity and responsiveness of the instrument were not compromised. In addition, the recoveries for the other QC samples were within established limits for the target compounds.

Data usability for undetected, biased-low analytes that had SALs greater than detection limits was unaffected.

Only one organic compound, 1,2-dichloroethane (1,2-DCA), was detected in a groundwater sample, and no organics were detected in the subsurface soil (As explained in Section 4.1, the septic tank contents were not analyzed for VOCs or SVOCs.) The 1,2-dichloroethane was found at a concentration greater than its SAL and retained as a COPC. No other organics were detected outside of the septic tank, so an MCA was not conducted (see Section 3.2.1).

Table 4-5 is modified as follows:

TABLE 4-5
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-003(b)

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
18637	AAB4505 AAB4507 AAB4509	18-1135	Blind QC	Cobalt	UJ	Blind QC sample concentration below the established lower limit of 50%.
18641	AAB4482 AAB4485 AAB4517	18-1114 18-1116 18-1136	Blind QC	Potassium	UJ	Blind QC sample concentration below the established lower limit of 50%.
18941	AAB4512 AAB4514 AAB4516	18-1136	Blind QC	Aluminum Chromium	UJ	Blind QC sample concentration below the established lower limit of 50%.
				Selenium	R	Blind QC sample concentration above the upper target limit of 200%.
19071	AAB4483 AAB4487 AAB4488	18-1115 18-1116 18-1117	Blind QC	Aluminum Beryllium Chromium Cobalt Vanadium	UJ or J	Blind QC sample concentration below the established lower limit of 50%.
			LCS	Selenium Thallium	UJ	Laboratory control sample recoveries below the established lower limit of 80%.
			N/A	Mercury	UJ	Holding time exceeded.
19962	AAB4732	18-1135	N/A	Mercury	R	Holding time grossly exceeded.

TABLE 4-5
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-003(b)
Continued

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
18118	AAB4483 AAB4487 AAB4488	18-1115 18-1116 18-1117	Blind QC	Anthracene Benzo(a)pyrene Bis(2-chloroethyl)ether Dibenzo(a,h)anthracene Hexachloroethane Naphthalene 1,2,4-Trichlorobenzene	UJ	Blind QC sample recoveries concentration beyond 3 sigma and/or < LDL; data usability questionable below the established lower limit of 50%.
	AAB4483 AAB4487 AAB4488	18-1115 18-1116 18-1117	Blind QC	1,2-Dichlorobenzene 2-Methylphenol	R	Blind QC sample recoveries concentration < target value of 10%.
18670	AAB4500 AAB4501 AAB4502 AAB4503 AAB4504 AAB4481	18-1126 18-1130 18-1131 18-1132 18-1133 18-1115	Blind QC	Anthracene 2-Methylphenol Naphthalene 1,2,4-Trichlorobenzene	UJ	Blind QC sample recoveries below the established lower limit of 50%.
				1,2-Dichlorobenzene	R	Blind QC sample recovery concentration < target value of 10%.
18118	AAB4483	18-1115	Internal standards	Azobenzene Benzo(a)pyrene Benzo(b)fluoranthene Benz(g,h,i)perylene Benzo(k)fluoranthene Dibenzo(a,h)anthracene Di-n-octyl phthalate Indeno(1,2,3-cd)pyrene	UJ	Internal standards below acceptance limits. analyte associated data questionable

TABLE 4-5
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-003(b)
Continued

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
18068	AAB4517	18-1136	Internal standards	Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(g,h,i)perylene Dibenzo(a,h)anthracene Di-n-octyl phthalate Indeno(1,2,3-cd)pyrene	UJ	Internal standards below acceptance limits. ~~analyte-associated data questionable~~
18118	AAB4487	18-1116	Internal Standard	Bromomethane n-Butylbenzene sec-Butylbenzene tert-Butylbenzene o-Chlorotoluene p-Chlorotoluene 1,2-Dichlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene Isopropylbenzene 4-Isopropyltoluene Propylbenzene 1,1,2,2-Tetrachloroethane 1,2,3-Trichloropropane 1,2,4-Trimethylbenzene 1,3,5-Trimethylbenzene	UJ	Internal standards below acceptance limits.
18118	AAB4488	18-1117	Surrogate	All VOCs	UJ	Recovery of 4-bromofluoromethane below established lower limit.
18161	AAB4485	18-1116	Surrogate	All VOCs	UJ	Recovery of 4-bromofluoromethane below established lower limit.

* See Section 3.1 for a description of the data qualifiers N/A: not applicable

PRS 16-003(c)

Section 4.1.2.3.1 is modified as follows:

~~Inorganics.—The inorganic data had no QA/QC problems that affected data usability.~~
INORGANICS. The QA/QC samples collected along with the field samples at this PRS included one rinsate blank, three trip blanks, and two sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Twelve samples had QA/QC problems that resulted in data qualifiers being assigned to the results for some inorganic analytes (Table 4-11). The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Four soil samples from one request number had QA problems associated with the laboratory control samples (LCS) that resulted in selenium and thallium being qualified as UJ. The recoveries for these analytes were below the established lower limit of 80%. The data are usable because the recoveries were sufficient to quantify the analytes if they were present. In addition, the detection limits are 50-60% of the background UTLs and more than an order of magnitude below the SALs. As a result, the low bias due to the LCS recoveries does not affect the data comparison.

- Twelve soil samples from three request numbers had QA problems associated with the blind QC samples that resulted in several analytes being qualified as UJ, J, or R. These analytes included aluminum (12 samples), beryllium (4 samples), chromium (12 samples), cobalt (4 samples), selenium (6 samples), sodium (6 samples), thallium (6 samples), and vanadium (10 samples). The recoveries for aluminum, beryllium, chromium, cobalt, thallium, and vanadium were below the established lower limit of 75%. The biases associated with these data, except for the selenium and sodium, did not affect the data comparisons because the detected analytes were a factor of two or more below their background UTLs or SALs. In addition, the recoveries were sufficient to detect and quantify the undetected analytes if they were present. The recoveries for the selenium and sodium results were >200% and are qualified as R. However, because all of the values are below the detection limit, the high bias does not affect the usability of the data as nondetects in the screening assessment.

- Six soil samples from one request had QA problems associated with the matrix spike that resulted in the lead data being qualified as J. The recovery in the matrix spike was above the established upper limit of 125%. The data are usable because the results are biased high.

- Four soil samples from one request number had a problem with the holding times for mercury analyses. The holding time for mercury (28 days) was exceeded by less than twice the holding time and the data were qualified as UJ. The data are usable because the samples were properly stored, thereby minimizing degradation. In addition, all of the data were nondetects with detection limits below background and more than two orders of magnitude below SAL.

A comparison of inorganics with background UTLs (Table 4-12) was not done for those analytes detected within the septic tank because such a comparison is not appropriate (see Section 3.2.1). No inorganics were detected above background UTLs in the drainfield soils or outfall sediments. Inorganics detected in filtered groundwater samples were eliminated as COPCs because they were less than the site-specific background values.

All of the detected inorganics in the septic tank were subjected to the SAL comparison. Only mercury was present in the septic tank sludge at a concentration greater than its SAL. The inorganics in the septic tank that were below SALs were not subjected to an MCA (see Section 3.2.1).

~~Organics.—Several samples had QA/QC problems that affected data usability (Table 4-11).~~

ORGANICS. The QA/QC samples collected along with the field samples at this PRS included one rinsate blank, three trip blanks, and two sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Seven samples had QA/QC problems associated with the SVOC data that resulted in data qualifiers being assigned to the results (Table 4-11). The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Several SVOCs that were reported as undetected had detection limits greater than their SALs (Appendix D). The detection limits were the normal EQLs because no dilutions or matrix interference problems were encountered with these samples. Therefore, the relationship between the sample value and the SAL for each analyte was unclear. Most of these compounds were eliminated as COPCs because of available process knowledge and the types of compounds detected in other TA-18 septic systems. Two analytes in drainfield soil samples, benzo(a)pyrene and bis(2-chloroethyl)ether, had problems with the blind QC sample (see below) that resulted in the data being biased low. Both analytes were retained as COPCs because of available process knowledge and detection of these compounds at concentrations above SAL in other drainfield soil samples.

- ~~Two analytes in drainfield soil samples, benzo(a)pyrene and bis(2-chloroethyl)ether, had problems with the blind QC sample that resulted in the data being biased low and data usability being questionable. Both analytes were retained as COPCs because of available process knowledge and detection of these compounds t concentrations above SAL in other drainfield soil samples.~~

- Four SVOC soil samples from one request number had QA problems associated with the blind QC sample that resulted in several analytes being qualified as UJ or R. The analytes qualified as UJ included anthracene, benzo(a)pyrene, bis(2-chloroethyl)ether, hexachloroethane, naphthalene, and 1,2,4-trichlorobenzene. The data are usable because the recoveries were sufficient to detect and quantify the analytes if they were present. The analytes qualified as R included 1,2-dichlorobenzene and 2-methylphenol and are unusable because the recoveries were <10%, making quantification difficult. The unusable data did not affect the sufficiency of the data for decision-making purposes because other acceptable sample results were available for the screening assessment.

  ~~Two analytes in two soil samples and three analytes in one groundwater sample had additional problems with the internal standards that resulted in the data being biased low and data usability being questionable.~~ Three SVOC samples (soil samples AAB4527, AAB4530 and one groundwater sample AAB4552) from two request numbers had QA problems associated with the area counts for one or more internal standards that resulted in several analytes being qualified as UJ. The data for the target compounds associated with the internal standards are usable because recoveries were sufficient to detect and quantify the analytes and the sensitivity and responsiveness of the instrument were not compromised. All Some of these analytes were retained as COPCs because of available process knowledge and the detection of these compounds above SAL in other drainfield soil samples.

Data usability for undetected, biased-low analytes that had SALs greater than detection limits was unaffected.

Several organic compounds were detected in the soil and groundwater adjacent to the septic tank. As explained in Section 4.1, tank contents were not analyzed for VOCs or SVOCs. Bis(2-ethylhexyl)phthalate, a common laboratory contaminant, was eliminated from the list of detected organics because it was detected in the method blanks associated with samples.

Five SVOCs in the soil and one VOC in the groundwater were found to be present at concentrations greater than their SALs and were retained as COPCs. Three detected organics — benzo(g,h,i)perylene, 4-chloro-3-methylphenol, and dibenzofuran — did not have SALs because of a lack of toxicity

information and were retained as COPCs (Table 4-12). The detected organics present at concentrations less than their SALs were subjected to an MCA (see below).

Multiple chemical analysis. Nine noncarcinogenic analytes in soil samples met the criteria for inclusion in an MCA (Table 4-13). The maximum normalized concentrations of these analytes added up to 0.0300; therefore, no noncarcinogenic analytes were retained as COPCs. Chrysene and 2,4,6-trichlorophenol were the carcinogenic analytes in soil samples that met the criteria for inclusion in an MCA; their maximum normalized concentrations added up to 0.1338, so neither analyte was retained as a COPC.

No noncarcinogenic analytes detected in filtered groundwater samples met the criteria for inclusion in an MCA.

Table 4-11 is modified as follows:

TABLE 4-11
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-003(c)

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
19071	AAB4526 AAB4527 AAB4528 AAB4530	18-1146 18-1147 18-1146 18-1147	Blind QC	Aluminum Beryllium Chromium Cobalt Vanadium	UJ or J	Blind QC sample recoveries below the established lower limit of 50%.
			LCS	Selenium Thallium	UJ	Laboratory control sample recoveries below the established lower limit of 80%.
			N/A	Mercury	UJ	Holding time exceeded.
19172	AAB4525 AAB4542 AAB4543 AAB4544 AAB4545 AAB4546	18-1145 18-1153 18-1155 18-1156 18-1157 18-1159	Blind QC	Aluminum Chromium Thallium Vanadium	UJ or J	Blind QC sample recoveries below the established lower limit of 50%.
				Selenium Sodium	R	Blind QC sample recoveries above the upper target limit of 200%.
			Matrix Spike	Lead	J	Matrix Spike recovery above the established upper limit of 125%.
20461	AAB5268 AAB5269	18-1652 18-1653	Blind QC	Aluminum Chromium	UJ or J	Blind QC sample recoveries below the established lower limit of 50%.
18118	AAB4526 AAB4527 AAB4528 AAB4530	18-1146 18-1147 18-1146 18-1147	Blind QC	Anthracene Benzo(a)pyrene Bis(2-chloroethyl)ether Hexachloroethane Naphthalene 1,2,4-Trichlorobenzene	UJ	~~Concentration in blind QC sample beyond 3-sigma and/or < LDL; data usability questionable~~ Blind QC sample recoveries below the established lower limit of 50%.

TABLE 4-11
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-003(c)
Continued

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
18118	AAB4526 AAB4527 AAB4528 AAB4530	18-1146 18-1147 18-1146 18-1147	Blind QC	2-Methylphenol 1,2-Dichlorobenzene	R	Blind QC sample recoveries < target value of 10%.
	AAB4527	18-1147	Internal standard	Azobenzene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(g,h,i)perylene Di-n-octyl phthalate Dibenzo(a,h)anthracene Indeno(1,2,3-cd)pyrene	UJ	Internal standards below acceptance limits. ~~; analyte-associated data questionable~~
	AAB4530			Azobenzene Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(g,h,i)perylene Bis(2-ethylhexyl)phthalate 4-Bromo-phenylether Butylbenzylphthalate Chrysene Dibenzo(a,h)anthracene 3,3'-Dichlorobenzidine Di-n-butyl phthalate Di-n-octyl phthalate 4,6-Dinitro-2-methylphenol Fluoranthene Indeno(1,2,3-cd)pyrene N-Nitrosodiphenylamine Pentachlorophenol Phenanthrene Pyrene		

TABLE 4-11
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-003(c)
Continued

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
18510	AAB4552	18-1165	Internal standard	Benzo(a)anthracene Bis(2-ethylhexyl)phthalate 4-Bromo-phenylether Butylbenzylphthalate Chrysene 3,3'-Dichlorobenzidine Di-n-butyl phthalate 4,6-Dinitro-2-methylphenol Fluoranthene Hexachlorobenzene N-Nitrosodiphenylamine Pentachlorophenol Phenanthrene Pyrene	UJ	Internal standards below acceptance limits. ~~perylene-d12 out of control; analyte associated data questionable~~

* See Section 3.1 for a description of the data qualifiers.

PRS 18-003(d)

Section 4.1.3.3.1 is modified as follows:

~~Inorganics.—Three samples had QA/QC problems that affected data usability.—Data for mercury in two soil samples and one groundwater sample were qualified as unusable because the holding time for these samples had been grossly exceeded.~~

INORGANICS. The QA/QC samples collected along with the field samples at this PRS included one rinsate blank, two trip blanks, one field blank, and two sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Eighteen samples had QA/QC problems that resulted in data qualifiers being assigned to the results for some inorganic analytes (Table 4-15a). The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Fifteen soil samples from three request numbers had QA problems associated with the blind QC samples that resulted in several analytes being qualified as UJ, J, or R. These analytes included aluminum (13 samples), antimony (2 samples), cadmium (2 samples), chromium (7 samples), selenium (7 samples), silver (2 samples), sodium (6 samples), and thallium (6 samples). The recoveries for aluminum, antimony, cadmium, chromium, silver, and thallium were below the established lower limit of 75%. The biases associated with these data did not affect the data comparisons because the detected analytes were a factor of two or more below their background UTLs and/or SALs. In addition, the recoveries were sufficient to detect and quantify the undetected analytes if they were present. The recoveries for the selenium and sodium results were >200% and are qualified as R. However, because all of the values are below the detection limit, the high bias does not affect the usability of the data as nondetects in the screening assessment.

- Seven samples (septic tank samples AAB5826, AAB5827, four soil samples, and groundwater sample AAB4604) from four request numbers had problems with the holding time for mercury analyses. The holding time for mercury (28 days) was grossly exceeded, i.e., more than two times the holding time, in all five samples, and these were qualified as R. Although the R qualified data should not be used, there is sufficient acceptable mercury data to determine if this inorganic is present in the drainfield.

- One groundwater sample from one request number had problems with the holding time for inorganics (excluding mercury). The 180-day holding time was exceeded by 9 days and the data were qualified as UJ or J. The data are usable because the inorganic material is extremely stable under proper storage conditions and will not degrade over very long periods.

A comparison of inorganics with background UTLs was not done for those analytes detected within the septic tank. Inorganics reported as undetected or less than background were eliminated as COPCs.

Several inorganics were detected in the groundwater at concentrations greater than their site-specific background values; no inorganics were detected above background UTLs in the soil. The data comparison table (Table 4-16) lists all of the inorganics detected within the septic tank as well as those in the groundwater at concentrations greater than the site-specific background.

The only inorganic detected at a concentration above the SAL was manganese in the groundwater samples (253 µg/L vs. 180 µg/L). However, this value was below the site-specific background value (523 µg/L), so manganese is not included in the data comparison table. No other inorganics were present at concentrations greater than their SALs. Beryllium was detected in the sludge from the septic tank and was retained as a COPC because it had no SAL. Inorganics detected in the groundwater below SAL were subjected to an MCA (see below).

~~Organics.—Three samples had QA/QC problems that affected data usability.~~

ORGANICS. The QA/QC samples collected along with the field samples at this PRS included one rinsate blank, two trip blanks, one field blank, and two sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Three samples had QA/QC problems associated with the SVOC data and two samples had QA/QC problems associated with the VOC data that resulted in data qualifiers being assigned to the results. The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Several SVOCs and VOCs that were reported as undetected had detection limits greater than their SALs (Appendix D). The detection limits were the normal EQLs because no dilutions or matrix interference problems were encountered with these samples. Therefore, the relationship between the sample value and the SAL for each analyte was unclear. These compounds were not detected in the settling-pit septic tank and, based on available site information, their presence in the soil outside the settling-pit septic tank was unlikely. These compounds were therefore eliminated as COPCs because of the available site information and their absence in other TA-18 septic systems.

- One SVOC sample from one request number had a QA problem associated with the blind QC sample that resulted in several analytes being qualified as UJ or R. The analytes qualified as UJ included acenaphthylene, 1,2-dichlorobenzene, 2,4-dinitrotoluene, 2-methylnaphthalene, naphthalene, 2-nitrophenol, pentachlorophenol, pyrene, 1,2,4-trichlorobenzene, 2,4,5-trichlorophenol, and 2,4,6-trichlorophenol. The data are usable because the recoveries were sufficient to detect and quantify the analytes if they were present. The analytes qualified as R included anthracene and 2-methylphenol, and are unusable because the recoveries were <10%, making quantification difficult. The unusable data did not affect the sufficiency of the data for decision-making purposes because other acceptable sample results were available for the screening assessment.

- Two SVOC samples from one request number had bis(2-ethylhexyl)phthalate and di-n-butyl phthalate detected at concentrations that were below the estimated quantitation limits (EQLs), resulting in the sample values being qualified as J. This sample results have a high degree of uncertainty because they cannot be accurately distinguished from the instrument "noise" levels. As a result, the data are usable as estimated values, but should be used with caution in the screening assessment because they cannot be accurately quantified. The analytical laboratory raised the detected concentration to the EQL and reported the analytes as undetected.

- The volatile organic data for two samples (one request number) from the septic tank were questionable because the data were (N) qualified; these compounds are the same as those qualified for PRS 18-003(a) (Table 4-3). The qualifier was included because the samples were heterogeneous; percent moisture was not determined; and large quantities of some target compounds severely affected instrument performance, which caused the samples to eventually be analyzed outside of the holding time. Several analytes were assumed to be present in the septic tank because of available site information and detection of the same or similar compounds in other TA-18 septic systems, even though they were undetected. As a result of the sample heterogeneity and sample dilution, the detection limits were above the normal EQLs and a number of analytes had SALS below the detection limits.

Data usability for undetected, biased-low analytes that had SALs greater than detection limits was unaffected.

Several organic compounds were detected in the sludge and water samples collected from the septic tank (Table 4-16). In addition, two VOCs were detected in the subsurface soil, and one was found in the groundwater. Toluene, a common laboratory contaminant, was eliminated from the list of detected organics because it was detected in the field blank associated with two samples.

Four VOCs were found in the sludge and water from the septic tank at concentrations greater than their SALs and were retained as COPCs. One VOC, 1,2-dichloroethane, was detected in the groundwater at a concentration greater than its SAL and was also retained as a COPC. Two VOCs, n-butylbenzene and cis-1,2-dichloroethylene, did not have SALs because of a lack of toxicity information and were therefore retained as COPCs. Those organics detected outside the septic tank at concentrations less than their SALs were subjected to an MCA (see below).

Multiple chemical analysis. At 16-003(d), four noncarcinogenic analytes from groundwater samples met the criteria for an MCA (Table 4-17). The maximum normalized concentrations of these analytes totaled 0.8957 so none of these analytes were retained as COPCs.

The two noncarcinogenic analytes from soil samples included in an MCA were trichlorofluoromethane and xylenes(mixed). The sum of their maximum normalized concentrations is 0.0000, so neither analyte was retained as COPCs as a result of the MCA. No carcinogenic analytes from either the groundwater or soil samples met the criteria for inclusion in an MCA.

Table 4-15a is added as follows:

TABLE 4-15a
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-003(d)

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
18631	AAB4568 AAB4586 AAB4587 AAB4588 AAB4589 AAB4590	18-1173 18-1180 18-1181 18-1182 18-1187 18-1188	Blind QC	Aluminum Thallium	UJ or J	Blind QC sample concentration below the established lower limit of 50%.
				Sodium	R	Blind QC sample concentration above the upper target limit of 200%.
18937	AAB4569 AAB4570 AAB4571 AAB4573 AAB4574 AAB4595 AAB4596	18-1176 18-1185 18-1176 18-1177 18-1177 18-1195 18-1195	Blind QC	Aluminum Chromium	UJ or J	Blind QC sample concentration below the established lower limit of 50%.
				Selenium	R	Blind QC sample concentration above the upper target limit of 200%.
19947	AAB4597 AAB4601	18-1196	Blind QC	Antimony Cadmium Silver	UJ or J	Blind QC sample concentration below the established lower limit of 50%.
			N/A	Mercury	R	Holding time grossly exceeded.
19972	AAB4591 AAB4593	18-1195	N/A	Mercury	R	Holding time grossly exceeded.
20366	AAB4604	18-1196	N/A	Mercury	R	Holding time grossly exceeded.
				All inorganics except mercury	UJ or J	Holding time exceeded.
15886	AAB5826 AAB5827	18-1044	N/A	Mercury	R	Holding time grossly exceeded.

TABLE 4-15a
SUMMARY OF DATA QA/QC PROBLEMS FOR PRS 18-003(c)
Continued

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
17895	AAB4597	18-1196	Blind QC	Acenaphthylene 1,2-Dichlorobenzene 2,4-Dinitrotoluene 2-Methylnaphthalene Naphthalene 2-Nitrophenol Pentachlorophenol Pyrene 1,2,4-Trichlorobenzene 2,4,5-Trichlorophenol 2,4,6-Trichlorophenol	UJ	Blind QC sample concentration below the established lower limit of 50%.
				Anthracene 2-Methylphenol	R	Blind QC sample concentration < target value of 10%.
17954	AAB4591 AAB4593	18-1195	N/A	Bis(2-ethylhexyl)phthalate Di-n-butyl phthalate	J	Analytes detected below EQLs; analytical laboratory raised values to EQLs and reported as undetected.
15883	AAB5826 AAB5827	18-1044	N/A	All VOCs	N	Presumptive evidence of presence; samples heterogeneous, instrument performance affected.

* See Section 3.1 for a description of the data qualifiers.

PRS 18-003(f)

Section 4.1.5.3.1 is modified as follows:

~~Inorganics.—The inorganic data had no QA/QC problems that affected data usability.~~
INORGANICS. The QA/QC samples collected along with the field samples at this PRS included one rinsate blank and one set of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. The inorganic results had no QA/QC problems and the data are usable as reported. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

No inorganics were detected in the filtered groundwater samples at concentrations above their site-specific background values. Antimony was the only inorganic detected in soil at a concentration greater than the background UTL and was carried forward to the SAL comparison stage (Table 4-21). Inorganics that were either undetected or less than background were eliminated as COPCs.

Although manganese was detected in the filtered groundwater samples at a concentration greater than its SAL, the sample values for manganese (135 and 211 µg/L) were less than the site-specific background value of 523 µg/L. Therefore, they are not presented in the data comparison table, and manganese is eliminated as a COPC.

Antimony was detected at a concentration less than its SAL and was subjected to an MCA (see below).

~~Organics.—Several samples had QA/QC problems that affected data usability (Table 4-20).~~
ORGANICS. The QA/QC samples collected along with the field samples at this PRS included one rinsate blank and one set of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Five samples had QA/QC problems associated with the SVOC data and four samples had QA/QC problems associated with the VOC data that resulted in data qualifiers being assigned to the results (Table 4-20). The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Several SVOCs and VOCs that were reported as undetected in soil had detection limits greater than their SALs (Appendix D). The detection limits were the normal EQLs because no dilutions or matrix interference problems were encountered with these samples. Therefore, the relationship between the sample value and the SAL for each analyte was unclear. Most of these compounds were not detected in the septic tank or at other TA-18 septic systems and, based on available site information, their presence in the soil outside the septic tank was unlikely. However, three analytes, benzo(a)pyrene, bis(2-chloroethyl)ether, and dibenzo(a,h)anthracene, that have detection limits greater than their SALs also had QA problems (see below) that resulted in the data being biased low. The three analytes were retained as COPCs because of available site information and detection in other TA-18 septic systems.

- Four SVOC soil samples from one request number had QA problems associated with the blind QC sample that resulted in several analytes being qualified as UJ or R. The analytes qualified as UJ included anthracene, 2-chlorophenol, 1,2-dichlorobenzene, 2-methylphenol, and 1,2,4-trichlorobenzene. The data are usable because the recoveries were sufficient to detect and quantify the analytes if they were present. The analyte qualified as R was pentachlorophenol, and is unusable because the recoveries were <10%, making quantification difficult. The unusable data did not affect the sufficiency of the data for decision-making purposes because other acceptable sample results were available for the screening assessment.

- ~~Three analytes, benzo(a)pyrene, bis(2-chloroethyl)ether, and dibenzo(a,h)anthracene, in one soil sample had problems with the base/neutral surrogate recoveries that resulted in the data being~~

~~biased-low and data usability being questionable. These analytes were retained as COPCs because of available site information and detection in other TA-18 septic systems.~~

- One SVOC soil sample from one request number had QA problems associated with the surrogate compounds that resulted in all of the analytes being qualified as UJ or R. Five of the six surrogate recoveries were below the acceptance criteria. Two of the three base/neutral surrogate recoveries were below the acceptance criteria and the base/neutral target compounds were qualified as UJ. Benzo(a)pyrene, bis(2-chloroethyl)ether, and dibenzo(a,h)anthracene were retained as COPCs because of available site information and detection in other TA-18 septic systems. One of the acid surrogate recoveries was below 10% and the acid target compounds for this surrogate were qualified as R. The data usability for this sample is questionable because recoveries were very low. However, the unusable or questionable data did not affect the decision-making process because other acceptable sample results were available for the screening assessment.

- Four VOC samples from one request number had QA problems associated with the initial calibration of the GCMS instrument that resulted in several analytes being qualified as UJ. The analytes acetone, 2-butanone, chloroethane, 2-hexanone, and trichlorofluoromethane were beyond the 30% relative standard deviation control limits, resulting in either an increase or a decrease in instrument sensitivity. The data are usable because the RRF for the target compounds was >0.05, which indicates that the calibration curve is sufficient to produce acceptable and quantifiable data.

- Four VOC soil samples from one request number had QA problems associated with the continuing calibration of the GCMS instrument that resulted in several analytes being qualified as UJ. The analytes carbon disulfide and chloromethane were beyond the 25%D control limits, resulting in a decrease in instrument sensitivity. The data are usable because the RRF for the target compounds was >0.05, which indicates that the calibration curve is sufficient to produce acceptable and quantifiable data.

- Four VOC soil samples from one request number had QA problems associated with the blind QC sample that resulted in 4-methyl-2-pentanone and trichloroethene being qualified as UJ. The data are usable because the recoveries were sufficient to detect and quantify the analytes if they were present.

Data usability for undetected, biased-low analytes that had SALs greater than detection limits was unaffected.

One organic, trichlorofluoromethane, was detected in the subsurface soil at a concentration less than its SAL (Table 4-21) and was subjected to an MCA (see below). Acetone was the only noncarcinogenic analyte detected in groundwater and therefore was not included in an MCA.

Multiple chemical analysis. No carcinogenic or noncarcinogenic analytes in groundwater met the criteria for inclusion in an MCA.

No carcinogenic analytes from soil samples met the criteria for inclusion in an MCA.

Two noncarcinogenic analytes in soil met the criteria for inclusion in an MCA (Table 4-22). The sum of the maximum normalized concentrations is 0.3719, so these analytes were not retained as COPCs.

Table 4-20 is modified as follows:

TABLE 4-20
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-003(f)

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
18623	AAB4640 AAB4642 AAB4644 AAB4646	18-1240 18-1241 18-1241 18-1241	Blind QC	Anthracene 2-Chlorophenol 1,2-Dichlorobenzene 2-Methylphenol 1,2,4-Trichlorobenzene	UJ	Blind QC sample recoveries below the established lower limit of 50%.
				Pentachlorophenol	R	~~Percent recovery <10% in blind QC sample. Data unusable.~~ Blind QC sample recovery <10%.
18531	AAB4654	18-1251	Surrogate	Benzo(a)pyrene ~~Bis(2-chloroethyl)ether~~ Dibenzo(a,h)anthracene Base/neutral Organics	UJ	Two of three base/neutral surrogate samples below acceptance criteria. ~~; data usability questionable~~
			Surrogate	Benzoic acid 4-Chloro-3-methylphenol o-Chlorophenol 2,4,-Dichlorophenol 2,4-Dimethylphenol 2,4-Dinitrophenol 2-Methyl-4,6-dinitrophenol 2-Methylphenol 4-Methylphenol 2-Nitrophenol 4-Nitrophenol Pentachlorophenol Phenol 2,4,5-Trichlorophenol 2,4,6-Trichlorophenol	R	One acid surrogate sample below recovery limit.

TABLE 4-20
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-003(f)
Continued

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
15623	AAB4640 AAB4642 AAB4644 AAB4645	18-1240 18-1241 18-1241 18-1241	Initial Calibration	Acetone 2-Butanone Chloroethane 2-Hexanone Trichlorofluoromethane	UJ	Beyond the 30% RSD control limits, resulting in a change in instrument sensitivity
			Continuing Calibration	Carbon Disulfide Chloromethane	UJ	Beyond the 25%D control limit, resulting in a decrease in instrument sensitivity
			Blind QC	4-Methyl-2-pentanone Trichloroethene	UJ	Blind QC sample concentration below the established lower limit of 50%

* See Section 3.1 for a description of the data qualifiers.

PRS 18-003(g)

Section 4.1.6.3.1 is modified as follows:

~~Inorganics: The inorganic data had no QA/QC problems that affected data usability.~~
INORGANICS. The QA/QC samples collected along with the field samples at this PRS included one rinsate blank, three trip blanks, one field blank, and two sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. The inorganic results had no QA/QC problems and the data are usable as reported. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

A comparison of the inorganics with background was not done for those analytes detected in the septic tank (see Section 3.2.1). The inorganics detected in the groundwater were compared with the site-specific background values (when available), while detected inorganics in the soils were compared with background UTLs (Table 4-24). Inorganics outside the septic tank that either were less than background values or were undetected were eliminated as COPCs.

Chromium was detected in the surrounding soil at a level slightly higher (34.3 mg/kg) than its background UTL (34.2 mg/kg) but less than the site-specific background value (54.2 mg/kg). Therefore, chromium was not retained as a COPC; however, it was carried forward to the SAL comparison stage because it was detected in the water within the septic tank.

None of the inorganics were present at concentrations greater than their SAL. No inorganics were subjected to an MCA because they all were detected within the septic tank (see Section 3.2.1).

~~Organics: Samples from within the septic tank had QA/QC problems that affected data usability.~~
ORGANICS. The QA/QC samples collected along with the field samples at this PRS included one rinsate blank three trip blanks, one field blank, and two sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Two samples had a QA/QC problem associated with the SVOC analysis, while the VOC results had no QA/QC problems. All of the organic analytical data are usable as reported. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Several SVOCs and VOCs that were reported as undetected had detection limits greater than their SALs (Appendix D). The detection limits were the normal EQLs because no dilutions or matrix interference problems were encountered with these samples. Therefore, the relationship between the sample value and the SAL for each analyte was unclear. These compounds were not detected in the settling-pit septic tank and, based on available site information, their presence in the soil outside the settling-pit septic tank was unlikely. These compounds were therefore eliminated as COPCs because available site information indicated their presence was unlikely.

- Two SVOC septic tank samples (AAB5928 and AAB5929) had a QA problem associated with the blind QC sample that resulted in ~~One analyte, 2,4,6-trichlorophenol had additional problems with the blind QC sample that resulted in the data being biased low and data usability being questionable.~~ The sample result was not qualified and the This analyte was eliminated as a COPC because available site information indicated its presence due to site activities was unlikely.

Data usability for undetected, biased-low analytes that had SALs greater than detection limits was unaffected.

All detected organics were carried forward to the SAL comparison stage (Table 4-24).

Three SVOCs and two three VOCs were detected in the septic tank at concentrations greater than their SALs and were retained as COPCs. In addition, ~~cis-1,2-dichloroethylene and~~ 1,1,2-trichloro-1,2,2-trifluorethane were was detected ~~(in the septic tank and in the soil, respectively)~~ in the subsurface soil ~~but do not have SALs below its SAL; these analytes also were retained as COPCs~~ and was not

retained as a COPC. The detected organics inside the septic tank that were less than their SALs were not subjected to an MCA (Section 3.2.1). The 1,1,2-trichloro-1,2,2-trifluorethane was also not subjected to an MCA because it was the only analyte detected in the soil.

PRS 16-003(h)

Section 4.1.7.3.1 is modified as follows:

~~Inorganics.—The inorganic data had no QA/QC problems that affected data usability.~~
INORGANICS. The QA/QC samples collected along with the field samples at this PRS included one rinsate blank, and one set of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Two samples had QA/QC problems that resulted in data qualifiers being assigned to the results for some inorganic analytes. The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Two soil samples from one request number had QA problems associated with the blind QC sample that resulted in selenium being qualified as R. The recovery for selenium (>200%) was above the upper established limit of 125%. However, because all of the values are below the detection limit, the high bias does not affect the usability of the data as nondetects in the screening assessment.

A comparison of inorganics with background was not done for those analytes detected inside the septic tank because such a comparison is not appropriate (see Section 3.2.1). No inorganics were detected in the soil at concentrations greater than the background UTLs. The inorganics in the septic tank were carried forward to the SAL comparison stage (Table 4-26). The inorganics that were undetected or were detected in samples outside the septic tank at concentrations less than the background values were eliminated as COPCs. No inorganics were detected in the septic tank at concentrations greater than SALs. The inorganics that were below SALs were subjected to an MCA (see below).

~~Organics.—Two water samples in the septic tank had QA/QC problems that affected data usability.~~
ORGANICS. The QA/QC samples collected along with the field samples at this PRS included one rinsate blank, and one set of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Two samples had a QA/QC problem associated with the SVOC analysis, while the VOC results had no QA/QC problems. All of the organic analytical data are usable as reported. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Several SVOCs and VOCs that were reported as undetected had detection limits greater than their SALs (Appendix D). The detection limits were the normal EQLs because no dilutions or matrix interference problems were encountered with these samples. Therefore, the relationship between the sample value and the SAL for each analyte was unclear. These compounds were not detected in the settling-pit septic tank and, based on available site information, their presence in the soil outside the settling-pit septic tank was unlikely. These compounds were therefore eliminated as COPCs.

- Two SVOC septic tank samples (AAB5928 and AAB5929) had a QA problem associated with the blind QC sample that resulted in One analyte, 2,4,6-trichlorophenol had additional problems with the blind QC sample that resulted in the data being biased low and data usability being questionable. The sample result was not qualified and the This analyte was eliminated as a COPC because available site information indicated its presence due to site activities was unlikely.

Data usability for undetected, biased-low analytes that had SALs greater than detection limits was unaffected.

All detected organics were within the septic tank, and none were detected at concentrations greater than their SALs (Table 4-26). These were subjected to an MCA (see below).

Multiple chemical analysis. No carcinogenic analytes were detected in water samples from the septic tank.

Seven noncarcinogenic analytes in water from the tank met the criteria for inclusion in an MCA (Table 4-27). The sum of their maximum normalized concentrations is 0.6701, so these analytes were not retained as COPCs.

Table 4-26a is added as follows:

TABLE 4-26a
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-003(h)

Request No.	Sample No.	Location No.	QA Sample Type	Analytes	Qualifier*	Comments
19171	AAB4700 AAB4703	18-1285	Blind QC	Selenium	R	Blind QC sample recovery above the upper target limit of 200%.
15904	AAB5832 AAB5833	18-1046	Blind QC	2,4,6-Trichlorophenol	Not Qualified	Blind QC sample recovery below the established lower limit of 50%.

* See Section 3.1 for a description of the data qualifiers.

PRS 18-012(a)

Section 4.2.2.3.1 is modified as follows:

~~Inorganics. The inorganic data presented no QA/QC problems that affected data usability.~~

INORGANICS. The QA/QC samples were collected as part of the drain and outfall aggregate that included PRSs 18-012(a), 18-012(b), 18-012(c), and 18-013, along with the field samples at these PRSs, and included two sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. The inorganic results had no QA/QC problems and the data are usable as reported. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

No inorganics were detected; therefore, they were eliminated as COPCs.

~~Organics. Both soil samples had QA/QC problems that affected data usability (Table 4-30).~~
ORGANICS. The QA/QC samples were collected as part of the drain and outfall aggregate that included PRSs 18-012(a), 18-012(b), 18-012(c), and 18-013, along with the field samples at these PRSs, and included two sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Two samples had QA/QC problems associated with the SVOC data that resulted in data qualifiers being assigned to the results. The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Several SVOCs reported as undetected had detection limits greater than their SALs. The detection limits were the normal EQLs because no dilutions or matrix interference problems were encountered with these samples. Therefore, the relationship between the sample value and the SAL for each analyte was unclear. All but two of these compounds were eliminated as COPCs because process information suggested that their presence at this site was unlikely as a result of site activities.

- ~~The two analytes, benzo(a)pyrene and bis(2-chloroethyl)ether, had problems with the blind QC sample that resulted in the data being biased low and data usability being questionable. Benzo(a)pyrene was the only analyte retained as a COPC because its presence at the site could be reasonably assumed.~~

- Two SVOC soil samples from one request number had QA problems associated with the blind QC sample that resulted in several analytes being qualified as UJ or R. The analytes qualified as UJ included anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, bis(2-chloroethyl)ether, 2-chloro-3-methylphenol, 4-methylphenol, naphthalene, pentachlorophenol, pyrene, 1,2,4-trichlorobenzene, and 2,4,6-trichlorophenol. The data are usable because the recoveries were sufficient to detect and quantify the analytes if they were present. Benzo(a)pyrene was the only analyte initially retained as a COPC because its presence at the site could be reasonably assumed based on the runoff from the asphalt roofs. The analytes qualified as R were 1,2-dichlorobenzene, hexachloroethane, and 2-methylphenol, and are unusable because the recoveries were <10%, making quantification difficult. The unusable data did not affect the sufficiency of the data for decision-making purposes because these analytes are not expected to be present in the runoff from the drain and storm sewer.

Data usability for undetected, biased-low analytes that had SALs greater than detection limits was unaffected.

Because no organic compounds were detected at this PRS, none were retained as COPCs.

Table 4-30 is modified as follows:

TABLE 4-30
SUMMARY OF DATA USABILITY PROBLEMS – PRS 18-012(a)

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
18770	AAB5286 AAB5287	18-1662 18-1664	Blind QC	1,2-Dichlorobenzene Hexachlorobenzene 2-Methylphenol	R	Blind QC sample ~~concentration~~ recovery < target value of 10%.
				Anthracene Benzo(a)pyrene Benzo(g,h,i)perylene Bis(2-chloroethyl)ether 4-Chloro-3-methylphenol 4-Methylphenol Naphthalene Pentachlorophenol Pyrene 1,2,4-Trichlorobenzene 2,4,6-Trichlorophenol	UJ	~~Percent recoveries < LDL; data usability questionable~~ Blind QC sample recoveries below the established lower limit of 50%.

* See Section 3.1 for a description of the data qualifiers

PRS 18-012(b)

Section 4.2.3.3.1 is modified as follows:

~~Inorganics.—The inorganic data had no QA/QC problems that affected data usability.~~
INORGANICS. The QA/QC samples were collected as part of the drain and outfall aggregate that included PRSs 18-012(a), 18-012(b), 18-012(c), and 18-013, along with the field samples at these PRSs, and included two sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. The inorganic results had no QA/QC problems and the data are usable as reported. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

Eight inorganics were detected in the sediments at concentrations greater than the background UTLs (Table 4-33). Chromium had a concentration that was less than the site-specific background value for soil, which was greater than the background UTL. As a result, chromium was eliminated from further consideration.

None of the inorganics were present at concentrations greater than their SALs. The inorganics detected at concentrations less than their SALs were subjected to an MCA (see below).

~~Organics.—The sediment samples had QA/QC problems that affected data usability (Table 4-32).~~
ORGANICS. The QA/QC samples were collected as part of the drain and outfall aggregate that included PRSs 18-012(a), 18-012(b), 18-012(c), and 18-013, along with the field samples at these PRSs, and included two sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Three samples had QA/QC problems associated with the SVOC data that resulted in data qualifiers being assigned to the results. The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Several SVOCs reported as undetected had detection limits greater than their SALs. The detection limits were the normal EQLs because no dilutions or matrix interference problems were encountered with these samples. Therefore, the relationship between the sample value and the SAL for each analyte was unclear. These compounds were eliminated as COPCs because process information indicated that their presence at this site was unlikely.

- ~~Two analytes, pentachlorophenol and bis(2-chloroethyl)ether, had problems with the blind QC sample that resulted in the data being biased low and data usability being questionable. Both analytes were eliminated as COPCs because process information suggested that their presence at this site was unlikely.~~

- Three SVOC sediment samples from one request number had QA problems associated with the blind QC sample that resulted in several analytes being qualified as UJ, J, or R. The analytes qualified as UJ or J included anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, bis(2-chloroethyl)ether, 2-chloro-3-methylphenol, 4-methylphenol, naphthalene, pentachlorophenol, pyrene, 1,2,4-trichlorobenzene, and 2,4,6-trichlorophenol. The data are usable because the recoveries were sufficient to detect and quantify the analytes if they were present. All of the analytes were eliminated as COPCs because site information indicates that their presence as a result of site activities was unlikely. The analytes qualified as R were 1,2-dichlorobenzene, hexachloroethane, and 2-methylphenol, and are unusable because the recoveries were <10%, making quantification difficult. The unusable data did not affect the sufficiency of the data for decision-making purposes because these analytes are not expected to be present in the runoff from the drain and storm sewer.

Data usability for undetected, biased-low analytes that had SALs greater than detection limits was unaffected.

Several organic compounds were detected in the sediments and compared with their SALs (Table 4-33). Seven SVOCs were detected at concentrations greater than SALs. Two additional SVOCs, phenanthrene and benzo(g,h,i)perylene, were detected in the sediments but did not have SALs. These nine analytes were retained as COPCs. Those detected organics present at concentrations less than their SALs were subjected to an MCA (see below).

Multiple chemical analysis. Thirteen noncarcinogenic analytes met the criteria for inclusion in an MCA (Table 4-34). The sum of the maximum normalized concentrations of these analytes was 1.4677, which results in an MCA on a sample-by-sample basis. The maximum normalized concentration, for sample AAB5292, totaled 1.4685. Antimony, copper, fluoranthene, lead, mercury, and pyrene contributed at least 0.1 to the sum for sample AAB5292, so these analytes were retained as COPCs. No carcinogenic analytes met the criteria for inclusion in an MCA.

Table 4-32 is modified as follows:

TABLE 4-32
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-012(b)

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
18770	AAB5292 AAB5293 AAB5294	18-1666 18-1667 18-1667	Blind QC	1,2-Dichlorobenzene Hexachlorobenzene 2-Methylphenol	R	Blind QC sample ~~concentration~~ recoveries < target value of 10%.
				Anthracene Benzo(a)pyrene Benzo(g,h,i)perylene Bis(2-chloroethyl)ether 4-Chloro-3-methylphenol 4-Methylphenol Naphthalene Pentachlorophenol Pyrene 1,2,4-Trichlorobenzene 2,4,6-Trichlorophenol	UJ	~~Percent recoveries < LDL; data usability questionable~~ Blind QC sample recoveries below the established lower limit of 50%.

* See Section 3.1 for a description of the qualifiers

PRS 18-012(c)

Section 4.2.4.3.1 is modified as follows:

~~Inorganics.—The inorganic data had no QA/QC problems that affected data usability.—No inorganics were detected in the sediments collected from the outfall at concentrations greater than the background UTLs. All of the inorganics were eliminated as COPCs.—(See Appendix D for a complete data presentation.)~~
INORGANICS. The QA/QC samples were collected as part of the drain and outfall aggregate that included PRSs 18-012(a), 18-012(b), 18-012(c), and 18-013, along with the field samples at these PRSs, and included two sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. There were no QA/QC problems associated with the data, and the data are usable as reported. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

No inorganics were detected in the sediments collected from the outfall at concentrations greater than the background UTLs. All of the inorganics were eliminated as COPCs. (See Appendix D for a complete data presentation.)

~~Organics.—The organic data had no QA/QC problems that affected data usability.—All of the organics were eliminated as COPCs because no organic compounds were detected in the sediments.~~
ORGANICS. The QA/QC samples were collected as part of the drain and outfall aggregate that included PRSs 18-012(a), 18-012(b), 18-012(c), and 18-013, along with the field samples at these PRSs, and included two sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. There were no QA/QC problems associated with the data, and the data are usable as reported. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

All of the organics were eliminated as COPCs because no organic compounds were detected in the sediments.

PRS 18-013

Section 4.2.5.3.1 is modified as follows:

~~Inorganics.—The inorganic data did not present any QA/QC problems that affected data usability.~~
INORGANICS. The QA/QC samples were collected as part of the drain and outfall aggregate that included PRSs 18-012(a), 18-012(b), 18-012(c), and 18-013, along with the field samples at these PRSs, and included two sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. The inorganic results had no QA/QC problems, and the data are usable as reported. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

Two inorganics were detected in the backfill at concentrations greater than both the background UTLs and the site-specific background values. Inorganics greater than background UTLs were carried forward to the SAL comparison stage (Table 4-38). The inorganics that were either undetected or less than background UTLs were eliminated as COPCs.

No inorganics were present at concentrations greater than SALs. The inorganics below SALs were subjected to an MCA (see below).

~~Organics.—All samples had QA/QC problems that affected data usability.—(Table 4-37).~~
ORGANICS. The QA/QC samples were collected as part of the drain and outfall aggregate that included PRSs 18-012(a), 18-012(b), 18-012(c), and 18-013, along with the field samples at these PRSs, and included two sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Five samples had QA/QC problems associated with the SVOC and VOC data that resulted in data qualifiers being assigned to the

results (Table 4-37). The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Several SVOCs reported as undetected had detection limits greater than their SALs. The detection limits were the normal EQLs because no dilutions or matrix interference problems were encountered with these samples. Therefore, the relationship between the sample value and the SAL for each analyte was unclear. These compounds were eliminated as COPCs because process information indicated that their presence at this site was unlikely. Two SVOCs, benzo(a)pyrene and bis(2-chloroethyl)ether, had problems with the blind QC sample (see below) that resulted in the data being biased low and data usability being questionable. As a result, the relationship between the sample value and the SAL for each analyte was unclear. Benzo(a)pyrene was retained as a COPC because its presence in the backfill was confirmed by a second sample. Bis(2-chloroethyl)ether was eliminated because its presence at the site was unlikely.

  Five SVOC soil samples from one request number had QA problems associated with the blind QC sample that resulted in several analytes being qualified as UJ ,J, or R. The analytes qualified as UJ or J included anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, bis(2-chloroethyl)ether, 2-chloro-3-methylphenol, 2-chloronaphthalene, 4-methylphenol, naphthalene, 1,2,4-trichlorobenzene, and 2,4,6-trichlorophenol. The data are usable because the recoveries were sufficient to detect and quantify the analytes if they were present. The analytes qualified as R were 1,2-dichlorobenzene, hexachloroethane, and 2-methylphenol, and are unusable because the recoveries were <10%, making quantification difficult. The unusable data did not affect the sufficiency of the data for decision-making purposes because these analytes are not expected to be present in the runoff from the drain and storm sewer.

Data usability for undetected, biased-low analytes that had SALs greater than detection limits was unaffected.

Several organic compounds were detected in the samples, and all were compared with their SALs (Table 4-38). Two SVOCs were retained as COPCs: benzo(a)pyrene, which was detected at a concentration greater than its SAL; and phenanthrene, which was detected but did not have a SAL. The detected organics that were less than their SALs were subjected to an MCA (see below).

Multiple chemical analysis. At PRS 18-013, backfill from the pit and tank was the only medium from which samples were taken. Five noncarcinogenic analytes met the criteria for inclusion in an MCA (Table 4-39). The sum of the maximum normalized concentrations of these analytes is 0.1293, so none were retained as COPCs.

Four carcinogenic analytes met the criteria for inclusion in an MCA. The sum of the maximum normalized concentrations of these analytes is 1.7899, resulting in the conduct of an MCA on a sample-by-sample basis. The maximum normalized concentration, for sample AAB5309, totaled 1.7863. Benzo(a)anthracene and benzo(b)fluoranthene each contributed at least 0.1 (0.8 and 0.97, respectively) to the sum for sample AAB5309, so these analytes were retained as COPCs.

Table 4-37 is modified as follows:

TABLE 4-37
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-013

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
18997	AAB5307 AAB5308 AAB5309 AAB5310 AAB5321	18-1680 18-1681 18-1682 18-1683 18-1770	Blind QC	1,2-Dichlorobenzene Hexachlorobenzene 2-Methylphenol	R	Blind QC sample ~~concentration~~ recoveries <10% of target value. ~~; data unusable~~
				Anthracene Benzo(a)pyrene Benzo(g,h,i)perylene Bis(2-chloroethyl)ether 4-Chloro-3-methylphenol 2-Chloronaphthalene 4-Methylphenol Naphthalene 1,2,4-Trichlorobenzene 2,4,6-Trichlorophenol	UJ or J	Blind QC sample ~~concentration~~ recoveries ~~< LDL; data usability questionable~~ below the established lower limit of 50%.

* See Section 3.1 for a description of the data qualifiers.

PRS 18-002(a)

Section 4.4.1.3.1 is modified as follows:

~~Inorganics. The inorganic data had no QA/QC problems that affected data usability.~~
INORGANICS. The QA/QC samples collected along with the field samples at this PRS included one rinsate blank and one performance evaluation sample for the inorganics. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. The inorganic results had no QA/QC problems, and the data are usable as reported. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

A number of inorganics were detected in the collected soil samples. Although many of the samples were composites of either two or four grabs, no adjustment was made for this in the data comparison (see Section 4.4). Because none of the inorganics exceeded either background UTL or site-specific background values, neither a SAL comparison nor an MCA were conducted, and no inorganic COPCs were retained.

~~Organics. Five soil samples were held for 51 days beyond the recommended 14-day extraction holding time and for 114 days beyond the 40-day analytical holding time. Because of the excessive holding times, data usability for these samples was questionable. However, two HE constituents were detected in one sample and were subjected to the SAL comparison.~~
ORGANICS. The QA/QC samples collected along with the field samples at this PRS included one rinsate blank and one performance evaluation sample for the inorganics. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Twelve samples had QA/QC problems associated with the HE data that resulted in data qualifiers being assigned to the results. The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Five HE soil samples from one request number had QA problems associated with the blind QC sample that resulted in several analytes being qualified as UJ. The analytes included m-nitrotoluene, o-nitrotoluene, p-nitrotoluene, and tetryl(methyl-2,4,6-trinitrophenylnitramine). The data are usable because the recoveries were sufficient to detect and quantify the analytes if they were present.

- Seven HE soil samples from one request number had a problem with the holding time for HE analysis. The recommended 14-day extraction holding time and the 40-day analytical holding time were exceeded by 51 days and 114 days, respectively, which resulted in the analytes being qualified as UJ or J. However, because the soil samples were kept frozen before extraction, the extraction holding time can be extended up to 8 weeks (and probably longer). Following extraction, the samples were preserved and stored at 4°C to inhibit bacterial growth and prevent photodegradation of the analytes. This process appears to stop decomposition of material for at least 71 days (or longer). Two HE constituents were detected in one soil sample and were subjected to the SAL comparison.

One HE compound, nitrobenzene, was detected in two soil samples. The sample values were compared with the SAL, and one value was found to be greater than the SAL (AAB4880 = 7.03 mg/kg vs. SAL = 5.3 mg/kg). As a result, nitrobenzene was retained as a COPC. The HE sample AAB4954 had detected concentrations of 2,4-dinitrotoluene (2,4-DNT) and 2,6-dinitrotoluene (2,6-DNT) that were below the SALs of 1.0 mg/kg. These analytes were eliminated as COPCs, and no other HE compounds were detected in the soil.

Table 4-42a is added as follows:

TABLE 4-42a
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-002(a)

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
18876	AAB4916 AAB4925 AAB4934 AAB4935 AAB4944 AAB4953 AAB4954	18-1367 18-1370 18-1380 18-1385 18-1391 18-1700 18-1703	N/A	All HE	UJ or J	Recommended extraction and analytical holding times exceeded.
18914	AAB4861 AAB4862 AAB4871 AAB4880 AAB4889	18-1300 18-1303 18-1310 18-1322 18-1331	Blind QC	m-Nitrotoluene o-Nitrotoluene p-Nitrotoluene Tetryl(methyl-2,4,6-trinitrophenylnitramine)	UJ	Blind QC sample concentration below the established lower limit of 50%.

* See Section 3.1 for a description of the data qualifiers.

PRS 18-002(b)

Section 4.4.2.3.1 is modified as follows:

~~Inorganics—The inorganic data had no QA/QC problems that affected data usability.~~
INORGANICS. The QA/QC samples collected along with the field samples at this PRS included two rinsate blanks, two sets of field duplicates, and one performance evaluation sample for the inorganics. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Thirty-one samples had QA/QC problems associated with the inorganic data that resulted in data qualifiers being assigned to the results. The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Thirty-one soil samples from three request numbers had QA problems associated with the blind QC samples that resulted in several analytes being qualified as UJ, J, or R. These analytes included aluminum (23 samples), beryllium (7 samples), chromium (31 samples), nickel (8 samples), potassium (8 samples), and selenium (16 samples). The recoveries for all aluminum results and 23 chromium results were below the established lower limit of 75%. The biases associated with these data did not affect the data comparisons because the detected analytes were a factor of two or more below their background UTLs or SALs. In addition, the recoveries were sufficient to detect and quantify the undetected analytes if they were present. The recoveries for the all beryllium, nickel, and potassium results, as well as 8 chromium results, were above the upper established limit of 125%. These data were qualified as UJ or J and are usable because the results are biased high. The recovery for the selenium results was >200% and they are qualified as R. However, because all of the values are below the detection limit, the high bias does not affect the usability of the data as nondetects in the screening assessment.

- Twenty-four soil samples from two request numbers had QA problems associated with the laboratory control samples (LCS) that resulted in sodium data in 8 samples and thallium data in 16 samples being qualified as UJ. The recoveries for these analytes were below the established lower limit of 80%. The data are usable because the recoveries were sufficient to quantify the analytes if they were present. In addition, the detection limits for thallium are a factor of five or more below the SALs. As a result, the low bias due to the LCS recoveries does not affect the data comparison.

- Eight soil samples from one request number had a problem with the holding times for mercury analyses. The holding time for mercury (28 days) was exceeded by less than twice the holding time and the data were qualified as UJ. The data are usable because the samples were properly stored, thereby minimizing degradation. In addition, all of the data were nondetects, with detection limits at background and more than two orders of magnitude below SAL.

A number of inorganics were detected in the collected soil samples. Although many of these samples were composites of either two or four grabs, no adjustment for compositing was made in the data comparison (see Section 4.4). Concentrations of each analyte found in each sample was compared with their background UTLs and site-specific background values. Those inorganics detected at concentrations greater than the background UTLs or site-specific background values are presented in Table 4-44.

All of the inorganics detected above background UTLs were below their SALs and were subjected to an MCA (see below).

~~Organics—The HE data had some QA/QC problems that affected data usability.—The analytical holding time of 40 days was exceeded by 92 days for seven soil samples.—Data usability of these samples was questionable.—No HE organics were detected.~~

ORGANICS. The QA/QC samples collected along with the field samples at this PRS included two rinsate blanks, two sets of field duplicates, and one performance evaluation sample for the inorganics. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Thirty-one samples had QA/QC problems associated with the HE data that resulted in data qualifiers being assigned to the results. The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Sixteen HE soil samples from one request number had QA problems associated with the blind QC sample that resulted in several analytes being qualified as UJ or R. The UJ qualified data were for m-nitrotoluene, p-nitrotoluene, and tetryl(methyl-2,4,6-trinitrophenylnitramine) because the recoveries were less than the established lower limit of 50%. The data are usable because the recoveries were sufficient to detect and quantify the analytes if they were present. The data for o-nitrotoluene and nitrobenzene were R qualified because the recoveries were less than 10%.

- Three HE soil samples from three request numbers had QA problems associated with surrogate recoveries that resulted in 4-amino-2,6-dinitrotoluene in one sample being qualified as J and all HE analytes in the other two samples being qualified as R. The laboratory has not established control limits for the surrogate recovery. The recovery for the one surrogate was 340% due to extract evaporation, resulting in possible loss of sample integrity, and the data were qualified as unusable. The recovery for the other sample was 176%, the datum for 4-amino-2,6-dinitrotoluene qualified as J, and usable because the result is biased high. The recovery for the third sample was 39% and qualified as R because of the low recovery plus holding time problems.

- Thirteen HE soil samples from two request numbers had a problem with the holding time for HE analysis. The recommended 14-day extraction holding time and the 40-day analytical holding time were exceeded by 22 days and 1 day, respectively, for seven samples, which resulted in the analytes being qualified as UJ. The recommended 40-day analytical holding time was exceeded by 92 days for six samples, which resulted in the analytes being qualified as UJ. Because the soil samples were kept frozen before extraction, the extraction holding time can be extended up to 8 weeks (and probably longer). Following extraction, the samples were preserved and stored at 4°C to inhibit bacterial growth and prevent photodegradation of the analytes. This process appears to stop decomposition of material for at least 71 days (or longer). Therefore, the data for seven samples are usable because the samples were properly stored to minimize degradation and the holding times were not grossly exceeded. The data for the other six samples should be used with caution because of the extreme exceedance of the holding time.

Several HE compounds were detected in the other soil samples collected at PRS 16-002(b) (Table 4-44). One HE compound detected, 4-amino-2,6-dinitrotoluene (4-amino-2,6-DNT), did not have a SAL and therefore was retained as a COPC. The HE compounds RDX and 2,4,6-trinitrotoluene (2, 4, 6-TNT) were detected at concentrations less than their SALs and were subjected to an MCA (see below).

Multiple chemical analysis. Three noncarcinogenic analytes met the criteria for inclusion in an MCA (Table 4-45). The sum of the maximum normalized concentrations of these analytes was 0.0759, so none were retained as COPCs. Only one carcinogenic analyte, RDX, met the criteria for inclusion in an MCA, so an MCA was not conducted.

Table 4-44a is added as follows:

TABLE 4-44a
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-002(b)

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
18890	AAB4440 AAB4442 AAB4444 AAB4445 AAB4447 AAB4449 AAB4451 AAB4453 AAB4455 AAB4457 AAB4459 AAB4461 AAB4463 AAB4465 AAB4467 AAB4469	18-1075 18-1075 18-1075 18-1075 18-1076 18-1076 18-1076 18-1077 18-1077 18-1077 18-1078 18-1078 18-1078 18-1079 18-1079 18-1079	Blind QC	Aluminum Chromium	UJ or J	Blind QC sample concentration below the established lower limit of 50%.
				Selenium	R	Blind QC sample recovery <10%.
			LCS	Thallium	UJ	Laboratory control sample recoveries below the established lower limit of 80%.
20228	AAB4965 AAB4966 AAB4975 AAB4984 AAB5032 AAB5041 AAB5050 AAB5059	18-1403 18-1405 18-1410 18-1421 18-1474 18-1481 18-1491 18-1500	Blind QC	Chromium	J	Blind QC sample concentration below the established lower limit of 50%.
	AAB4975	18-1410		Nickel	J	Blind QC sample concentration below the established lower limit of 50%.

TABLE 4-44a
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-002(b)
Continued

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
20228	AAB4965 AAB4975 AAB5050 AAB5059	18-1403 18-1410 18-1491 18-1500	Blind QC	Potassium	J	Blind QC sample concentration below the established lower limit of 50%.
	AAB4965 AAB4966 AAB4975 AAB4984 AAB5032 AAB5041 AAB5050 AAB5059	18-1403 18-1405 18-1410 18-1421 18-1474 18-1481 18-1491 18-1500	LCS	Sodium	UJ	Laboratory control sample recoveries below the established lower limit of 80%.
			N/A	Mercury	UJ	Holding time exceeded.
20461	AAB4993 AAB4994 AAB5003 AAB5012 AAB5013 AAB5022 AAB5023	18-1431 18-1436 18-1441 18-1450 18-1450 18-1461 18-1463	Blind QC	Aluminum Chromium	UJ or J	Blind QC sample concentration below the established lower limit of 50%.

TABLE 4-44a
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-002(b)
Continued

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
18117	AAB4440 AAB4442 AAB4444 AAB4445 AAB4447 AAB4449 AAB4451 AAB4453 AAB4455 AAB4457 AAB4459 AAB4461 AAB4463 AAB4465 AAB4467 AAB4469	18-1075 18-1075 18-1075 18-1075 18-1076 18-1076 18-1076 18-1077 18-1077 18-1077 18-1078 18-1078 18-1078 18-1079 18-1079 18-1079	Blind QC	m-Nitrotoluene p-Nitrotoluene Tetryl(methyl-2,4,6-trinitrophenylnitramine)	UJ	Blind QC sample concentration below the established lower limit of 50%.
				o-Nitrotoluene Nitrobenzene	R	Blind QC sample recovery <10%.
	AAB4457	18-1077	Surrogate	4-Amino-2,6-dinitrotoluene	J	Surrogate recovery above the upper established limit.
19723	AAB5032	18-1474	Surrogate	All HE	R	Surrogate recovery very high due to possible loss of sample integrity from extract evaporation.
	AAB4965 AAB4966 AAB4975 AAB4984 AAB5041 AAB5050 AAB5059	18-1403 18-1405 18-1410 18-1421 18-1481 18-1491 18-1500	N/A	All HE	UJ	Recommended extraction and analytical holding times exceeded.

TABLE 4-14a
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-002(b)
Continued

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
20459	AAB4993	18-1431	Surrogate	All HE	R	Surrogate recovery very high due to possible loss of sample integrity from extract evaporation.
	AAB4994 AAB5003 AAB5012 AAB5013 AAB5022 AAB5023	18-1436 18-1441 18-1450 18-1450 18-1461 18-1463	N/A	All HE	UJ	Recommended extraction and analytical holding times exceeded.

* See Section 3.1 for a description of the data qualifiers
N/A: not applicable

Section 4.4.3.3.1 is modified as follows:

~~Inorganics. The inorganic data had some QA/QC problems that affected data usability (Table 4-48). The recommended 28-day holding time for mercury was grossly exceeded.~~
INORGANICS. The QA/QC samples collected along with the field samples at this PRS included two rinsate blanks, three field blanks, five sets of field duplicates, and one performance evaluation sample for the inorganics. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Eighty-four samples had QA/QC problems associated with the inorganic data that resulted in data qualifiers being assigned to the results (Table 4-48). The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Forty-nine soil samples from five request numbers had QA problems associated with the blind QC samples that resulted in several analytes being qualified as UJ, J, or R. The UJ and J qualified analytes included aluminum (20 samples), beryllium (2 samples), chromium (35 samples), lead (5 samples), nickel 16 samples), selenium (5 samples), and sodium (7 samples). The recoveries for all results, except for sodium, were below the established lower limit of 75%. The biases associated with these data did not affect the data comparisons because the detected analytes were a factor of two or more below their background UTLs or SALs. In addition, the recoveries were sufficient to detect and quantify the undetected analytes if they were present. The recoveries for the sodium results were above the upper established limit of 125% and are usable because the results are biased high. The recoveries for 10 of the selenium results were >200% and are qualified as R. However, because all of the values are below the detection limit, the high bias does not affect the usability of the data as nondetects in the screening assessment.

- Five soil samples from one request number had QA problems associated with the matrix spike samples that resulted in selenium and zinc being qualified as UJ and J, respectively. The recoveries in the matrix spike were below the established lower limit of 75%. The biases associated with these data did not affect the data comparisons because the results are below background UTLs and several orders of magnitude below the SALs. In addition, the blind QC sample recoveries were acceptable for these analytes.

- Four soil samples from one request number had a QA problem associated with the laboratory control samples (LCS) that resulted in thallium data being qualified as UJ. The recovery for thallium was below the established lower limit of 80%. The data are usable because the recovery was sufficient to quantify the analyte if present. In addition, the detection limits for thallium are a factor of five or more below the SALs and the blind QC recovery was acceptable. As a result, the low bias due to the LCS recoveries does not affect the data comparison.

- Sixty-seven soil samples from five request numbers had problems with the holding time for mercury analyses. The holding time for mercury (28 days) was grossly exceeded, i.e., by more than twice the holding time, and the data were qualified as R. Although the samples were properly stored, thereby minimizing degradation, the extreme exceedance of the holding time makes the data questionable. In addition, all of the acceptable mercury data were nondetects with detection limits below background and more than two orders of magnitude below SAL.

- Eighteen soil samples from two request numbers had problems with the holding time for inorganic analyses, excluding mercury. The 180-day holding time for inorganic analyses was exceeded by 15 to 23 days. The data are usable because the inorganic material is extremely stable under proper storage conditions and will not degrade over very long periods of time.

A number of inorganics were detected in the collected soil samples. Although many of the samples were composites of either two or four grabs, the analytical results obtained from these composite samples were not multiplied by the number of grab samples (see Section 4.4). Those inorganics detected at concentrations greater than the background UTLs are presented in Table 4-49. Comparison with the site-specific background values found that most of the inorganics were detected at concentrations less than these values. The exceptions were chromium, copper, and lead, which were above both background values in some samples. The inorganics that were undetected or were less than the background UTLs were eliminated as COPCs.

All of the inorganics detected above background UTLs were below SALs and were subjected to an MCA (see below).

~~Organics. The HE data presented QA/QC problems that may have affected data usability (Table 4-48).~~
ORGANICS. The QA/QC samples collected along with the field samples at this PRS included two rinsate blanks, three field blanks, five sets of field duplicates, and one performance evaluation sample for the inorganics. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Eighty-four samples had QA/QC problems associated with the HE data that resulted in data qualifiers being assigned to the results (Table 4-48). The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Thirty-three HE soil samples from three request numbers had QA problems associated with the blind QC samples that resulted in several analytes being qualified as UJ or R. The UJ qualified analytes included nitrobenzene (18 samples), m-nitrotoluene (4 samples), p-nitrotoluene (4 samples), and tetryl(methyl-2,4,6-trinitrophenylnitramine) (33 samples) because the recoveries were less than the established lower limit of 50%. The data are usable because the recoveries were sufficient to detect and quantify the analytes if they were present. The R qualified analytes included o-nitrotoluene (4 samples) and nitrobenzene (4 samples) because the recoveries were less than 10%.

~~- The data for two HE analytes in four samples were qualified as unusable because of problems with the blind QC sample. In addition, the recommended extraction and analytical holding times for a number of other HE analytes were exceeded by more than 50 days and 100 days, respectively. As a result, most of the HE data were questionable or qualified as unusable.~~

- Fifty-two HE soil samples from six request numbers had a problem with the holding time for HE analysis. The recommended 14-day extraction holding time and the 40-day analytical holding time were exceeded by more than 50 days and 100 days, respectively. The data in 43 samples were qualified as UJ, while all of the HE analytes in three samples and six HE analytes in six samples were qualified as R. Because the soil samples were kept frozen before extraction, the extraction holding time can be extended up to 8 weeks (and probably longer). Following extraction, the samples were preserved and stored at 4°C to inhibit bacterial growth and prevent photodegradation of the analytes. This process appears to stop decomposition of material for at least 71 days (or longer). Therefore, the UJ qualified data are usable because the samples were properly stored to minimize degradation and the data for the other three samples should be used with caution.

Several HE compounds were detected in the soil samples. As shown in Table 4-49, HMX, RDX, and 2,4,6-trinitrotoluene were detected at concentrations less than their SALs and were subjected to a MCA (see below). Two other compounds — 2-amino-4,6-dinitrotoluene (2-amino-4,6-DNT) and 4-amino-2,6-dinitrotoluene (4-amino-2,6- DNT) — did not have SALs and were retained as COPCs.

Multiple chemical analysis. Six noncarcinogenic analytes met the criteria for inclusion in an MCA (Table 4-50). The maximum normalized concentrations of these analytes totaled 1.2782. When normalized concentrations of the analytes were totaled sample by sample, none of the sums exceeded 1. Sample

AAB2526 corresponded to the largest sum of 0.8208. Consequently, none of the analytes in the MCA were retained as COPCs.

Only one carcinogenic analyte, RDX, met the criteria for inclusion in an MCA, making an MCA unnecessary.

Table 4-48 is modified as follows:

TABLE 4-48
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 27-002

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
18632	AAB5070 AAB5071 AAB5080 AAB5089 AAB5090	27-1511 27-1514 27-1521 27-1532 27-1535	Blind QC	Chromium Lead	J	Blind QC sample recovery below the established lower limit of 75%.
	AAB5090	27-1535		Sodium	J	Blind QC sample recovery above the established upper limit of 125%.
	AAB5070 AAB5071 AAB5080 AAB5089 AAB5090	27-1511 27-1514 27-1521 27-1532 27-1535	Matrix Spike	Selenium Zinc	UJ or J	Matrix Spike recoveries below the established lower limit of 75%.
18890	AAB4407 AAB4409 AAB4411 AAB4412	27-1057	Blind QC	Aluminum Chromium	J	Blind QC sample recovery below the established lower limit of 75%.
				Selenium	R	Blind QC sample recovery <10%.
			LCS	Thallium	UJ	Laboratory control sample recovery below the established lower limit of 80%.
19170	AAB5118 AAB5145 AAB5146 AAB5155 AAB5164 AAB5191	27-1562 27-1591 27-1594 27-1600 27-1610 27-1640	Blind QC	Sodium	J	Blind QC sample recovery above the established upper limit of 125%.
				Selenium	R	Blind QC sample recovery <10%.
			N/A	Mercury	UJ	Holding time exceeded.

TABLE 4-48
SUMMARY OF DATA USABILITY PROBLEMS FOR FRS 27-002
Continued

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
19680	AAB2468	27-1008	Blind QC	Chromium	UJ or J	Blind QC sample recovery below the established lower limit of 75%.
	AAB2470	27-1008				
	AAB2472	27-1008				
	AAB2474	27-1009				
	AAB2476	27-1009				
	AAB2478	27-1009				
	AAB4389	27-1045				
	AAB4391	27-1045				
	AAB4393	27-1045				
	AAB4414	27-1058				
	AAB4416	27-1058				
	AAB4418	27-1058				
	AAB4420	27-1059				
	AAB4422	27-1059				
	AAB4424	27-1059				
	AAB4432	27-1061				
	AAB4434	27-1061				
	AAB4436	27-1061				
	AAB4420	27-1059		Beryllium	J	Blind QC sample recovery above the established upper limit of 125%.
	AAB4424					

TABLE 4-48
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 27-002

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
19680	AAB2468	27-1008	N/A	Mercury	R	Holding time grossly exceeded.
	AAB2470	27-1008				
	AAB2472	27-1008				
	AAB2474	27-1009				
	AAB2476	27-1009				
	AAB2478	27-1009				
	AAB4389	27-1045				
	AAB4391	27-1045				
	AAB4393	27-1045				
	AAB4414	27-1058				
	AAB4416	27-1058				
	AAB4418	27-1058				
	AAB4420	27-1059				
	AAB4422	27-1059				
	AAB4424	27-1059				
	AAB4432	27-1061				
	AAB4434	27-1061				
	AAB4436	27-1061				
19798	AAB2461	27-1007	N/A	All inorganics, except mercury	UJ or J	Holding time exceeded.
	AAB4376	27-1043				
	AAB4378	27-1043				
	AAB4380	27-1043				
	AAB4381	27-1043				
	AAB4383	27-1044				
	AAB4385	27-1044				
	AAB4387	27-1044				
	AAB4426	27-1060				
	AAB4428	27-1060				
	AAB4430	27-1060				
				Mercury	R	Holding time grossly exceeded.

TABLE 4-48
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 27-002
Continued

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
19944	AAB2480 AAB2482 AAB2484 AAB2486 AAB2488 AAB2490 AAB2524 AAB2526 AAB2528 AAB2529 AAB4363 AAB4365 AAB4367 AAB4370 AAB4372 AAB4374	27-1010 27-1010 27-1010 27-1011 27-1011 27-1011 27-1029 27-1029 27-1029 27-1029 27-1032 27-1032 27-1032 27-1033 27-1033 27-1033	Blind QC	Aluminum Chromium Nickel	UJ or J	Blind QC sample recoveries below the established lower limit of 75%.
			N/A	Mercury	R	Holding time grossly exceeded.
19945	AAB2492 AAB2494 AAB2496 AAB2497 AAB2499 AAB2501 AAB2503	27-1015 27-1015 27-1015 27-1015 27-1016 27-1016 27-1016	N/A	All inorganics, except mercury	UJ or J	Holding time exceeded.
				Mercury	R	Holding time grossly exceeded.

TABLE 4-48
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 27-002
Continued

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
19969	AAB2506	27-1017	N/A	Mercury	R	Holding time grossly exceeded.
	AAB2508	27-1017				
	AAB2510	27-1017				
	AAB2512	27-1018				
	AAB2514	27-1018				
	AAB2516	27-1018				
	AAB2518	27-1019				
	AAB2520	27-1019				
	AAB2522	27-1019				
	AAB2531	27-1030				
	AAB4353	27-1030				
	AAB4355	27-1030				
	AAB4357	27-1031				
	AAB4359	27-1031				
	AAB4361	27-1031				
17731	AAB2468	27-1008	Blind QC	Nitrobenzene Tetryl(methyl-2,4,6-trinitrophenylnitramine)	UJ	Blind QC sample recovery below the established lower limit of 50%.
	AAB2470	27-1008				
	AAB2472	27-1008				
	AAB2474	27-1009				
	AAB2476	27-1009				
	AAB2478	27-1009				
	AAB4389	27-1045				
	AAB4391	27-1045				
	AAB4393	27-1045				
	AAB4414	27-1058				
	AAB4416	27-1058				
	AAB4418	27-1058				
	AAB4420	27-1059				
	AAB4422	27-1059				
	AAB4424	27-1059				
	AAB4432	27-1061				
	AAB4434	27-1061				
	AAB4436	27-1061				

TABLE 4-48
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 27-002
Continued

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
17735	AAB2461 AAB4376 AAB4378 AAB4380 AAB4381 AAB4383 AAB4385 AAB4387 AAB4426 AAB4428 AAB4430	27-1007 27-1043 27-1043 27-1043 27-1043 27-1044 27-1044 27-1044 27-1060 27-1060 27-1060	Blind QC	Tetryl(methyl-2,4,6-trinitrophenylnitramine)	UJ	Blind QC sample recovery below the established lower limit of 50%.
16069	AAB5099 AAB5108 AAB5109	27-1541 27-1551 27-1554	N/A	All HE	R	Holding time grossly exceeded.
18117	AAB4407 AAB4409 AAB4411 AAB4412	27-1057	Blind QC	m-Nitrotoluene p-Nitrotoluene Tetryl(methyl-2,4,6-trinitrophenylnitramine)	UJ	Blind QC sample recoveries below the established lower limit of 50%.
				Nitrobenzene o-Nitrotoluene	R	~~Nitrobenzene detect at concentration < target; o-nitrotoluene not detected~~ Blind QC sample recoveries < target value of 10%.
18551	AAB5118 AAB5145 AAB5145 AAB5155 AAB5164 AAB5191	27-1562 27-1591 27-1594 27-1600 27-1610 27-1640	N/A	Tetryl(methyl-2,4,6-trinitrophenylnitramine) 4-Amino-2,6-dinitrotoluene 2,6-Dinitrotoluene m-Nitrotoluene o-Nitrotoluene p-Nitrotoluene	R	HE holding time ~~missed~~ grossly exceeded.

TABLE 4-48
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 27-002
Continued

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
18608	AAB5127	27-1570	N/A	All HE	UJ	Holding time exceeded.
	AAB5136	27-1580				
	AAB5173	27-1620				
	AAB5182	27-1630				
18874	AAB2492	27-1015	N/A	All HE	UJ	Holding time exceeded.
	AAB2494	27-1015				
	AAB2496	27-1015				
	AAB2497	27-1015				
	AAB2499	27-1016				
	AAB2501	27-1016				
	AAB2503	27-1016				
18879	AAB2506	27-1017	N/A	All HE	UJ	Holding time exceeded.
	AAB2508	27-1017				
	AAB2510	27-1017				
	AAB2512	27-1018				
	AAB2514	27-1018				
	AAB2516	27-1018				
	AAB2518	27-1019				
	AAB2520	27-1019				
	AAB2522	27-1019				
	AAB2531	27-1030				
	AAB4353	27-1030				
	AAB4355	27-1030				
	AAB4357	27-1031				
	AAB4359	27-1031				
	AAB4361	27-1031				

TABLE 4-48
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 27-002
Continued

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
18884	AAB2480	27-1010	N/A	All HE	UJ or J	Holding time exceeded.
	AAB2482	27-1010				
	AAB2484	27-1010				
	AAB2486	27-1011				
	AAB2488	27-1011				
	AAB2490	27-1011				
	AAB2524	27-1029				
	AAB2526	27-1029				
	AAB2528	27-1029				
	AAB2529	27-1029				
	AAB4363	27-1032				
	AAB4365	27-1032				
	AAB4367	27-1032				
	AAB4370	27-1033				
	AAB4372	27-1033				
	AAB4374	27-1033				

* See Section 3.1 for a description of the data qualifiers N/A: not applicable

PRS 18-005(a)

Section 4.5.1.3.1 is modified as follows:

Inorganics:
INORGANICS. The QA/QC samples were not collected along with the field samples at this PRS. However, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Five samples had QA/QC problems associated with the inorganic data that resulted in data qualifiers being assigned to the results. The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Five soil samples from one request number had QA problems associated with the blind QC sample that resulted in several analytes being qualified as UJ, J, or R. The UJ and J qualified analytes included aluminum, chromium, thallium, and vanadium. The recoveries for all results were below the established lower limit of 75%. The biases associated with these data did not affect the data comparisons because the detected analytes were a factor of four or more below their background UTLs and an order of magnitude below SALs. In addition, the recovery was sufficient to detect and quantify thallium if present. The recoveries for the sodium and selenium results were >200% and are qualified as R. However, because all of the values are below the detection limit, the high bias does not affect the usability of the data as nondetects in the screening assessment.

No inorganics were detected in the soil at concentrations greater than the background UTLs; all were eliminated as COPCs.

Organics: HE compounds were the only organics for which analyses were performed; none were detected.
ORGANICS. QA/QC samples were not collected along with the field samples at this PRS. However, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Five samples had QA/QC problems associated with the HE data that resulted in data qualifiers being assigned to the results. The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Five HE soil samples from one request number had QA problems associated with the blind QC sample that resulted in several analytes being qualified as UJ. The analytes included m-nitrotoluene, o-nitrotoluene, p-nitrotoluene, and tetryl(methyl-2,4,6-trinitrophenylnitramine). The data are qualified because the recoveries were less than the established lower limit of 50%, and are usable because the recoveries were sufficient to detect and quantify the analytes if they were present.

No organics were detected at this PRS.

Table 4-51b is added as follows:

TABLE 4-51b
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-005(a)

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
19173	AAB5297 AAB5298 AAB5299 AAB5300 AAB5301	18-1670 18-1671 18-1672 18-1673 18-1674	Blind QC	Aluminum Chromium Thallium Vanadium	UJ or J	Blind QC sample recovery below the established lower limit of 75%.
				Selenium Sodium	R	Blind QC sample recovery less than 10%.
18595	AAB5297 AAB5298 AAB5299 AAB5300 AAB5301	18-1670 18-1671 18-1672 18-1673 18-1674	Blind QC	m-Nitrotoluene o-Nitrotoluene p-Nitrotoluene Tetryl(methyl-2,4,6-trinitrophenylnitramine)	UJ	Blind QC sample recovery below the established lower limit of 50%.

* See Section 3.1 for a description of the data qualifiers

PRS 18-010(b)

Section 4.6.1.3.1 is modified as follows:

~~Inorganics.—The inorganic data presented no QA/QC problems that affected data usability.~~
INORGANICS. The QA/QC samples collected along with the field samples at this PRS included one rinsate blank, one set of field duplicates, and one performance evaluation sample for the inorganics for the storm drain aggregate. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. One sample had a QA/QC problem associated with the inorganic data that resulted in data qualifiers being assigned to the results (Table 4-54). The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- One sediment sample from one request number had a QA problem associated with the laboratory control sample (LCS) that resulted in the potassium being qualified as J. The recovery was outside the established limits of 80%-120%. The data are usable because the recovery was sufficient to quantify the analyte if present.

Manganese and zinc were detected in the surface soil and sediments at concentrations greater than both the site-specific background values and the background UTLS (Table 4-55). Neither of these inorganics were present at concentrations greater than SALs and were included in an MCA (see below). Inorganics that were either undetected or less than their background UTLs were eliminated as COPCs.

~~Organics.—Several soil samples had QA/QC problems that affected data usability (Table 4-54).~~
ORGANICS. The QA/QC samples collected along with the field samples at this PRS included one rinsate blank, one set of field duplicates, and one performance evaluation sample for the inorganics for the storm drain aggregate. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Six samples had QA/QC problems associated with the organic data that resulted in data qualifiers being assigned to the results (Table 4-54). The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Several SVOCs that were reported as undetected had detection limits greater than their SALs. The detection limits were the normal EQLs because no dilutions or matrix interference problems were encountered with these samples. Therefore, the relationship between the sample value and the SAL for each analyte was unclear. ~~Most of these~~ The compounds were eliminated as COPCs because process information suggested that their presence at this site was unlikely as a result of site activities. ~~However, PAHs were retained as COPCs because their possible presence in runoff from paved areas was likely.~~

- Six SVOC soil samples from one request number had QA problems associated with the blind QC sample that resulted in several analytes being qualified as UJ or R. The analytes qualified as UJ included anthracene, 2-chlorophenol, 2-methylphenol, naphthalene, and 1,2,4-trichlorobenzene. The data are usable because the recoveries were sufficient to detect and quantify the analytes if they were present. The analyte qualified as R was 1,2-dichlorobenzene because the recovery was <10%, making quantification difficult. The unusable data did not affect the sufficiency of the data for decision-making purposes because this analyte is not expected to be present in the runoff from the storm drains.

~~- Two analytes, benzo(a)pyrene and dibenzo(a,h)anthracene, had additional problems with the internal standard perylene-d12 that resulted in the data being biased low and data usability being questionable. Because of their possible presence in the runoff from paved areas, these analytes were retained as COPCs.~~

- Two SVOC sediment samples from one request number had QA problems associated with the area counts for one internal standard that resulted in several analytes, including benzo(a)pyrene and dibenzo(a,h)anthracene, being qualified as UJ. The data for the target compounds associated with the internal standard are usable because recoveries were sufficient to detect and quantify the analytes and the sensitivity and responsiveness of the instrument were not compromised. Because of the potential for benzo(a)pyrene and dibenzo(a,h)anthracene to be present in the runoff from the paved areas drained by this outfall, these analytes were initially retained as COPCs.

Data usability for undetected, biased-low analytes that had SALs greater than detection limits was unaffected.

Several organic compounds were detected in the soil and sediments; none were present at concentrations greater than their respective SALs (Table 4-55). One semivolatile organic, phenanthrene, was detected but did not have a SAL and was retained as a COPC. Those detected organics that were present at concentrations less than their SALs were subjected to an MCA (see below).

Multiple chemical analysis. Five noncarcinogenic analytes in soil met the criteria for inclusion in an MCA (Table 4-56). The sum of the maximum normalized concentrations was 0.1243, so no analytes were retained as COPCs. Because bis(2-ethylhexyl) phthalate was the only carcinogenic analyte, an MCA for this category was not conducted.

Table 4-54 is modified as follows:

TABLE 4-54
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-010(b)

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
20227	AAB5222	18-1754	LCS	Potassium	J	Laboratory control sample recovery outside the established limits of 80% to 120%.
19802	AAB5219 AAB5222	18-1747 18-1754	Internal Standard	Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(g,h,i)perylene Di-n-octyl phthalate Dibenzo(a,h)anthracene Indeno(1,2,3-cd)pyrene	UJ	~~Perylene-d12 below acceptance limit; associated data questionable~~ Area counts below the acceptance limit for one internal standard.
	AAB5217 AAB5218 AAB5219 AAB5220 AAB5221 AAB5222	18-1746 18-1746 18-1747 18-1749 18-1750 18-1754	Blind QC	Anthracene 2-Chlorophenol 2-Methylphenol Naphthalene 1,2,4-Trichlorobenzene	UJ	Blind QC sample recoveries below the established lower limit of 50%.
				1,2-Dichlorobenzene	R	Blind QC sample concentration < target value of 10%.

* See Section 3.1 for a description of the data qualifiers

PRS 18-010(c)

Section 4.6.2.3.1 is modified as follows:

~~Inorganics.—The inorganic data did not present any QA/QC problems that affected data usability.~~
INORGANICS. The QA/QC samples collected along with the field samples at this PRS included one performance evaluation sample for the inorganics for the storm drain aggregate. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. The inorganic results had no QA/QC problems and the data are usable as reported. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

Two inorganics, copper and mercury, were detected in the sediment at concentrations greater than both the background UTL and site-specific background values (Table 4-61). The inorganics that were either undetected or less than their background UTLs were eliminated as COPCs.

Neither copper nor mercury were present at concentrations greater than SALs and were included in an MCA (see below).

~~Organics.—Both soil samples presented QA/QC problems that affected data usability (Table 4-60).~~
ORGANICS. The QA/QC samples collected along with the field samples at this PRS included one performance evaluation sample for the inorganics for the storm drain aggregate. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Two samples had QA/QC problems associated with the organic data that resulted in data qualifiers being assigned to the results (Table 4-60). The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

Several SVOCs that were reported as undetected had detection limits greater than their SALs. The compounds were eliminated as COPCs because available site information indicated that their presence was unlikely.

- Several SVOCs that were reported as undetected had detection limits greater than their SALs. The detection limits were the normal EQLs because no dilutions or matrix interference problems were encountered with these samples. Therefore, the relationship between the sample value and the SAL for each analyte was unclear. ~~Most of these~~ The compounds were eliminated as COPCs because process information suggested that their presence at this site was unlikely as a result of site activities. ~~However, PAHs were retained as COPCs because their possible presence in runoff from paved areas was likely.~~

- ~~Three analytes, benzo(a)pyrene, bis(2-chloroethyl)ether, and pentachlorophenol, had additional problems with the blind QC sample that resulted in the data being biased low and data usability being questionable. Because of its possible presence in the runoff from paved areas, benzo(a)pyrene was retained as a COPC. The other two compounds were eliminated because process information suggested that their presence at this site was unlikely.~~

- Two SVOC sediment samples from one request number had QA problems associated with the blind QC sample that resulted in several analytes being qualified as UJ, J, or R. The analytes qualified as UJ or J included anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, bis(2-chloroethyl)ether, 4-chloro-2-methylphenol, 4-methylphenol, naphthalene, pentachlorophenol, pyrene, 1,2,4-trichlorobenzene, and 2,4,6-trichlorophenol. The data are usable because the recoveries were sufficient to detect and quantify the analytes if they were present. The analytes qualified as R were 1,2-dichlorobenzene, 2-methylphenol, and hexachloroethane because the recovery was <10%, making quantification difficult. The unusable data did not affect the sufficiency of the data for decision-making purposes because the analytes are not expected to be present in the runoff from the storm drains. Because of the potential for benzo(a)pyrene to be present in the runoff from the paved areas

drained by this outfall, this analyte was initially retained as a COPC. The other compounds were eliminated because process information suggested that their presence as a result of site activities was unlikely.

Data usability for undetected, biased-low analytes that had SALs greater than detection limits was unaffected.

Three organic compounds were detected in the sediments; none were present at concentrations greater than their SALs (Table 4-61). One detected SVOC, phenanthrene, did not have a SAL and was retained as a COPC. Those detected organics that were present at concentrations less than their SALs were subjected to an MCA (see below).

Multiple chemical analysis. Four noncarcinogenic analytes in sediment met the criteria for inclusion in an MCA (Table 4-62). The sum of the maximum normalized concentrations was 0.0160, so no analytes were retained as COPCs. No carcinogenic analytes met the criteria for inclusion in an MCA.

Table 4-60 is modified as follows:

TABLE 4-60
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-010(c)

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
188970	AAB5227 AAB5228	18-1724 18-1727	Blind QC	1,2-Dichlorobenzene Hexachlorobenzene 2-Methylphenol	R	Blind QC sample ~~concentration~~ recoveries < target value of 10%.
				Anthracene Benzo(a)pyrene Benzo(g,h,i)perylene Bis(2-chloroethyl)ether 4-Chloro-2-methylphenol 4-Methylphenol Naphthalene Pentachlorophenol Phenanthrene Pyrene 1,2,4-Trichlorobenzene 2,4,6-Trichlorophenol	UJ or J	~~Percent recoveries < LDL ;data questionable~~ Blind QC sample recoveries below the established lower limit of 50%.

* See Section 3.1 for a description of the data qualifiers

PRS 18-010(d)

Section 4.6.3.3.1 is modified as follows:

Inorganics:
INORGANICS. The QA/QC samples collected along with the field samples at this PRS included one performance evaluation sample for the inorganics for the storm drain aggregate. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Two sample had QA/QC problems associated with the inorganic data that resulted in data qualifiers being assigned to the results (Table 4-65a). The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Two sediment samples from one request number had QA problems associated with the blind QC sample that resulted in aluminum, chromium, and mercury being qualified as UJ or J. The recoveries were below the established lower limit of 75%. The biases associated with these data did not affect the data comparisons because the detected analytes were a factor of three or more below their SALs and recovery was sufficient to detect and quantify the analytes if present.

Two inorganics were detected in the sediments at concentrations greater than both the background UTLs and their site-specific background values (Table 4-65). The inorganics that were either undetected or less than their background values were eliminated as COPCs. None were present at concentrations greater than SALs and were included in an MCA (see below).

Organics:
ORGANICS. The QA/QC samples collected along with the field samples at this PRS included one performance evaluation sample for the inorganics for the storm drain aggregate. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. The organic results had no QA/QC problems and the data are usable as reported. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

Several SVOCs in the sediment samples were reported as undetected but had detection limits greater than their SALs. The detection limits were the normal EQLs because no dilutions or matrix interference problems were encountered with these samples. Therefore, the relationship between these data and the SALs for these analytes was unclear. These analytes were eliminated as COPCs because they were not likely to be present as a result of site activities.

Benzo(a)pyrene was detected at a concentration greater than its SAL and phenanthrene was detected but did not have a SAL; both were retained as COPCs (Table 4-65). Those present at concentrations less than their SALs were subjected to an MCA (see below).

Multiple chemical analysis. Four noncarcinogenic analytes in sediments met the criteria for inclusion in an MCA (Table 4-66). The sum of their maximum normalized concentrations was 0.1183, so none of these analytes were retained as COPCs.

Four carcinogenic analytes met the criteria for inclusion in an MCA. The sum of their maximum normalized concentrations was 1.3871. The normalized concentrations of these analytes totaled 1.3871 for sample AAB5233 and 1.0235 for sample AAB5234. Benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene contributed at least 0.1 to at least one sample sum, so these analytes were retained as COPCs.

Table 4-65a is added as follows:

TABLE 4-65a
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-010(d)

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
20272	AAB5233 AAB5234	18-1728 18-1730	Blind QC	Aluminum Chromium Mercury	UJ or J	Blind QC sample recoveries below the established lower limit of 75%.

* See Section 3.1 for a description of the data qualifiers

PRS 18-010(e)

Section 4.8.4.3.1 is modified as follows:

~~Inorganics.—The inorganic data presented no QA/QC problems that affected data usability.~~
INORGANICS. The QA/QC samples collected along with the field samples at this PRS included one performance evaluation sample for the inorganics for the storm drain aggregate. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. The inorganic results had no QA/QC problems and the data are usable as reported. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

Four inorganics were detected in the sediments at concentrations greater than the background UTLs (Table 4-70). The concentrations of lead, mercury, and zinc also exceeded the site-specific background value; cadmium did not have a site-specific background value. The inorganics that were either undetected or less than their background UTLs were eliminated as COPCs.

No inorganics were present at concentrations greater than SALs, so all were included in an MCA (see below).

~~Organics.—The sediment samples had QA/QC problems that affected data usability (Table 4-69).~~
ORGANICS. The QA/QC samples collected along with the field samples at this PRS included one performance evaluation sample for the inorganics for the storm drain aggregate. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Seven samples had QA/QC problems associated with the organic data that resulted in data qualifiers being assigned to the results (Table 4-69). The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Several SVOCs that were reported as undetected had detection limits greater than their SALs. The detection limits were the normal EQLs because no dilutions or matrix interference problems were encountered with these samples. Therefore, the relationship between the sample value and the SAL for each analyte was unclear. ~~All but two of these~~ The compounds were eliminated as COPCs because process information suggested indicated that ~~there is no likely source for~~ these compounds at this site are not the result of site activities.

~~• Benzo(a)pyrene, which was undetected for four of the seven samples taken, had a problem with the blind QC sample that resulted in the data being biased low and data usability being questionable for these four samples. Because the analyte was detected in the remaining three samples, benzo(a)pyrene was retained as a COPC.~~

- Seven SVOC samples from one request number had QA problems associated with the blind QC sample that resulted in several analytes being qualified as UJ, J, or R. The analytes qualified as UJ or J included anthracene, benzo(a)anthracene, bis(2-ethylhexyl)phthalate, 1,2-dichlorobenzene, 1,4-dichlorobenzene, 2,4-dinitrotoluene, 2,6-dinitrotoluene, 2-methylphenol, 4-methylphenol, naphthalene, pentachlorophenol, pyrene, and 1,2,4-trichlorobenzene. The data are usable because the recoveries were sufficient to detect and quantify the analytes if they were present. Benzo(a)pyrene also had low recovery in the blind QC sample, but was not qualified because of this QA problem (see next bullet). The analyte qualified as R was 4-nitrophenol because the recovery was <10%, making quantification difficult. The unusable data did not affect the sufficiency of the data for decision-making purposes because the analyte is not expected to be present in the runoff from the storm drains.

~~• Dibenzo(a,h)anthracene, although reported as undetected, had a problem with internal standards that resulted in the data being biased low and data usability being questionable. Because of its possible presence in the runoff from paved areas, this analyte was retained as a COPC.~~

- Four SVOC samples from one request number had QA problems associated with the area counts for one or two internal standards that resulted in several analytes being qualified as UJ or J. The data for the target compounds associated with the internal standard [benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, di-n-octyl phthalate, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene] are usable because recoveries were sufficient to detect and quantify the analytes and the sensitivity and responsiveness of the instrument were not compromised. Dibenzo(a,h)anthracene was initially retained as a COPC because of its potential to be present in the runoff from the paved areas drained by this outfall. Benzo(a)pyrene was retained as a COPC, because it was detected in three sediment samples above its SAL.

Data usability for undetected, biased-low analytes that had SALs greater than detection limits was unaffected.

Two SVOCs, benzo(b)fluoranthene and benzo(a)pyrene, were detected at concentrations greater than their SALs and were retained as COPCs (Table 4-70). Two additional SVOCs, benzo(g,h,i)perylene and phenanthrene, were detected but did not have SALs and were retained as COPCs. Those detected at concentrations less than their SALs were subjected to an MCA (see below).

Multiple chemical analysis. Seven noncarcinogenic analytes met the criteria for inclusion in an MCA (Table 4-71). The sum of the maximum normalized concentrations of these analytes was 0.2216, so they were not retained as COPCs.

Three carcinogenic analytes met the criteria for inclusion in an MCA. The sum of the maximum normalized concentrations was 0.6183, so the analytes were not retained as COPCs.

Table 4-69 is modified as follows:

TABLE 4-69
SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-010(e)

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
16824	AAB5249 AAB5250 AAB5251 AAB5252 AAB5253 AAB5254 AAB5255	18-1732 18-1733 18-1734 18-1735 18-1736 18-1739 18-1742	Blind QC	Benzo(a)pyrene Anthracene Benzo(a)anthracene Bis(2-ethylhexyl)phthalate 1,2-Dichlorobenzene 1,4-Dichlorobenzene 2,4-Dinitrotoluene 2,6-Dinitrotoluene 2-Methylphenol 4-Methylphenol Naphthalene Phenanthrene Pyrene 1,2,4-Trichlorobenzene	UJ or J	Blind QC sample ~~concentration~~ recoveries below the established lower limit of 50%. ~~< target value; data usability questionable~~
	AAB5249 AAB5250 AAB5251 AAB5252	18-1732 18-1733 18-1734 18-1735	Internal standards	Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(g,h,i)perylene Di-n-octyl phthalate Dibenzo(a,h)anthracene Indeno(1,2,3-cd)pyrene	UJ or J	~~Internal standards~~ Area counts below acceptance limits for one or two internal standards. ~~; data associated questionable~~
			Blind QC	4-Nitrophenol	R	Blind QC sample ~~concentration~~ recovery < target value of 10%.

* See Section 3.1 for a description of the data qualifiers

PRS 18-010(f)

Section 4.6.5.3.1 is modified as follows:

Inorganics.
INORGANICS. The QA/QC samples collected along with the field samples at this PRS included one performance evaluation sample for the inorganics for the storm drain aggregate. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Two samples had QA/QC problems associated with the inorganic data that resulted in data qualifiers being assigned to the results (Table 4-73a). The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Two sediment samples from one request number had QA problems associated with the blind QC sample that resulted in several aluminum and chromium being qualified as UJ or J. The recoveries were below the established lower limit of 75%. The bias associated with the aluminum data did not affect the data comparison because the detected values were an order of magnitude or more below its background and chromium recovery was sufficient to detect and quantify the analyte if present.

No inorganics were detected in the sediments at concentrations greater than the background UTLs. All of the inorganics were eliminated as COPCs.

Organics.
ORGANICS. The QA/QC samples collected along with the field samples at this PRS included one performance evaluation sample for the inorganics for the storm drain aggregate. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. The organic results had no QA/QC problems and the data are usable as reported. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

No organic compounds were detected in the sediments.

Table 4-73a is added as follows:

TABLE 4-73a
SUMMARY OF DATA QA/QC PROBLEMS FOR PRS 18-010(f)

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
20461	AAB5262 AAB5263	18-1762 18-1763	Blind QC	Aluminum Chromium	UJ or J	Blind QC sample recovery below the established lower limit of 75%.

* See Section 3.1 for a description of the data qualifiers

PCO Wells

Section 4.7.1.3.1 is modified as follows:

~~Inorganics. For some of the samples, the required 28-day holding time for mercury in water was exceeded by 56 days, rendering the data unusable.~~
INORGANICS. The QA/QC samples collected along with the field samples for the PCO wells included seven field blanks, seven trip blanks, and four sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Nine samples had QA/QC problems associated with the inorganic data that resulted in data qualifiers being assigned to the results (Table 4-75). The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Three samples from two request numbers had a QA problem associated with the matrix spike samples that resulted in calcium being qualified as J. The recovery was slightly below the lower established limit of 75% so that the data is only slightly biased low. The data are usable because the recovery was sufficient to quantify the analyte and the blind QC sample recovery was acceptable.

- Six groundwater samples from three request numbers had problems with the holding time for mercury that resulted in the analyte being qualified as UJ, J, or R. The holding time for mercury (28 days) was exceeded by less than twice the holding time for four samples and the data were qualified as UJ or J. The data are usable because the samples were properly stored, thereby minimizing degradation. In addition, all of the data were an order of magnitude or more below the SAL. The holding time for mercury (28 days) was grossly exceeded, i.e., by more than twice the holding time, in two samples and the data were qualified as R. Although the samples were properly stored, thereby minimizing degradation, the extreme exceedance of the holding time makes the data questionable.

Concentrations of several inorganics detected in groundwater samples, both filtered and nonfiltered, were greater than the site-specific background values. These inorganics, as well as those that did not have a site-specific background value, were carried forward to the SAL comparison stage.

Antimony, which did not have a site-specific background value, was detected in a laboratory duplicate at a concentration slightly above the detection limit but was not detected in its corresponding laboratory sample. Therefore, it was not considered a concern and was eliminated from further evaluation.

Manganese was present in nonfiltered samples at wells PCO-2 and PCO-3 (Locations 36-2021 and 36-2022, (Figure 4-28)) at concentrations greater than both its SAL and its site-specific background concentration (Table 4-76). The inorganics below SALs were not subjected to an MCA because the sampling objective was to characterize general groundwater conditions down-gradient from TA-16 rather than to evaluate the effects of a specific PRS.

~~Organics. Three groundwater samples had QA/QC problems that affected data usability (Table 4-75).~~
ORGANICS. The QA/QC samples collected along with the field samples for the PCO wells included seven field blanks, seven trip blanks, and four sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Three samples had QA/QC problems associated with the organic data that resulted in data qualifiers being assigned to the results (Table 4-75). The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

~~- Chrysene and pentachlorophenol had problems with the blind QC sample that resulted in the data being biased low and data usability being questionable. These analytes were eliminated because their relative insolubility in water made their presence in the groundwater down canyon from TA-16 unlikely.~~

- One SVOC groundwater sample from one request number had QA problems associated with the blind QC sample that resulted in 2,4-dinitrophenol being qualified as UJ. Two other SVOC groundwater samples had low recoveries in the blind QC sample for chrysene and pentachlorophenol, but these analytes were not qualified. The recoveries for all the analytes were below the established lower limit of 50%. The data are usable because the recoveries were sufficient to detect and quantify the analytes if present. These analytes were eliminated because their presence in the groundwater down-canyon from TA-16 is unlikely.

- ~~Benzo(a)anthracene had a problem with internal standard chrysene-d12 that resulted in the data being biased low and data usability being questionable. This analyte was eliminated because its relative insolubility in water made its presence in the groundwater down-canyon from TA-16 unlikely.~~

- One SVOC groundwater sample from one request number had QA problems associated with the area count for one internal standard that resulted in the target analytes (benzo(a)anthracene, butyl benzyl phthalate, chrysene, 3,3'-dichlorobenzidine, fluorene, pentachlorophenol, and pyrene) being qualified as UJ. The data for the target compounds associated with the internal standard are usable because recoveries were sufficient to detect and quantify the analytes and the sensitivity and responsiveness of the instrument were not compromised. These analytes were eliminated because their presence in the groundwater down-canyon from TA-16 is unlikely.

- Two SVOC groundwater samples from two request numbers had QA problems associated with the surrogates that resulted in several analytes being qualified as R. The recoveries for the acid extractable surrogates were less than 10% and the acid extractable data are unusable. The unusable data did not affect the decision-making because other acid extractable data are acceptable.

- Two SVOC groundwater samples from one request number had a problem with the extraction holding time for SVOCs in water that resulted in all SVOC data for these samples being qualified as UJ. The 7-day extraction holding time was exceeded by one day. The data are usable because the samples were properly stored (4°C in the dark) so degradation was minimized.

- Bis(2-ethylhexyl)phthalate, a common laboratory contaminant, was eliminated because it was detected in the method blank and blind QC sample associated with one sample.

Data usability for undetected, biased-low analytes that had SALs greater than detection limits was unaffected.

Measured concentrations of 1,3-dinitrobenzene (1,3-DNB), HMX, and nitrobenzene were less than the site-specific background values. Chloroform and m-nitrotoluene were detected in the PCO wells (Table 4-76) but not in the background wells (see Table 3-2); the concentrations were well below the respective SALs.

All of the detected organics were eliminated from further evaluation. They were not subjected to an MCA because the sampling objective was to characterize general groundwater conditions.

Table 4-75 is modified as follows:

TABLE 4-75
SUMMARY OF DATA USABILITY PROBLEMS FOR THE PCO WELLS

Request No.	Sample No.	Well	Location No.	Sample Type	Analytes	Qualifier*	Comments
19690	AAA9571 AAA9572	PCO-2	36-2021	N/A	Mercury	R	Holding time grossly exceeded. ~~Required holding time for mercury in water exceeded~~
16797	AAA5984	PCO-1	36-2021	Matrix Spike	Calcium	J	Matrix spike recovery below the established lower limit of 75%.
16800	AAA5987 AAA5988	PCO-3	36-2022				
20530	AAA9587	PCO-3	36-2022	N/A	Mercury	UJ	Holding time exceeded.
20588	AAA9588 AAA9589 AAA9590	PCO-3	36-2022	N/A	Mercury	UJ or J	Holding time exceeded.
16222	AAA5956	PCO-3	36-2022	Surrogates	Acid-extractable organic compounds	R	Percent recoveries <10%.
19725	AAA9589 AAA9590	PCO-3	36-2022	N/A	All SVOCS	UJ	Holding time exceeded.
16798	AAA5987 AAA5988	PCO-3	36-2022	Blind	Chrysene Pentachlorophenol	Not Qualified	Blind QC sample ~~concentration < target value~~ recoveries below the established lower limit of 50%.
16792	AAA5984	PCO-1	36-2020	Internal standards	Benzo(a)anthracene Butyl benzyl phthalate Chrysene 3,3'-Dichlorobenzidine Fluorene Pentachlorophenol Pyrene	UJ	Area count for one internal standard ~~of chrysene-d12~~ below acceptance limit. ~~; data questionable~~
				N/A	Total petroleum hydrocarbons	Not Qualified	Sample insufficient for analysis

TABLE 4-75
SUMMARY OF DATA USABILITY PROBLEMS FOR THE PCO WELLS
Continued

Request No.	Sample No.	Well	Location No.	Sample Type	Analytes	Qualifier*	Comments
21184	AAB2542	PCO-3	36-2022	Surrogates	All Acid-extractable organics	R	Recoveries were below 10%.
	AAB2541		36-2022	Blind QC	2,4-Dinitrophenol	UJ	Blind QC sample recovery below the established lower limit of 50%.

* See Section 3.1 for a description of the data qualifiers. N/A: not applicable.

LACEF Wells

Section 4.7.2.3.1 is modified as follows:

~~Inorganics. The inorganic data had no QA/QC problems that affected data usability.~~
INORGANICS. The QA/QC samples collected along with the field samples for the PCO wells included nine field blanks, eight trip blanks, and three sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Eleven samples had QA/QC problems associated with the inorganic data that resulted in data qualifiers being assigned to the results (Table 4-77). The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Four groundwater samples from two request numbers had a QA problem associated with the matrix spike samples that resulted in calcium being qualified as J. The recovery was slightly below the lower established limit of 75% (71%), so that the data is only slightly biased low.

- One groundwater sample from one request number had a QA problem associated with the blind QC sample that resulted in potassium being qualified as J. The recovery was above the upper established limit of 125%, and the datum is usable because the result is biased high.

- Five groundwater samples from one request number had a problem with the holding time for mercury that resulted in the analyte being qualified as UJ. The holding time for mercury (28 days) was exceeded by less than twice the holding time for five samples and the data were qualified as UJ. The data are usable because the samples were properly stored, thereby minimizing degradation. In addition, all of the data were an order of magnitude or more below the SAL.

Several inorganics were detected in the groundwater and compared with the site-specific background values (Table 4-78). The inorganics with site-specific background values were not detected at concentrations greater than these values.

Three inorganics were detected in filtered samples at concentrations above the site-specific background values for groundwater but less than their respective SALs and were subjected to an MCA (see below). Inorganics detected at concentrations less than the site-specific background values were not evaluated further.

~~Organics. Several groundwater samples had QA/QC problems that affected data usability (Table 4-77).~~
ORGANICS. The QA/QC samples collected along with the field samples for the PCO wells included nine field blanks, eight trip blanks, and three sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Nine samples had QA/QC problems associated with the organic data that resulted in data qualifiers being assigned to the results (Table 4-77). The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Several SVOCs that were reported as undetected had detection limits greater than their SALs. The detection limits were the normal EQLs because no dilutions or matrix interference problems were encountered with these samples. Most of the compounds were eliminated as COPCs because available site information indicated that their presence was unlikely. However, some compounds were not eliminated because some of the wells (MW-2, MW-3, and MW-4) were in close proximity to and down-gradient from PRS 18-003(a).

- ~~QA/QC problems with the blind QC samples for hexachlorophenol in five groundwater samples at MW-1, MW-2, MW-3, and MW-4 and chrysene and pentachlorophenol in two other groundwater samples at MW-1 and MW-2 resulted in data being biased low and usability being questionable. All~~

~~three were eliminated from MW-1 because this well was up-gradient from the settling pit [PRS 18-003(a)], a potential source of these compounds (Figure 4-27). They were retained as COPCs for MW-2, MW-3, and MW-4 because these wells were close to PRS 18-003(a) and could have received input from this source.~~

- One SVOC groundwater sample from one request number had QA problems associated with the blind QC sample that resulted in chrysene, fluorene, pentachlorophenol, and pyrene being qualified as UJ. Three other SVOC groundwater samples had low recoveries in the blind QC samples for hexachlorobenzene (1 sample), and chrysene and pentachlorophenol (2 samples). However, these analytes were not qualified (chrysene was qualified because of internal standard problems as described below). The recoveries for all analytes were below the lower established limit of 50%. The data are usable because the recoveries were sufficient to detect and quantify the analytes if they were present. All of the analytes were eliminated from MW-1 because this well was up-gradient from the settling pit [PRS 18-003(a)], a potential source of these compounds (Figure 4-27). Hexachlorobenzene, chrysene and pentachlorophenol were retained as potential COPCs for MW-2, MW-3, and MW-4 because the SALs were below the detection limits and these wells were close to PRS 18-003(a), which could have been a source for these analytes.

- ~~Several PAHs had a problem with internal standards in two samples from MW-1 and MW-2 and one sample from MW-4 that resulted in the data being biased low and usability being questionable. These PAHs were eliminated for MW-1 because this well was up-gradient from PRS 18-003(a), a potential source of these compounds (Figure 4-27). However, they were retained as COPCs for MW-2 and MW-4 because these wells were in close proximity to PRS 18-003(a) and therefore could have received input from this source.~~

- Five SVOC groundwater samples from three request numbers had QA problems associated with the area counts for one or two internal standards that resulted in the target analytes being qualified as UJ. The data for the target compounds associated with the internal standard are usable because recoveries were sufficient to detect and quantify the analytes and the sensitivity and responsiveness of the instrument were not compromised. Several analytes, including some PAHs and bis(2-ethylhexyl)phthalate, were retained as potential COPCs for MW-2, MW-3, and MW-4 because these wells were in close proximity to PRS 18-003(a) and therefore could have received input from this source. These analytes were eliminated for MW-1 because this well was up-gradient from PRS 18-003(a), a potential source of these compounds (Figure 4-27).

- ~~Five semivolatiles had QA/QC problems with the base/neutral extractable surrogate compounds for one sample from MW-3, resulting in data being biased low and usability being questionable. These analytes were retained as COPCs because MW-3 was close to PRS 18-003(a) and therefore could have received input from this source.~~

- One SVOC groundwater sample from one request number had QA problems associated with the base/neutral extractable surrogate recoveries that resulted in the associated analytes being qualified as UJ. The recoveries for surrogates were below the lower acceptance limits. The data are usable because the recoveries were sufficient to detect and quantify the analytes if they were present. Five semivolatiles from this sample [bis(2-chloroethyl)ether, 2,4-dinitrotoluene, 2,6-dinitrotoluene, hexachlorobenzene, and indeno(1,2,3-cd)pyrene] were retained as potential COPCs because MW-3 was close to PRS 18-003(a) and therefore could have received input from this source.

- Two SVOC groundwater samples from one request number had a problem with the extraction holding time for SVOCs in water that resulted in all SVOC data for these samples being qualified as UJ. The 7-day extraction holding time was exceeded by seven days. The data are usable because the samples were properly stored (4°C in the dark) so degradation was minimized.

- Three VOC groundwater samples from one request number had QA problems associated with the relative response factors for the initial and continuing calibrations that resulted in 2-butanone and 2-chloroethyl-vinylether being qualified as UJ. The data are usable because the relative standard deviation control limits were ±30% and the percent difference control limits were ±25%D, indicating that instrument sensitivity was not affected.

- Five HE groundwater samples from one request number had a QA problem associated with the relative standard deviation for the initial calibration that resulted in RDX being qualified as J. The relative standard deviation was above the 20% control limit for RDX. The data are usable because the continuing calibration percent difference was acceptable and the instrument sensitivity was not affected.

- One HE groundwater sample from one request number had a QA problem associated with the surrogate recovery that resulted in all HE analytes being qualified as UJ or J. The recovery was below the established lower limit of 35%. The data are usable because the recovery was sufficient to detect and quantify the analytes if they were present and the detected analytes were below their SALs.

Data usability for undetected, biased-low analytes that had SALs greater than detection limits was unaffected.

Three HE compounds and two VOCs were detected in the groundwater from the MW wells. HMX and RDX were detected at concentrations greater than the site-specific background values (Table 4-78). Three other organics —1,2-dichloroethane, m-nitrotoluene, and carbon disulfide — were not detected in the up-gradient background wells. Only 1,2-dichloroethane was detected at a concentration greater than the SAL and was retained as a COPC. The other organics were subjected to an MCA (see below).

Multiple chemical analysis. Five noncarcinogenic analytes met the criteria for inclusion in an MCA (Table 4-79). The sum of the maximum normalized concentrations of these analytes was 0.2717, so none were retained as COPCs.

RDX was the only carcinogenic analyte that met the criteria for inclusion in an MCA.

Table 4-77 is modified as follows:

TABLE 4-77
SUMMARY OF DATA USABILITY PROBLEMS FOR LACEF MONITORING WELLS

Request No.	Well No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
16818	MW-1 MW-2	AAA9539 AAA9542	18-1013 18-2014	Matrix Spike	Calcium	J	Matrix spike recovery below the established lower limit of 75%.
16822	MW-3 MW-4	AAA9543 AAA9544	18-2015 18-2016				
18641	MW-4	AAA9566	18-2015	Blind QC	Potassium	J	Blind QC sample recovery above the established upper limit of 125%.
20518	MW-1 MW-2 MW-3 MW-4 MW-3	AAA9577 AAA9578 AAA9579 AAA9580 AAA9582	18-2013 18-2014 18-2015 18-2016 18-2015	N/A	Mercury	UJ	Holding time exceeded.
16111	MW-1 MW-2 MW-3 MW-4	AAA5957 AAA5958 AAA5959 AAA5960 AAA5961	18-2013 18-2014 18-2015 18-2016	Blind	Hexachlorobenzene	Not Qualified	Blind QC sample ~~concentration~~ recovery ~~< target value; data usability questionable~~ below the established lower limit of 50%.
16317	MW-1 MW-2	AAA9539 AAA9542	18-2013 18-2014	Blind	Chrysene Pentachlorophenol	Not Qualified	Blind QC sample ~~concentration~~ recoveries ~~< target value; data usability questionable~~ below the established lower limit of 50%.

TABLE 4-77
SUMMARY OF DATA USABILITY PROBLEMS FOR LACEF MONITORING WELLS
Continued

Request No.	Well No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
16817	MW-1 MW-2	AAA9539 AAA9542	18-2013 18-2014	Internal standards	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(g,h,i)perylene Benzo(k) fluoranthene Bis(2-ethylhexyl)phthalate Butyl benzyl phthalate Chrysene Dibenzo(a,h)anthracene Di-n-octyl phthalate	UJ	Area count of two internal standards chrysene-d12 below acceptance limits. ; data usability questionable
				Initial Calibration	RDX	J	Relative standard deviation control limit >20%.
16821	MW-3	AAA9543	18-2015	Surrogates	~~Bis(2-chloroethyl)ether~~ ~~2,4-Dinitrotoluene~~ ~~2,6-Dinitrotoluene~~ ~~Hexachlorobenzene~~ ~~Indeno(1,2,3-cd)pyrene~~ All Base/neutral organics	UJ	Surrogate ~~Percent~~ recoveries below lower established control limits. ; data questionable
	MW-3 MW-4	AAA9543 AAA9544	18-2015 18-2016	Internal Standards	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(g,h,i)perylene Benzo(k) fluoranthene Bis(2-ethylhexyl)phthalate Butyl benzyl phthalate Chrysene Dibenzo(a,h)anthracene Di-n-octyl phthalate	UJ	Area count of two internal standards below acceptance limit.

TABLE 4-77
SUMMARY OF DATA USABILITY PROBLEMS FOR LACEF MONITORING WELLS
Continued

Request No.	Well No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
16821	MW-3 MW-4 MW-4	AAA9543 AAA9544 AAA9545	18-2015 18-2016 18-2016	Blind QC	Chrysene Fluorene Pentachlorophenol Pyrene	UJ	Blind QC sample recovery below the established lower limit of 50%.
				Initial and Continuing Calibrations	2-Butanone 2-Chloroethyl-vinylether	UJ	Response factors below control limits.
				Initial Calibration	RDX	J	Relative standard deviation control limit >20%.
				Surrogate	All HE	UJ or J	Surrogate recovery was below the established lower limit of 35%.
17057	MW-5 MW-6	AAA9555 AAA9554	18-1024 18-1023	N/A	All SVOCs	UJ	Holding time exceeded.
18068	MW-4	AAA9566	18-2016	Internal standards	Benzo(a)pyrene Benzo(b)fluoranthene Benzo(g,h,i)perylene Benzo(k) fluoranthene Dibenzo(a,h)anthracene Di-n-octyl phthalate Indeno(1,2,3-cd)pyrene	UJ	Area count for last internal standard below acceptance limit. ~~; data usability questionable~~
21148	MW-1	AAB2533	18-2013	Surrogates	Acid-extractable organics	R	Percent recoveries <10%.

* See Section 3.1 for a description of the data qualifiers.

Wetlands

Section 4.8.3.1 is modified as follows:

Concentrations of analytes detected in the wetlands sediment and surface water were compared with the respective concentrations in sediment and surface water in wetlands located up-canyon from the activities at TA-18 (i.e., WL-1 and WL-3). The maximum detected values for each analyte at these two sites was used as the site-specific background values for the wetlands (Table 4-81). If an analyte was not detected in the surface water or sediment at WL-1 and WL-3, the background value was assumed to be 0.

~~Inorganics.—The inorganic data presented no QA/QC problems that affected data usability.~~
INORGANICS. The QA/QC samples collected along with the field samples for the PCO wells included two rinsate blanks, five field blanks, five trip blanks, and four sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. The inorganic results had no QA/QC problems and the data are usable as reported. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

Several inorganics were detected in WL-4 through WL-8 at concentrations greater than the site-specific background values (Table 4-83). Silver, although not detected at the background sites, was detected at the downstream wetland sites. None of these analytes were detected at concentrations greater than SALs.

These analytes were eliminated from further consideration. Water quality standards for domestic surface water sources have been promulgated for two of these analytes, barium (1000 µg/L) and lead (50 µg/L) (NMWQCC 1995). Although surface water in the wetlands is not a domestic water source, the measured concentrations of these constituents in the water did not exceed the standard. Beryllium, which does not have a SAL, was detected at concentrations of 1.3-1.4 mg/kg. Because this is greater than the site-specific background value of 1.0 mg/kg but less than the background UTL, beryllium was not considered a concern. The inorganics were not subjected to an MCA because the purpose of this assessment was to characterize general water quality conditions in the wetlands.

~~Organics.—Some organics data had QA/QC problems that affected data usability (Table 4-82).~~
ORGANICS. The QA/QC samples collected along with the field samples for the PCO wells included nine field blanks, eight trip blanks, and three sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Two samples had QA/QC problems associated with the organic data that resulted in data qualifiers being assigned to the results (Table 4-82). The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- ~~Several SVOCs and VOCs that were reported as undetected had detection limits greater than their SALs. Therefore, the relationship between the sample value and the SAL for each analyte was unclear. All but two SVOCs were eliminated as COPCs because the nature of site activities suggested that their presence in the wetlands was unlikely.~~

- Several SVOCs and VOCs that were reported as undetected had detection limits greater than their SALs. The detection limits were the normal EQLs because no dilutions or matrix interference problems were encountered with these samples. Therefore, the relationship between the sample value and the SAL for each analyte was unclear. The compounds were eliminated as COPCs because available site information indicated that their presence in the wetlands was unlikely.

- Seven SVOC surface water samples from three request numbers had low recoveries in the blind QC samples for benzo(a)pyrene (5 samples) and 2,4,6-trichlorphenol (2 samples). However, these analytes were not qualified because of the low recoveries, which were below the established lower limit of 50%. ~~Two analytes, benzo(a)pyrene and 2,4,6-trichlorophenol, in several~~

surface-water samples had additional problems with the blind QC sample that resulted in the data being biased low and usability being questionable. The data are usable because the recoveries were sufficient to detect and quantify the analytes if present. Both analytes were eliminated as COPCs because their potential presence in the surface water down-canyon from TA-18 as a result of site activities was unlikely.

- One VOC sample from one request number had a QA problem associated with the continuing calibration that resulted in 2-butanone being qualified as J. The percent difference was above the 25% control limit. The data are usable because the relative response factor was >0.05 and sensitivity of the instrument was not affected.

- One HE sample from one request number had a QA problem associated with blind QC sample that resulted in tetryl(methyl-2,4,6-trinitrophenylnitramine) being qualified as J. The method blank and QC spike sample contained a peak at the same confirmation retention time as tetryl, causing difficulty in confirming or not confirming the presence of analyte in the sample.

Data usability for undetected, biased-low analytes that had SALs greater than detection limits was unaffected.

Toluene, a common laboratory contaminant, was eliminated from further consideration because it was detected in the trip and field blanks associated with WL-7. Other compounds, such as HMX and RDX, were at concentrations less than the site-specific background values and were eliminated from further evaluation. None of the organics were present at concentrations greater than their SALs (Table 4-83) and were not subjected to an MCA because the sampling objective was to determine if site activities at TA-18 had resulted in the release of materials to the environment.

Table 4-82 is modified as follows:

TABLE 4-82
SUMMARY OF DATA USABILITY PROBLEMS FOR THE WETLANDS

Request No.	Wetland No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
15827	WL-8	AAA5901 AAA5902	36-2000 36-2001	Blind QC	2,4,6-Trichlorophenol	Not Qualified	Blind QC sample ~~concentration~~ recovery ~~< target value; data usability questionable~~ below the established lower limit of 50%.
15959	WL-3 WL-1	AAA5933 AAA5934	18-2001 18-2002	Blind QC	Benzo(a)pyrene	Not Qualified	Blind QC sample ~~concentration~~ recovery ~~< target value; data usability questionable~~ below the established lower limit of 50%.
15964	WL-1	AAA5945 AAA5946 AAA5947	18-2009 18-2010				
15827	WL-7	AAA5911	36-2005	Continuing Calibration	2-Butanone	J	Percent difference was above the 25% control limit.
15867	WL-4	AAA5927	36-2016	Blind QC	Tetryl(methyl-2,4,6-trinitrophenylnitramine)	J	Method blank and QC spike sample contained a peak at the same confirmation retention time as tetryl, causing difficulty in confirming presence of analyte.
~~15879~~	~~WL-4~~	~~AAA5927~~	~~36-2016~~	~~Surrogates~~	~~Acid Organic Compounds~~	R	~~Percent recovery of acid surrogate was <10%~~

* See Section 3.1 for a description of the data qualifiers

References:

EPA (US Environmental Protection Agency), February 1994. "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, EPA540/R-94/012, Washington, DC. (EPA 1994, 1205)

EPA (US Environmental Protection Agency), February 1994. "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA540/R-94/013, Washington, DC. (EPA 1994, 1206)

Comment 1.e.iii. *LANL shall provide an explanation of the fields and comments of the analytical results in Appendix D.*

LANL Response:

The following information is added to Appendix D.

All data in this appendix are from sample analysis at fixed laboratories. Several of the column headings are self-explanatory, i.e., analyte, location ID, sample ID, sample value, background value, SAL value, units, sample location, and suite, while others may not be as clear. Column heading descriptions for these columns are as follows:

- **BEGIN** beginning depth from which the sample was collected;
- **END** ending depth from which the sample was collected;
- **UNITS** the units that accompany the sample depths, i.e., inches (in) or feet (ft);
- **MAT** environmental matrix of the sample; SS indicates soil (or sludge from septic tanks) and W indicates water, including liquid from septic tanks.
- **S** symbol column; blank, indicates a detection, and "less than" symbol (<), indicates that the analyte was undetected.
- **FIELD CODE** identifies QA/QC samples collected during the field investigation.
  - FD = field duplicate;
  - EB = equipment blank;
  - PE = performance evaluation sample;
  - FB = trip blank and;
  - FR = field blank.
- **LAB CODE** identifies laboratory QA/QC samples.
  - D = laboratory duplicate
  - R = replicate.
- **EPA QUAL** qualifier column for data qualifiers provided following data validation. (The FIMAD data base did not contain qualifiers for most of the data when Appendix D was printed.)
  - UJ = undetected estimated;
  - J = estimated;
  - R = unusable and;
  - N = presumptive evidence of presence.
- **TECH CODE** presents the analytical technique used in the analysis.
- **REQUEST NUMBER** LANL internal numeric applied to the written request sent to an analytical laboratory for analysis of a sample or group of samples;
- **REPORT NUMBER** LANL internal numeric applied to the written report from the analytical laboratory documenting the analytical results for a sample or group of samples. The report number provides a reference if the hard copy data package needs to be retrieved.

Comment 1.e.iv. *LANL shall provide a summary of all analytical data in Appendix D regardless of nondetectable concentrations.*

LANL Response:

LANL will ensure that the sampling plans presented in the RFI report correctly summarize the analyses presented in Appendix D. Any variances from the analyses proposed in the RFI Work Plan will be included in the revised text referenced in the response to Comment 1.c.i.

A corrected summary of samples collected and variances from the sampling plans for each PRS are included in Attachment F.

Comment 1.e.v. *It is not clear if the analytical results presented in Appendix D were obtained from a mobile analytical laboratory, an on-site fixed laboratory, an off-site fixed laboratory, or a combination. LANL shall revise the appendix to provide this information.*

LANL Response:

All data in Appendix D are from fixed analytical laboratories See also the response to Comment 1.c.v and 1.e.iii.

2. SPECIFIC COMMENTS

2.a Background Data Assessment

Comment 2.a.i. *Section 3.2.1 Background Data Comparison: LANL shall use a 95th confidence level of the 95 percentile of distribution to compute the UTL. See comment 1.a.iv. [Agreements and Action Items from Joint Environmental Protection Agency, Department of Energy, and University of California Meeting Held on September 18-19, 1995; EM ER:95-541, dated October 4, 1995]*

LANL Response:

See response to Comment 1.a.iv.

Comment 2.a.ii. *Section 3.2.1 Background Data Comparison: All RFI reports submitted after October 1, 1996 shall use laboratory-wide background data for screening and risk-based decisions and show the comparison to background using the most current, revised background data [Programmatic Issues from NODs dated January 16, 1995]*

LANL Response:

This RFI report was submitted to EPA in November 1995. At that time, site-wide background data were only available for Bandelier Tuff and soils. Applicable background data were and are still not available for the alluvial aquifer in Pajarito Canyon, except for that gathered from up-gradient wells as part of this RFI. LANL will evaluate any changes in conclusions that result from replacing background values used in the RFI report (including site-specific soil concentrations) with presently available site-wide UTLs. See responses to Comment 1.a.iv (use of 95th percentile UTLs) and Comment 2.a.vi (background wells).

Comment 2.a.iii. *Section 3.2.1: No reference material or discussion is provided regarding where site-specific background soil samples were obtained and how the site-specific values were determined for comparison. See comment below.*

LANL Response:

The text in Section 3.2.1 explains that the samples for site-specific background values for soil and groundwater were collected from boreholes (completed as wells) located west of TA-18; Figure 3.2 shows the locations of these wells. The text in that section, Paragraph 3 under Background Wells, explains that the maximum value of each analyte detected in the soil or groundwater was used as the site-specific background value. There were not sufficient data points to calculate a meaningful 95th percentile UTL, and the maximum value is considered to be a conservative estimate.

Comment 2.a.iv. *Section 3.2.1: Because the RFI report is a "stand-alone" document, a tabulated summary of concentrations, a checkplot showing the sampling locations, and a concise overview of the methodology for determining the UTL and SAL shall be provided for the both the site-wide and site-specific background information. See comments 1.b.i and 1.b.ii.*

LANL Response:

Discussion:

See response to Comment 1.b.ii regarding checkplots.

See response to Comment 1.a.v for an overview of how soil SALs are derived.

Revised Text:

Section 3.2.1 is modified as follows:

~~The initial step in the screening assessment process is the comparison of detected levels of inorganic analytes with background values. Analytes are retained as COPCs as a result of this comparison using the following criteria:~~

- ~~If the detected value of an analyte is equal to or lower than the background value with which it is compared, it is eliminated as a COPC.~~
- ~~If the detected value is greater than the background value, it is retained as a COPC and is subjected to the next step in the screening process.~~

~~Those inorganic analytes that are detected but do not have background values are also subjected to the SAL comparison.~~

~~The statistic used to represent background for all the inorganic analytes in soils is the upper tolerance limit (UTL). The UTL is the 95% upper confidence limit for the 99th percentile of the background distribution (Ryti 1995). To calculate the UTL value for inorganics, the Laboratory background database used data from soil samples taken at exposed A, B, and C horizons in a variety of Los Alamos County locations near the perimeter of the Laboratory property (Longmire et al., in preparation, 1142). None of these locations are within OU 1093.~~

Inorganic Chemicals

Detected inorganic chemicals are compared with natural background distributions to determine if they should be retained as COPCs or eliminated from further evaluation. The inorganic background data used in this RFI Report are from the following sources:

- **Soil and sediment samples collected throughout Los Alamos County for which chemical analyses were performed for certain inorganic (i.e., metal) chemicals (Longmire et al. 1995, 1142; 1995, 1266). The all-soil-horizon background data set (inclusive of the A, B, and C horizons) was used because the soil horizon was not identified during the sampling. See Figure 3-2a .**
- **Background concentrations of data collected up-canyon from the PRSs being reported. To obtain an estimate of the site-specific background concentrations of inorganics, three**

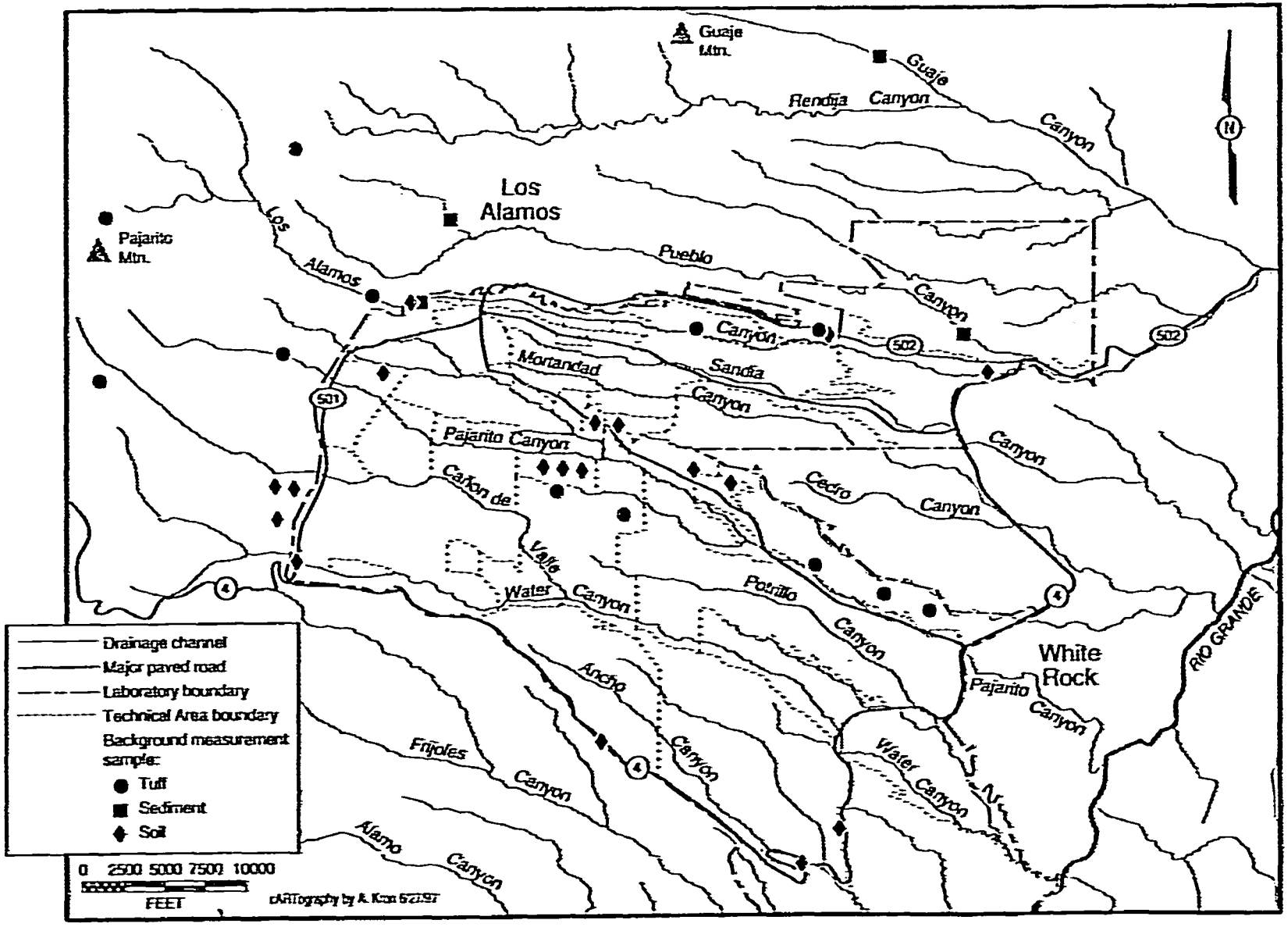


Figure 3.2a LANL sitewide background sampling locations for tuff, sediment, and soil.

boreholes (two of which were completed as wells) were drilled in Pajarito Canyon, up-canyon from any potential release sources at TA-18. The background well locations were in a forested meadow area approximately 300 yd west of Building 18-23, alongside the ephemeral creek (see Figure 3-2). The soil from the borings was analyzed for target analyte list (TAL) metals and mercury. The maximum detected concentration of each analyte was used as an estimated background concentration. Estimates of the site-specific background for TA-18 were obtained because of the presence of other potential contaminant sources up-gradient from this technical area.

Comparisons between site data and site-wide background data are performed by comparing each observed concentration datum with a chemical-specific screening value that is the upper tolerance limit (UTL). The current background UTL is the 95% upper confidence limit of the 95th percentile of the background distribution (Ryti et al. 1996, 1298).

Further statistical comparisons are performed for the analytes that exceed their UTLs to determine whether statistically significant differences exist between the observed site and background datasets. The Gehan/Wilcoxon Rank Sum test, the Quantile test, and the Slippage test are used for these evaluations (Gilbert 1987). The Gehan modification of the Wilcoxon 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 the observed number of site concentrations being greater than the maximum background concentration, given that the site data originates from the same distribution as the background data. Among the three tests, most types of differences between distributions can be determined. Observed significance levels (p-values) are reported for the tests. The p-value is the probability of observing data at least as different from the typical background data as the actual, observed site data, if the site concentration distribution is the same as background. If a p-value is less than 0.05, then there is reason to suspect that there is a difference between the background and site distributions; otherwise, no difference is indicated and the site concentrations are not statistically different from background. These tests are performed only for PRSs that have at least four samples, and only for the analytes that have adequate background datasets. For example, mercury data is not subjected to these tests because the background dataset is almost entirely composed of non-detected data.

A comparison of the inorganic concentrations detected in the settling pit or septic tanks with background UTLs was not conducted because such a comparison is performed only to determine if a release to the environment has occurred. Because the contents of the pit/tank are confined, they are not related to levels in the environment, so a background comparison is not appropriate.

~~The background comparison is not routinely performed for organic compounds, which are considered to have zero background concentrations. However, for some high explosive (HE) compounds, the maximum detected values obtained from sampling at TA-18 background wells (discussed below) are used as estimates of site-specific background concentrations when performing the data comparisons at each site.~~

<u>Background wells.</u> The alluvial aquifer in Pajarito Canyon extends approximately 1 mi up-canyon (west) of TA-18. The aquifer is recharged primarily by ephemeral stream flow in the canyon. Contaminants from sources west of OU 1093 could be present in the groundwater.

~~To obtain an estimate of the site-specific background concentrations of inorganic and organic analytes in groundwater, samples were collected from three boreholes (two of which were completed as wells) that were drilled in the alluvium of Pajarito Canyon, up-canyon from any of the potential contaminant sources at TA-18. The background well locations were in a forested meadow area approximately 300 yd west of Building 18-23, alongside the ephemeral creek (see Figure 3-2).~~

The results of this sampling reflects the quality of the shallow groundwater flowing into the area and the constituents in the soil up-gradient from all PRSs at TA-18. The maximum detected value of each

analyte in the soil and groundwater analyzed from these wells were used as estimates of the site-specific background concentrations for the data comparisons at each site in OU 1093.

Inorganics: The inorganic results for soil from the background wells were less than the Laboratory background UTLs except for thallium and chromium (Table 3-1).

No background UTLs are available for groundwater, so the inorganic data from the background wells were compared with the SALs for water. These data were found to be below SALs except for manganese (180 µg/L) and thallium (2 µg/L). These two inorganics were present at elevated concentrations in the background wells. The site-specific background values for inorganics are presented in Table 3-1.

Organic Chemicals

Background data are not available for organic chemicals. Organic chemicals positively identified in one or more samples have been carried forward in the screening assessment process for the PRSs in this RFI report. Chemicals not detected in any sample have been removed from further consideration.

Organics: The results from the background wells indicated that several organics, primarily HE, were detected in the groundwater; one VOC was detected in the soil (Table 3-2). The maximum detected values were used as estimates of the site-specific background concentrations for these analytes when performing the data comparisons at each site.

Section 3.2.2 is modified as follows:

~~The next step in the screening assessment process is the comparison of detected concentrations with SALs. These risk-based, media-specific action levels are compared with maximum concentrations of an analyte to determine whether further evaluation of potential contamination is warranted (LANL 1993, 1085).~~

~~For surface water or groundwater, the SALs are based on regulatory levels; for soil, they are calculated using a risk-based methodology described in the proposed RCRA Subpart S, Corrective Action for Solid Waste Management Units (EPA 1990, 0432). An additional conservative modification of the Subpart S methodology was introduced to account for exposure to volatile organic compounds (VOC) volatilizing from soil. The soil-to-air volatilization factor was calculated based on an equation provided by the EPA and chemical-specific parameters (LANL 1993, 1164).~~

~~The SALs for surface water and groundwater are maximum contaminant levels (MCL) promulgated under the Safe Water Drinking Act as directed by 40 CFR 264, Subpart S. Subpart S also indicates that state water quality standards established pursuant to the Clean Water Act, Section 303c, will be used for surface water constituents when these standards have been established for the body of water in question. If water quality standards have not been established, MCLs will be used as action levels if the surface water has been designated as a drinking water source. Further, the state of New Mexico water quality regulations (which take precedence over the Clean Water Act) stipulate that filtered samples shall be used for the comparison of inorganic concentrations against state water quality standards. In accordance with this, only the inorganic results from filtered samples were used in the SAL comparison for surface water and groundwater samples.~~

The screening action levels (SALs) for nonradiological chemicals in soil currently in use are based on the EPA Region 9 preliminary remediation goals (PRGs) for residential soil and tap water (Smucker 1996). These replace the SALs in use when the RFI report was prepared, which were based on the methodology presented in Subpart S of 40 CFR 264. There are currently no screening values for water equivalent to the soil SALs. Instead, reported chemical concentrations in surface water and groundwater are compared to the appropriate and applicable Native American Pueblo, state, or federal water quality standards for a chemical.

The Region 9 PRGs are derived by incorporating current EPA toxicity values [i.e., reference doses (RfDs) and carcinogenic slope factors] from the IRIS (EPA 1994, 1167) or HEAST (Miller 1994, 1169) databases, as well as from EPA's National Center for Environmental Assessment, with standard exposure parameters to estimate contaminant concentrations in environmental media that are protective of humans over a lifetime. The PRGs correspond to a fixed level of risk (10^{-6}) for carcinogens and a noncarcinogenic hazard quotient of one. For those chemicals for which Region 9 PRGs are not available, SALs will be calculated using the methodology in EPA's "Corrective Action for Solid Waste Management Units," Subpart S (EPA 1990, 0432) provided that sufficient, adequate, and approved toxicity data are available to calculate RfDs or cancer slope factors. For those chemicals that do not have sufficient, adequate, and approved toxicity data to calculate an RfD or cancer slope factor, a surrogate will be used to obtain a SAL, based on similarity in structure and/or toxicology. For example, phenanthrene has no SAL available, but, because it is similar in structure to anthracene, the SAL for anthracene will be used in the data comparison for phenanthrene. SALs are updated annually as new toxicity information, and/or applicable or relevant and appropriate requirements (ARARs), become available.

In this investigation, soil SALs have been used to screen not only analytical results for surface and subsurface soils but also those for sludge and sediment samples. Soil SALs were used to screen sediment and sludge samples because no other screening values are available, and this method provides a risk-based point of comparison for the data, thereby permitting a first-cut screening of the chemicals.

~~The SALs are calculated using current chemical- and route-specific toxicity values and default exposure parameters and are based on average daily exposures that do not exceed the corresponding target risks or hazard values (i.e., a cancer risk of 1 in a million for all Class A and B carcinogens, a cancer risk of 1 in 100,000 for all Class C carcinogens, and a hazard index of 1 for noncarcinogens).~~

Analytes are categorized either as "equal to or exceeds SAL", "below SAL", or "no SAL" (if a SAL value has not been calculated). For inorganics, the detected concentrations greater than the background UTLs are compared with the SAL for that analyte; for organics, any concentration above the detection limit is compared with its respective SAL.

References:

EPA (U.S. Environmental Protection Agency), August 1, 1996. "Region 9 Preliminary Remediation Goals (PRGs) 1996," San Francisco, CA.

EPA (U.S. Environmental Protection Agency), May 1994. "Integrated Risk Information System (IRIS)," Office of Science and Technology, National Technical Information Service, Springfield, Virginia.

EPA (U.S. Environmental Protection Agency), July 27, 1990. "Corrective Action for Solid Waste Management Units (SWMUs) at Hazardous Waste Management Facilities," proposed rule, Title 40 Parts 264, 265, 270, and 271, Federal Register, Vol. 55, pp. 30798-30884. (EPA 1990, 0432)

Miller, I.C., March, 1994. "Health Effects Assessment Summary Tables Annual Update, FY-1994," 9200.6-303(94-1), EPA 540-R-94-020, Office of Research and Development, Office of Emergency and Remedial Response, Washington, D.C.

Comment 2.a.v. *Table 3-1, page 3-5: For comparison purposes, LANL should include SALs on Table 3-1.*

LANL Response:

Table 3-1 of the RFI report has been amended as follows, using the SAL values based on EPA Region IX residential PRGs for soil and appropriate water quality standards. (See response to Comments 1.a.iii and 1.a.v regarding replacement of former SAL values.)

TABLE 3-1
MAXIMUM DETECTED VALUES OF INORGANICS IN THE BACKGROUND WELLS

Analyte	SAL (mg/kg)	Soil Background UTL (mg/kg)		Site-Specific Background (Soil) (mg/kg)	New Mexico Groundwater Standards (µg/L)	Site-Specific Background (Groundwater) (µg/L)
		Current	Former			
Arsenic	N/A[a]	7.82	11.6	2.9	100	4.8
Barium	5300	315	1140	116	1000	214
Beryllium	N/A[b]	1.95	3.31	0.48	N/A (4)[c]	1.8
Chromium	210	19.3	34.2	54.2	10	19.1
Cobalt	4600	19.2	51.1	3.04	N/A (1000)[d]	7.4
Copper	2800	15.5	15.7	15.3	1000	25
Lead	400	23.3	39	9.2	1000	14.1
Manganese	3200	714	1030	375	200	523
Mercury	23	0.1	0.1	0.05	2	Not Detected
Nickel	1500	15.2	28.7	12.2	N/A (100)[d]	Not Detected
Selenium	380	1.7	1.7	0.49	50	Not Detected
Thallium	5.4	1.0	0.9	1.7	N/A (2)[e]	3.9
Vanadium	41.9	41.9	66.2	17.3	N/A (100)[d]	27.5
Zinc	50.8	50.8	101	41.8	10000	64.3

[a] SAL for arsenic is below the site-wide background value, therefore, the background UTL is used for the SAL comparison.
[b] SAL for beryllium is below the site-wide background value, therefore, the background UTL is used for the SAL comparison.
[c] Groundwater standard not available, number in parentheses is Drinking Water Standard for EPA and NMED.
[d] Groundwater standard not available, number in parentheses is New Mexico Standard for Livestock Watering.
[e] Groundwater standard not available, number in parentheses is New Mexico Drinking Water Standard.

Comment 2.a.vi. *Section 3.2.1, Background wells: The close proximity of all three background groundwater monitoring wells in Pajarito Canyon fails to provide a true characterization of the alluvial groundwater system within the canyon. The well placement focused only on a small area with limited opportunity for natural variability.*

LANL Response:

A single up-gradient well is a common approach for characterizing groundwater quality at RCRA sites. In this instance, two wells in close proximity were constructed and sampled in the center of the somewhat linear aquifer, close to TA-18 within Pajarito Canyon, but up-gradient of any influence of operations at the site. Wells substantially more up-gradient will not necessarily reflect the quality of water flowing into the portion of the aquifer at the TA-18 boundary. An up-gradient well was not constructed in Threemile Canyon, but the water issuing from a well box was sampled as part of the wetland sampling. That discharge, which is perennial, is either directly associated with or is the source of recharge for the alluvial aquifer in Threemile Canyon, up-gradient from its confluence with Pajarito Canyon. LANL acknowledges that the data from that source were not used in determining background groundwater quality. However, as part of the site-wide hydrogeologic investigation, LANL has proposed to drill additional wells in the

alluvium within both Threemile and Pajarito canyons. Those data will be used to support a more complete evaluation of background (up-gradient) water quality for the area covered by this RFI report. See response to Comment 1.a.ii.

Comment 2.a.vii. *Section 3.2.2 Comparison with Screening Action Levels Other Standards: LANL shall base its SALs on USEPA Region IX preliminary remediation goals for a residential scenario. See comment 1.a.v.*

LANL Response:

See response to Comment 1.a.v.

2.b Section 4.1, Septic Systems

2.b.i General

Comment 2.b.i(1). *For those septic systems and associated lines where hazardous constituents were identified above background in both the septic settling or holding tank and in the subsurface, LANL shall evaluate the integrity of the septic system drain lines.*

LANL Response:

In a meeting held with HRMB on April 21 it was clarified that this comment expresses a concern for the extent to which residual contamination in the septic tank, associated drainlines, and drainfield soils could be transported from the respective PRS, principally by groundwater. This concern bears directly on the final disposition of the septic system components, as addressed in Comment 2.b.i.(3). The Laboratory is developing a ER position on closure of septic tanks (and ancillary features) that will address this issue. It is expected that this position will be discussed with HRMB during May 1997.

Additional groundwater monitoring, as described in the Sampling and Analysis Plan for Groundwater Investigations in Threemile and Pajarito Canyon (Attachment A), will address the concern regarding extent of contamination that may be associated with the septic system drain fields.

Comment 2.b.i(2). *For those septic systems and associated lines where hazardous constituents were identified above background in the septic settling or holding tanks, LANL shall perform interim measures to prevent further discharge into the environment.*

LANL Response:

As described in the RFI report (Section 3.2.1), the concentrations of inorganic constituents in the holding tank and septic tanks were not compared with background UTLs because such a comparison is not considered appropriate. Rather, all detected concentrations were presented in the data comparison tables for both inorganic and organic constituents. However, LANL recognized that there was a continuing potential for release of the contaminants in the tanks to the environment. Thus, LANL proposed in the RFI report to remove the contents of the tanks at PRSs 18-003(a, b, c, d, and g). This was done as an interim action in the summer of 1995. The results of that work is documented in an interim action report (Environmental Restoration Project 1996, ER ID No. 55044).

Reference:

Environmental Restoration Project, September 1996. "Interim Action Completion Report for Potential Release Sites 18-003(a-d, g), Holding Tank and Septic Tanks, Field Unit 2," Los Alamos National Laboratory Report LA-UR-96-3340, ER ID No. 55044, Los Alamos, New Mexico. (Environmental Restoration Project 1996, ER ID No. 55044)

Comment 2.b.i(3). *For each inactive septic tank, LANL shall remove or, at a minimum, backfill the tank with a solid, non-porous material (such as flow crete). However, any action other than removal of the tank and associated lines may not be considered as a final disposition appropriate for NFA. See following site-specific comments.*

LANL Response:

The facilities that formerly discharged wastes to the septic tanks at TA-18 have been removed or taken out of service, so no additional discharges to the tanks are expected. The holding tank—PRS 18-003(a)—has been cleaned, but remains in service to receive discharges from an emergency radioactive decontamination facility. The operating group at TA-18 plans to replace that holding tank with an aboveground unit this fiscal year. No further remedial action will be taken at the tanks until an agreement has been reached on acceptable methods for septic system abandonment. (See response to Comment 2.b.i(1).

<u>2.b.ii Section 4.1.1 18-003a-b) Settling Pit, Septic Tank and Drainfield</u>. *These active PRSs are proposed for accelerated cleanup which includes the removal of the septic tanks' contents and pressure rinsing of the septic tanks.*

Comment 2.b.ii(1). *The Settling Pit [18-003(a)] was found to contain elevated concentrations of Volatile Organic Compounds (VOCs) and Polyaromatic Hydrocarbons (PAHs); no VOC or Semivolatile Organic Compound (SVOC) analyses were conducted at the Septic Tank [18-003(b)]. Groundwater samples obtained southwest of the Drainfield and at MW-3 (sample location 18-2015) were found to contain concentrations of 1,2-dichloroethane (DCA) greater than SALs. 1,2-DCA is attributable to site activities and, can possibly be related to septic activities at PRSs 18-003(a) and 18003(b).*

LANL Response:

As noted in the response to Comment 2.b.i.(3), the contents of these tanks were removed by an interim action. VOC and SVOC analyses were conducted as part of that action. PRS 18-003(a) remains in service until a replacement tank is installed. PRS 18-003(b) has been taken out of service. See response to Comments 1.c.iii and 2.b.i(2).

Comment 2.b.ii(2). *LANL shall conduct further investigations to determine the integrity of the drainlines associated with these PRSs, confirm or eliminate 18-003(b) as a potential alternate source by performing the proper analyses (including SVOCs), and determine the nature and extent of the resulting groundwater contamination. All groundwater wells within this vicinity should also be analyzed for high explosive (HE) compounds using SW-846 Method 8330 to provide a comprehensive site-wide survey of these constituents and to determine if these PRSs may have contributed to the overall degradation of the alluvial groundwater system.*

LANL Response:

The integrity of the drainlines and the possible source(s) of DCA at PRSs 18-003(a and b) is addressed in the response to Comment 2.b.i(1). LANL will present data on VOC and SVOC analysis of the contents of PRS 18-003(b). See response to Comment 1.c.iii. However, LANL believes that the characterization of this site conducted during the RFI and in the subsequent interim action demonstrate that these sites do not pose a threat to human health. Issues pertaining to characterization of the nature and extent of contamination, and presence or absence of HE compounds are addressed in the response to Comment 1.a.ii.

Comment 2.b.ii(3). *It is recommended that sampling locations and analytical results from the LACEF wells, and any other pertinent sampling locations, be presented concurrently with these PRSs. This would provide additional data by which a more comprehensive evaluation could be made of this PRSs.*

LANL Response:

LANL considered developing a single figure that would include all data for PRSs 18-003(a and b) and the LACEF wells. The quantity of data precluded doing so on a 8-1/2- x 11-in. figure. The text in Section 4.1.1.4 of the RFI report refers the reader to Section 4.7.2, which discusses the data from the LACEF wells. HRMB's recommendation to provide all data on a single figure will be addressed in developing the checkplots requested in Comment 1.b.ii.

2.b.iii Section 4.1.2 18-003(c) Septic Tank and Drainfield. *This active PRS is proposed for accelerated cleanup which includes the removal of the septic tank's contents and pressure rinsing of the septic tank.*

Comment 2.b.iii(1) Further Investigations. *LANL shall conduct further investigations at this PRS in order to determine the following: the presence or absence of VOCs in the septic tank; the presence or absence of contaminants in the subsurface between the drainfield and the nearest surface water body; the integrity of the drainlines associated with the PRS; the source of the groundwater contamination (at a minimum, eliminate the septic tank and its associated drainlines and drainfield as a potential source); and the nature and extent of the identified groundwater contamination.*

LANL Response:

This PRS is not active. It was taken out of service in 1996. See response to Comments 2.b.i.(1) and 2.b.ii(2).

Comment 2.b.iii(2). *LANL shall obtain or provide analytical results for sediment samples at the following locations in Threemile Canyon: up-gradient of Threemile Springs 3A and 3B; down-gradient of Threemile Springs 3A and 3B and up-gradient of the influence of the firing sites, 18-002(b, c); down-gradient of the firing sites [18-002(b, c)] and up-gradient of TA-18 Spring; and down-gradient of TA-18 Spring. These samples shall be analyzed for 40 Code of Federal Regulations Appendix IX constituents including HE using SW-846 Method 8330.*

LANL Response:

The objective of the RFI was to investigate PRSs located within TA-18, rather than possible releases from PRSs up-gradient from TA-18. As a result, there was no extensive sampling of water and sediment upstream from TA-18. Water and sediment samples were collected from areas just up-gradient from facilities in TA-18, primarily to evaluate the possible accumulation of contaminants within the wetlands. LANL acknowledges that the RFI data for springs in Threemile Canyon and groundwater in Pajarito Canyon up-gradient of TA-18 indicate the presence of contaminants introduced up-gradient from TA-18. The presence, and possible source(s) of these contaminants, will be considered in developing a sampling plan for the alluvial wells proposed as part of the site-wide hydrogeologic evaluation (see response to Comment 1.a.ii).

The Sampling and Analysis Plan for Groundwater Investigations in Threemile and Pajarito Canyon (Attachment A) includes sampling of stream flow and groundwater, both up-gradient from TA-18. One objective of the Stage 1 sampling is to better define the flow regime in Threemile Canyon, and identify locations where HE contamination is being introduced into Threemile Canyon. Reconnaissance in Threemile Canyon in April 1997 suggests that the location designated as Threemile Spring A/B may be a point of emergence of groundwater in the alluvium into the stream channel. The sampling in Threemile Canyon during Stage 1 will lead to a better definition of where sediments should be sampled, and that sampling will be carried out as part of Stage 2 of the investigation.

2.b.iv. Section 4.1.3 18-003(d) Septic Tank and Drainfield: *This active PRS is proposed for accelerated cleanup which includes the remove of the septic tank's contents and pressure rinsing of the septic tank.*

Comment 2.b.iv(1). *The septic tank [18-003(d)] was found to contain elevated concentrations of VOCs and solvents. A groundwater sample obtained north of the drainfield was found to contain concentrations of 1,2-DCA greater than its SAL. 1,2-DCA is attributable to site activities and, possibly to PRS 18-003(d).*

LANL Response:

This septic system is not active. It was taken out of service in 1996. LANL believes (and states in the RFI report) that PRS 18-003(d) is the source of the 1-2 dichloroethane detected in groundwater. A corrective action program, consisting of the construction and sampling of five shallow monitoring wells in the vicinity of the site, is now in progress to address this issue.

Comment 2.b.iv(2). *LANL shall conduct further investigations to determine the integrity of the drainlines associated with the PRS, confirm or eliminate the septic tank as a potential source of the groundwater contamination, and determine the nature and extent of the groundwater contamination.*

LANL Response:

The issue regarding integrity of the drainlines is addressed in the response to Comment 2.b.i(1). The remaining issues in the comment are addressed by the response to Comment 2.b.iv.(1).

Comment 2.b.iv(3). *LANL shall provide in its NOD response clarification to the following issue: The analytical results as indicated on Figure 4-4 for sample AAA5827, sample location 1044, differ from the Appendix D analytical results spreadsheet to Table 4.1: 1,1-DCA is greater than SALs in Appendix D. In addition, Table 4-1 does not indicate that the sludge samples were analyzed for VOCs and SVOCs as shown in Figure 4-4.*

LANL Response:

Figure 4-4 has been corrected to indicate that 1-1 DCA is greater than the New Mexico Groundwater Quality Standard (Attachment D). Table 4-1 has been corrected as provided in Attachment F to indicate analysis of VOC and SVOC.

2.b.v. Section 4.1.4 18-003(f) Septic Tank: *This inactive PRS is proposed for NFA based on the absence of hazardous constituents above action levels.*

Comment 2.b.v(1). *LANL shall conduct further investigations to determine the integrity of the drainlines associated with the PRS, confirm or eliminate the septic tank as a potential source of the groundwater contamination, and determine the nature and extent of the groundwater contamination.*

LANL Response:

No groundwater contamination was detected at this site. Concentrations of all inorganics in filtered samples were below the site-specific background concentrations (also measured in filtered samples) except for nickel, which was not detected in the groundwater samples from the background wells. Acetone was reported in one groundwater sample at a concentration substantially below the SAL and the Region 9 PRG for tap water. Acetone is a common analytical laboratory contaminant and may not be related to waste discharges to this PRS. These conclusions have been re-evaluated as part of the summary of changes resulting from the use of revised UTLs and Region 9 PRGs for SALs (see response

to Comments 1.a.v and 1.a.iv). LANL sees no justification for further investigation specific to this PRS. However, the presence of this PRS will be considered in developing a more comprehensive groundwater monitoring plan for the TA-18 area. See response to Comment 1.a.ii.

2.b.vi Section 4.1.5 18-003(g) Septic Tank: *This active PRS is inappropriately proposed for NFA based on the following deficiencies:*

Comment 2.b.vi(1). *LANL eliminated a COPC (1,1,2-trichloro-1,2,2-trifluoroethane) based on "no reasonable pathway" for human exposure. The rationale for eliminating this COPC is inappropriate. LANL has yet to obtain basic information necessary to conclude that interconnection between the shallow alluvial aquifer and the regional aquifer does not exist. LANL must use SALs based on Region IX PRGs or calculate a SAL using Subpart S guidance. See comment 1.a.v.*

LANL Response:

Discussion:

Previously, there was no SAL available for the chemical in question. However, the current Region IX residential PRGs do contain a value for the chemical. Use of the Region IX residential PRG for a SAL allows the chemical to be eliminated as a COPC.

Revised Text:

The last paragraph of Section 4.1.6.3.1 is modified as follows:

Three SVOCs and two three VOCs were detected in the septic tank at concentrations greater than their SALs and were retained as COPCs. In addition, ~~cis-1,2-dichloroethylene and~~ 1,1,2-trichloro-1,2,2-trifluorethane were was detected ~~(in the septic tank and in the soil, respectively)~~ in the subsurface soil ~~but do not have SALs~~ below its SAL~~, these analytes also were retained as COPCs~~ and was not retained as a COPC. The detected organics inside the septic tank that were less than their SALs were not subjected to an MCA (Section 3.2.1). The 1,1,2-trichloro-1,2,2-trifluorethane was also not subjected to an MCA because it was the only analyte detected in the soil.

The first paragraph of Section 4.1.6.3.4, Data Interpretation, is modified as follows:

Human Health Risk. All except one of the COPCs chemicals were detected inside the septic tank. The VOC — 1,1,2-trichloro-1,2,2-trifluoroethane — detected in the subsurface soil (84-120 in.) ~~does not have~~ has a SAL of 21,000 mg/kg, which is several orders of magnitude above the detected concentration (0.013 mg/kg). Therefore, 1,1,2-trichloro-1,2,2-trifluoroethane and is eliminated from further consideration. ~~because it had no reasonable pathway.~~

Comment 2.b.vi.(2). *LANL shall clarify the rationale for locating sample 18-1275 at such a great distance from the potential source. The reviewer questions the representativeness of the sample.*

LANL Response:

The location of the well at location 18-1275 is the same as proposed in the approved RFI work plan. As indicated in Figure 4-6, the well is approximately 15 ft from the septic tank—PRS 18-003(g). The general direction of groundwater flow, as indicated in Figure B-3, is eastward, but probably has a southeasterly vector towards the ephemeral stream in Pajarito Canyon. The well was placed in a location that is believed to be generally down-gradient from the tank, and for this reason LANL believes the well is appropriately located to detect any significant groundwater contamination resulting from possible past releases from the tank.

Comment 2.b.vi.(3). *The analytical results for sample location 18-1275 (samples AAB4696, 0218-95-0256, and 0218-95-0257) are not addressed in the text. LANL must provide a discussion of these analytical results.*

LANL Response:

Discussion:

As described in Section 4.1.6.3.1, no inorganics were detected above the site-specific background values at location 18-1275. However, comparison to the current background UTL for chromium results in one detected concentration of 34.3 mg/kg above the UTL of 19.3 mg/kg. The discussion of 1,1,2-trichloro-1,2,2-trifluoroethane is presented in the response to comment 2.b.vi(1). Otherwise, the only information missing from the discussion of the analytical results at this sample location regards the detected concentrations of acetone in two samples.

Revised Text:

The following paragraph is added to the end of Section 4.1.6.3.1:

Acetone was detected in two groundwater samples at concentrations of 13.6 µg/L and 35.4 µg/L. Although acetone is a common laboratory contaminant, the method blank associated with these samples did not detect acetone. Therefore, it is assumed that the detections of acetone are valid. Because acetone does not have a groundwater quality standard, these concentrations are compared to its Region IX PRG for tap water of 610 µg/L (EPA 1996, 1351). The detected concentrations of acetone are more than an order of magnitude below the tap water PRG and, therefore, acetone is not considered to be a COPC.

Reference:

EPA (U.S. Environmental Protection Agency), August 1, 1996. "Region 9 Preliminary Remediation Goals (PRGs) 1996," San Francisco, CA. (EPA 1996, 1351)

Comment 2.b.vi.(4). *Table 5-1 indicates that the tank sludge was not sampled for uranium (U) or plutonium (Pu) even though the RFI Workplan specifies that they are COPCs at the PRS. LANL must provide an explanation why these constituents were not analyzed for.*

LANL Response:

As suggested in Section 4.1.6.2 of the RFI report, there was not sufficient sludge in the tank to allow for analysis of all potential contaminants. The text did not clearly state this fact. Because it was believed that organic contaminants were of greatest concern at this PRS, a field decision was made that the available sludge material would analyzed for VOCs and SVOCs. During the interim action at this PRS it was possible to collect adequate sludge to conduct analysis for U and Pu. The data are presented in the interim action plan for this PRS (Environmental Restoration Project 1997, ER ID No.) and indicate that low levels of U and Pu were present in the sludge.

Reference:

Environmental Restoration Project, May 1996. "Interim Action Plan for Potential Release Sites 18-003(a-d,g), Field Unit 2," Los Alamos National Laboratory report, ER ID No. 54470, Los Alamos, New Mexico. (Environmental Restoration Project 1997, ER ID No. 54470)

2.b.vii Section 4.1.7, Septic Tank 18-003(h): *This active PRS is inappropriately proposed for NFA based on the following deficiencies:*

Comment 2.b.vii(1): *No groundwater samples appear to have been obtained down-gradient of the PRS. LANL must ensure that groundwater has not been adversely affected by the PRS.*

LANL Response:

Discussion:

The attempt to construct a well at location 18-1288, the location proposed in the approved RFI Work Plan, is described in Section 4.1.7.2. The text indicates that it was not possible to complete the well at that location because of penetrating the sewer line carrying discharge from PRS 18-003(h) and that there was no alternative location to drill because of a lack of space. The reported location of the sewer line, as indicated in Figure 5-13 of the RFI Work Plan, was east of its actual location. Figure 4-6 indicates, perhaps inadequately, that there is a nearly 4-ft elevation difference between the surface at PRS-18-003(h) and the location of the proposed well. The slope of the surface near PRS 18-003(h) prevented positioning the drill rig in an alternative location in close proximity to the septic tank. The uncertain location of the sewer line discouraged any attempt to move a short distance further east, and construction of a monitoring well further than 15 to 20 ft from the tank was not felt to produce representative samples of the possible influence of the tank on groundwater. Accordingly, no alternative location was selected. As stated in Section 4.1.7.3.1, no COPCs were detected in the tank at concentrations above SAL.

The data for PRS 18-003(h) were re-evaluated based on comparisons to the New Mexico groundwater standards as part of the overall rescreening of the PRSs.

Revised Text:

Table 4-26 presents the results of the comparison, and is modified as follows:

TABLE 4-26
DATA COMPARISON FOR PRS 18-003(h)

Sample ID	Location ID	Media	Barium (µg/L)	Chromium (µg/L)	Lead (µg/L)	Zinc (µg/L)
Groundwater Standard	N/A	N/A	1000	50	50	10,000
AAB5832	18-1046	tank liquid	34	6	3	1100
AAB5833	18-1046	tank liquid	30	5	3	940

Sample ID	Location ID	Media	Benzoic Acid (µg/L)	4-Methylphenol (µg/L)	Phenol (µg/L)
Groundwater Standard	N/A	N/A	Not Available	5[a]	5[a]
AAB5832	18-1046	tank liquid	40	73	11
AAB5833	18-1046	tank liquid	21	76	12

N/A = not applicable
[a] Groundwater standard is for total phenols, i.e., all phenol compounds.

As a result of the rescreening, Section 4.1.7.4 is modified as follows:

Comparison of the septic tank contents at PRS 18-003(h) with the New Mexico Groundwater Standards was done because the only potential exposure pathway of concern would appear to be the groundwater (tank is located below grade and the groundwater table is at a depth of approximately 20 ft). This conservative comparison found that 4-methylphenol and phenol are at concentrations that may be a potential concern for groundwater quality. The groundwater standard for total phenols is 5 µg/L compared to concentrations of 11-12 µg/L of phenol and 73-76 µg/L of 2-methylphenol in the septic tank liquid. These compounds will, therefore, be included as part of the quarterly monitoring program for TA-18.

~~NFA is provisionally proposed for this PRS based on Criterion 4. The site has been characterized, and no RCRA regulated COPCs are present.~~ A preliminary review of the radiological data indicates that uranium was detected in the tank at significantly less than background soil concentrations and at background concentrations in the soil samples. Plutonium, the only other radioactive COPC, was not detected in any samples at this site. The possible need for corrective action required under the HSWA permit will be fully addressed after a complete review of the radiological data. These conclusions will be presented in the radiological addendum to this report (planned for completion by February 1996). (See also response to Comment 1.a.ii.)

Comment 2.b.vii(2). *Building 18-152 (as indicated in the text on p. 4-58) is not located on Figures 1-2 or 4-6. LANL must revise the text and/or the figure.*

LANL Response:

Discussion:

The text incorrectly stated Building 18-152. The text should have stated Structure 152, which is the septic tank as indicated in Figure 4-6.

Revised Text:

The last paragraph of Section 4.1.7.2 is modified as follows:

Groundwater could not be sampled because the auger inadvertently punctured the active sanitary sewer line from Building **Structure 18-152 (the septic tank)**, but the borehole could not be repositioned because of a lack of space. Sewer water that leaked into the shallow borehole made further drilling at that location inadvisable because contamination could be introduced into the perched aquifer (potentially contaminating any samples collected).

Comment 2.b.vii(3). *Locations of the attempted borings (Section 4.1.7.2) are not indicated on the corresponding figure in the RFI report. LANL must revise the figure.*

LANL Response:

Discussion:

The boring (location 18-1285) is shown in the figure, but the text did not specifically identify that location as the boring in question.

Revised Text:

The second paragraph in Section 4.1.7.2 is modified as follows:

In August 1994, the paved area around the septic tank was checked for radiation. Since surface readings were at background levels, no "surface" soil samples were taken from beneath the asphalt pavement. Subsurface soil was sampled from a borehole (sample location 18-1285) located in a shallow, paved storm-water ditch approximately 10 ft down-gradient (southeast) of the septic tank (Figure 4-6). Inaccessibility, overhead utility lines, and an adjacent storm sewer opening severely limited the area available for drilling. Two subsurface soil samples (AAB4700 and AAB4703) were collected in discrete 2.5-ft intervals from the 5-ft core sections taken from the borehole at 18-1285, as stipulated in the NOD (see Section 4.1).

Comment 2.b.vii(4). *Sample location (18-1285) is not located near the PRS and may not be physically or statistically representative of the PRS. LANL must either obtain additional samples or provide assurances that the sample obtained adequately characterizes the PRS.*

LANL Response:

The primary purpose for drilling the borehole at Location 18-1285 was to collect groundwater samples. The location was selected so as to be down-gradient from the PRS, and sufficiently close to detect the presence of significant groundwater contamination. The entire sampling strategy was premised on the possible presence of potential contaminants in the septic tank, PRS-18-003(h). As indicated in the response to Comment 2.b.vii(1), it was not possible to locate a groundwater sampling point in a more representative location. However, as also noted in that response, no contaminants were detected in the tank.

Comment 2.b.vii(5). *The tank liquids, soil, and groundwater were not sampled for inorganic constituents even though the RFI Workplan (Table 5-1) cites beryllium, uranium, silver, and plutonium as potential contaminants of concern. LANL must clarify why the samples were not analyzed for these constituents and sample the tanks, soil, and groundwater for them.*

LANL Response:

As indicated in Table 4-1 of the RFI report, liquids from the tank and soil from location 18-1045 were analyzed for inorganics. As noted in Section 4.1.7.2, there was no sludge in the tank, and it was not possible to collect groundwater samples. The data for inorganic constituents in the tank water are presented in Tables 4-26 and 4-27. As noted in Section 4.1.7.3.1, no inorganic concentrations in the soil samples are above background. This conclusion has been re-evaluated as part of a revision of the UTL values used in the report (see response to Comment 1.a.iv).

2.c. Section 4.2 Sumps, Tanks, and Drains

2.c.i Section 4.2.1 18-004(a,b) Industrial Drainlines, Collection Tanks. *This inactive PRS is inappropriately proposed for NFA based on the following deficiencies:*

Comment 2.c.i(1). *LANL must provide the analytical results for the wipe samples obtained for this PRS; they were not found in Appendix D.*

LANL Response:

Discussion:

Swipes were taken of the interior of the pipe, and the radiation level was measured. Results were reported at or below instrument background.

Revised Text:

Add new text to p. 4-62, Section 4.2.1.2, second paragraph, after second sentence:

...below uncertainty limits. **Analysis of the sample was conducted by a CST-9 mobile radiochemistry lab using a gas-flow proportional counting system which, for this sample, had a minimum detectable activity (MDA) of 1.73 pCi/Filter for alpha radiation, also the uncertainty limit. Uncertainty limits were ±4.47 pCi/Filter for beta and ±269.88 pCi/Filter for gamma radiation. Analytical results were 0.00 pCi/Filter for alpha, 1.60 for beta, and 116.83 for gamma.**

Comment 2.c.i(2). *Table 4-28 of the RFI report indicates that the wipes were only sampled for U and gross alpha/beta/gamma, although the RFI Workplan indicates that the solvents and acids were also utilized at the PRS. LANL must provide the rationale for not sampling for solvents and acids at this PRS.*

LANL Response:

Discussion:

There was no material to collect from the accessible portion of the pipe for analysis for solvents, acids, or uranium. That was not explained in the text.

Revised Text:

Add new text to p. 4-62, section 4.2.1.2, second paragraph, after last sentence:

... vapors above background. **A sharp bend at the pipe opening and lack of any accessible residue prevented planned sampling for solvents, acids, and uranium. Field instruments therefore were used to sample for any vapors or radiation at the pipe opening. Sampling any residues remaining in the downhill end of the presumably empty pipe, which was capped during decommissioning of PRS 18-004(b), would require excavation of the driveway. Based on negative results of field and radiological sampling, such disruptive actions seem unwarranted.**

Comment 2.c.i(3). *Subsurface soils and groundwater were not adequately (none were obtained) sampled and characterized at this PRS. LANL must ensure that subsurface soils and groundwater have not been adversely affected by this PRS.*

LANL Response:

The approved RFI work plan proposed sampling the surface of the concrete in the former containment pit; no groundwater sampling was proposed. As noted in Section 4.2.1.2 of the RFI report, it was not possible, using geophysics, to locate the concrete because of the interfering effects of numerous underground utilities. There is no information as to whether remnants of the pit even exist. It is not possible to excavate at the site, because that excavation would block a vehicle path necessary to both site operations and security personnel; site security procedures preclude blocking this location. There is no evidence of a release of contaminants at this site, and LANL believes NFA is appropriate. However, if HRMB will not approve a request for NFA, LANL will request that investigation of these PRSs be deferred until site decommissioning.

2.c.ii Section 4.2.2 18-012(a) Outfall: *This non-Hazardous and Solid Waste Amendment (HSWA) active PRS should be retained for further evaluation based on the following deficiency.*

Comment 2.c.ii(1). *Page 4-67 states that "benzo(a)pyrene [which is an Appendix VIII constituent]...is retained as a COPC..." however, page 4-69 states that "...no COPCs...were retained..." LANL must clarify this issue and revise the text as necessary.*

Section 4.2.2.3.1 is modified as follows:

ORGANICS. **The QA/QC samples were collected as part of the drain and outfall aggregate that included PRSs 18-012(a), 18-012(b), 18-012(c), and 18-013, along with the field samples at these PRSs and two sets of field duplicates. In addition, routine laboratory QA/QC samples were prepared and analyzed with each batch of samples. Two samples had QA/QC problems associated with the SVOC data that resulted in data qualifiers being assigned to the results. The qualification of the data because of QA/QC issues did not affect the sufficiency of the data for decision-making purposes because the majority were acceptable and defensible. The QA/QC**

mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

- Several SVOCs reported as undetected had detection limits greater than their SALs. The detection limits were the normal EQLs because no dilutions or matrix interference problems were encountered with these samples. Therefore, the relationship between the sample value and the SAL for each analyte was unclear. All but two of these compounds were eliminated as COPCs because process information suggested that their presence at this site was unlikely as a result of site activities.

- ~~The two analytes, benzo(a)pyrene and bis(2-chloroethyl)ether, had problems with the blind QC sample that resulted in the data being biased low and data usability being questionable. Benzo(a)pyrene was the only analyte retained as a COPC because its presence at the site could be reasonably assumed.~~

- Two SVOC samples from one request number had QA problems associated with the blind QC sample that resulted in several analytes being qualified as UJ or R. The analytes qualified as UJ included anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, bis(2-chloroethyl)ether, 2-chloro-3-methylphenol, 4-methylphenol, naphthalene, pentachlorophenol, pyrene, 1,2,4-trichlorobenzene, and 2,4,6-trichlorophenol. The data are usable because the recoveries were sufficient to detect and quantify the analytes if they were present. The analytes qualified as R were 1,2-dichlorobenzene, hexachloroethane, and 2-methylphenol, and are unusable because the recoveries were <10%, making quantification difficult. The unusable data did not affect the sufficiency of the data for decision-making purposes because these analytes are not expected to be present in the runoff from the drain and storm sewer.

~~Data usability for undetected, biased-low analytes that had SALs greater than detection limits was unaffected.~~

Because no organic compounds were detected at this PRS, none were retained as COPCs.

Section 4.2.2.3.3, Data Interpretation, is modified as follows:

In general, polycyclic aromatic hydrocarbons (PAHs), the group to which benzo(a)pyrene, benzo(b) fluoranthene, chrysene, pyrene, etc. belongs, have been sporadically detected at many PRSs throughout the Laboratory. There is typically no specific source of PAHs attributable to the process activities at these PRSs. It has been found that PAHs are associated with asphalt runoff (e.g., paved areas and roofs) as well as incomplete combustion (e.g., incinerators, forest fires, or vehicle exhaust) (Clement International Corporation 1995, ER ID No. 55663; Bradley et al. 1994, 1144; Menzie et al. 1992, ER ID No. 55635; Butler et al. 1984, ER ID No. 55634; Edwards 1983, ER ID No. 55636). In most cases, these chemicals are detected in areas influenced by these types of non-PRS-related sources, e.g., stormwater outfalls, ditches next or near paved driveways or roads, etc. The PAHs are eliminated, in many cases, based on available site information, because only those chemicals believed or suspected of being associated with a release from a PRS as a result of site activities are retained and subjected to the screening assessment process.

Benzo(a)pyrene was qualified as "undetected estimated" (UJ) in the surface soil because of a problem with the blind QC sample that resulted in the data being biased low, and was initially retained as a COPC at PRS 16-012(a) because the detection limit was greater than the SAL. Its potential presence in the surface soil would be the result of the discharge from a combined industrial sewer and drain, which drains the asphalt roof of the building as well as the floors and sinks from Building 16-116 (Criticality Area 3). Based on available site information (LANL 1993, 1085; Paxton 1978, 16-0006), no materials were used that would have resulted in PAHs being released at this site. Because no other source of benzo(a)pyrene, except the runoff from the asphalt roof, is present at this PRS, this non-PRS-related activity is the presumed source and benzo(a)pyrene is eliminated as a COPC.

Benzo(a)pyrene was retained as a COPC by the screening assessment. However, the outfall receives the discharge from a combined industrial sewer and drain, which services the roof, floor, and sinks from Building 18-116. The presence of benzo(a)pyrene, a PAH, probably is the result of drainage from the asphalt roof. Therefore, it is eliminated from further evaluation.

A preliminary review of the radiological data indicates that uranium was detected in soil samples but at background concentrations.

No ecotoxicological COPCs were retained for PRS 18-012(a).

References:

Paxton, H.C., March 1978. "Thirty Years at Pajarito Canyon Site," Los Alamos Scientific Laboratory Report LA-7121-H, ER ID No. 5716, Los Alamos, New Mexico. (LANL 1993, 1085)

Clement International Corporation, August 1995. "Toxicological Profile for Polycyclic Aromatic Hydrocarbons," prepared under Contract No. 205-88-0608 for Agency for Toxic Substances and Disease Registry, ER ID No. 55663, US Public Health Service, Washington, DC. (Clement International Corporation 1990, ER ID No. 55663)

Bradley, L.J.N., B.H. Magee, and S.L. Allen, 1994. "Background Levels of Polycyclic Aromatic Hydrocarbons (PAH) and Selected Metals in New England Urban Soils," in Journal of Soil Contamination, Vol. 3(4), p. 349. (Bradley et al. 1994, 1144)

Butler, J.D., V. Butterworth, S.C. Kellow, and H.G. Robinson, 1984. "Some Observations of the Polycyclic Aromatic Hydrocarbon (PAH) Content of Surface Soils in Urban Areas," *The Science of the Total Environment*, ER ID No. 55634, Vol. 33, pp. 75-85. (Butler et al. 1984, ER ID No. 55634)

Edwards, N.T., 1983. "Polycyclic Aromatic Hydrocarbons (PAHs) in the Terrestrial Environment — A Review," *Journal of Environmental Quality*, ER ID No. 55636, Vol. 12, No. 4, pp. 427-441. (Edwards 1983, ER ID No. 55636)

LANL (Los Alamos National Laboratory), May 1993. "RFI Work Plan for Operable Unit 1093," Los Alamos National Laboratory Report LA-UR-93-422, Los Alamos, New Mexico. (LANL 1993, 1085)

Menzie, C.A., B.B. Potocki, and J. Santodonato, 1992. "Exposure to Carcinogenic PAHs in the Environment," *Environmental Science and Technology*, ER ID No. 55635, Vol. 26, No. 7, pp. 1278-1284. (Menzie et al. 1992, ER ID No. 55635)

2.c.iii Section 4.2.3 18-012(b) Outfall: *This non-HSWA active PRS should be retained for further evaluation based on the following deficiencies:*

Comment 2.c.iii(1). *LANL compares COPCs which are greater than SALs to industrial PRGs. LANL must compare COPCs which exceed SALs to USEPA Region IX residential PRGs, or when PRGs are unavailable, SALs calculated from Subpart S guidance. See comment 1.a.v.*

LANL Response:

Discussion: The data from PRS 18-012(b) has been re-evaluated using the current background UTLs and SALs (EPA Region 9 residential PRGs) and the results presented in the response to comment 1.a.v. In addition, the COPCs (chemicals either greater than SALs or as a result of the MCE) were evaluated and the cancer risk or hazard quotients calculated based on a comparison to the EPA Region 9 industrial PRGs. The results of this preliminary risk evaluation are also presented in the response to comment 1.a.v. These PRGs were used because the future land use scenario is expected to remain as continued Laboratory use. This conservative comparison was done in lieu of a baseline risk assessment, because only a few samples were collected at this PRS and the sampling was biased towards the most likely contaminated areas.

Comment 2.c.iii(2). *LANL must provide supporting documentation to support the elimination of COPCs based on the presence of potential alternate source(s). See comment 1.b.iv.*

LANL Response:

The first paragraph of Section 4.2.3.3.4 is modified as follows:

In general, polycyclic aromatic hydrocarbons (PAHs), the group to which benzo(a)pyrene, benzo(b) fluoranthene, chrysene, pyrene, etc. belongs, have been sporadically detected at many PRSs throughout the Laboratory. There is typically no specific source of PAHs attributable to the process activities at these PRSs. It has been found that PAHs are associated with asphalt runoff (e.g., paved areas and roofs) as well as incomplete combustion (e.g., incinerators, forest fires, or vehicle exhaust) (ATSDR 1995; Bradley et al. 1994, 1144; Menzie et al. 1992, ER ID No. 55635; Butler et al. 1984, ER ID No. 55634; Edwards 1983, ER ID No. 55636). In most cases, these chemicals are detected in areas influenced by these types of non-PRS-related sources, e.g., stormwater outfalls, ditches next or near paved driveways or roads, etc. The PAHs are eliminated, in many cases, based on available site information, because only those chemicals believed or suspected of being associated with a release from a PRS as a result of site activities are retained and subjected to the screening assessment process.

The organics detected in the sediments from the storm sewer outfall are PAHs. The outfall at PRS 18-012(b) receives discharge from several sources, including the floor drains, sinks, a welding quench tank, and runoff from the asphalt and tar roofs of Buildings 18-30 and 18-31 (LANL 1993, 1085; LASL 1955; ER ID No. 14744). Because the only source of PAHs is the runoff from the asphalt and tar roofs, a non-PRS related activity, the PAHs detected at the outfall are eliminated as COPCs. ~~The outfall is strongly influenced by drainage from the asphalt and tar roofs of Buildings 18-30 and 18-31. Therefore, it is likely that the high concentrations of PAHs in the sediments are the result of the runoff from these areas and are not site-related activities. The organic COPCs are therefore eliminated from further evaluation.~~

References:

Clement International Corporation, August 1995. "Toxicological Profile for Polycyclic Aromatic Hydrocarbons," prepared under Contract No. 205-88-0608 for Agency for Toxic Substances and Disease Registry, ER ID No. 55663, US Public Health Service, Washington, DC. (Clement International Corporation 1990, ER ID No. 55663)

Bradley, L.J.N., B.H. Magee, and S.L. Allen, 1994. "Background Levels of Polycyclic Aromatic Hydrocarbons (PAH) and Selected Metals in New England Urban Soils," in Journal of Soil Contamination, Vol. 3(4), p. 349. (Bradley et al. 1994, 1144)

Butler, J.D., V. Butterworth, G.C. Kellow, and H.G. Robinson, 1984. "Some Observations of the Polycyclic Aromatic Hydrocarbon (PAH) Content of Surface Soils in Urban Areas," *The Science of the Total Environment*, ER ID No. 55634, Vol. 33, pp. 75-85. (Butler et al. 1984, ER ID No. 55634)

Edwards, N.T., 1983. "Polycyclic Aromatic Hydrocarbons (PAHs) in the Terrestrial Environment — A Review," *Journal of Environmental Quality*, ER ID No. 55636, Vol. 12, No. 4, pp. 427-441. (Edwards 1983, ER ID No. 55636)

LANL (Los Alamos National Laboratory), May 1993. "RFI Work Plan for Operable Unit 1093," Los Alamos National Laboratory Report LA-UR-93-422, Los Alamos, New Mexico. (LANL 1993, 1085)

LASL (Los Alamos Scientific Laboratory), May 27, 1955. Engineering Drawing ENG-C-12711, Rev. 4, Sheet 61 of 101, prepared by Skidmore, Owings, and Merrill, SFA-GJ-52-2, ER ID No. 14744, Los Alamos, New Mexico.

Menzie, C.A., B.B. Potocki, and J. Santodonato, 1992. "Exposure to Carcinogenic PAHs in the Environment," *Environmental Science and Technology*, ER ID No. 55635, Vol. 26, No. 7, pp. 1278-1284. (Menzie et al. 1992, ER ID No. 55635)

2.c.iv Section 4.2.4 18-012(c) Outfall: *This non-HSWA active PRS should be retained for further evaluation based on the following deficiencies:*

Comment 2.c.iv(1) *LANL shall conduct further investigations at this PRS to address the following concerns: obtaining one sample at the apex of the drain line is inadequate to identify a release and no samples were obtained from the nearby drainage-way.*

LANL Response:

Two samples were collected at the outfall of this drain, as indicated in Figure 4-11. The outfall consisted of a pipe, the end of which was exposed in a vertical earthen bank in the side of a drainage ditch. The drainage ditch conducts runoff from the nearby highway and frequently carries runoff water. Samples were collected from the sidewall of the ditch, directly under the pipe opening; samples collected from the bottom of the drainage ditch would not be representative of any discharge from the pipe. The drainage ditch sample was proposed in the approved RFI work plan, but this deviation from the plan was not noted in the RFI report. The variance will be included in the text revision proposed in the response to Comment 1. c.i. However, LANL believes that the sampling was performed in the most appropriate location to bound the magnitude of any contamination resulting from discharges from the outfall and that additional sampling is not required.

Comment 2.c.iv(2). *The RFI Workplan indicates that the sump was eliminated from sampling due to the lack of contaminants of concern (process information). If no COPCs were anticipated, LANL must explain the rationale leading to the sampling of this drain line.*

LANL Response:

As explained in the RFI work plan and in Section 4.2.4 of the RFI report, there are two drains associated with this PRS—one drains the pit formerly containing an ultrasonic cleaner and the other is connected to floor drains where only potable water could have been discharged. The drain connected to equipment pit was sampled (see response to Comment 2.c.iv(1)). As explained in Section 4.2.4., the other drain, which discharges to a dry well sump, was not sampled.

2.c.v. Section 4.2.5 18-013 Waste Tank: *This non-HSWA inactive PRS should be retained for further evaluation based on the following deficiency:*

Comment 2.c.v(1). *LANL compares COPCs which are greater than SALs to industrial PRGs. LANL must compare COPCs which exceed SALs to USEPA Region IX residential PRGs, or when PRGs are unavailable, SALs calculated from Subpart S guidance. See comment 1.a.v.*

LANL Response:

See responses to Comments 1.a.v. and 2.c.iii(1) regarding comparisons to Region 9 residential PRGs.

Discussion:

The data from PRS 18-013 has been re-evaluated using the current background UTLs and SALs (EPA Region 9 residential PRGs) and the results presented in the response to Comment 1.a.v. In addition, the COPCs (chemicals detected at concentrations greater than SALs) were evaluated and the cancer risk or hazard quotients calculated based on a comparison to the EPA Region 9 industrial PRGs. The results of this preliminary risk evaluation are also presented in the response to Comment 1.a.v. These PRGs were used because the future land use scenario is expected to remain as continued Laboratory use. This conservative comparison was done in lieu of a baseline risk assessment, because only a few samples were collected at this PRS and the sampling was biased towards the most likely contaminated areas.

2.c.vi Section 4.3.1 18-08 - Underground Storage Tank: *This non-HSWA inactive PRS is proposed for no further action because it could not be located.*

Comment 2.c.vi(1). *Since the completion of this RFI report, this tank has been located and is, therefore, not appropriate for NFA recommendations until investigations have been completed. The tank should be investigated and remediated under the State of New Mexico's Underground Storage Tank regulations.*

LANL Response:

As noted in the comment, this tank was located in the summer of 1996. The tank and contents were removed, soil samples collected from beneath the tank, and auger holes drilled below the former tank and around the periphery to verify the extent of petroleum hydrocarbon contamination. A report on the removal of the tank and the associated sampling was submitted to the New Mexico Underground Storage Bureau on December 4, 1996.

2.d Section 4.4 Firing Sites

2.d.i General

Comment 2.d.i(1). *LANL failed to investigate the potential for release to groundwater for these sites. No attempt was made to determine if the firing sites contribute to HE concentrations in groundwater.*

LANL Response:

Groundwater sampling specific to the firing site areas was not proposed in the approved RFI Work Plan. HE was detected in 2 of the 14 soil samples collected at PRS 18-002(a) and in 2 of the 31 samples collected at PRSs 18-002(b and c). One of the reported values at PRS 18-002(a) was slightly greater than the SAL, but less than the industrial PRG [see response to Comment 2.d.ii(4)]. HE was reported at low concentrations in 4 of the 99 soil samples collected at PRS 27-002, and all concentrations were substantially below SALs. LANL believes that these concentrations do not present an unacceptable risk to human health and do not represent a significant source of potential groundwater contamination. HE constituents were reported in samples of groundwater from background wells up-gradient from TA-18 (Section 3.2.1) and in the discharge from the spring, which recharges the alluvial aquifer in Threemile Canyon (Section 4.8.3.1). Groundwater samples from the PCO wells (Section 4.7.1) and the LACEF wells (Section 4.7.2) also show concentrations of HE, but at levels comparable to that observed in the background wells. All reported values of HE constituents in groundwater (and in the water sampled in Threemile Canyon) are below the respective SAL. LANL sees no basis for extensive additional sampling to investigate the possible effect of the firing sites on groundwater. However, some additional groundwater sampling is proposed that will augment the existing knowledge, as described in the response to Comment 1.a.ii.

Comment 2.d.i(2). *LANL obtained composite samples at these firing sites. Composite samples are inappropriate for determining the nature and extent of contamination. LANL must resample these sites using discrete grab sampling methodologies. See comment 1.c.ii.*

LANL Response:

See response to Comment 1.c.ii.

Comment 2.d.i(3). *LANL's analytical laboratory consistently exceeded holding times for HE samples. LANL must resample these sites to obtain useable data.*

LANL Response:

During the time the RFI was conducted at former OU 1093, analysis of samples for HE was performed by the Laboratory's DX division. Sample through-put often fell short of demand, and samples were frequently held past the holding times specified in SW846 methods. However, samples were maintained in freezers prior to extraction and in refrigerators at 4°C in the dark prior to analysis, and it is believed that little degradation of the HE occurred after sample collection. The activities that may have introduced HE to the soil occurred in the early 1940s, and all unstable HE constituents are likely to have degraded during the 50 years elapsed time until sampling occurred. LANL has performed some specific investigations of the effects of the missed holding times on the representativeness of the analyses.

Both RDX and HMX degrade slowly in the environment, and expected degradation half-lives are 36 and 39 years, respectively (DuBois and Baytos 1991, 0718). On the other hand, trinitrotoluene (TNT) and explosive material impurities such as mononitrotoluene and mononitrobenzene degrade relatively quickly when exposed to moisture and sunlight (TOXNET). The organisms that metabolize these latter aromatic compounds thrive in environmental conditions, and their activity can be enhanced by exposure of the sample to moisture or sunlight after sample collection. The ordinary methods of sample safekeeping, cooling and protection from sunlight, will retard biological degradation of HE constituents, and even samples that are held past specified holding times will have more residual contamination than the same material would have had if left in place in the environment.

The high explosive materials were released to the environment at the TA-18 firing sites more than 50 years ago. Readily degradable materials have, in all likelihood, been degraded, and some additional exposure to sunlight will not have substantially accelerated that degradation. The samples were eight refrigerated or frozen while being held for analysis, contributing to reduction in the rate of degradation. Thus, the effect of missed holding times is less than it would be for relatively "fresh" explosive material, particularly with regard to aromatic compounds.

Laboratory Group DX-2, responsible for performing the HE analyses conducted for this RFI, conducted an experiment to determine the effect of missed holding times for both extraction and analysis (Campbell and Rivera 1995, 1321). Spiked QC samples were kept frozen. Extraction and analysis was performed within the specified 14 and 40 days, respectively, to produce a baseline. Parts of the remaining samples were extracted within the specified 14 days, and then held for 71 days before extraction. The remaining samples were held for 71 days before extraction, and then anaylsis of the extract was performed within 3 days.

In the experiment, the spiked compounds were detected in all samples, but reported concentrations were lower in those samples held beyond the extraction or analysis times than in those analyzed within the specified holding times. Campbell and Rivera suggest a multiplier of 3 can be applied to data from samples with missed holding times to bound the concentrations that would have been observed had samples been extracted and analyzed properly.

The extent to which holding times were exceeded varied for samples from TA-18, with some samples more than 50 days beyond the specified extraction times, and some more than 110 days beyond the specified time after extraction. While these delays are in the general range of those used in the experiment, it is conservative to apply an additional factor beyond the multiplier of 3 proposed by

Campbell and Rivera. Data are considered generally usable if the extraction and analysis was within the experimental period applied by Campbell and Rivera (see response to Comment 1.a.ii). However, some re-sampling will be required to better quantify the effect of missed holding times for samples where the holding times were grossly exceeded.

For the firing sites at TA-18 and TA-27, HE or related compounds were detected in samples that both met and exceeded holding times. However, most detects were in samples that met holding times. Additional sampling will be included in the proposed groundwater sampling program described in the response to Comment 1.a.ii. The plan for collection of additional samples for HE analysis will be submitted to HRMB by September 30, 1997.

References:

Campbell, M. S., and T. Rivera, November 27, 1995. "HE Analyses Effected by Exceeded Holding Times," Los Alamos National Laboratory Memorandum DX-2:95-____ to Danny Martinez (ESA-EPE) from Mary. S. Campbell and Thomas Rivera (DX-2), ER ID No. 53900, Los Alamos, New Mexico. (Campbell and Rivera 1995, 1321)

DuBois, F. W. and J. F. Baytos, May 1991. "Weathering of Explosives for Twenty Years," Los Alamos National Laboratory Report LA-11931, Los Alamos, New Mexico. (DuBois and Baytos 1991, 0718)

TOXNET (on-line database of chemical stability and toxicological information, including environmental fate and transport data of chemical contaminants).

2.d.ii Section 4.4.1. 18-002(a) Firing Site: *This inactive PRS is inappropriately proposed for NFA based on the following deficiencies:*

Comment 2.d.ii(1). *LANL did not ascertain if this PRS adversely impacted the groundwater. See comment 2.d.i.(1).*

LANL Response:

This PRS is not inactive, it was abandoned as a firing site in the late 1940's. See response to Comment 2.d.i.(1) regarding effects of this PRS on groundwater.

Comment 2.d.ii(2). *LANL obtained composite samples for determining the nature and extent of contamination. See comment 2.d.i.(2).*

LANL Response:

See response to Comment 1.c.ii.

Comment 2.d.ii(3). *The laboratory exceeded the holding times for the HE samples. See comment 2.d.i.(3).*

LANL Response:

See response to Comment 2.d.i(3).

Comment 2.d.ii(4). *LANL inappropriately compares COPCs greater than SALs to industrial and recreational PRGs. See Comment 1.a.v.*

LANL Response:

Discussion. The data from PRS 18-002(a) has been re-evaluated using the current background UTLs and SALs (EPA Region 9 residential PRGs) and the results presented in the response to comment 1.a.v. The HE organics, 2,4-dinitrotoluene, 2,6-dinitrotoluene, and nitrobenzene, were detected in the surface soil. In the RFI report, 2,4-dinitrotoluene and 2,6-dinitrotoluene were less than their SALs and nitrobenzene was greater than its SAL. As a result of the rescreening, all three chemicals (2,4-dinitrotoluene, 2,6-dinitrotoluene, and nitrobenzene) were eliminated because they are below their SALs (Region 9 residential PRGs).

2.d.iii Section 4.4.2 18-002(b,c) *Firing Sites, Drop Tower in Threemile Canyon: These inactive PRSs are inappropriately proposed for NFA based on the following deficiencies:*

Comment 2.d.iii(1). *LANL did not ascertain if this PRS adversely impacted the groundwater. See comment 2.d.i.(1).*

LANL Response:

See response to Comment 2.d.i(1).

Comment 2.d.iii(2). *LANL obtained composite samples for determining the nature and extent of contamination. See comment 2.d.i.(2).*

LANL Response:

See response to Comment 1.c.ii.

Comment 2.d.iii(3). *The laboratory exceeded the holding times for the HE samples. See comment 2.d.i.(3).*

LANL Response:

See response to Comment 2.d.i.(3).

2.d.iv Section 4.4.3 27-002 Firing Site: *This inactive PRS is inappropriately proposed for NFA based on the following deficiencies:*

Comment 2.d.iv(1). *LANL did not ascertain if this PRS adversely impacted the groundwater. See comment 2.d.i.(1).*

LANL Response:

See response to Comment 2.d.i(1).

Comment 2.d.iv(2). *LANL obtained composite samples for determining the nature and extent of contamination. See comment 2.d.i.(2).*

LANL Response:

See response to Comment 1.c.ii.

Comment 2.d.iv(3). *The laboratory exceeded the holding times for the HE samples. See comment 2.d.i.(3).*

LANL Response:

See response to Comment 2.d.i(3).

2.e Section 4.5 Sites with Potentially Contaminated Soil

2.e.i General

Comment 2.e.i(1). *The RFI report did not provide a "Sampling and Analysis Plan" table for the PRSs with potentially contaminated soil. LANL shall revise the RFI report to include such table.*

LANL Response:

Insert on p. 4-130, Section 4.5.1.2, following the first paragraph:

Analyses conducted on potentially contaminated soil at the magazine site were as follows:
- Rad van screening (alpha, beta, gamma)
- Metals (EPA 6010)
- High Explosives (U.S. Army Toxic & Hazardous Materials Agency 0522)
- Total Uranium (HASL-300)
- Isotopic Thorium (HASL-300)
- Gamma Spectroscopy (HASL-300), but done only if gross gamma was above background

Insert on p. 4-134, Section 4.5.2.2, following the first paragraph:

Analyses conducted on potentially contaminated soil at the generator pad were as follows:
- Rad van screening (alpha, beta, gamma)
- Mercury analysis (EPA 7471)

2.e.ii Section 4.5.1 16-005(a) Magazine Site: *This inactive PRS is inappropriately proposed for NFA based on the following deficiencies:*

Comment 2.e.ii(1). *LANL failed to obtain samples from within the PRS's bermed area. LANL shall obtain the additional samples.*

LANL Response:

LANL conducted the sampling at this site in accordance with the approved RFI Work Plan. As noted in Section 5.3.1.1.2 of the RFI work plan, the SWMU Report indicated the possible presence of contamination in the area surrounding the former location of the magazine. The immediate perimeter of the former building was, therefore, considered the most appropriate location for sampling. The berm surrounding the former location of the magazine is no longer present. As noted in the RFI Work Plan, there were no reports of releases from the magazine. LANL sees no basis for resampling at this site.

Comment 2.e.ii(2). *LANL sampled subsurface soils at a depth of one foot followed by a sample every other foot. LANL must explain the rationale for this sampling interval.*

LANL Response:

As described in Section 4.5.1.2, samples were collected from 0 to 12 in. No samples were collected as alluded to by the comment.

2.e.iii. **Section 4.5.2 18-011 Building 18-22 Site:** *This non-HSWA inactive PRS should be retained for further evaluation based on the following deficiencies:*

Comment 2.e.iii(1). *Surface soil sampling that was conducted for this PRS inadequately characterizes the site. LANL sampled the surface soils (0 to 6 inches) at the site. Since Section 4.5.2.2 states that the building's foundation is covered with approximately two feet of soil, then potential contamination is anticipated to be approximately two feet below ground surface and not in surface soils. LANL must resample this PRS at a depth corresponding with the building's foundation.*

LANL Response:

Discussion:

The text in Section 4.5.2.2 did not adequately explain how the sampling was conducted. Trenches were excavated to expose the edges and center of the concrete pad (there was no former building at this location). Samples were then collected from 0 to 6 in. below the former edge of the pad and on its surface. LANL believes this is consistent with that suggested by the comment and that no additional sampling is required at this PRS.

Revised Text:

Section 4.5.2.2 is modified as follows:

~~Only surface soil sampling was conducted at PRS 18-011.~~ **Trenches were excavated at PRS 18-011 to expose the edges and the center of the concrete pad that was the foundation of the former building.** Four equally spaced sampling locations were selected 2 ft outside the square perimeter of the remaining foundation slab; a fifth sample was collected at the center of the pad. Figure 4-20 shows the sample locations. **Samples were collected from 0 to 6 inches below the edge of the concrete pad as well as on the surface of the pad.** Using this strategy, sample locations close to Building 18-22 (the **former generator building**) would intersect the area of highest residual contamination if any release had occurred inside the building. In accordance with the RFI Work Plan (LANL 1993, 1085), the number of sampling locations gives 95% confidence of establishing whether concentrations above SALs are present in 50% or more of the area around the former structure.

Comment 2.e.iii(2). *LANL indicates within the RFI report that the mercury spill has been remediated by the Health Division; however, LANL does not provide supporting documentation as evidence of this remedial activity. LANL must provide this additional documentation. See comment 1.b.v, et alia.*

LANL Response:

As noted in Section 5.3.2.1.2 of the RFI work plan, no documentation of the cleanup could be obtained. The nonavailability of that documentation was the primary reason sampling was proposed at this site.

2.f **Section 4.6 Storm Drains**

2.f.i **Section 4.6.1 18-010(b) Storm Drain Outfall:** *This non-HSWA active PRS should be retained for further evaluation based on the following deficiencies:*

Comment 2.f.i(1). *LANL does not provide supporting documentation to support eliminating the COPCs based on "process information." See comment 1.b.iv.*

LANL Response:

Discussion:

Documentation supporting the elimination of PAHs associated with asphalt as COPCs is provided in the response to Comment 1.b.iv.

Revised Text:

The first paragraph of Section 4.6.1.3.4 is modified as follows:

In general, polycyclic aromatic hydrocarbons (PAHs), the group to which benzo(a)pyrene, benzo(b) fluoranthene, chrysene, pyrene, etc. belongs, have been sporadically detected at many PRSs throughout the Laboratory. There is typically no specific source of PAHs attributable to the process activities at those PRSs. It has been found that PAHs are associated with asphalt runoff (e.g., paved areas and roofs) as well as incomplete combustion (e.g., incinerators, forest fires, or vehicle exhaust) (Clement International Corporation 1995, ER ID No. 55663; Bradley et al. 1994, 1144; Menzie et al. 1992, ER ID No. 55635; Butler et al. 1984, ER ID No. 55634; Edwards 1983, ER ID No. 55636). In most cases, these chemicals are detected in areas influenced by these types of non-PRS-related sources, e.g., stormwater outfalls, ditches next or near paved driveways or roads, etc. The PAHs are eliminated, in many cases, based on available site information, because only those chemicals believed or suspected of being associated with a release from a PRS as a result of site activities are retained and subjected to the screening assessment process.

The organic COPCs detected or suspected of being present in sediments from the drainage ditch west of Building 16-30 are PAHs. ~~most likely were a result of pavement runoff and therefore were not related to site activities. Based on this rationale, no organic COPCs were retained at this PRS.~~ Benzo(a)pyrene and dibenzo(a,h)anthracene were qualified as UJ (undetected estimated) in the surface soil and were initially retained as COPCs because the detection limits were greater than the SALs. Their presence in the surface soil was possible because the outfall at PRS 16-010(b) receives discharge from an asphalt paved drainage ditch, as well as runoff from the paved parking area adjacent to the ditch (LANL 1993, 1085), and other PAHs (fluoranthene and phenanthrene) were detected. Because the only likely source of PAHs is the runoff from the asphalt ditch and the paved parking area, non-PRS-related activities, the PAHs suspected of being present at the outfall are eliminated as COPCs.

References:

Agency for Toxic Substances and Disease Registry (ATSDR) 1995. "Toxicological Profile for Polycyclic Aromatic Hydrocarbons (PAHs)," (Update), August.

Bradley, L.J.N., B.H. Magee, and S.L. Allen, 1994. "Background Levels of Polycyclic Aromatic Hydrocarbons (PAH) and Selected Metals in New England Urban Soils," Journal of Soil Contamination, 3(4): 349-361.

Butler, J.D., V. Butterworth, S.C. Kellow, and H.G. Robinson, 1984. "Some Observations of the Polycyclic Aromatic Hydrocarbon (PAH) Content of Surface Soils in Urban Areas," The Science of the Total Environment, 33: 75-85.

Edwards, N.T., 1983. "Polycyclic Aromatic Hydrocarbons (PAHs) in the Terrestrial Environment — A Review," Journal of Environmental Quality, 12(4): 427-441.

LANL (Los Alamos National Laboratory), May 1993. "RFI Work Plan for Operable Unit 1093," Los Alamos National Laboratory Report LA-UR-93-422, Los Alamos, New Mexico. (LANL 1993, 1085)

Menzie, C.A., B.B. Potocki, and J. Santodonato, 1992. "Exposure to Carcinogenic PAHs in the Environment," Environmental Science and Technology, 26(7): 1278-1284.

Comment 2.f.ii(2). *Although the RFI Work Plan anticipated that solvents had been utilized at the PRS, no samples were obtained or analyzed for VOCs. LANL shall provide sampling documentation that VOCs are not present at this PRS.*

LANL Response:

Sampling at this site was in accordance with the approved RFI Work Plan. As explained in Section 5.4.5.1 of the work plan, VOCs could not reasonably be expected to have been retained in the sediments at these sites. LANL sees no basis for re-sampling.

2.f.ii Section 4.6.2 18-010(c) Storm Drain Outfall: *This non-HSWA active PRS should be retained for further evaluation based on the following deficiencies:*

Comment 2.f.ii(1). *LANL does not provide supporting documentation to support eliminating the COPCs based on "process information." See comment 1.b.iv.*

LANL Response:

Discussion:

Documentation supporting the elimination of PAHs associated with asphalt as COPCs is provided in the response to Comment 1.b.iv.

Revised Text:

Section 4.6.2.3.4 is modified as follows:

In general, polycyclic aromatic hydrocarbons (PAHs), the group to which benzo(a)pyrene, benzo(b) fluoranthene, chrysene, pyrene, etc. belongs, have been sporadically detected at many PRSs throughout the Laboratory. There is typically no specific source of PAHs attributable to the process activities at these PRSs. It has been found that PAHs are associated with asphalt runoff (e.g., paved areas and roofs) as well as incomplete combustion (e.g., incinerators, forest fires, or vehicle exhaust) (Clement International Corporation 1995, ER ID No. 55663; Bradley et al. 1994, 1144; Menzie et al. 1992, ER ID No. 55635; Butler et al. 1984, ER ID No. 55634; Edwards 1983, ER ID No. 55636). In most cases, these chemicals are detected in areas influenced by these types of non-PRS-related sources, e.g., stormwater outfalls, ditches next or near paved driveways or roads, etc. The PAHs are eliminated, in many cases, based on available site information, because only those chemicals believed or suspected of being associated with a release from a PRS as a result of site activities are retained and subjected to the screening assessment process.

~~The organics COPCs suspected of being present in the sediments around Building 18-30 most likely are derived from the drainage of the paved area. In addition, the detection of a low concentration of phenanthrene in the sediments most likely is a result of this drainage. Therefore, no organic COPCs related to site activities are present at this PRS.~~

The outfall at PRS 18-010(c) receives runoff from the asphalt paved area and driveway between Buildings 18-30 and 18-31 (LANL 1990, 0145; LANL 1993, 1066), which are a likely source of PAHs as described above. The PAHs, e.g., benzo(a)pyrene, were undetected in the surface soil, and were initially retained as COPCs because the detection limits were greater than the SALs. However, because the source of the PAHs is non-PRS-related activities (runoff from asphalt), the PAHs presumed to be present at the outfall are eliminated as COPCs. Only those chemicals believed or suspected of being associated with a release from a PRS as a result of site activities are retained as COPCs.

Bis(2-chloroethyl)ether was eliminated from further consideration because it was not likely to be present as a result of site activities. Based on the *Handbook of Environmental Contaminants: Guide for Site Assessment*, (Shinoldecker 1992, ER ID No. 55587), bis(2-chloroethyl)ether is an organic solvent used in a variety of processes and is not part of the chemical inventory for TA-16. The only process listed that would be relevant at this site is its use in tar processing. Therefore, it may be present in minute quantities as a result of the runoff from the asphalt roofs and can be eliminated as originating from a non-PRS-related activity.

Pentachlorophenol was also eliminated because process information and the chemical inventory suggested its presence at the site was unlikely. This chemical is used as an insecticide for termite control and as a general herbicide (Budavari 1989, ER ID No. 55589) and, therefore, may be associated with maintenance activities at TA-16. Therefore, it can be eliminated based on its source being a non-PRS-related activity.

Copper and mercury are detected at concentrations greater than the background UTL. However, neither is present at concentrations greater than its SAL; therefore, both are eliminated as COPCs.

The first paragraph of Section 4.6.2.4 is modified as follows:

~~At PRS 16-010(c), the organics retained as COPCs are PAHs, which are often detected in soils and sediments in the vicinity of paved areas as a result of drainage. Because this PRS receives drainage primarily from the paved area around Building 16-30, and the PAHs have no identified sources, they are not retained as COPCs. As a result,~~ No RCRA-regulated human health COPCs are retained at PRS 16-010(c). A preliminary review of the radiological data indicates that uranium, the only radioactive COPC, was present at background concentrations.

References:

Clement International Corporation, August 1995. "Toxicological Profile for Polycyclic Aromatic Hydrocarbons," prepared under Contract No. 205-88-0608 for Agency for Toxic Substances and Disease Registry, ER ID No. 55663, US Public Health Service, Washington, DC. (Clement International Corporation 1990, ER ID No. 55663)

Bradley, L.J.N., B.H. Magee, and S.L. Allen, 1994. "Background Levels of Polycyclic Aromatic Hydrocarbons (PAH) and Selected Metals in New England Urban Soils," in Journal of Soil Contamination, Vol. 3(4), p. 349. (Bradley et al. 1994, 1144)

Budavari, S. (Ed.), 1989. *The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals*, ER ID No. 55589, 11th edition, Merck and Company, Rahway, New Jersey. (Budavari 1989, ER ID No. 55589)

Butler, J.D., V. Butterworth, S.C. Kellow, and H.G. Robinson, 1984. "Some Observations of the Polycyclic Aromatic Hydrocarbon (PAH) Content of Surface Soils in Urban Areas," *The Science of the Total Environment*, ER ID No. 55634, Vol. 33, pp. 75-85. (Butler et al. 1984, ER ID No. 55634)

Edwards, N.T., 1983. "Polycyclic Aromatic Hydrocarbons (PAHs) in the Terrestrial Environment — A Review," *Journal of Environmental Quality*, ER ID No. 55636, Vol. 12, No. 4, pp. 427-441. (Edwards 1983, ER ID No. 55636)

LANL (Los Alamos National Laboratory), November 1990. "Solid Waste Management Units Report," Volumes I through IV, Los Alamos National Laboratory Report LA-UR-90-3400, prepared by International Technology Corporation under Contract 9-XS8-0062R-1, Los Alamos, New Mexico. (LANL 1990, 0145)

LANL (Los Alamos National Laboratory), May 1993. "RFI Work Plan for Operable Unit 1093," Los Alamos National Laboratory Report LA-UR-93-422, Los Alamos, New Mexico. (LANL 1993, 1085)

Menzie, C.A., B.B. Potocki, and J. Santodonato, 1992. "Exposure to Carcinogenic PAHs in the Environment," *Environmental Science and Technology*, ER ID No. 55635, Vol. 26, No. 7, pp. 1278-1284. (Menzie et al. 1992, ER ID No. 55635)

Shineldecker, C.L. 1992. Handbook of Environmental Contaminants: Guide to Site Assessment, ER ID No. 55587, Lewis Publishers, Chelsea, MI.

Comment 2.f.ii(2). *Although the RFI Work Plan anticipated that solvents had been utilized at the PRS, no samples were obtained or analyzed for VOCs. LANL shall provide sampling documentation that VOCs are not present at this PRS.*

LANL Response:

See response to Comment 2.f.i(2).

2.f.iii Section 4.6.3 18-010(d) Drainage Collection Area: *This non-HSWA active PRS should be retained for further evaluation based on the following deficiencies:*

Comment 2.f.iii(1). *LANL does not provide supporting documentation to support eliminating the COPCs based on "process information." See comment 1.b.iv.*

LANL Response:

Discussion:

Documentation supporting the elimination of PAHs associated with asphalt as COPCs is provided in the response to Comment 1.b.iv.

Revised Text:

Section 4.6.3.3.4 is modified as follows:

~~The organic COPCs detected in sediments are PAHs that most likely are derived the paved area drainage northeast of Building 18-37 and therefore are not related to site activities. Based upon this rationale, these organic COPCs are eliminated from further evaluation.~~

In general, polycyclic aromatic hydrocarbons (PAHs), the group to which benzo(a)pyrene, benzo(b) fluoranthene, chrysene, pyrene, etc. belongs, have been sporadically detected at many PRSs throughout the Laboratory. There is typically no specific source of PAHs attributable to the process activities at these PRSs. It has been found that PAHs are associated with asphalt runoff (e.g., paved areas and roofs) as well as incomplete combustion (e.g., incinerators, forest fires, or vehicle exhaust) (Clement International Corporation 1995, ER ID No. 55663; Bradley et al. 1994, 1144; Menzie et al. 1992, ER ID No. 55635; Butler et al. 1984, ER ID No. 55634; Edwards 1983, ER ID No. 55636). In most cases, these chemicals are detected in areas influenced by these types of non-PRS-related sources, e.g., stormwater outfalls, ditches next or near paved driveways or roads, etc. The PAHs are eliminated, in many cases, based on available site information, because only those chemicals believed or suspected of being associated with a release from a PRS as a result of site activities are retained and subjected to the screening assessment process.

The outfall at PRS 18-010(d) receives runoff from the asphalt paved area northeast of Building 18-37 (LANL 1993, 1085). The PAHs, e.g., benzo(a)pyrene, benzo(b)fluoranthene, etc., were detected in the surface soil, and were initially retained as COPCs. Because the only source of PAHs is the asphalt covered area, a non-PRS-related activity, the PAHs detected at the outfall are eliminated

as COPCs. Only those chemicals believed or suspected of being associated with a release from a PRS as a result of site activities are retained as COPCs.

Lead and zinc were detected at concentrations greater than both their background UTLs and their site-specific background values. Although this detection suggests that the site could be their source, both analytes were present at concentrations below their SALs and therefore are eliminated as COPCs.

The first paragraph of Section 4.6.3.4 is modified as follows:

~~At PRS 18-0010(d), the organics retained as COPCs are PAHs, which are often detected in soils and sediments in the vicinity of paved areas as a result of drainage. Because this PRS receives drainage primarily from the paved area around Building 18-37, and the PAHs have no identified sources, they are not retained as COPCs.~~ **No RCRA-regulated COPCs for human health are retained at PRS 18-010(d).** A preliminary review of the radiological data indicates that uranium, the only radioactive COPC, was present at background concentrations. Therefore, NFA is provisionally recommended based on the No Further Action Criteria Policy's Criterion 4: The site has been characterized, and no COPCs were present. This recommendation is contingent upon a complete review of the radiological data, which will be presented in the addendum to this report (planned for completion by February 1996).

References

Clement International Corporation, August 1995. "Toxicological Profile for Polycyclic Aromatic Hydrocarbons," prepared under Contract No. 205-88-0608 for Agency for Toxic Substances and Disease Registry, ER ID No. 55663, US Public Health Service, Washington, DC. (Clement International Corporation 1990, ER ID No. 55663)

Bradley, L.J.N., B.H. Magee, and S.L. Allen, 1994. "Background Levels of Polycyclic Aromatic Hydrocarbons (PAH) and Selected Metals in New England Urban Soils," in Journal of Soil Contamination, Vol. 3(4), p. 349. (Bradley et al. 1994, 1144)

Butler, J.D., V. Butterworth, S.C. Kellow, and H.G. Robinson, 1984. "Some Observations of the Polycyclic Aromatic Hydrocarbon (PAH) Content of Surface Soils in Urban Areas," *The Science of the Total Environment*, ER ID No. 55634, Vol. 33, pp. 75-85. (Butler et al. 1984, ER ID No. 55634)

Edwards, N.T., 1983. "Polycyclic Aromatic Hydrocarbons (PAHs) in the Terrestrial Environment — A Review," *Journal of Environmental Quality*, ER ID No. 55636, Vol. 12, No. 4, pp. 427-441. (Edwards 1983, ER ID No. 55636)

LANL (Los Alamos National Laboratory), May 1993. "RFI Work Plan for Operable Unit 1093," Los Alamos National Laboratory Report LA-UR-93-422, Los Alamos, New Mexico. (LANL 1993, 1085)

Menzie, C.A., B.B. Potocki, and J. Santodonato, 1992. "Exposure to Carcinogenic PAHs in the Environment," *Environmental Science and Technology*, ER ID No. 55635, Vol. 26, No. 7, pp. 1278-1284. (Menzie et al. 1992, ER ID No. 55635)

Comment 2.f.iii(2). *Although the RFI Workplan anticipated that solvents had been utilized at the PRS, no samples were obtained or analyzed for VOCs. LANL shall provide sampling documentation that VOCs are not present at this PRS.*

LANL Response:

See response to Comment 2.f.i(2).

Comment 2.f.iii(3). *Figure 4-24 does not clearly identify those areas which are paved and unpaved.*

LANL Response:

The perimeter of the paved area is indicated in Figure 4-24. However, the figure incorrectly indicates that paving extends underneath the area sampled at this outfall.

Figure 4-24 is modified to clearly indicate the paved and unpaved areas (see Attachment D).

2.f.iv Section 4.6.4 18-010(e) Storm Drain Outfall: *This non-HSWA active PRS should be retained for further evaluation based on the following deficiencies:*

Comment 2.f.iv(1). *LANL does not provide supporting documentation to support eliminating the COPCs based on "process information." See comment 1.b.iv.*

LANL Response:

Discussion:

Documentation supporting the elimination of PAHs associated with asphalt as COPCs is provided in the response to Comment 1.b.iv.

Revised Text:

Section 4.6.4.3.4 is modified as follows:

~~The organic COPCs detected or thought to be present in the sediment samples most likely are a result of drainage runoff from the paved area around Buildings 18-28 and 18-147.~~

In general, polycyclic aromatic hydrocarbons (PAHs), the group to which benzo(a)pyrene, benzo(b) fluoranthene, chrysene, pyrene, etc. belongs, have been sporadically detected at many PRSs throughout the Laboratory. There is typically no specific source of PAHs attributable to the process activities at these PRSs. It has been found that PAHs are associated with asphalt runoff (e.g., paved areas and roofs) as well as incomplete combustion (e.g., incinerators, forest fires, or vehicle exhaust) (Clement International Corporation 1995, ER ID No. 55663; Bradley et al. 1994, 1144; Menzie et al. 1992, ER ID No. 55635; Butler et al. 1984, ER ID No. 55634; Edwards 1983, ER ID No. 55636). In most cases, these chemicals are detected in areas influenced by these types of non-PRS-related sources, e.g., stormwater outfalls, ditches next or near paved driveways or roads, etc. The PAHs are eliminated, in many cases, based on available site information, because only those chemicals believed or suspected of being associated with a release from a PRS as a result of site activities are retained and subjected to the screening assessment process.

The outfall at PRS 18-010(e) receives discharge from the paved ditch as well as runoff from the asphalt paved area between Buildings 18-28 and 18-147 (LANL 1993, 1085). The PAHs, e.g., benzo(a)pyrene, benzo(b)fluoranthene, etc., were detected in the surface soil, and were initially retained as COPCs. Because the only source of PAHs is the runoff from the paved ditch and the asphalt covered areas, non-PRS-related activities, the PAHs detected at the outfall are eliminated as COPCs. Only those chemicals believed or suspected of being associated with a release from a PRS as a result of site activities are retained as COPCs.

Zinc, lead, and cadmium were detected in the sediments at concentrations greater than both their background UTLs and site-specific background values, which suggests that the site could be a source of these analytes. However, all of the inorganics were present at concentrations less than their SALs and therefore are eliminated as COPCs.

The first paragraph of Section 4.6.4.4 is modified as follows:

~~The organic COPCs retained at PRS 18-010(e) are PAHs, which are often detected in soils and sediments in the vicinity of paved areas as a result of drainage runoff. Because PRS 18-010(e) received~~

drainage from the paved area around Buildings 18-26 and 18-147, and no site-related sources for these PAHs have been identified, these COPCs were not retained. In addition, no inorganic COPCs are retained. No RCRA-regulated COPCs for human health are retained at PRS 18-010(d). A preliminary review of radiological data indicates that uranium, the only radioactive COPC, was present at background concentrations. Therefore, NFA is provisionally recommended for PRS 18-010(e) based on the No Further Action Criteria Policy's Criterion 4: The site has been characterized, and no COPCs were present. This recommendation is contingent upon further review of the radiological data, which will be presented in the addendum to this report (planned for completion by February 1996).

References

Agency for Toxic Substances and Disease Registry (ATSDR) 1995. "Toxicological Profile for Clement International Corporation, August 1995. "Toxicological Profile for Polycyclic Aromatic Hydrocarbons," prepared under Contract No. 205-88-0608 for Agency for Toxic Substances and Disease Registry, ER ID No. 55663, US Public Health Service, Washington, DC. (Clement International Corporation 1990, ER ID No. 55663)

Bradley, L.J.N., B.H. Magee, and S.L. Allen, 1994. "Background Levels of Polycyclic Aromatic Hydrocarbons (PAH) and Selected Metals in New England Urban Soils," in Journal of Soil Contamination, Vol. 3(4), p. 349. (Bradley et al. 1994, 1144)

Butler, J.D., V. Butterworth, S.C. Kellow, and H.G. Robinson, 1984. "Some Observations of the Polycyclic Aromatic Hydrocarbon (PAH) Content of Surface Soils in Urban Areas," *The Science of the Total Environment*, ER ID No. 55634, Vol. 33, pp. 75-85. (Butler et al. 1984, ER ID No. 55634)

Edwards, N.T., 1983. "Polycyclic Aromatic Hydrocarbons (PAHs) in the Terrestrial Environment — A Review," *Journal of Environmental Quality*, ER ID No. 55636, Vol. 12, No. 4, pp. 427-441. (Edwards 1983, ER ID No. 55636)

LANL (Los Alamos National Laboratory), May 1993. "RFI Work Plan for Operable Unit 1093," Los Alamos National Laboratory Report LA-UR-93-422, Los Alamos, New Mexico. (LANL 1993, 1085)

Menzie, C.A., B.B. Potocki, and J. Santodonato, 1992. "Exposure to Carcinogenic PAHs in the Environment," *Environmental Science and Technology*, ER ID No. 55635, Vol. 26, No. 7, pp. 1278-1284. (Menzie et al. 1992, ER ID No. 55635)

Comment 2.f.iv(2). *Although the RFI Work Plan anticipated that solvents had been utilized at the PRS, no samples were obtained or analyzed for VOCs. LANL shall provide sampling documentation that VOCs are not present at this PRS.*

LANL Response:

See response to Comment 2.f.i(2).

Comment 2.f.iv(3). *Sample locations 18-1732 and 18-1733 as shown on Figure 4-25 indicate "(BCP)" and "(BaP)," respectively. LANL must clarify what these notations mean.*

LANL Response:

BaP refers to benzo-a-pyrene. BCP is a typographical error and should have been BaP.

Figure 4-25 is modified to change BCP to BaP and a footnote is added to the figure legend to indicate that BaP refers to benzo(a)pyrene (see Attachment D).

Comment 2.f.iv(4). *LANL must indicate the name of the creek the outfall drains into.*

LANL Response:

The drain discharges to the channel of the ephemeral stream in Pajarito Canyon. That information is clearly provided on the figure, and LANL sees no reason to revise the figure.

Comment 2.f.iv(5). *When describing locations in the text, LANL must use reference points clearly located on the corresponding figure. For example, Building 18-30 is cited in the text, but is not located in the corresponding figure, Figure 4-25. LANL must revise the text accordingly.*

LANL Response:

Discussion:

The text incorrectly references Building TA-18-30 and Figure 4-20 and contains other typos.

Revised Text:

The first two sentences in Section 4.6.4 are revised as given below. All buildings referred to in the revised text are indicated in Figure 4-25. PRS 18-010(e) is the storm drain outfall of a paved ditch that serves the area northeast of Building TA-18-28 (Figure 4-25). A pipe, located at the east end of the ditch, passes under the paved area west of Building TA-18-129 to a grating east of Building TA-18-190 and turns south.

2.f.v Section 4.6.5 18-010(f) Storm Drain Outfall: *This non-HSWA active PRS should be retained for further evaluation based on the following deficiencies:*

Comment 2.f.v(1). *Although the RFI Work Plan anticipated that solvents had been utilized at the PRS, no samples were obtained or analyzed for VOCs. LANL shall provide sampling documentation that VOCs are not present at this PRS.*

LANL Response:

See Comment 2.f.i(2).

2.g Section 4.7 Groundwater Sampling

2.g.i General

Comment 2.g.i(1). *Drill logs, well construction, and sampling methodology are not presented in the RFI report. LANL must provide this information within the RFI report. See comment 1.b.i.*

LANL Response:

See response to Comment 1.b.i.

Comment 2.g.i(2). *Available historical groundwater data obtained from nearby wells, springs, and seeps should be included in the evaluation of this technical area.*

LANL Response:

The scope of the investigation reported in the RFI report for former OU 1093 did not include investigation of nearby wells and springs, except for those included within the boundaries of the operable unit. The additional investigations proposed in the response to Comment 1.a.ii will address this comment.

Comment 2.g.i(3). *The statement that "No significant additional input is occurring within TA-18..." is an improper statement to make in this RFI report. The lack of understanding of the modes of groundwater occurrence and the interplay of these modes, coupled with the lack of sufficient monitoring wells, makes such a statement tentative at best. The effect TA-18 has had and continues to have on the groundwater cannot be determined with confidence at this time.*

LANL Response:

The objectives of the RFI did not include complete characterization of groundwater within Pajarito Canyon. Additional information related to this issue will be addressed by investigations proposed in the response to Comment 1.a.ii. However, the data from this RFI indicate that concentrations of potential contaminants detected within and up-gradient from TA-18 are generally at lower concentrations in the down-gradient PCO wells. This fact supports the statement that no significant input is occurring within TA-18.

Comment 2.g.i(4). *LANL does not specify the objectives of the groundwater sampling. From that standpoint, it is difficult to derive the value from the investigation as it relates to TA-18. LANL must provide language which defines the objectives of the groundwater sampling so that a proper review of the information can be made.*

LANL Response:

Discussion:

The objectives of the RFI sampling are given in Section 5.6.3 of the RFI work plan.

Revised Text:

The following is added to Section 4.7:

The conceptual site model for TA-18 (Figure 1-4) identifies groundwater as a potential migration pathway for contaminants and, therefore, a medium that needs to be monitored. The objectives of the groundwater sampling associated with TA-18 are,

- **to measure concentrations of chemicals in the groundwater,**
- **to identify chemicals of potential concern, either as a result of TA-18 activities or activities off-site,**
- **to obtain data on the seasonal variability of the concentrations of chemicals of potential concern,**
- **to obtain data on seasonal water level changes,**
- **to determine local background concentrations of chemicals in the groundwater, and**
- **to obtain data on water quality parameters regulated by the Safe Drinking Water Act.**

The monitoring wells (either drilled as part of the RFI investigation or previously drilled) were strategically located to monitor the potential impacts on water quality from individual operations within TA-18 as well as the combined effects of the entire TA down-canyon.

2.g.ii Section 4.7.1 PCO Wells

Comment 2.g.ii(1). *Section 4.7.1.1: As mentioned, the PCO-series wells have been monitored on an annual basis as part of the Environmental Surveillance program. Presumably, additional analytical data is*

available from these previous sampling events. LANL must present the historical data for these wells within this RFI report to provide a more complete synopsis of groundwater degradation near TA 18.

LANL Response:

The proposed additional groundwater investigation, as presented in the Sampling and Analysis Plan for Groundwater Investigations in Threemile and Pajarito Canyon (Attachment A), proposes to evaluate a minimum of three additional quarters of groundwater monitoring in the PCO wells. The historical data for the PCO wells will be included in a summary and evaluation of the new sampling data to determine the scope of Stage 2 investigations.

Comment 2.g.ii(2). *Section 4.7.1.3.1, Inorganics: LANL must revise the text to indicate which samples exceeded holding times. It is recommended that the corresponding figures also somehow indicate which samples exceeded holding times.*

LANL Response:

The samples that exceeded holding times for inorganics (mercury only) are listed in Table 4-75. The designation of samples exceeding holding times on figures is not presently required by the approved RFI report framework policy.

Section 4.7.1.3.1 and Table 4-75 have been modified and presented in the response to Comment 1.e.ii, QA/QC discussions.

Comment 2.g.ii(3). *Section 4.7.1.3.1, Organics: The text does not indicate which samples had detectable concentrations of 1,3-dinitrobenzene (DNB) and octohydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX). LANL must revise the text to show these corrections.*

LANL Response:

As stated in Section 4.7.1.3.1, these constituents were at concentrations below the site-specific background groundwater concentrations listed in Table 3.2.1 of the RFI report. Consistent with the approved RFI Framework Policy, the data comparison tables, text, and the figures only address potential contaminant concentrations above background. Concentrations of these constituents are provided in Appendix D of the RFI Report.

Comment 2.g.ii(4). *Section 4.7.1.3.1, Organics: LANL does not provide supporting documentation necessary to eliminate the COPCs based on the contaminants relative insolubility in water. See comment 1.b.iv.*

LANL Response:

Three organics were reported as nondetects, but QC problems resulted in the reported concentrations being suspect. They could not be eliminated as COPCs because the respective SALs are below the normal detection limits. Insufficient information is available to substantively prove that these suspected contaminants were not present in the samples or that they could not be in some way derived from TA-18 activities. The RFI report only concluded that it was unlikely. Additional sampling of the PCO wells is planned as part of a broader investigation of groundwater in Pajarito Canyon (see response to Comment 1.a.ii). The presence or absence of these contaminants will be addressed by that sampling.

2.g.iii Section 4.7.2 LACEF Monitoring Wells

Comment 2.g.iii(1). *Based on the primary objective of this RFI report (which is to investigate those PRSs located at TA 18), groundwater monitoring wells should also be located near the drain field at 18-003(b) or southeast of Buildings 18-168 and 18-23.*

LANL Response:

Discussion:

The LACEF monitoring wells are located southeast of Building TA-18-168, as recommended by the comment. Also as recommended by the comment, two monitoring wells—18-1135 and 18-1136—were located adjacent to the drainfield at PRS 18-003(b). However, the text in Section 4.7.2 did not adequately cross-reference the discussion of these latter wells in Section 4.1.1, and the figure did not show the wells.

Revised Text:

See Attachment D for the revised Figure 4-27.

Section 4.7.2 is modified as follows:

During 1990, the Laboratory installed four monitoring wells around the LACEF building (Building18-168) at TA-18: MW-1 (up-gradient), MW-2, MW-3, and MW-4 (down-gradient), (Figure 4-27). **The down-gradient wells are south and southeast of Building 18-168 and in the vicinity of the settling pit [PRS 18-003(a)] and the septic tank [PRS 18-003(b)].** These wells were installed to establish baseline levels of radionuclides in soils and shallow groundwater surrounding the Building 18-168 and to assess the potential for transport of radionuclides in the shallow groundwater system in Pajarito Canyon (LATA 1991, 16-0005). **In addition, a permanent monitoring well (MW-7) was subsequently installed in the drainfield at sample location 18-1135 (Figure 4-27). The first quarter analytical data from well MW-7 are presented in Table 4-6 (sample no. 0218-95-0252) as part of the Phase I investigation at PRS 18-003(b).**

All four wells were drilled through alluvium to a depth of 25 ft. Drilling was performed with a top-drive drill rig and an 8-in. hollow-stem auger. The wells were cased with a 20-ft section of 2-in. PVC well screen placed on the bottom of the borehole. Two-inch PVC casing was used from the top of the screened section to the ground surface. The annular space surrounding the well was filled with silica sand to within 3 ft of the surface and finished to the surface with grout. A metal well head with a cast-iron cover was placed into the wet grout. A 2.5-ft diameter concrete collar and lockable expansion-type well plug were installed around each well for well head protection. The wells were developed by pumping with a hand pump (LATA 1991, 16-0005).

All four boreholes were sampled every 5 ft during drilling. The alluvium encountered in the boreholes consisted of a mixture of reddish brown sandy clays, clays, sands, and clayey sands. Tuff cobbles were most frequently rounded to subrounded. Clay and sand layers of 1 in. to more than 1 ft were common, with sandy layers ranging from poorly sorted to well sorted. No clear marker beds were identified in the boreholes, and most strata appear to be laterally discontinuous (LATA 1991, 16-0005).

None of the boreholes fully penetrated the alluvium; field observations indicate that the alluvium/tuff interface is probably at a depth of 35 ft in the area. The first indications of moisture were observed at a depth of 10 to 12 ft in each well, with the first fully saturated zones occurring at approximately 20 ft. Following well development, the static water level in the wells averaged approximately 15 ft (land surface datum). This is consistent with observations of construction activities in the area, where water has been encountered in excavations at approximately 15 ft of depth; however, water levels are highly variable both seasonally and annually in Pajarito Canyon (LATA 1991, 16-0005).

Comment 2.g.iii(2). *Groundwater from sample location 18-1135 was obtained during the investigation of 18-003(b), but was not analyzed for high explosives. All groundwater wells within this vicinity should also be analyzed for HE using SW 846 Method 8330 to provide a comprehensive site-wide survey of these constituents and to determine if these PRSs may have contributed to the overall degradation of the alluvial groundwater system.*

LANL Response:

High explosives are not a potential contaminant for PRSs 18-003(a and b), although samples from the nearby LACEF wells were analyzed for HE. The analysis of samples from selected existing and future monitoring wells will be included in the sampling plan indicated in the response to Comment 1.a.ii.

2.h Section 4.8 Wetlands

Comment 2.h.i. *Section 4.8.2, Field Investigation: Based on drill log and water chemistry data, Springs 3A and 3B are suspected of discharging from the volcanic units of the Tshirege Member of the Bandelier Tuff. Since these springs feed into the alluvial deposits and wetlands of Threemile Canyon, background samples obtained from these wetlands (WL-1 and WL-3) may not be truly representative of background alluvial conditions. LANL shall investigate the springs and seeps which may contribute contaminants to the alluvial aquifer in Pajarito and Threemile Canyons and LANL shall investigate the alluvial conditions up-gradient of the influence of these springs, including TA-18 spring.*

LANL Response:

These springs and seeps will be included in the investigation proposed in the response to Comment 1.a.ii.

Comment 2.h.ii. *Figure 4-30, page 4-187 and associated text: If potential sources are located upstream of TA-18 in Pajarito Canyon, LANL shall obtain, where possible, background wetlands samples from Pajarito Canyon up-gradient of its confluence with Threemile Canyon.*

LANL Response:

Wetlands in Pajarito and Threemile canyons sampled by this RFI occur in locations with perennial streamflow or where the water table is close to or at the surface. Wetlands have not been observed close to TA-18 up-gradient in Pajarito Canyon. However, collection of possible additional background data pertinent to wetlands will be included in the sampling proposed in the response to Comment 1.a.ii.

Comment 2.h.iii. *Table 4-81, page 4-195: Site-wide background values (as represented by the UTL) should also be provided for comparison purposes. See comments 1.b.ii and 1.b.iii.*

LANL Response:

Discussion:

At the time the RFI report was written, site-wide UTL values for sediments were not available. However, these data are now available and have been included in an evaluation of the significance of use of the new UTLs. See response to Comment 1.a.iv.

Revised Text:

Table 4-81 is modified as follows:

TABLE 4-61
MAXIMUM CONCENTRATIONS OF ANALYTES DETECTED IN THE BACKGROUND WETLAND SITES

Analyte	Site-Wide Sediment Background UTLs (mg/kg)	Site-Specific Background Values	
		Sediment (mg/kg)	Surface Water (µg/L)
INORGANICS			
Barium	141	130	82
Beryllium	1.4	1	ND
Chromium	8.8	9	ND
Lead	13.8	13	3
Nickel	10	7.9	ND
Uranium (Total)	7.6	45.4	4.03
Zinc	62.1	69	ND
ORGANICS			
Acetone	NA	0.21	ND
HMX	NA	ND	3.38
RDX	NA	ND	0.323
RADIONUCLIDES	(pCi/g)	(pCi/g)	(pCi/L)
Plutonium-238	0.006	0.055	0.014
Plutonium-239/240	0.2	2.22	0.036
Thorium-228	2.3	6.23	0.69
Thorium-230	2.3	3.13	0.62
Thorium-232	2.3	2.33	0.181

ND: not detected

Comment 2.h.iv. *Section 4.8.2: An evaluation of historical information, such as aerial photographs, should have been used to determine if the drainage and wetlands were present at the time of potential contaminant discharge. From the information provided, it is uncertain whether the background samples obtained for this RFI report are unbiased representations of the wetland/alluvial conditions in the canyon. LANL shall provide an evaluation of the historical information to determine if these locations were suitable to meet the objectives of this RFI.*

LANL Response:

LANL will evaluate the representativeness of the background wetland locations as part of the investigations proposed in the response to Comment 1.a.ii.

Comment 2.h.v. *Section 4.8.3.4, paragraph 1: The following statement is misleading and inappropriate for a RFI report: "Because the concentrations either were less than the SALs or did not have a SAL; human health risk is not a concern." This statement leads the reader to believe that a health risk is not a concern. The evaluation of risk to human health and the environment is paramount to our mission as environmental professionals. The statement intends to say that the concentrations were such that a risk assessment was unnecessary. LANL shall revise the statement to read "Because..., human health risk was not evaluated."*

LANL Response:

LANL acknowledges that the referenced statement could be misinterpreted. The last sentence of the first paragraph of Section 4.8.3.4 is revised as follows:

Because the concentrations either were less than the SALs or did not have a SAL ~~human health risk is not a concern,~~ **potential contaminants at this location do not present an unacceptable risk to human health.**

Comment 2.h.vi. *Figure 4-33, page 4-190: Does not include a notation that o-nitrotoluene exceeded background concentrations at sample location 36-2001, sample identification AAA5902, as shown in Table 4-83 on page 4-196. LANL shall revise the text and figure, as necessary.*

LANL Response:

Discussion:

The compound, o-nitrotoluene, was not detected in the background wetlands (WL-1 and WL-3), but was detected in the background wells and in the surface water in one of the down-canyon wetlands (WL-8). The surface water concentrations for o-nitrotoluene were incorrectly presented as being greater than the concentrations detected in the background wells (last paragraph of Section 4.8.3.4, Data Interpretation). The detected concentrations of o-nitrotoluene are less than the background well concentration (3.7 µg/L), but are presented in Table 4-83. Figure 4-33 presents o-nitrotoluene as being detected in one surface water sample (AAA5901), but not in the second surface water sample (AAA5902). Figure 4-33 (Attachment D) is modified to present this detection.

Revised Text:

The last paragraph of Section 4.8.3.4 is modified as follows:

The HE compounds o-nitrotoluene and tetryl(methyl-2,4,6-trinitrophenylnitramine) were detected in surface water from WL-4, WL-6, WL-7, and WL-8. These HE organics were not detected in the background wetlands but were detected in the background wells at maximum concentrations of 3.7 µg/L and 0.12 µg/L, respectively. ~~These concentrations are higher in the wetlands surface water than in the background wells.~~ **The concentrations of o-nitrotoluene in the wetlands surface water are less than the background wells concentration, while the concentrations for tetryl(methyl-2,4,6-trinitrophenylnitramine) are greater than the concentration detected in the background wells. Because these compounds were not detected in the background wetlands, the results suggesting** that the source(s) of these compounds could be input from TA-18 or the nearby former firing site (PRS 27-002).

Comment 2.h.vii. *Section 4.8.4, Human Health Risk: 2,4,6-trichlorophenol was identified as being a COPC unrelated to activities conducted at TA-18. It is unclear if an evaluation was performed to determine if this constituent is attributable to other LANL-related activities. The question of attribution must be evaluated on a site-wide or systemic basis. LANL shall clarify this issue.*

LANL Response:

The chemical 2,4,6 trichlorophenol was retained through the screening assessment because, although reported as a nondetect, QC problems with the analysis required that the reported concentration be considered suspect. This chemical is used as a preservative or germicide according to The Merck Index. These uses are not associated with the activities at TA-18 and 2,4,6-trichlorophenol is not on the chemical inventory for this site. Identification of other possible sources for this chemical within the entire Laboratory is beyond the scope of this RFI. Such issues will ultimately be addressed by the Canyons field unit, which will conduct integrated investigations of the canyon systems at the Laboratory.

Comment 2.h.viii. *Section 4.8.3.1, Organics: The detection limit for various VOCs and SVOCs exceeded SALs. LANL shall provide a listing of all instances at TA-18 where detection limits exceed SALs and provide an explanation.*

LANL Response:

The analytical methods used to detect analytes in samples sent to offsite laboratories are SW 846 methods, which are required by NMED and EPA. These methods provide detection limits that are above the SALs for some analytes. In these instances, the lowest achievable detection limit may be used as a SAL for these chemicals as presented in the approved Installation Work Plan (LANL 1995, 1275). In addition, these chemicals are evaluated as to their likelihood of being present based on process and site knowledge and/or the detection of similar chemicals or degradation products in the samples submitted for analyses (Risk-Based Corrective Action Process) (LANL 1996, 1297). If process/site knowledge indicates that the chemical(s) is/are not likely to be present at the site and/or similar chemicals are not detected, the chemicals are eliminated from further evaluation. On the other hand, if process knowledge indicates that the chemical may be present and/or similar chemicals are detected, the chemical is evaluated further, i.e., retained as a COPC.

References:

Dorries, A. M. (Ed.), June 1, 1996. "Risk-Based Corrective Action Process," Revision 1, Los Alamos National Laboratory Report LA-UR-96-2811, Los Alamos, New Mexico. (Dorries 1996, 1297)

LANL (Los Alamos National Laboratory), November 1995. "Installation Work Plan for Environmental Restoration," Revision 5, Los Alamos National Laboratory Report LA-UR-95-4048, Los Alamos, New Mexico. (LANL 1995, 1275)

2.I Appendix B, Hydrogeology

Comment 2.I.I. *Springs and seeps are not addressed or sampled as part of this RFI report. See comment 2.g.I.(2)*

LANL Response:

The scope of the RFI did not address potential contaminant sources up-gradient from TA-18. However, sampling of these springs will be included in the investigations proposed in the response to Comment 1.a.II.

Comment 2.I.II. *All figures within this report should include the locations of "the inventory of monitoring wells" as listed in Table B-1 and any other wells within 1 mile of any PRS or within the canyon system. LANL shall revise all figures to reflect this comment.*

LANL Response:

The wells drilled as part of the RFI at former OU 1093 were all drilled to monitor potential effects of sanitary waste systems on groundwater. The location of each well was intended to focus on the possible effects of a specific PRS. Sampling of those wells considered the potential contaminants from that PRS, as opposed to those of nearby (or in the case of firing sites, surrounding) PRSs. Thus, a discussion of the analytical data from a particular well is primarily applicable to the adjacent septic system. LANL questions the added value of presenting information on sampling points not specific to the particular PRSs represented in a particular figure. However, LANL has reviewed the figures in Chapter 4 of the RFI report and added the locations of any monitoring wells within the limits of the figure. The scale of all figures addressing particular PRSs does not allow the presentation of all wells within one mile of a PRS or within the canyon.

See Attachment D for the revised figures.

Comment 2.I.iii. *The RFI report incorrectly states that "...no perched aquifers have been observed between the shallow alluvial aquifer and the main aquifer..." LANL shall revise this statement or strike it from the report. The following items directly conflict with the previous statement:*

- *Springs 3A, 3B, and TA-18 appear to discharge from a perched zone within the Tshirege Member of the Bandelier Tuff; and*
- *during the drilling of PM-2 a perched, saturated zone within the Otowi Formation was encountered at an elevation of 6380 feet (approximately 500 feet above the regional aquifer).*

LANL Response:

Discussion:

The springs referred to, as noted in the comment, issue from a geologic unit that is physically above the alluvial aquifer in Pajarito Canyon; these are not evidence of a perched aquifer below the alluvial aquifer. LANL recognizes that zones of possible saturation were encountered in the drilling of well PM-2 and of Seismic Hazard Borehole (SHB) 4, located near and within TA-18, respectively. These zones are not necessarily indications of a perched aquifer below the alluvial aquifer in the vicinity of TA-18, but it is appropriate that this information be included in the RFI report. The report acknowledges, in Figure 2-1 and Section 2.42, the potential for downward percolation of water from the alluvial aquifer.

The investigation of the possible presence of a perched zone between the alluvial aquifer and the main aquifer in the vicinity of TA-18 is included in the Hydrogeologic Workplan (LANL 1996, 1378).

Reference:

LANL (Los Alamos National Laboratory), December 6, 1996. "Hydrogeologic Workplan," Revision 1.0, Los Alamos National Laboratory Report, ER ID No. 55430, Los Alamos, New Mexico. (LANL 1996, 1378)

Revised Text:

The end of the fourth paragraph of Section 2.4.2, Main Aquifer, is modified as given below.

No perched water is known to exist between the shallow alluvial groundwater body and the main aquifer below OU 1093 (Devaurs 1985,0046). **Zones of possible saturation were encountered below the alluvial aquifer during the drilling of well PM-2, located just east of TA-18, and of Seismic Hazard Borehole 4, located on the north side of TA-18 adjacent to Pajarito Road. No further investigation was conducted to determine whether these zones represented a perched aquifer.**

Comment 2.I.iv. *Page B4, paragraph 6: "Groundwater elevations were measured ...in the PCO well." LANL shall clarify which PCO well is referred to and revise the text accordingly.*

LANL Response:

The report contains a typographical error in the referenced paragraph. Water level elevations were measured in all PCO wells. The sentence is revised to read:

Groundwater elevations were measured periodically. . .and prior to that in the PCO wells.

Comment 2.I.v. *Water Chemistry: The general chemistry analytical results should be summarized and compiled into a table for easy reference and readability. A table would eliminate the burden on the reader to discern which constituents were below detection limits, what those detection limits were, why the*

PCO-2 well does not have a corresponding Stiff diagram, and why there is no cation/anion balance for PCO-3 on page B-6. LANL shall make revisions to address this comment.

LANL Response:

The general chemistry analytical results are provided in Appendix D. However, to enhance readability, LANL has prepared a table compiling the results used for preparing Stiff diagrams. LANL believes that the Stiff diagrams and presentation of charge balance calculation are the optimum way to summarize the general chemistry results. The tabulation of the charge balance on Page B-6 contains a typographical error—PCO-2 should be PCO-3. The text in the middle paragraph on that page correctly notes that insufficient data are available to prepare a Stiff diagram (and by extension, calculate the charge balance) for well PCO-2. LANL is uncertain what the comment refers to regarding constituents below detection limits. All data used in discussing the general chemistry are for detected constituents.

A tabulation of the data used to prepare the Stiff Diagrams is presented in Attachment E to this NOD response.

ATTACHMENT A

SAMPLING AND ANALYSIS PLAN FOR GROUNDWATER INVESTIGATIONS IN THREEMILE AND PAJARITO CANYON

ATTACHMENT A

SAMPLING AND ANALYSIS PLAN-PAJARITO AND THREEMILE CANYONS GROUNDWATER INVESTIGATION

1.0 Problem Definition

RFI Phase 1 sampling at former OU 1093 indicated the presence of several potential contaminants in soils and groundwater, primarily volatile organic compounds (VOC) and high explosives (HE). Data on the observed concentrations are presented in Chapter 4 of the RFI Phase 1 report (LANL 1995, 1255). The only constituent detected at concentrations which exceeded groundwater quality standards was 1-2 dichloroethane (EDC), which was detected near three now-abandoned septic systems. Notable detections of these potential contaminants are shown in Figure 1-1.

The existing data indicate that groundwater up-gradient from TA-18 in Pajarito Canyon contains high explosive compounds and degradation products. However, samples were collected only once from the up-gradient wells, so there is no direct information on seasonal variability.

Samples were collected quarterly and analyzed for high explosives at a location within TA-18. The location may potentially be affected by HE contamination from a former firing site, but the sampling data (Table 1-1) provide some information on expected seasonal variability.

Table 1-1. Concentrations of HMX in Wells MW-1, -2, -3, and -4 (µG/l)

Well	10/93	2/94	7/94	2/95
MW-1	3.1	4.3	3.4	NA
MW-2	2.3	3.3	3.2	NA
MW-3	0.3	3.8	2.7	4.5
MW-4	3.2 (dup. 3.5)	3.2	3.3 (dup 3.4)	3.4

The data for HMX show at least as much variability among the four wells for a particular sampling event as from event to event for a particular well. For these data, sampling and measurement variability appears to obscure any evidence of seasonal variability.

Additional data are required to establish:

- What is the magnitude and seasonal variability of potential contaminant concentrations in groundwater and surface water entering TA-18 from up-gradient locations?
- How does the magnitude and seasonal variability of potential contaminant concentrations vary within and down-gradient from TA-18?
- Is there evidence of potential contaminant sources within or down-gradient from TA-18 that are degrading water quality so as to exceed groundwater or surface water quality standards?

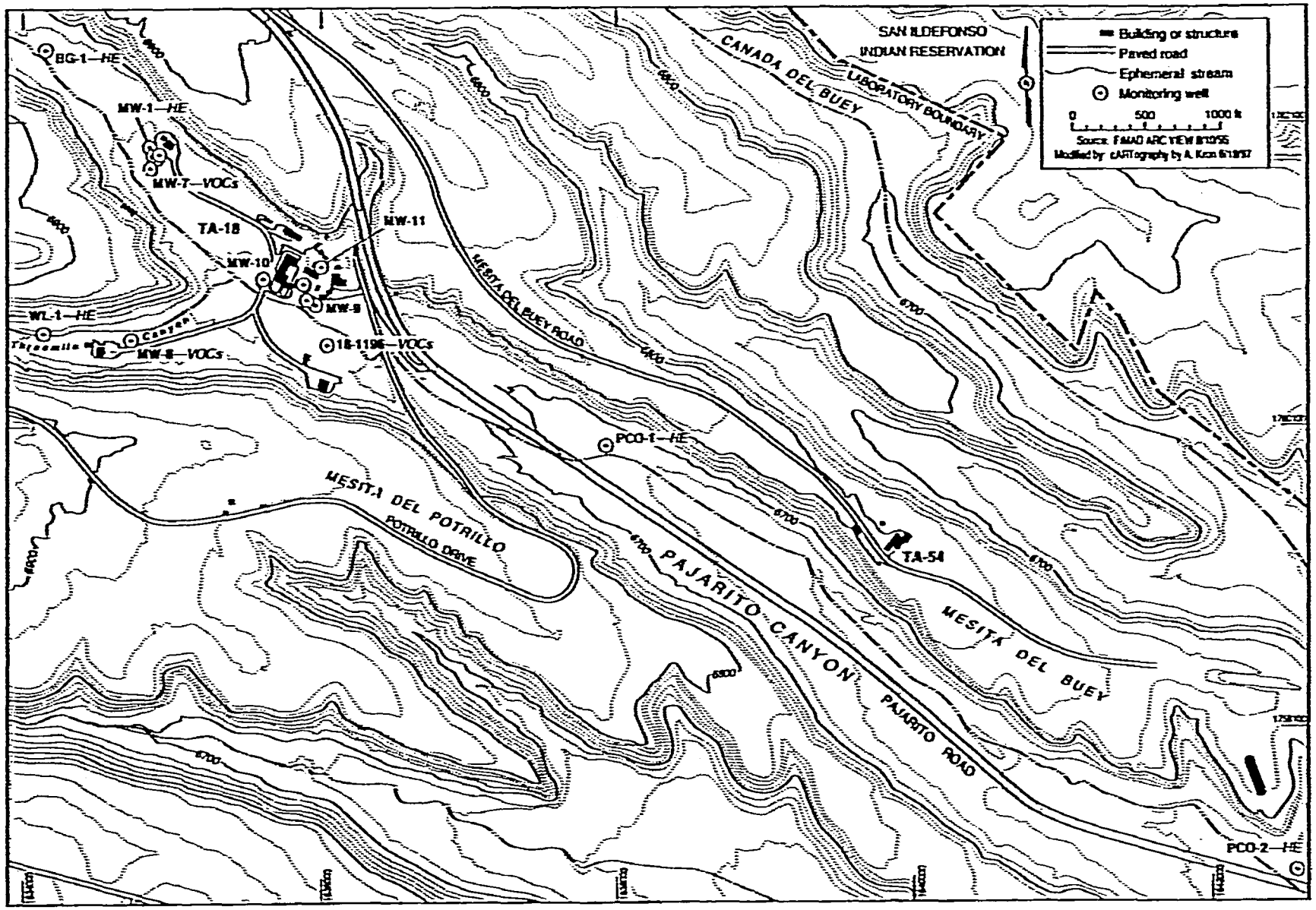


Figure 1-1. HE and VOCs detected in groundwater by Phase I RFI sampling at former OU 1093.

2.0 SAP Design

2.1 Overview

The Hydrogeologic Work Plan (LANL, 1378) proposed a number of shallow alluvial wells in Pajarito and Threemile Canyons. These wells will augment existing wells within and down-gradient from TA-18 to establish a relatively dense groundwater sampling network. In addition, flowing surface water and springs up-gradient and down-gradient from TA-18 will be sampled to determine influent and effluent water quality and potential contaminant concentrations. The sampling will be done in several stages, as follows:

Stage 1. Determine Potential Contaminants

- Collect water samples from flowing streams and springs in Threemile and Pajarito canyon up-gradient from TA-18 for a minimum of 3 quarters (9 months) to evaluate the magnitude and variability of potential contaminant contributions to groundwater from these sources.
- Collect groundwater samples from selected existing wells up-gradient from, within, and down-gradient from TA-18 to determine magnitude and variability of potential contaminant concentrations.
- Install one monitoring well in Threemile Canyon up-gradient from all potential contaminant sources within TA-18 to determine up-gradient water quality in Threemile Canyon.
- Record stream flow data and water level elevations in monitoring wells in the study area on a quarterly basis to obtain water balance information for the study area, and possibly establish some hydrologic parameters, such as transmissivity, for the shallow aquifer.

The data collected from this stage will be used to shorten the list of potential contaminants, and to better define the distribution of these potential contaminants in the study area. The number and locations of additional monitoring wells will be determined by noting areas within and down-gradient from TA-18 where additional groundwater data are needed to explain the observed water quality data. Hydrologic properties estimated during Stage 1 will be used to design, as needed, further hydrogeologic tests.

Stage 2. Construct and Sample Additional Wells.

Additional monitoring wells will be installed and added to the sampling network. The list of target analytes may be revised based on Stage 1 sampling results. The collected data will be used to establish the full nature and extent of potential contaminant concentrations within former OU 1093.

2.2 Target Analytes

Stage 1 sampling will encompass all analytical suites from which analytes were retained as COPCs by the screening assessment portions of the RFI report. Table 2.2-1 summarizes these COPCs by PRS. From the table, it is evident that constituents from all major analytical suites (inorganics, VOCs, SVOCs, HE, and radionuclides) were detected at one or more PRSs, and will need to be included in the proposed sampling. Results from the first phase of sampling will be used to refine the list, possibly reducing the number of suites analyzed at a particular location.

Table 2.2-1 Primary COPCs Retained by Screening Assessment

PRS	Description	Inorganics	VOCs	SVOCs	HE	Radionuclides
18-001(a)	Lagoons	NR	NR	NR	NR	Thorium
18-001(b)	Sewer Line	lead, barium	EDC	PAHs, bis-(2-ethylhexyl) phthalate	NR	
18-001(c)	Sump	NR	NR	NR	NR	NR
18-002(a)	Firing site	NR	NA	NR	NR	NR
18-002(a,b)	Firing Site	NR	NA	NR	No SAL	NR
27-002	Firing Site		NA		No SAL	NR
18-003(a,b)	Septic System	lead,	TCE, PCE, EDC	PAH,	NA	Pu, U
18-003(c)	Septic System	Hg,	EDC,	PAH, pentachloro-phenol	2-4 DNT, 2-6 DNT	U, Pu
18-003(d)	Septic System	NR	EDC, 1-1 dichloro-ethane	TCE, 1-1-2 trichloro-ethane		
18-003(e)	Septic System	NR	NR	TCE	NA	NR
18-003(f)	Septic System	NR	NR	PAH	NA	NR
18-003(g)	Septic System	NR	Benzene, 1-4 dichloro-benzene	bis-(2-ethylhexyl) phthalate, 4-methyl-phenol	NA	NR
18-003(h)	Septic System	NR	NR	phenols	NA	NR
18-004(a,b)	Collection tanks	NS	NS	NS	NS	NR
18-005(	Magazine	NR	NA	NA	NR	NR
18-006	Uranium Solution Storage Pipe	NS	NS	NS	NS	NS
18-008	UST	NA	NR	NR	NA	NA
18-010(b)	Storm Drain	NR	NA	NR	NA	NR
18-010(c)	Storm Drain	NR	NA	PAHs	NA	NR
18-010(d)	Storm Drain	NR	NA	PAHs	NA	NR
18-010(e)	Storm Drain	NR	NA	PAHs	NA	NR
18-010(f)	Storm Drain	NR	NA	NR	NA	NR
18-011	Soil Contamination	NR	NA	NA	NA	NA
18-012(a)	Drain and outfall	NR	NA	PAH	NA	NR
18-012(b)	Drain and outfall	antimony, copper, lead, mercury	NA	PAH	NA	NR
18-012(c)	Drain and outfall	NR	NA	NR	NA	NR
18-013	Waste tank	NR	NR	PAH	NA	NR

NR - No COPCs retained by screening assessment
NS - Not Sampled
NA - Not Analyzed

2.3 Sampling Locations

Plate 1 shows the location of PRSs where COPCs were retained by the screening assessment, and principal COPCs at those locations. The figure also indicates the locations of existing monitoring wells, and proposed sampling locations for Stage 1 of this investigation. Table 2.3-1 describes the purpose of sampling at each of these locations, and the suites for which analysis will be requested at each.

2.4 Measurements and Sampling Procedures

2.4.1 Well Development

All of the shallow monitoring wells within TA-18 (MW-1 through MW-16), well BG-1 up-gradient from TA-18, and Wells MW-17 and MW-18 down-gradient from TA-18, were constructed with 2-in. PVC perforated casing. Well development was commonly performed by pumping or bailing the well, and development was not sufficient to reduce turbidity to an acceptable level. All of the wells scheduled for Stage 1 sampling (Table 2.3-1) will be further developed using surge blocks or other methods in an attempt to reduce turbidity. In addition, all wells will be fitted with a low-volume bladder pump set approximately in the middle of the water column in the well. Experience with other sampling has shown that this results in minimal disturbance of the water in the very bottom of the well bore, where any sediments tend to settle. The goal of the additional well development and the use of bladder pumps is to obtain water samples with a turbidity less than 5 Nephlometric Turbidity Units (NTU), the sample acceptance criteria specified in ER-SOP-06.02. The PCO series wells are currently equipped with bladder pumps, and samples generally meet the turbidity acceptance criteria. After well development and bladder pump installation, all wells will be allowed to stabilize for at least two weeks before sampling.

2.4.2 Water Levels

Before each sampling event, the depth to water will be determined in each well. Previously surveyed elevations of the measurement point (typically top of casing) will be used to plot water level elevations for each well and develop water table contour maps. Stream channel segments in which surface flow is occurring will also be noted, and used as an aid to contouring. (The presence of a flowing stream indicates a potential for groundwater recharge or discharge, depending on the relative elevations of the stream channel and adjacent groundwater elevations.)

2.4.3 Stream Flow

Stream gauges are currently in place in Threemile and Pajarito Canyons (Figure 2.4.3-1) The gauge in Pajarito is equipped with a continuous recorder; the one in Threemile requires direct reading. The gauge in Threemile will be read on a periodic basis throughout the Stage 1 sampling period. The frequency will depend on antecedent and current runoff conditions, being more frequent when runoff rates vary greatly, such as during summer storm periods or spring snowmelt. A third stream gauge will be installed near the eastern (downstream) boundary of TA-18.

The stream flow data, coupled with groundwater elevation measurements, will be used to estimate water-balance relationships for the shallow aquifer.

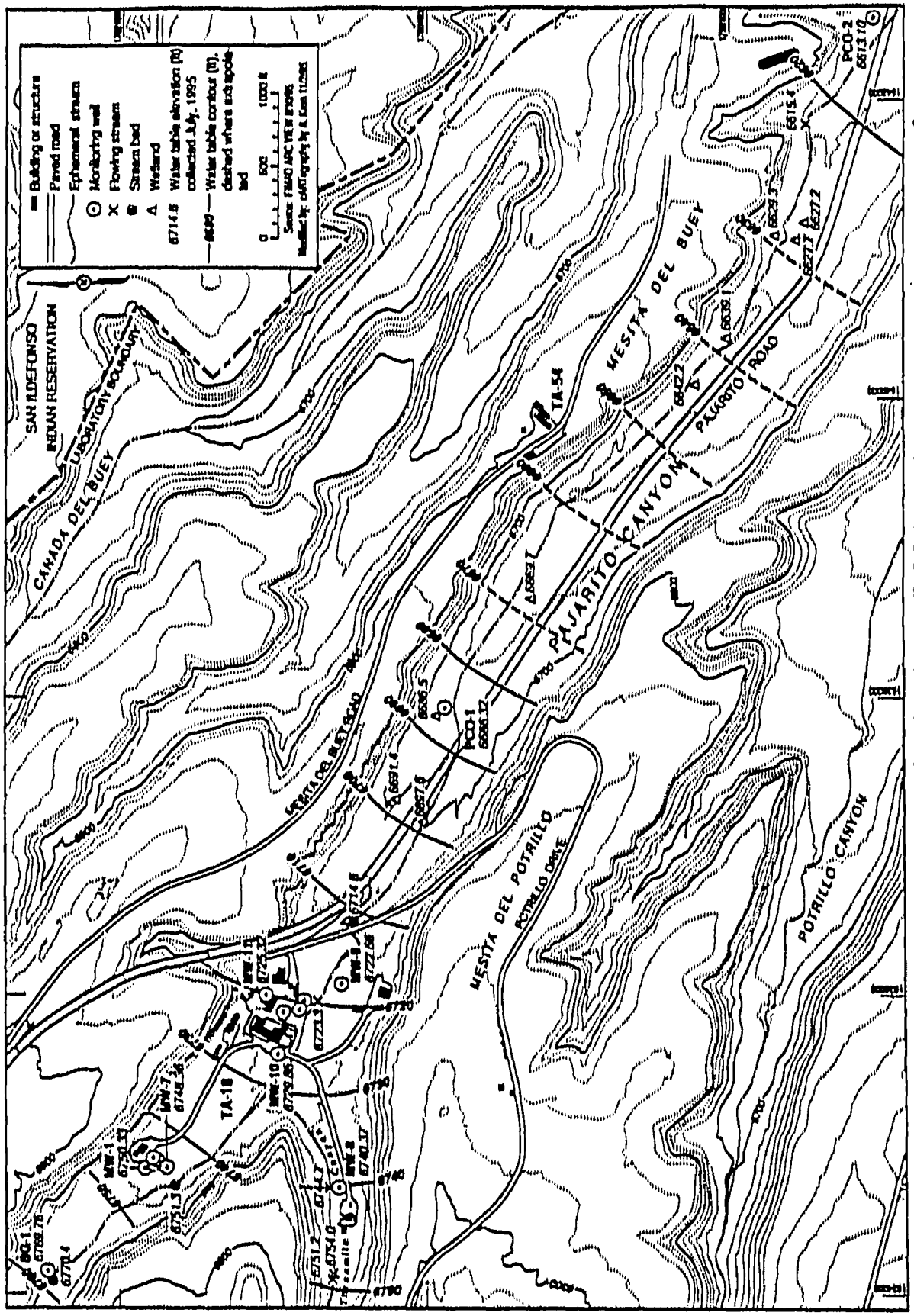


Figure B-2. Wetland, stream, streambed, and well-water elevations from wells BG-1 to PCO-2.

Fig. figure will be replaced by a two-sheet plot showing all existing and proposed surface monitoring wells

Table 2.3.1-1 Sampling Design for Proposed Sampling Locations

Location Description	Location ID	Media	Purpose								
				MET	VOC	SVOC	HE	Major cations /anions	NO_3	Cl	H-3
Threemile Canyon Stream, near Threemile Spring A/B	18-00021	Surface Water	Determine water quality of ground water recharge source	X	X	X	X	X	X	X	
Pajarito Canyon Stream near TA-18 Boundary	18-10022	Surface Water	Determine water quality of ground water recharge source	X	X	X	X	X	X	X	
TA-18 Spring	18-10019	Surface Water	Determine relationship, if any, between spring and alluvial aquifer in Threemile Canyon	X	X	X	X	X	X	X	
BG-1, Background Well in Pajarito Canyon	18-1060	Ground Water	Determine influent water quality to TA-18 in Pajarito Canyon	X	X	X	X	X	X	X	X

Location Description	Location ID	Media	Purpose								
				MET	VOC	SVOC	HE	Major cations /anions	NO3	Cl	H-3
BG-3-Background Well (New), in Threemile Canyon	18-10023 24	Ground Water	Determine influent water quality to TA-18 in Threemile Canyon	X	X	X	X	X	X	X	X
MW-4	18-2016	Ground Water	Measure COPCs from PRS 18-003(a,b)-verify HE data from BG-1	X	X	X	X	X			
MW-7	18-1135	Ground Water	Measure COPCs from PRS 18-003(a,b)	X	X	X	X	X			
MW-8	18-1166	Ground Water	Measure COPCs from PRS 18-003(c). Determine changes in HE resulting from PRS 18-002(b,c)	X	X	X	X	X			

Location Description	Location ID	Media	Purpose								
				MET	VOC	SVOC	HE	Major cations /anions	NO_3	Cl	H-3
MW-6	18-2024	Ground Water	Measure Combined effects of upgradient PRSs, 18-003(a,b,c,f), 18-002(a), and 18-002(b,c)	X	X	X	X	X	X	X	X
MW-10	18-1255	Ground Water	Measure Combined effects of upgradient PRSs, 18-003(a,b,c,f), 18-002(a), and 18-002(b,c)	X	X	X	X	X	X	X	
MW-12		Ground water	Measure COPCs from PRS 18-003(d); track changes in HE concentrations	X	X	X	X	X			

Location Description	Location ID	Media	Purpose								
				MET	VOC	SVOC	HE	Major cations /anions	NO3	Cl	H-3
Pajarito Canyon Stream at down-stream end of TA-18	18-10025	Surface Water	Determine Surface water quality at exit from TA-18	X	X	X	X	X	X	X	
MW-17	18-01684	Ground water	Determine water quality downstream from TA-18, and upstream from PRS 27-002	X	X	X	X	X	X	X	X
PCO-1		Ground water	Determine water quality downstream from TA-18, and upstream from PRS 27-002	X	X	X	X	X	X	X	X
WL-5	36-2014	Sedime nt	Obtain sample in 0-6 in depth interval	X	X	X	X				
WL-6	36-2009	Sedime nt	Obtain sample in 0-6 in depth interval	X	X	X	X				

Location Description	Location ID	Media	Purpose								
				MET	VOC	SVOC	HE	Major cations /anions	NO3	Cl	H-3
WL-7	36-2004	Sediment	Obtain sample in 0-6 in depth interval	X	X	X	X				
WL-8	36-2001	Sediment	Obtain sample in 0-6 in depth interval	X	X	X	X				
MW-18	18-01685	Ground water	Determine Water Quality within influence of PRS 27-002	X			X	X			
PCO-2		Ground water	Determine water quality down-gradient from PRS 27-002 and all wetland areas	X	X	X	X	X	X	X	

Table 2.3-1. Sampling Design for Proposed Sampling Locations

2.4.4 Well Drilling and Water Sampling Protocols

2.4.4.1 Well Construction

All new wells for both Stage 1 and Stage 2 sampling will be constructed in conformance with ER SOPs 04.01, 04.04, 05.01 and 05.02. The typical design for wells MW-1 through MW-17 is illustrated in Figure 2.4.4.-1. The proposed design for new wells, as given in the Hydrogeologic Work Plan (LANL, 1378), is shown in Figure 2.4.4.-2. The new wells will penetrate the entire saturated thickness of the alluvial aquifer, which is underlain by unsaturated or partially saturated Bandelier tuff. The wells will be screened throughout the full saturated thickness, and, where possible screening will be extended above the saturated zone to allow for rises in the water table. However, a minimum of 5 ft is required between the surface and the bottom of the bentonite seal to ensure proper sealing of the well annulus.

2.4.4.2 Surface Water Sampling

Samples of stream flow and spring discharge will be collected in conformance with ER SOP 06.13. Samples will be collected with a peristaltic pump to minimize air contact during sampling. For purposes of comparison with various water quality standards, and for the intended data uses, aliquots for the various analyses will be either filtered, non-filtered, or both, as indicated in Table 2.4.4-1.

Table 2.4.4-1 Filtered and Non-filtered Surface Water Samples, by Analysis

Analysis	Filtered	Non-Filtered
TAL metals (except Hg)	X (livestock watering standards)	
Mercury		X (livestock watering, wildlife habitat standards)
Selenium		X (wildlife habitat standards)
VOC		X
SVOC		X
HE		X
Major cations/anions	X (water chemistry)	
NO_3		X
Cl		X

2.4.4.2 Groundwater Sampling

Groundwater samples will be collected in conformance with ER SOPs 06.01, 06.02, and 06.03. Well purging will be accomplished with the installed bladder pumps. Aliquots for major cations/anions will be filtered; aliquots for metals will be filtered and non-filtered; all other aliquots will be non-filtered. Field measurements of pH, turbidity, TDS, and temperature will be made.

2.4.4.3 Sediment Sampling

Sediment samples from the wetland areas will be collected with a hand auger, in conformance with ER SOP 06.10. Samples will be collected from a depth interval of 0-6 in. (See Comment 1.c.iv of this NOD Response.)

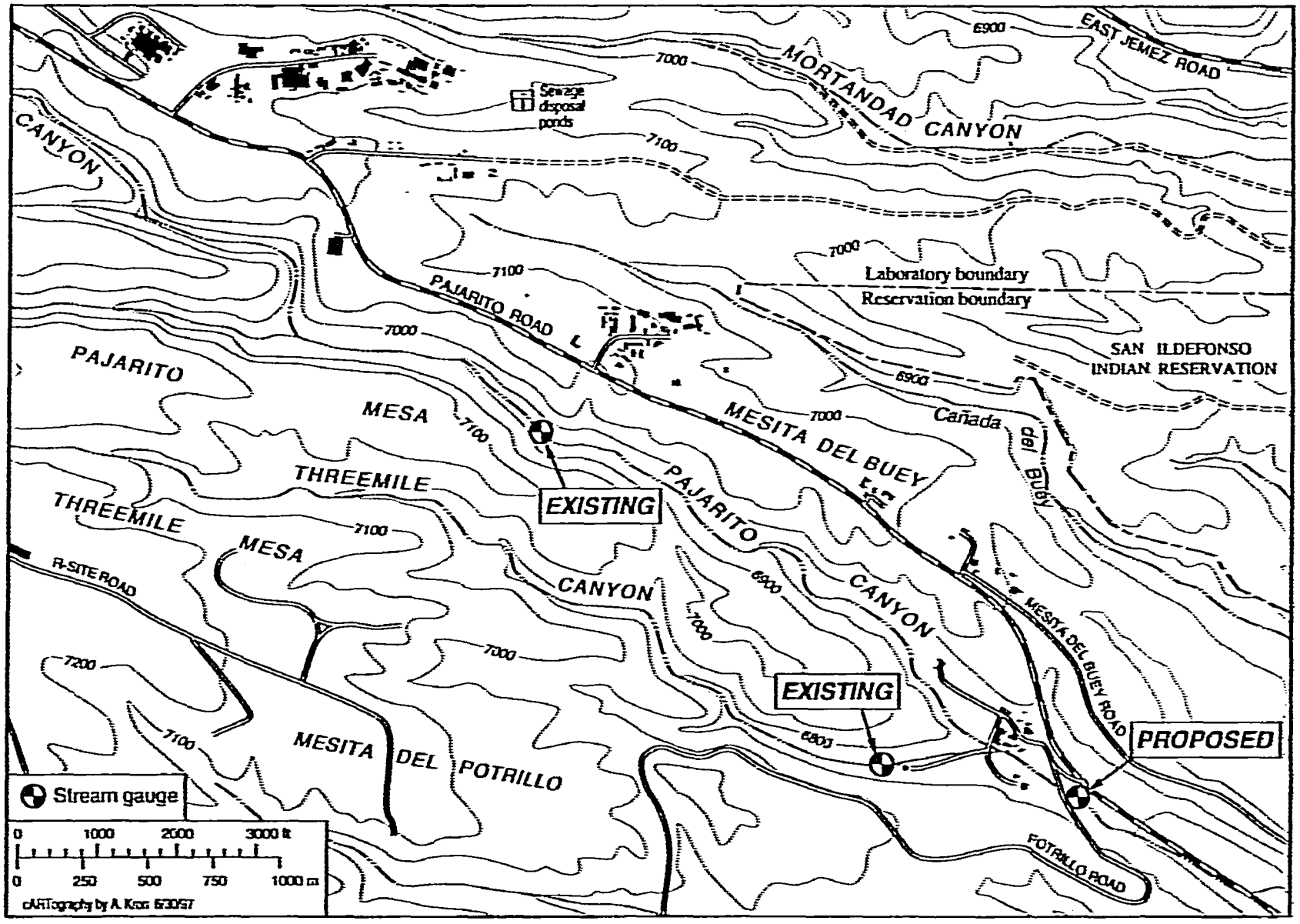
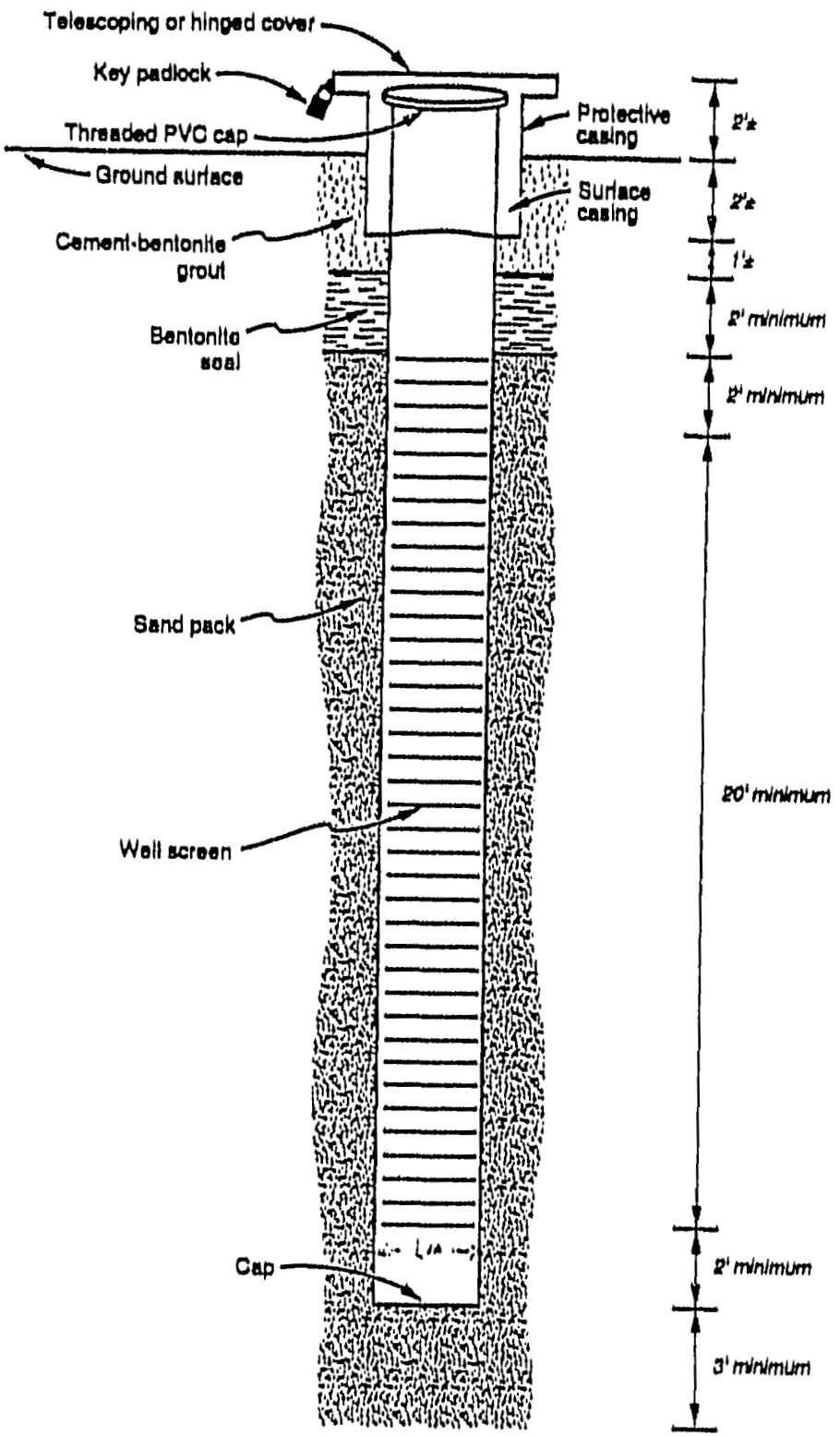


Figure 2.4.3-1. Locations of existing and proposed stream gauges.

Figure 2.4.3-1. Location of Existing and Proposed Stream Gauges Near TA-18



2.4.4-1

Figure 3.5. Monitoring well construction details (not to scale).

Figure 2.4.4-1. Design of Existing Monitoring Wells

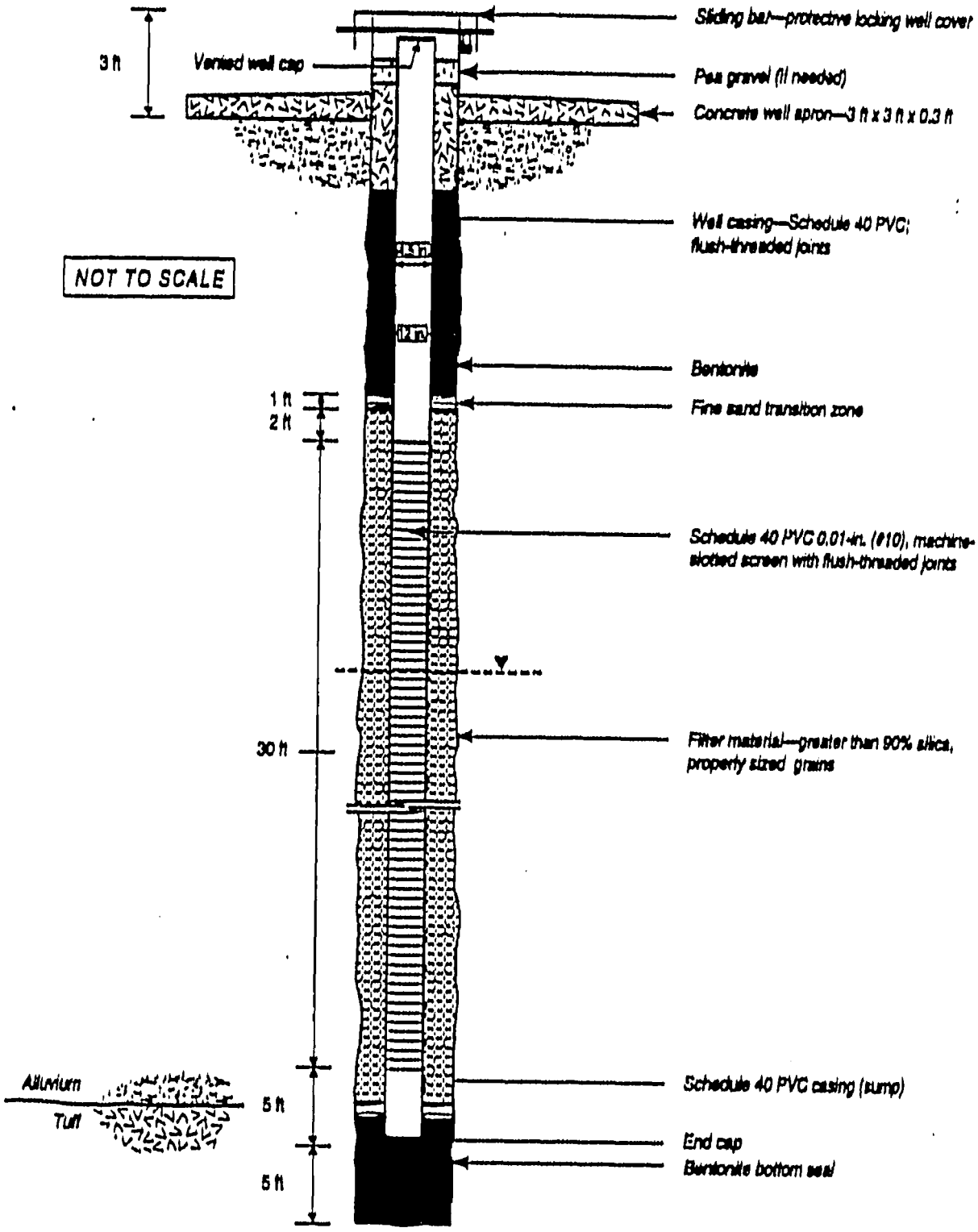


Figure 4-6: Type 1 (alluvial) well design.

2.4.4-2

Figure 2.4.4-2. Design of Additional Shallow Monitoring Wells

2.4.4.4 Field QC Samples

The types, number, and purpose of field QC samples are shown in Table 2.4.4-2. Duplicates and PE samples will be submitted only for VOCs, SVOCs, and HE because VOCs and HE are the primary COPCs in the area under investigation. Residuals from high explosives, such as 2-4-6 trinitrotoluene, are reported by the SVOC analysis. Some constituents from these suites are expected to be present at concentrations near screening action levels or water quality standards. Confidence in the reported concentrations of VOCs, and of both HE and associated residuals, will add support to any conclusions regarding possible sources of observed VOC and HE concentrations.

Table 2.4.4.-2 Field QC Samples

Sample Type	Number	Purpose
Duplicates	3 samples for each quarter, analyzed for HE, VOCs, and SVOCs	Obtain variance estimates for the two primary COPCs (VOCs and HE constituents) previously observed in TA-18 groundwater samples.
Trip Blanks	1 per shipping container containing water samples for VOC analysis	Evaluate possible cross-contamination among sample containers.
Performance Evaluation Samples for HE, VOCs, and SVOCs (especially HE residuals)	2 samples for each quarter	Evaluate analytical laboratory performance.

2.4.4.5 Sample Analysis Methods

The methods proposed for sample analysis are given in Table 2.4.4.-3

Table 2.4.4-3 Analytical Methods

Analyte	Method
TAL metals	EPA 6010
Mercury	EPA 6010
Selenium	EPA 6010
VOCs	EPA 8260
SVOCs	EPA 8270
HE	EPA 8330 ????
Major cations/anions	Standard methods
Nitrates/Nitrates	EPA 300
Chloride	EPA 300
Tritium	????

3.0 Data Use and Interpretation

3.1 Stream Flow

Stream flow data will be used to establish the net surface water loss as the streams in Pajarito and Threemile Canyons cross TA-18. A significant portion of that flow loss results in groundwater recharge, although some fraction is lost to evapotranspiration. An estimate of the recharge in Pajarito and Threemile Canyons, coupled with water quality data for the up-gradient background wells, will be used to estimate a volume-weighted background water quality for groundwater entering the western boundary of TA-18. As now planned, the first three quarters of sampling and water level measurements will encompass the period from November through May, which correspond to the expected low and high elevations of both streamflow and water table.

3.2 Groundwater Elevations

Changes in groundwater elevations, in conjunction with estimates of the porosity and horizontal extent of the aquifer, will be used to estimate changes in the volume of groundwater in storage between measurement periods. The rate of change can also be used to estimate transmissivity for the aquifer. The change in groundwater storage will be compared with stream flow loss to refine water balance estimates for the aquifer.

3.3 Water Chemistry

Changes in concentrations of major cations and ions, as well as pH, will be used to evaluate the extent to which there may be contaminant sources within TA-18, particularly those associated with PRSs where COPCs were present above screening levels. Data presented in the RFI Report indicated little change in water quality within TA-18, but a persistent degradation with down-gradient distance east of TA-18. Seasonal changes in water quality, corresponding to the rise and fall of the water table, could indicate that some contaminant sources are seasonally encountered by the groundwater.

3.4 Concentrations of Potential Contaminants

3.4.1 Evaluation of Potential Contaminant Sources Within TA-18

The primary objective of the proposed sampling is to determine the extent to which concentrations of potential contaminants in groundwater change with down-gradient distance. Data from wells located in Threemile and Pajarito Canyon upstream from their confluence will be compared against the respective background wells in each canyon. As discussed in Section 3.1, for wells at and below the confluence, up-gradient wells will be used to determine a volume-weighted background water quality resulting from groundwater entering the western boundary of TA-18 through the two canyons. Observed concentrations of COPCs in wells within and down-gradient from TA-18 will initially be compared directly against the appropriate background concentration. In order to strengthen statistical comparisons of up-gradient and down-gradient data, At each of the upgradient (background) wells in Pajarito and Three-Mile Canyons, four sampling events will occur. This data will be considered our full amount of background water quality measurements for this site.

For downgradient wells affected by waters from only one of these canyons, comparisons will be made with only the four appropriate data sets. For those monitoring wells that are downgradient of both the Pajarito and Threemile Canyon background wells, comparison with all eight background samples may be

conducted if the data suggest that combining both background wells is appropriate. Data from the down-gradient wells will be compared to prediction intervals calculated from the background data, according to the theory put forth in Chapter 1 of Statistical Methods for Groundwater Monitoring by Robert D. Gibbons. An overall confidence level of 95% will be used for these tests. That is, the probability of a false positive reading for any of the simultaneous tests to be conducted (each analyte at each well) will be 5%.

Available data, as presented in Table 1-1, suggest that seasonal variability may not be detectable in the data. If so, steady-state background concentrations will be assumed. If the background concentrations vary significantly with time, an attempt will be made to develop a dynamic mixing model, using estimated groundwater flow rates. This will allow a more refined estimate of how the effects of changes in background water quality may be realized at any particular sampling location.

Qualitative and quantitative evaluation of the collected data will be used to assess whether PRSs within and down-gradient from TA-18 appear to be contributing contaminants to the groundwater. It is expected that HE constituents will be detected at most sampling locations; HE constituents have been previously detected up-gradient, within, and down-gradient from TA-18. The variability of HE concentrations across the study area will provide some indication of the effectiveness of the existing well network in characterizing the nature and extent of contamination in the shallow groundwater.

3.4.2 Stage 2 Sampling Design

The data from the Stage 1 sampling will be used, to the extent possible, to characterize the nature and extent of contamination. The need for additional monitoring wells will be assessed, and recommendations developed regarding the number and proposed locations of any additional wells or other sampling locations for Stage 2 sampling. The data from Stage 1 will also be used to refine the list of analytes for which data will be collected in the Stage 2 sampling.

ATTACHMENT B

SUPPORTING DOCUMENTATION

ATTACHMENT C

CHECKPLOT OF SAMPLING RESULTS

ATTACHMENT D

REVISED FIGURES

ATTACHMENT E

SUPPORTING DATA FOR STIFF DIAGRAMS

ATTACHMENT F

SUMMARY OF SAMPLES TAKEN

ATTACHMENT B

SUPPORTING DOCUMENTATION

Location of Information about each PRS in Field Log Books, Well Construction Details, and Drill Logs

	Field Activity Log Book, OU1093, Randy Mynard, 1993 (A)	Field Log Book, OU1093, (Controlled Doc. #207) Randy Mynard, 1994 (B)	Excerpt from Log Book, Surface Soil Sampling, OU1093, Victor Hesch, 1993 (C)	Field Log Book, Surface Soil Sampling, OU1093, Victor Hesch, 1994 (D)	Field Log Book, Wetlands and Monitor Well Sampling in TA-18 and TA-36, Peter Gram, 1993-1994 (E)	Supplemental Field Log, OU 1093 Surface Sampling, Peter Gram, 1994 (F)	Well Construction Details: RP# 275, Item # 27, Well Completion Information Forms, 12 pages (G)	Drill Logs: RP #275, Item #26, Core Sample Logs, 81 pages (H)	Drill Logs and Well Construction Details: LATA 1991 (I)	Drill Logs and Well Construction Details: Purtyman 1995 (J)	Sample Collection Logs 10/94 (K)	Sample Collection Logs 4/95 (L)
18-002(a)		X		X		X						
18-002(b)(c)		X		X		X						
18-003(a)	X	X		X								
18-003(b)	X	X		X								
18-003(c)	X	X		X								
18-003(d)	X	X		X								
18-003(e)	X	X		X		X						
18-003(f) manhole	X	X										
18-003(f) septic tank		X										
18-003(g)	X	X										
18-003(h)	X	X										
18-004(a)		X										
18-004(b)		X										
27-002		X		X		X						
18-005(a)				X		X						
18-010(b)				X		X						
18-010(c)				X		X						
18-010(d)				X		X						
18-010(e)				X		X						
18-010(f)				X		X						
18-011				X		X						
18-012(a)				X		X						
18-012(b)				X		X						
18-012(c)			X									
18-013				X								

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Location of Information about each PRS in Field Log Books, Well Construction Details, and Drill Logs

	Field Activity Log Book, OU1093, Randy Mynard, 1993 (A)	Field Log Book, OU1093, (Controlled Doc. #207) Randy Mynard, 1994 (B)	Excerpt from Log Book, Surface Soil Sampling, OU1093, Victor Hasch, 1993 (C)	Field Log Book, Surface Soil Sampling, OU1093, Victor Hasch, 1994 (D)	Field Log Book, Wetlands and Monitor Well Sampling in TA-18 and TA-36, Peter Gram, 1993-1994 (E)	Supplemental Field Log, OU 1093 Surface Sampling, Peter Gram, 1994 (F)	Well Construction Details; RP# 275, Item # 27, Well Completion Information Forms, 12 pages (G)	Drill Logs; RP #275, Item #26, Core Sample Logs, 81 pages (H)	Drill Logs and Well Construction Details; LATA 1991 (I)	Drill Logs and Well Construction Details; Purtyman 1995 (J)	Sample Collection Logs 10/94 (K)	Sample Collection Logs 4/95 (L)
Wetland Area					X							
LACEF Wells (MW-1, MW-2, MW-3, MW-4)					Oct 93, Feb 94, July 94				X		Oct 94	Apr 95
PCO Wells (PCO-1, PCO-2, PCO-3)				July 94	Oct 93, Feb 94, July 94					X	Oct 94	Apr 95
Temporary Well: 18-1136								X				
Temporary Well: 18-1165								X				
Temporary Well: 18-1195								X				
Temporary Well: 18-1196								X				
Temporary Well: 18-1233								X				
Temporary Well: 18-1254								X				
MW-7: 18-1135							X	X				
MW-8: 18-1166							X	X				
MW-9: 18-1234							X					
MW-10: 18-1255							X	X				
MW-11: 18-1275							X	X				

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ATTACHMENT C

CHECKPLOT OF SAMPLING RESULTS

ATTACHMENT D

REVISED FIGURES

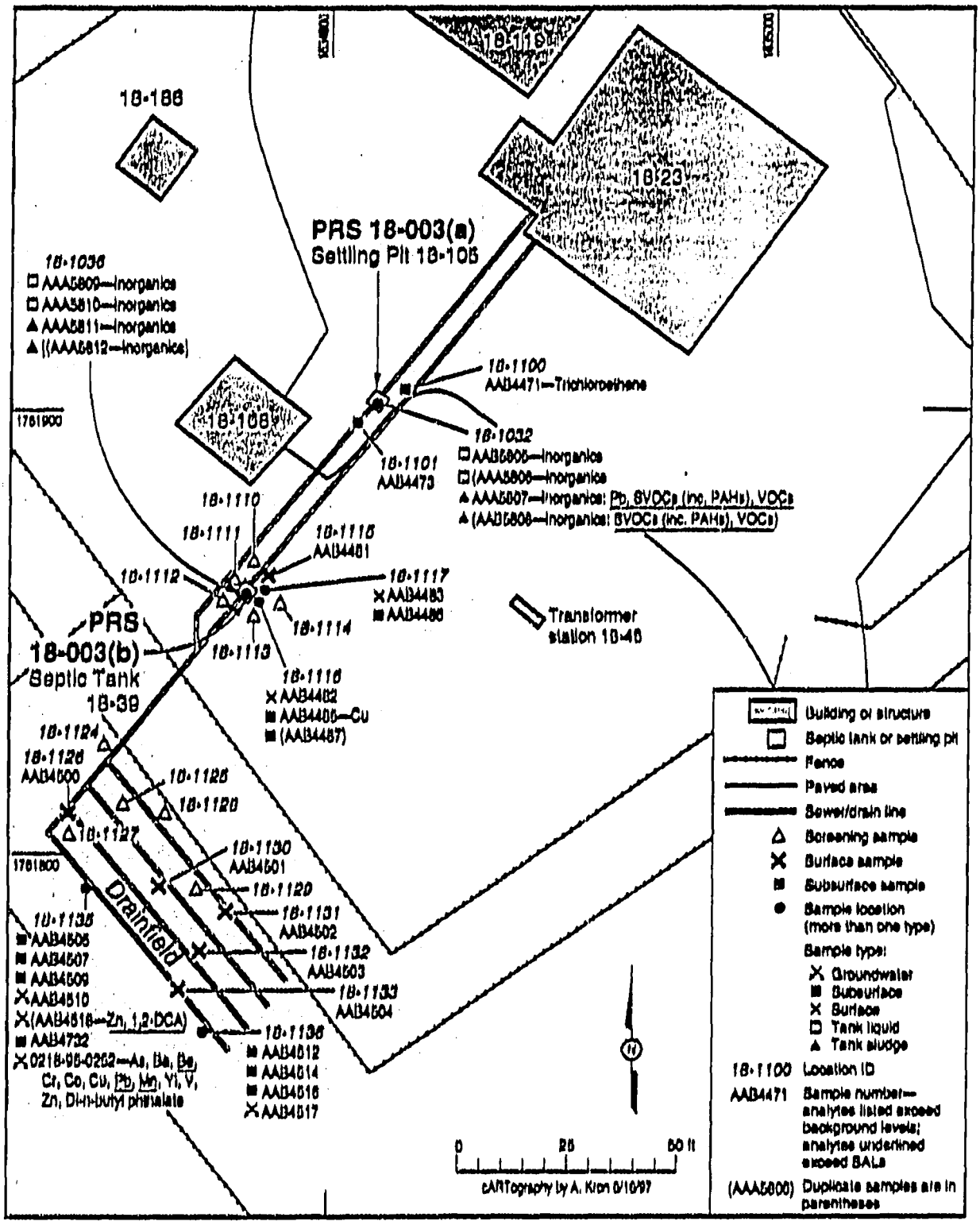

Figure 4-2. Sample locations and results of screening assessment for PRS 18-003(a and b).

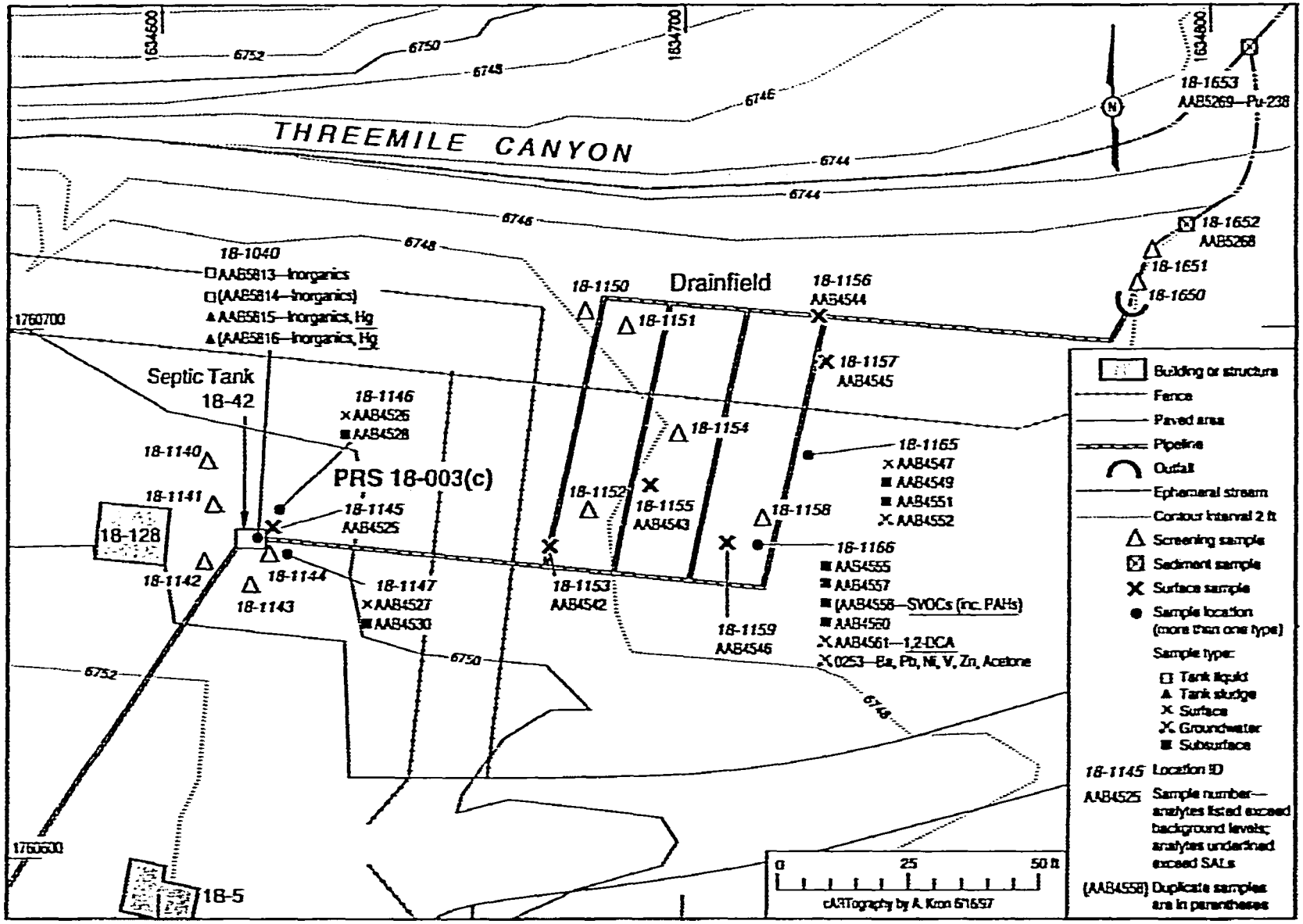

Figure 4-3. Sample locations and results of screening assessment for PRS 18-003(c).

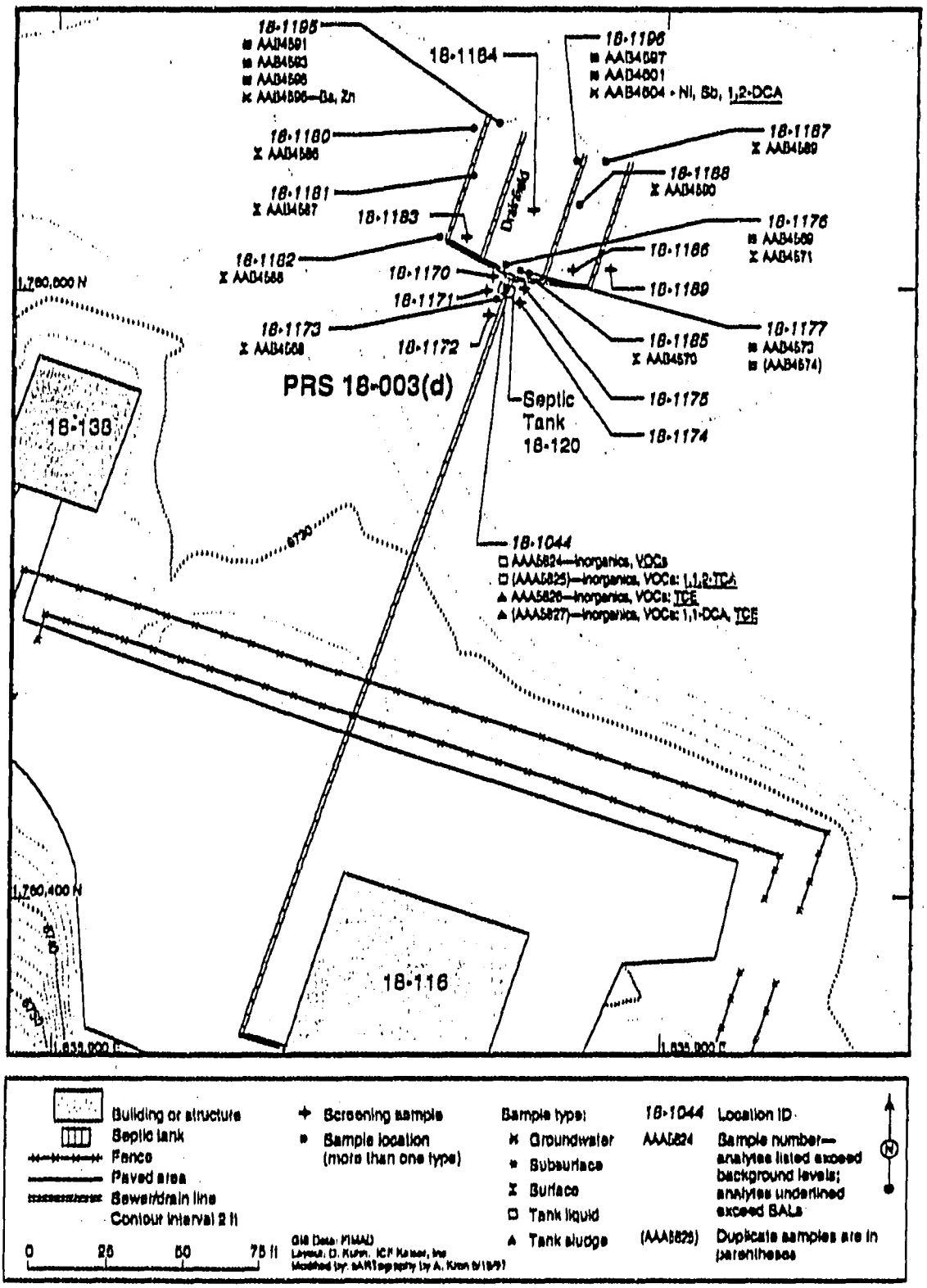

Figure 4-4. Sample locations and results of screening assessment at PRS 18-003(d).

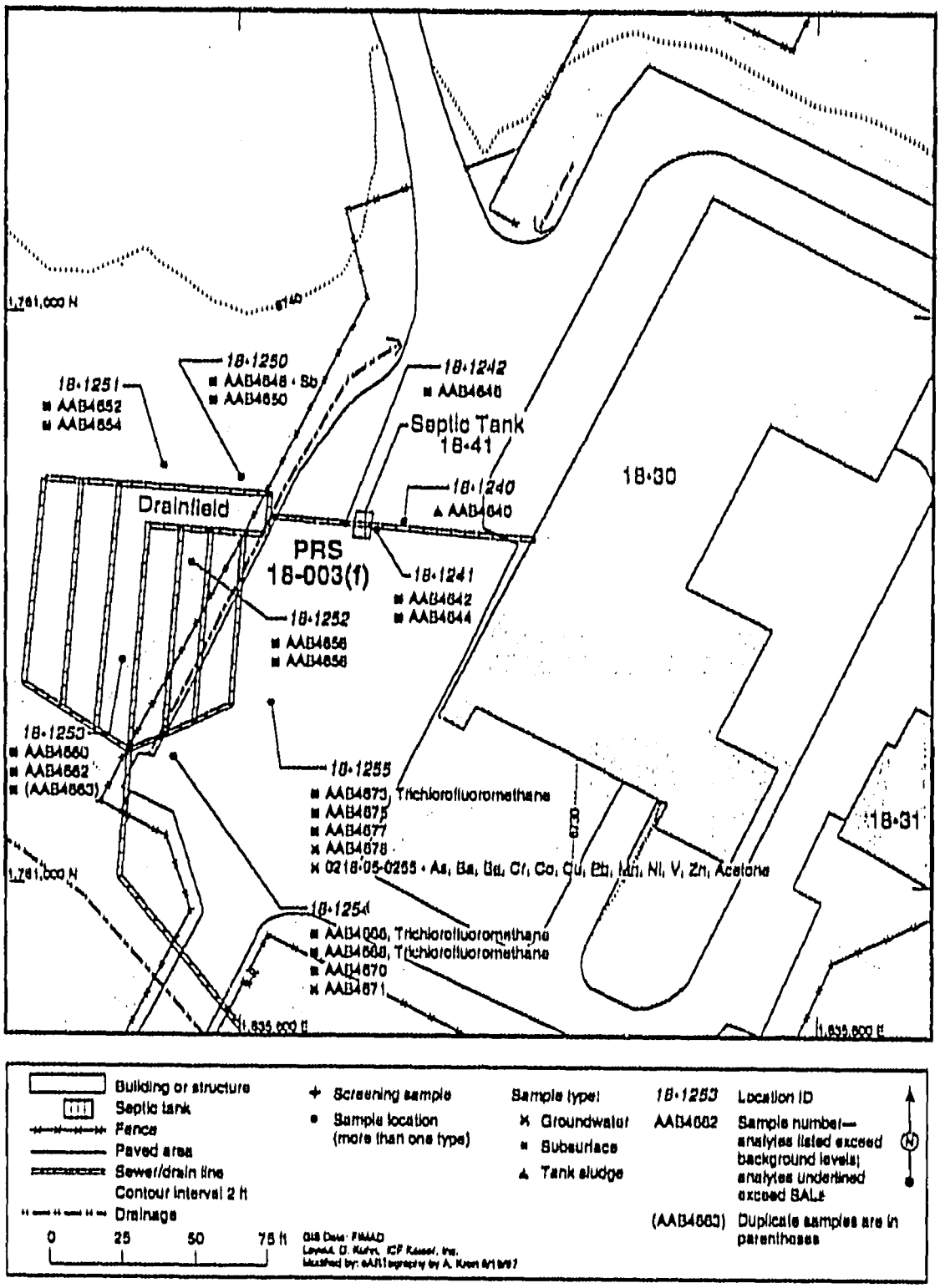

Figure 4-5. Sample locations and results of screening assessment at PRS 18-003(f).

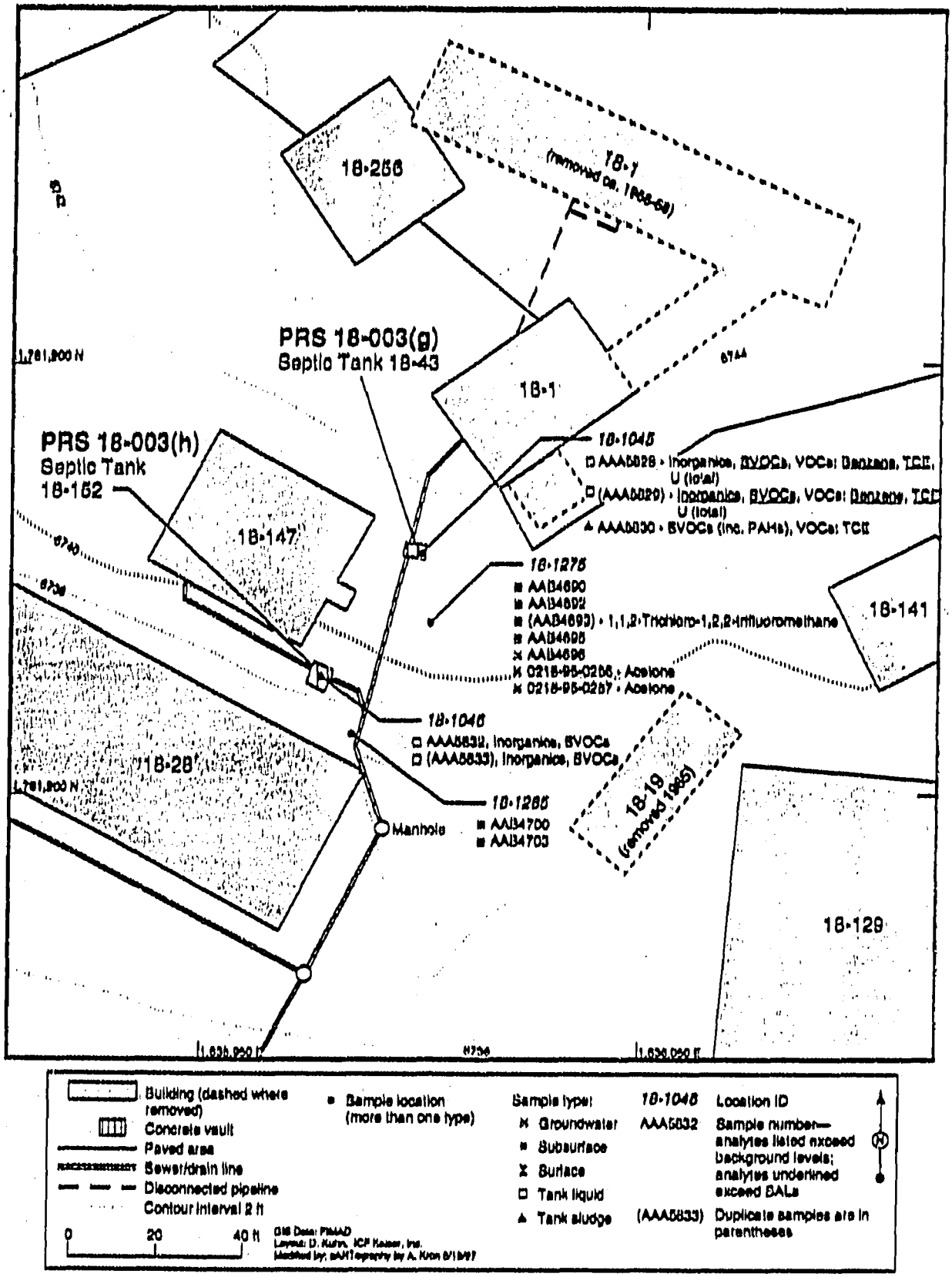

Figure 4-6. Sample locations and results of screening assessment at PRS 18-003(g,h).

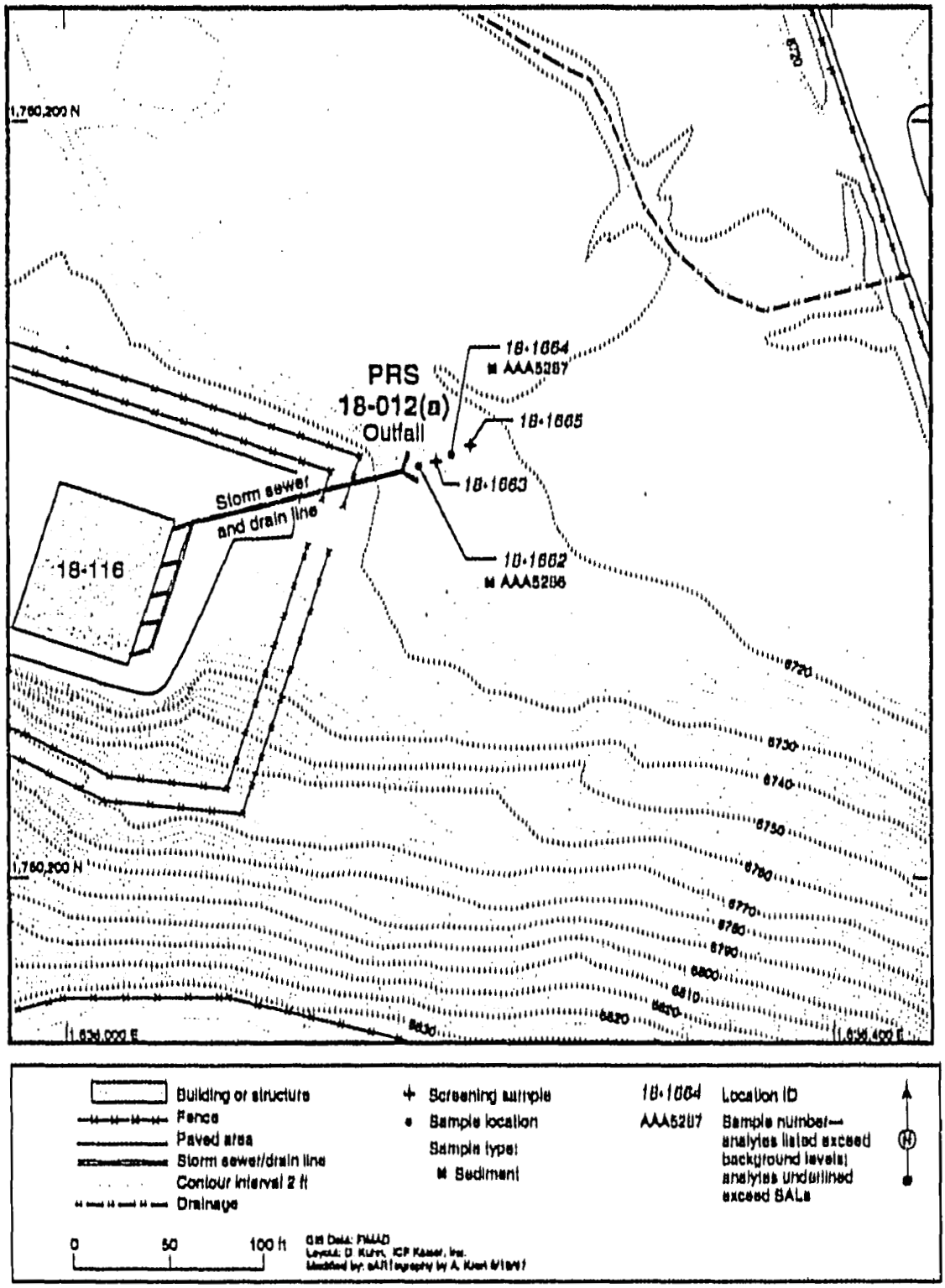

Figure 4-9. Sample locations and results of screening assessment at PRS 18-012(a).

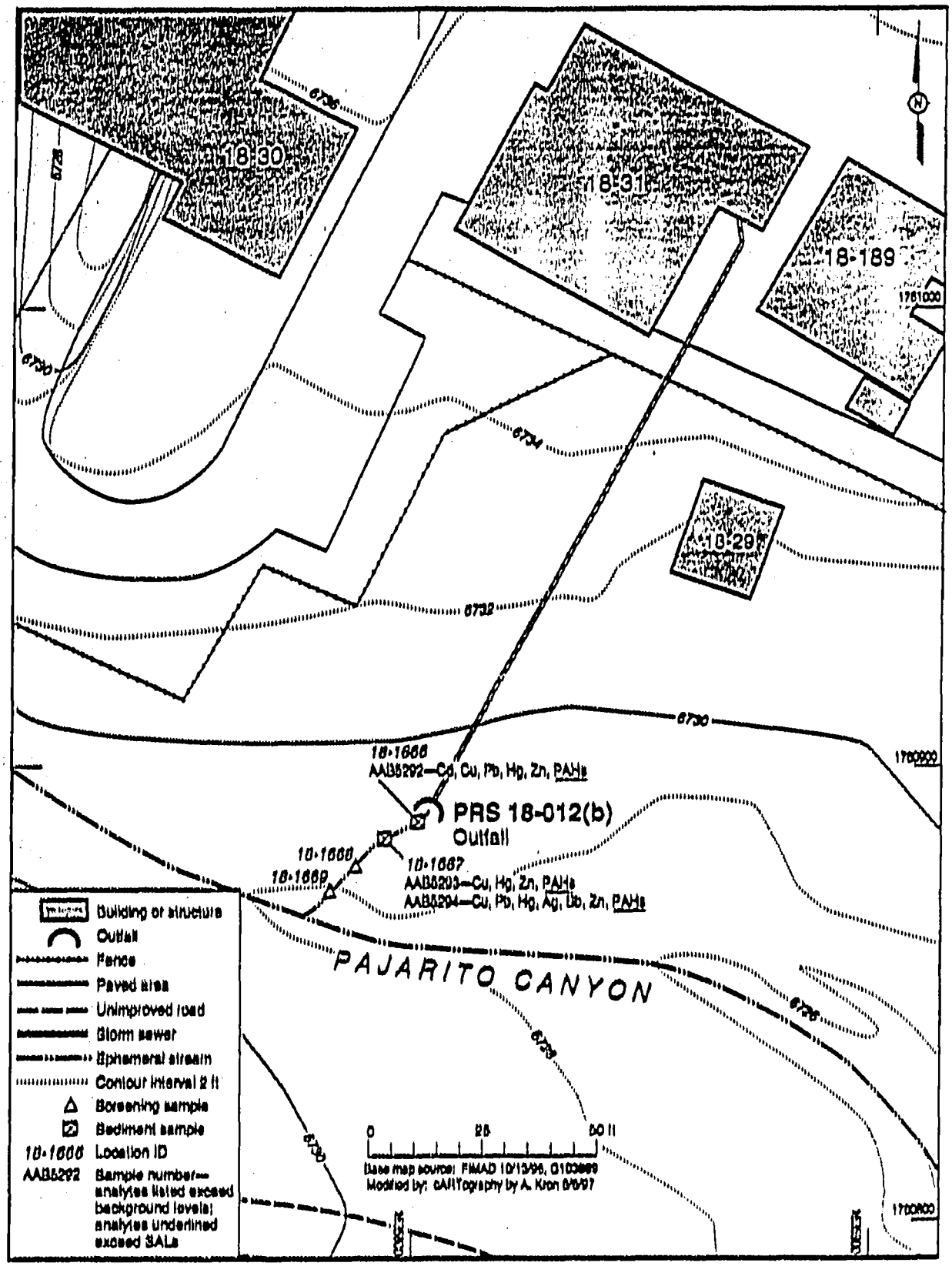

Figure 4-10. Sample locations and results of screening assessment for PRS 18-012(b).

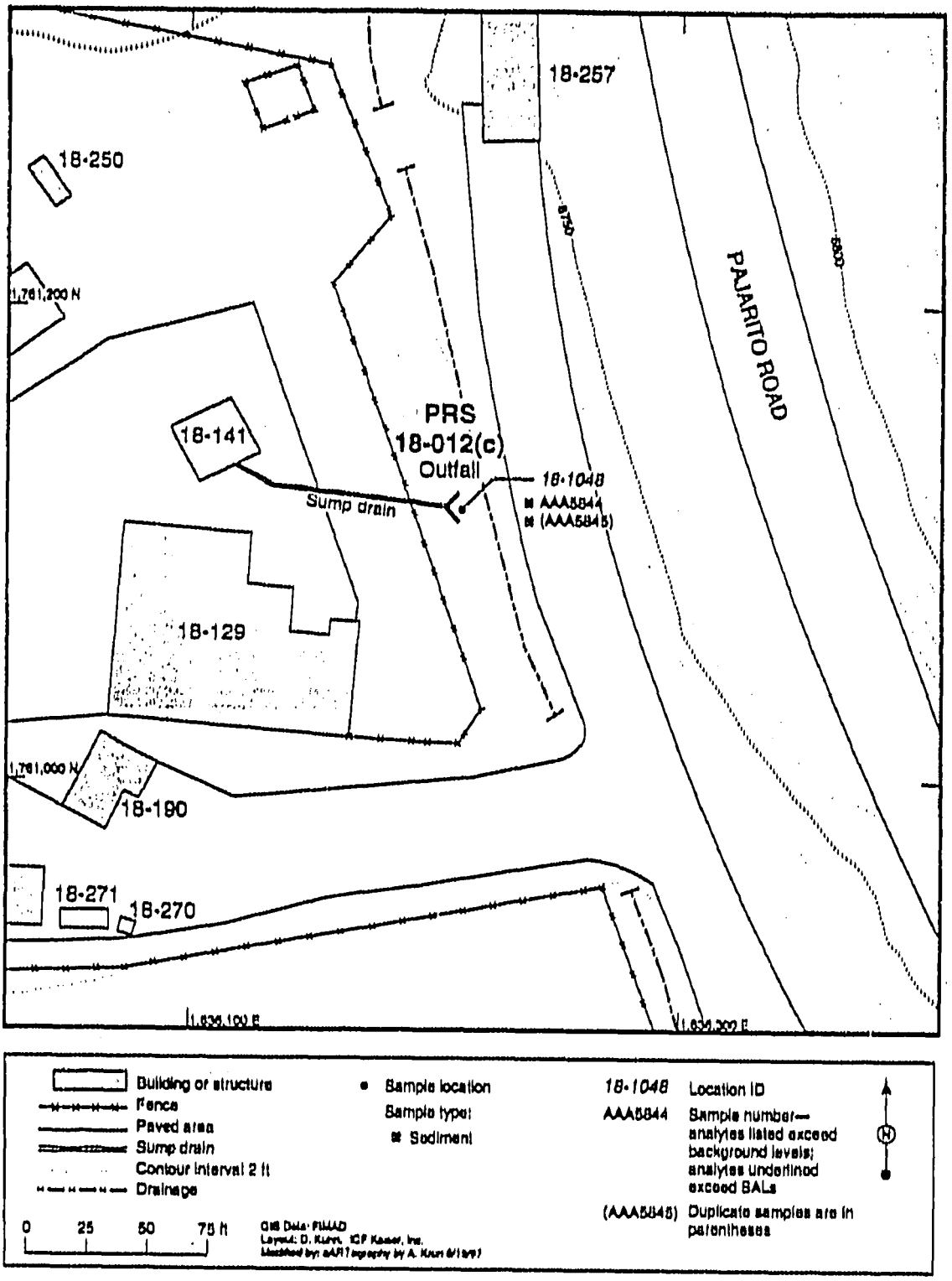

Figure 4-11. Sample locations and results of screening assessment at PRS 18-012(c).

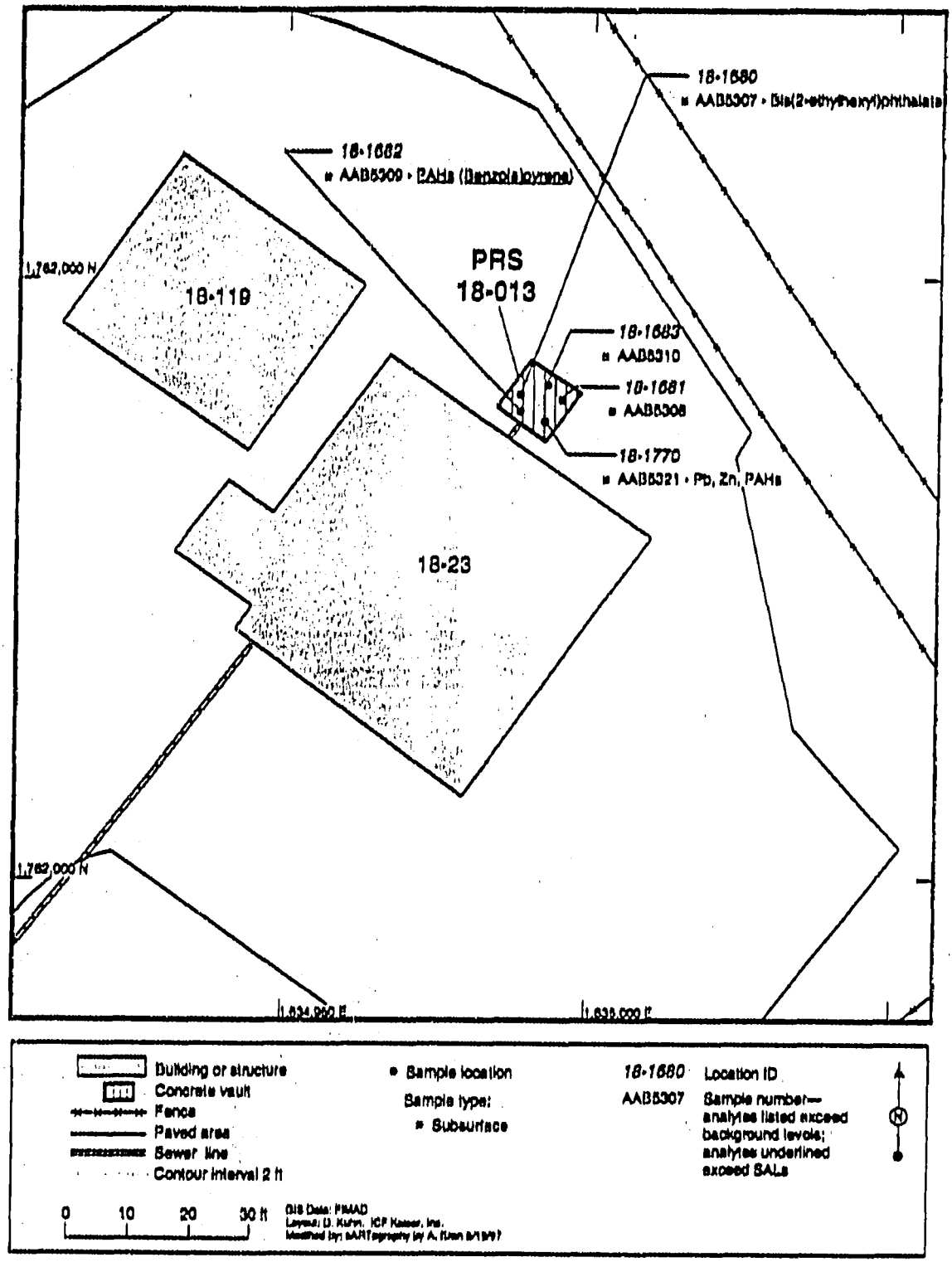

Figure 4-12. Sample locations and results of screening assessment at PRS 18-013.

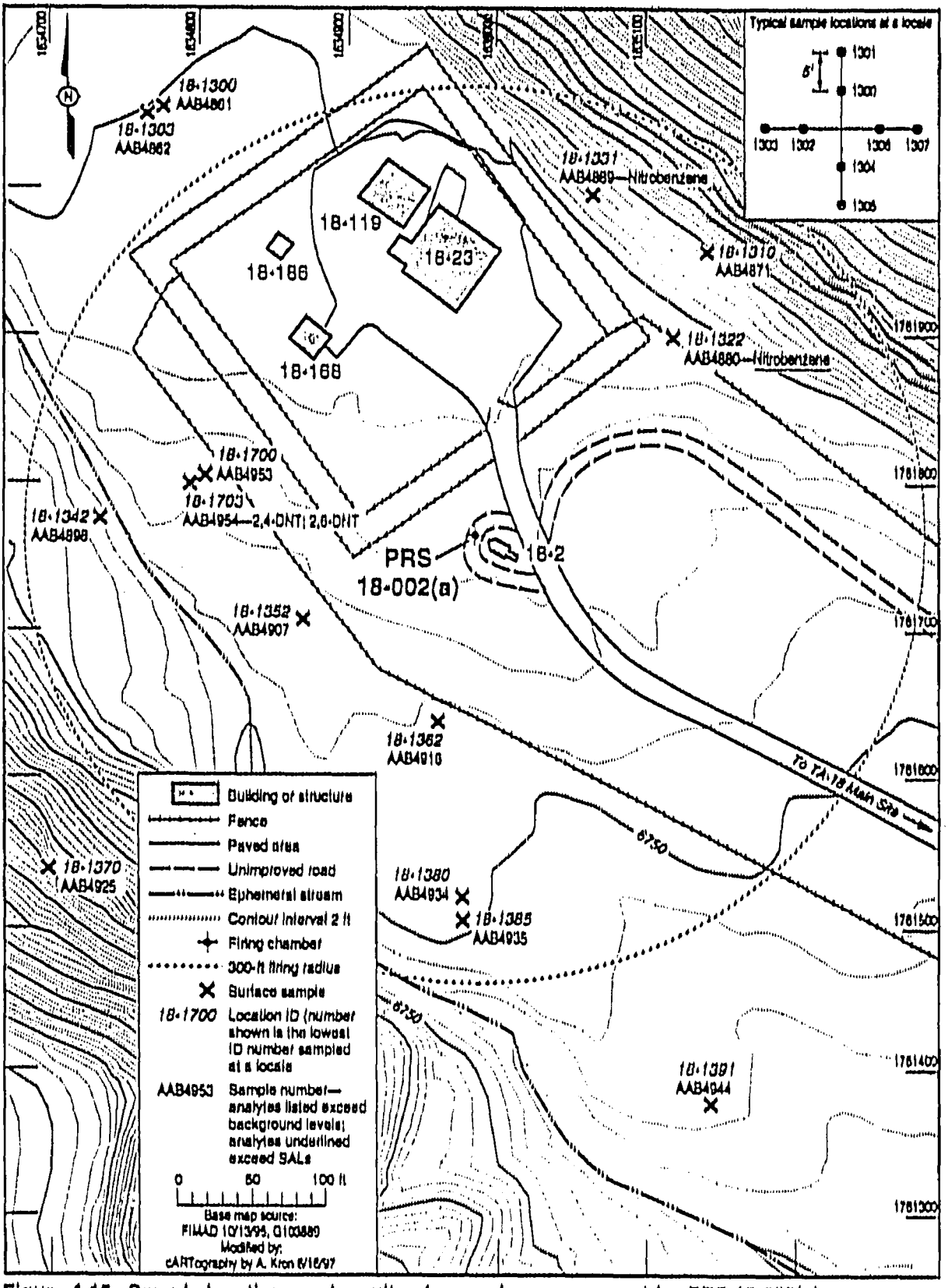

Figure 4-15. Sample locations and results of screening assessment for PRS 18-002(a).

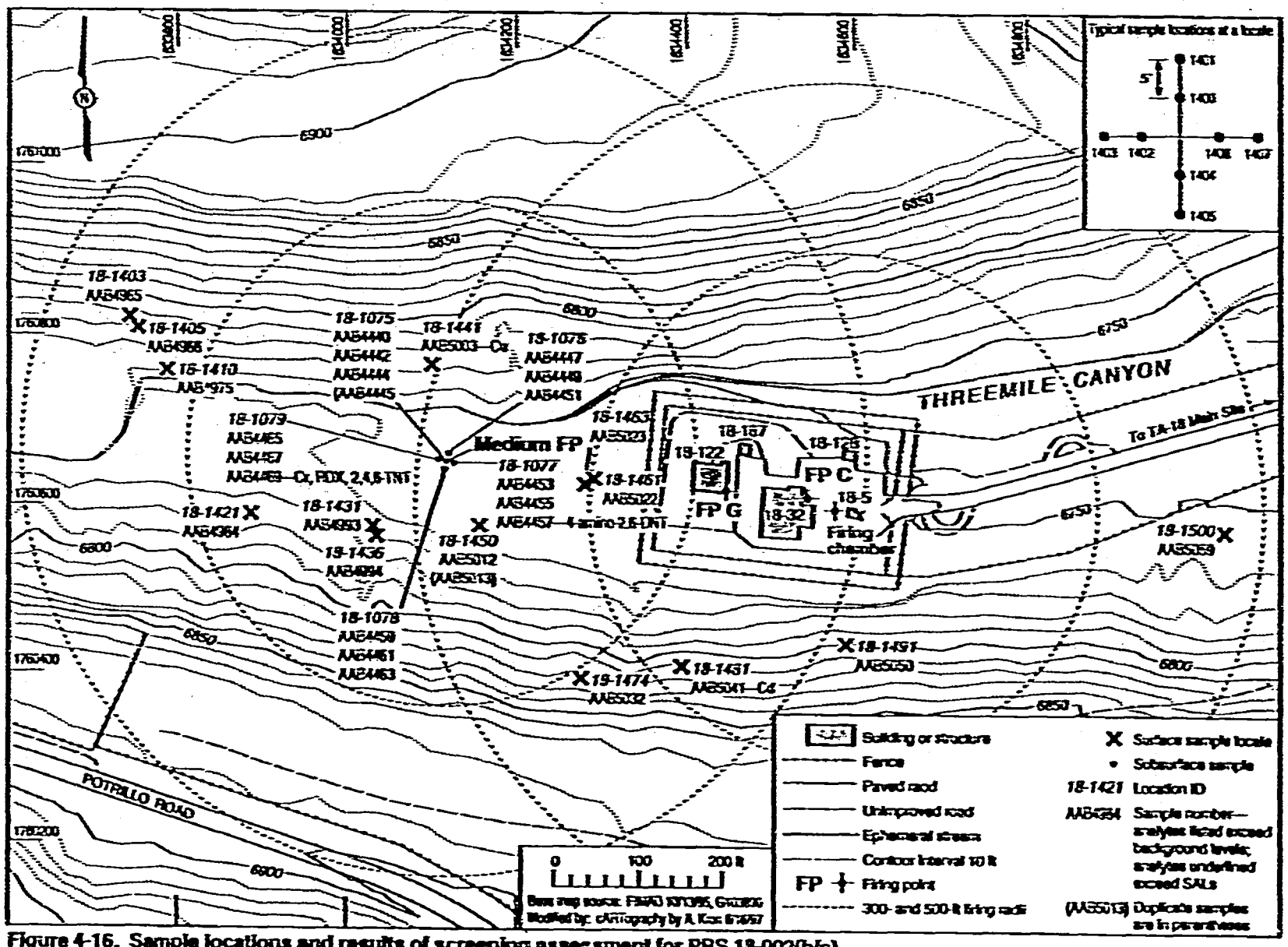

Figure 4-16. Sample locations and results of screening assessment for PRS 18-002(b/c).

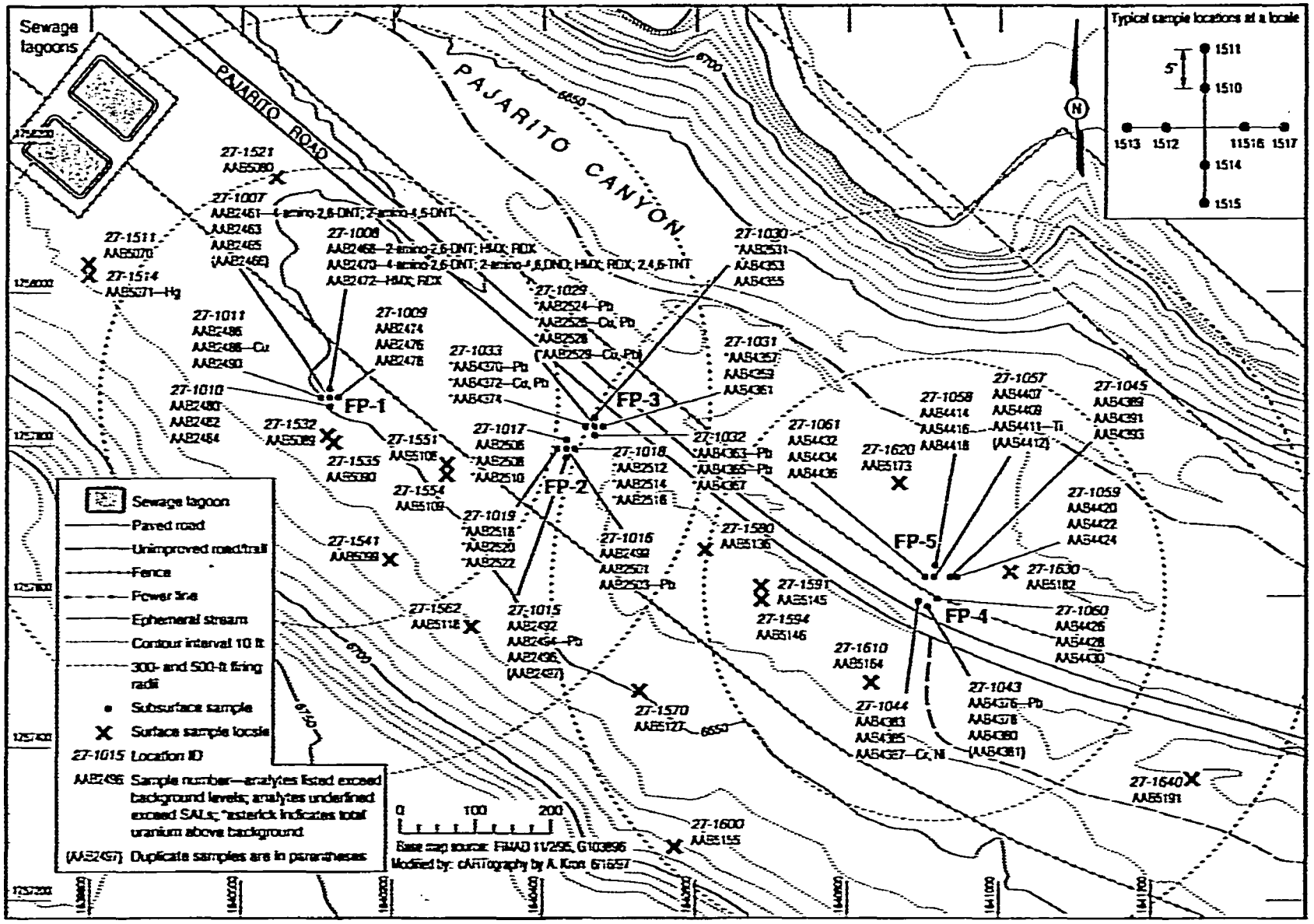

Figure 4-17. Sample locations and results of screening assessment for PRS 27-002.

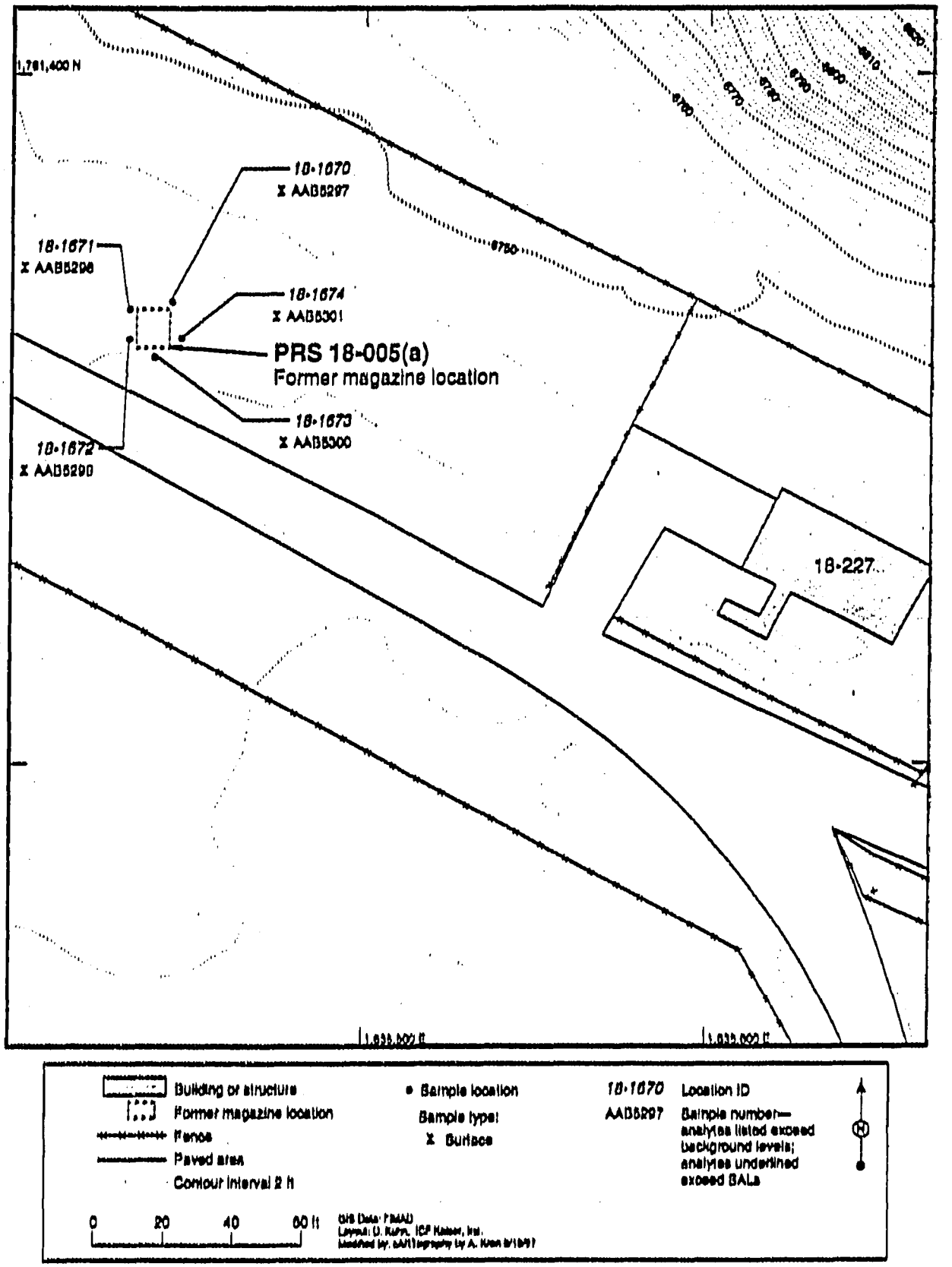

Figure 4-19. Sample locations and results of screening assessment at PRS 18-005(a).

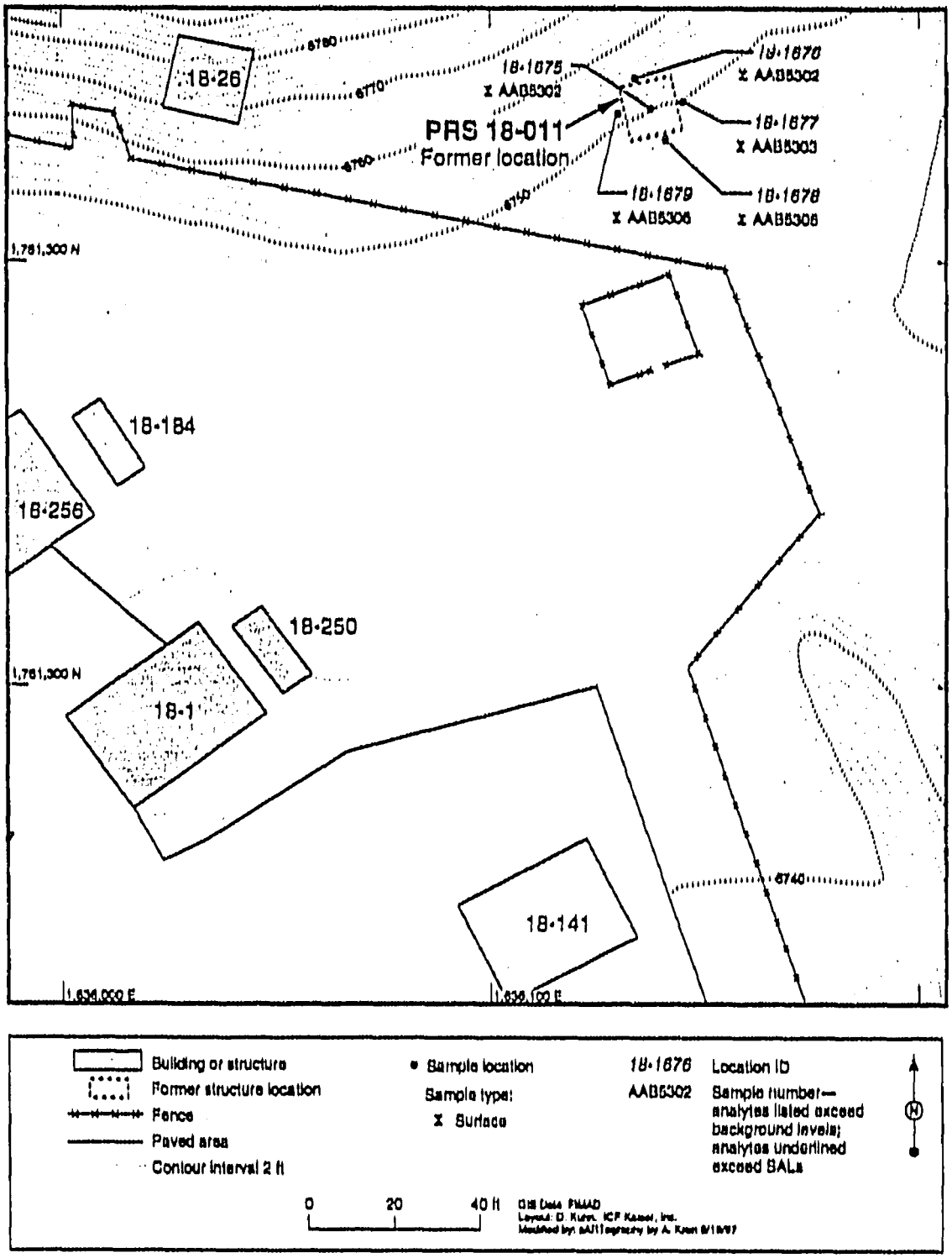

Figure 4-20. Sample locations and results of screening assessment at PRS 18-011.

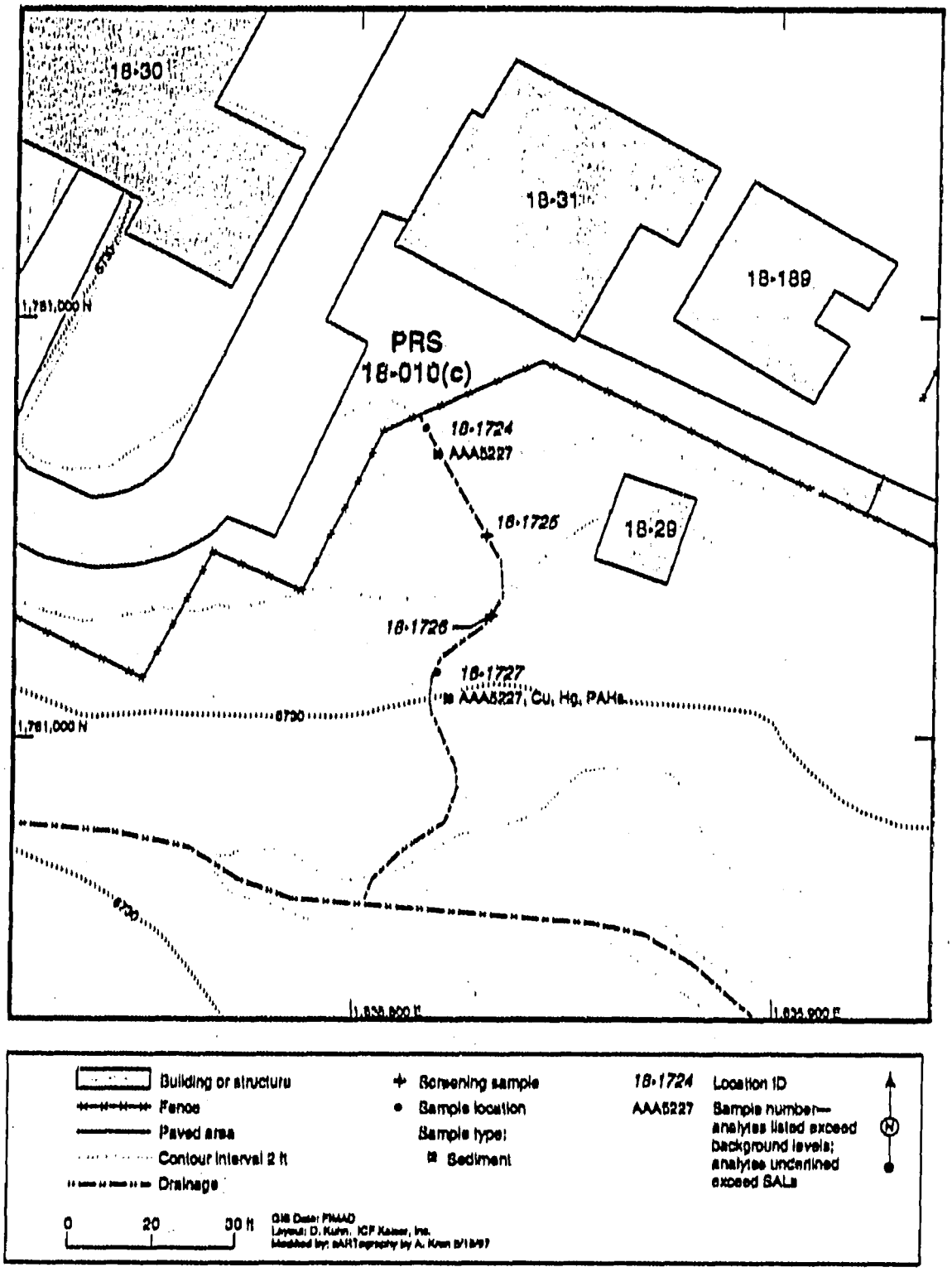

Figure 4-23. Sample locations and results of screening assessment at PRS 18-010(c).

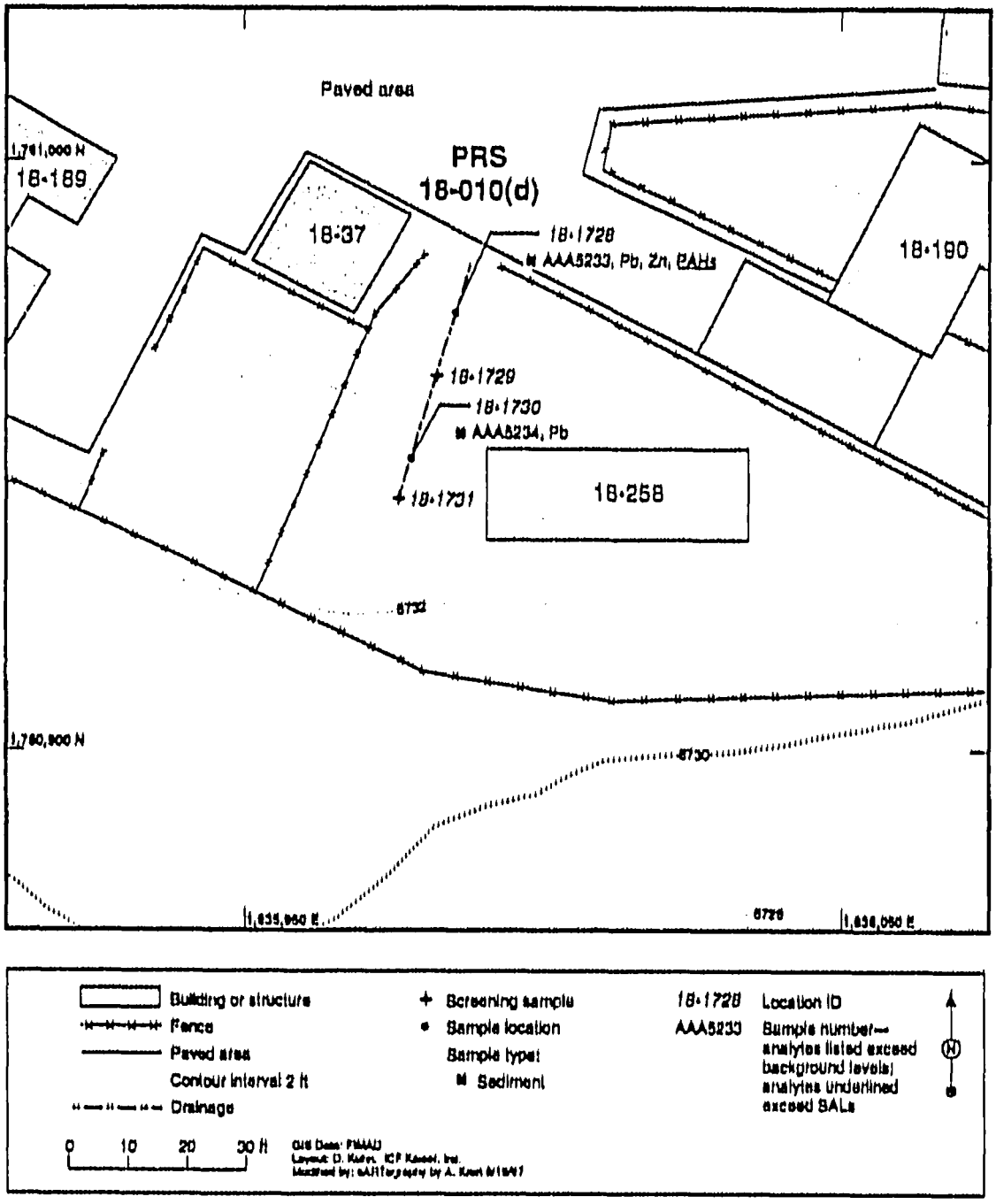

Figure 4-24. Sample locations and results of screening assessment at PRS 18-010(d).

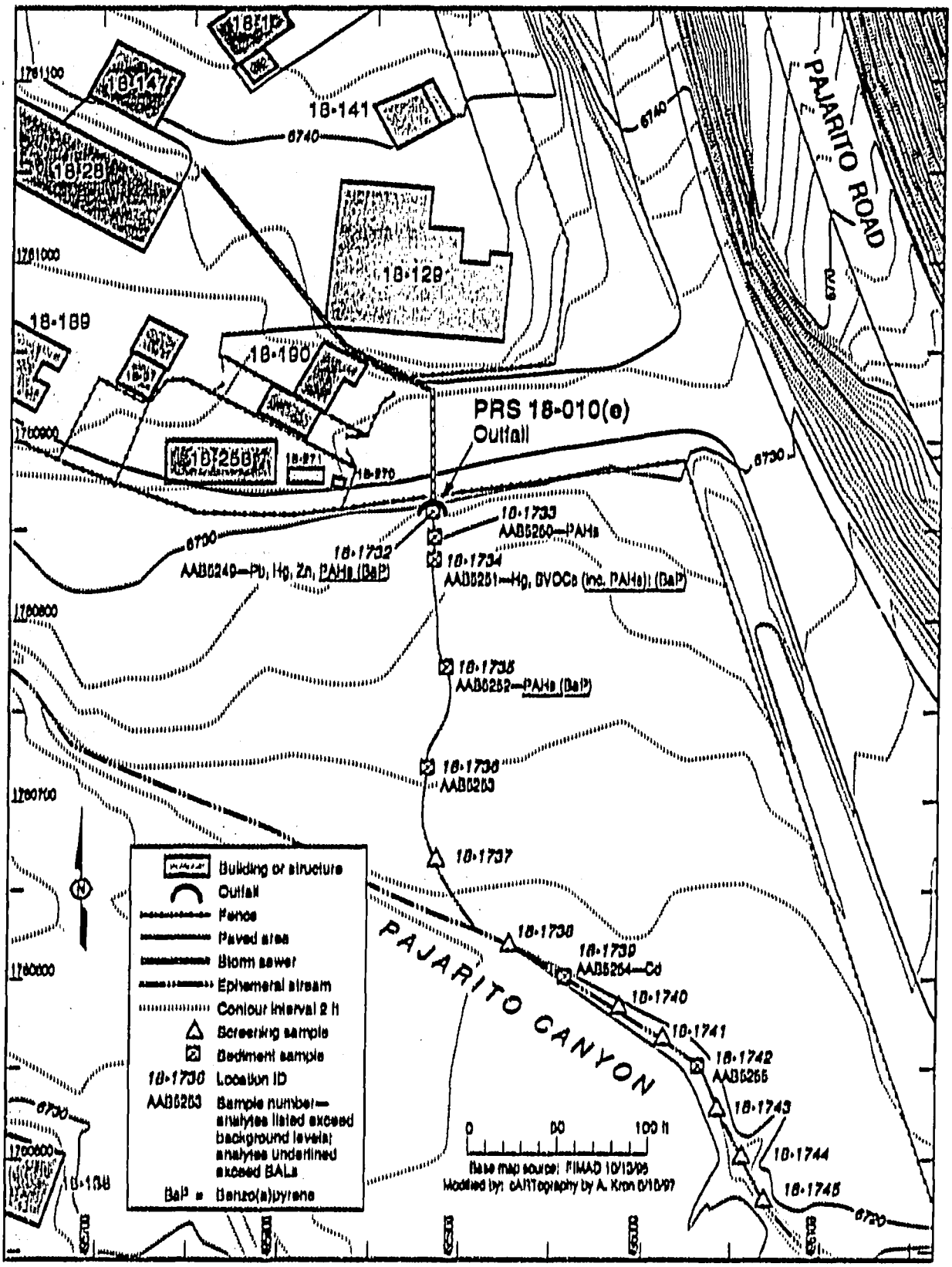

Figure 4-25. Sample locations and results of screening assessment for PRS 18-010(e).

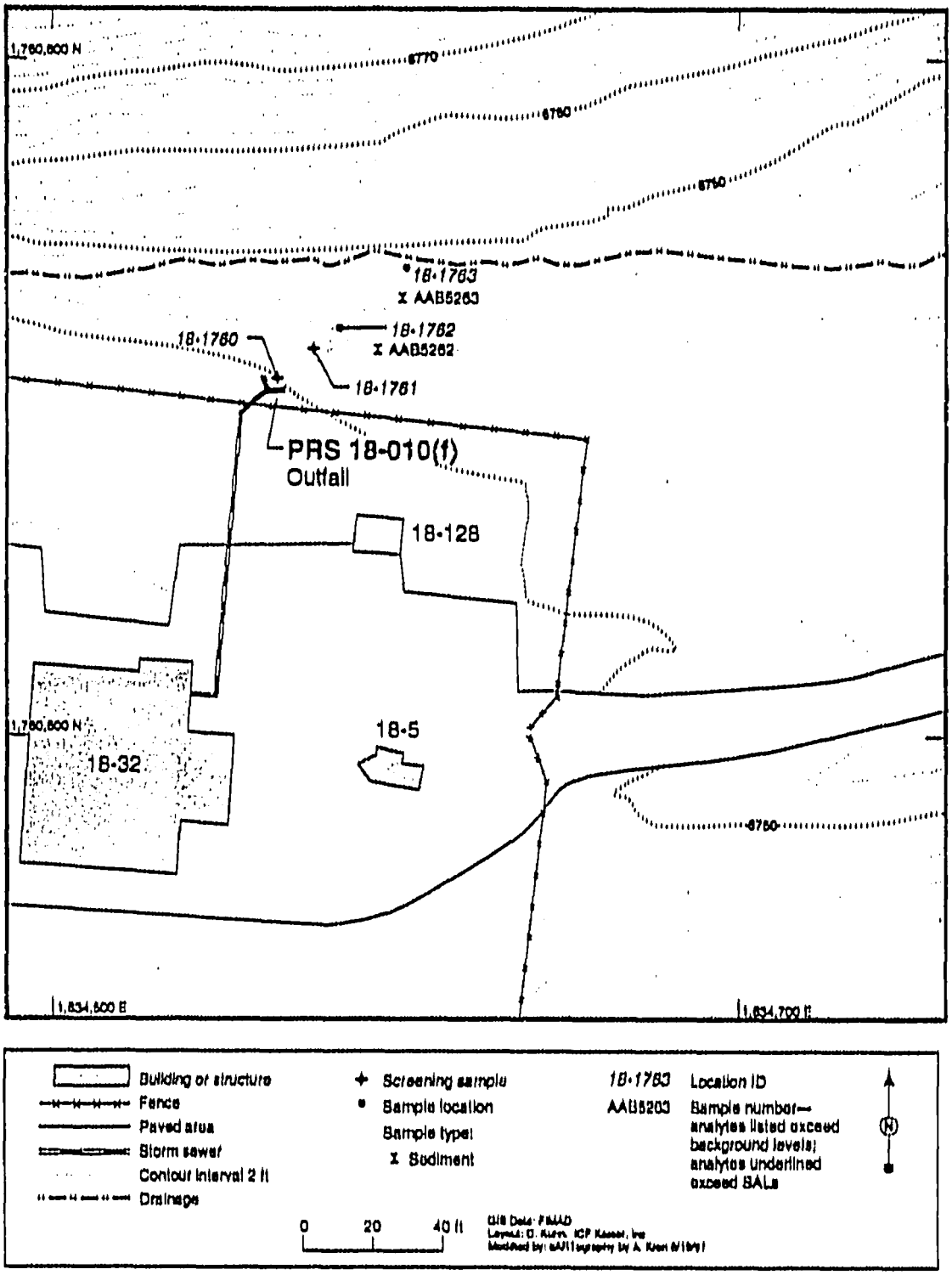

Figure 4-26. Sample locations and results of screening assessment at PRS 18-010(f).

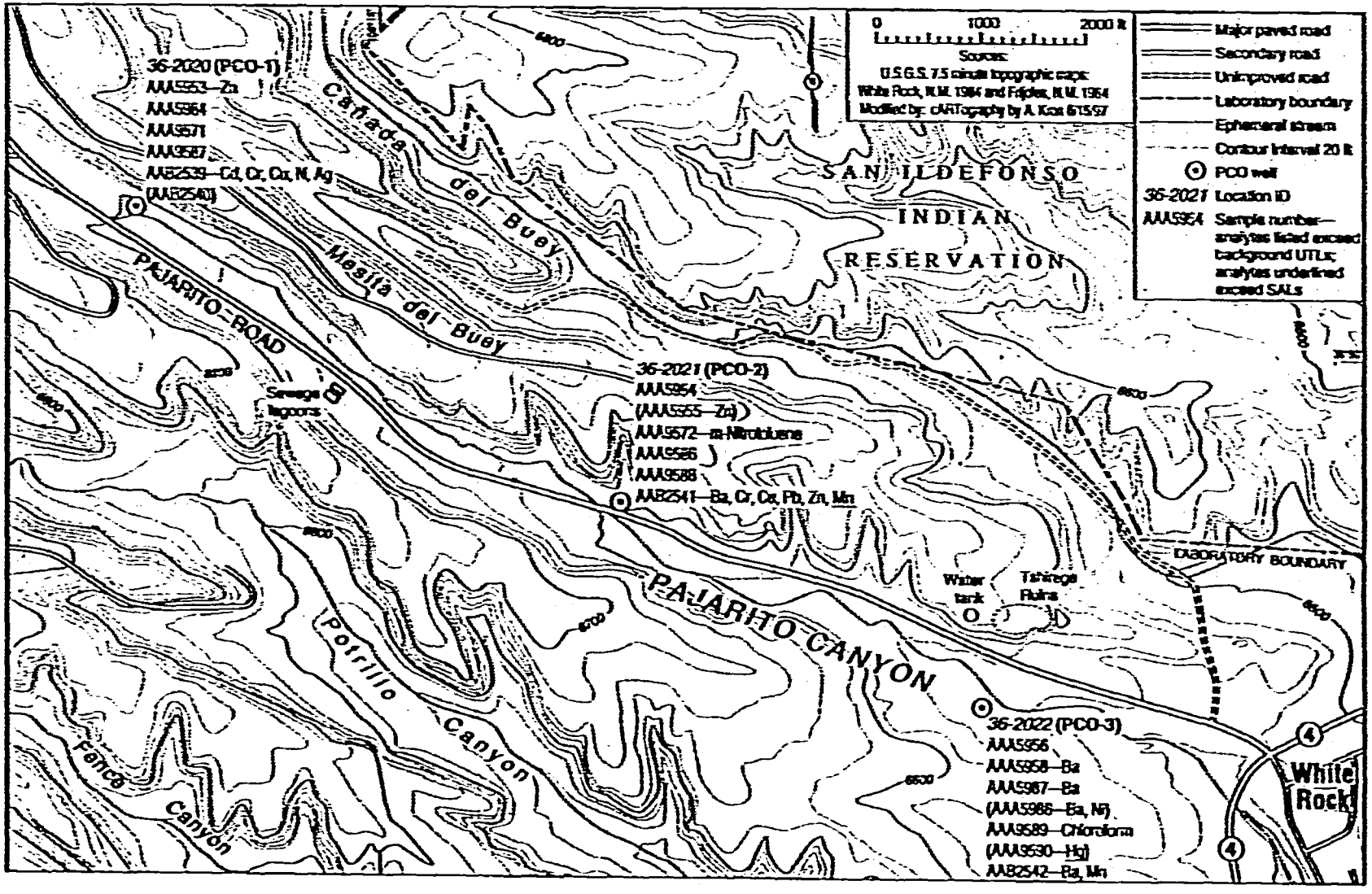

Figure 4-28. Sample locations and results of screening assessment for PCO wells.

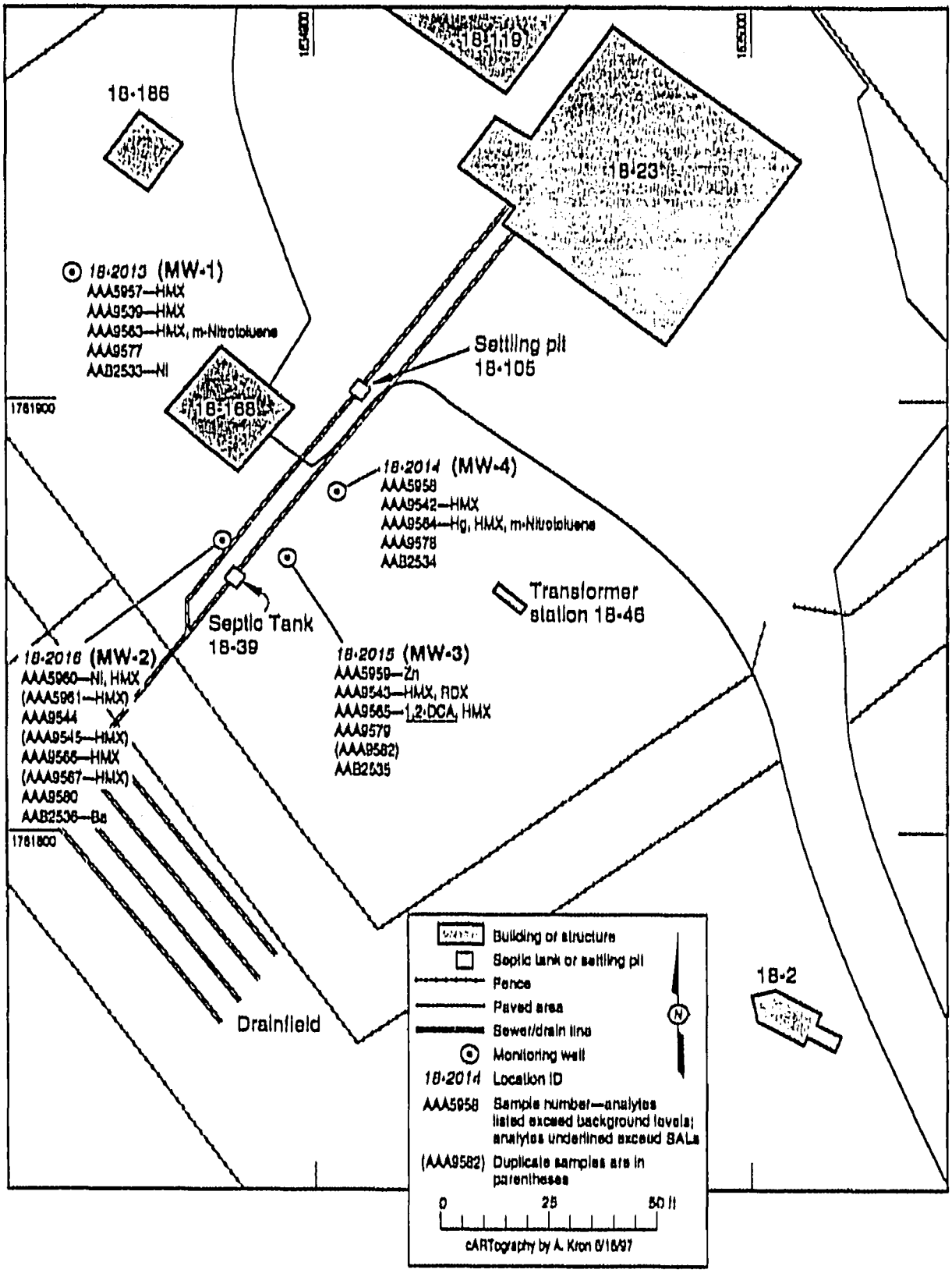

Figure 4-29. Sample locations and results of screening assessment for LACEF monitoring wells.

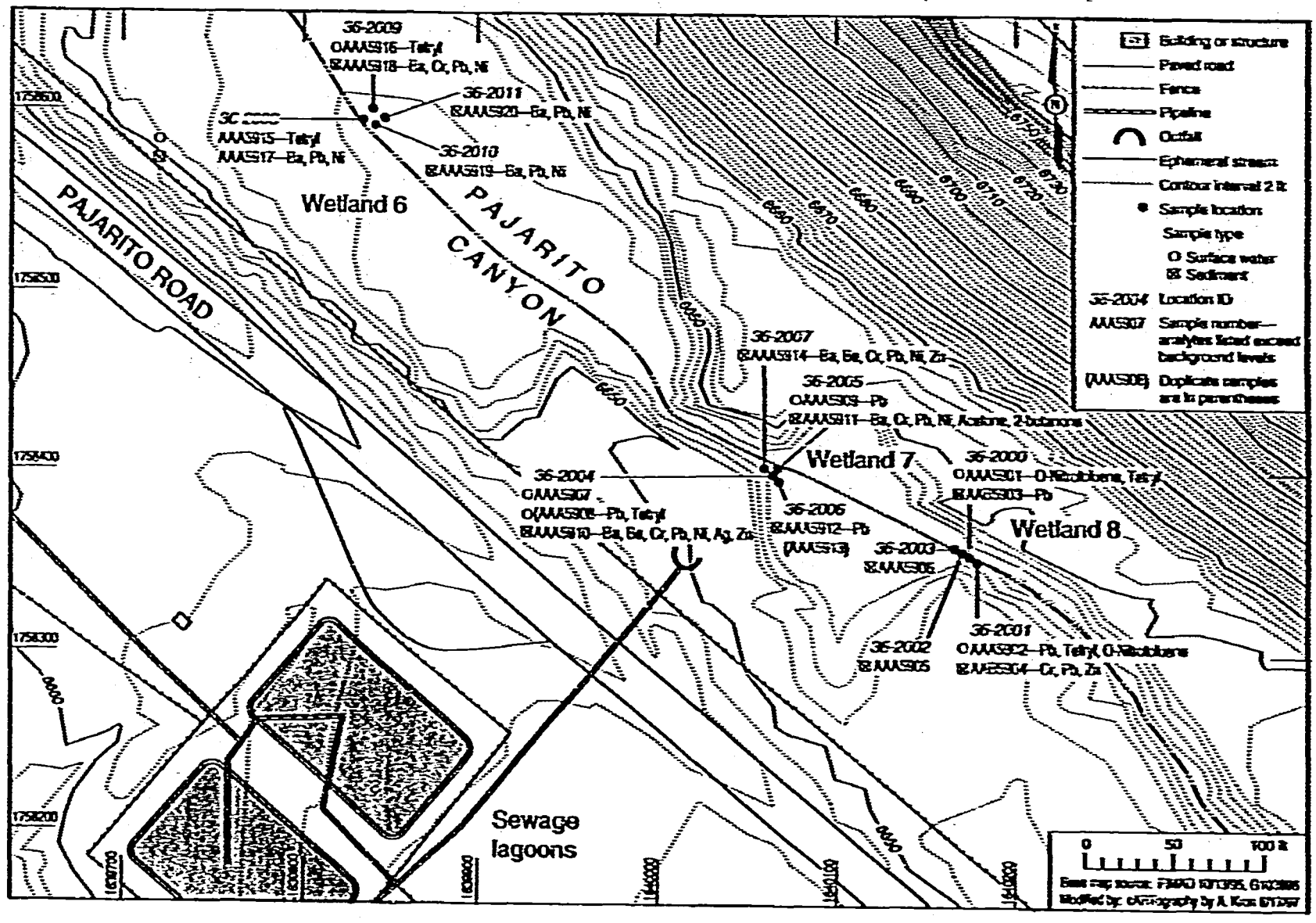

Figure 4-33. Sample locations and results of screening assessment for WL-6, WL-7, and WL-8.

ATTACHMENT E

SUPPORTING DATA FOR STIFF DIAGRAMS

WELL DATA

Well	Location ID Number	Analyte Code Description	Sample ID Number	Sample Results	Reporting Units	Lab Qualifier
BG-1	18-1060	Alkalinity, Total (Methyl Orange [pH=4.5] end point)	AAB2442	49200	UG/L	
BG-1	18-1060	Calcium	AAB2442	13200	UG/L	
BG-1	18-1060	Chloride	AAB2442	15.5	MG/L	
BG-1	18-1060	Magnesium	AAB2442	4460	UG/L	U
BG-1	18-1060	Nitrogen, Nitrate (Expressed as NO3)	AAB2442	99.7	UG/L	
BG-1	18-1060	Potassium	AAB2442	7310	UG/L	
BG-1	18-1060	Sodium	AAB2442	14800	UG/L	
BG-1	18-1060	Sulfate	AAB2442	7500	UG/L	
MW-7	18-1135	Calcium	0218-95-0252	37500	UG/L	
MW-7	18-1135	Magnesium	0218-95-0252	18300	UG/L	
MW-7	18-1135	Potassium	0218-95-0252	10900	UG/L	
MW-7	18-1135	Sodium	0218-95-0252	19300	UG/L	
MW-7	18-1135	Alkalinity, Total (Methyl Orange [pH=4.5] end point)	AAB4518	43700	UG/L	
MW-7	18-1135	Calcium	AAB4518	16300	UG/L	
MW-7	18-1135	Chloride	AAB4518	15.8	MG/L	
MW-7	18-1135	Magnesium	AAB4518	3650	UG/L	U
MW-7	18-1135	Nitrogen, Nitrate (Expressed as NO3)	AAB4518	310	UG/L	
MW-7	18-1135	Potassium	AAB4518	5640	UG/L	
MW-7	18-1135	Sodium	AAB4518	13900	UG/L	
MW-7	18-1135	Sulfate	AAB4518	7960	UG/L	
MW-8	18-1166	Alkalinity, Total (Methyl Orange [pH=4.5] end point)	AAB4561	42200	UG/L	
MW-8	18-1166	Calcium	AAB4561	18600	UG/L	
MW-8	18-1166	Chloride	AAB4561	26.5	MG/L	
MW-8	18-1166	Magnesium	AAB4561	6010	UG/L	
MW-8	18-1166	Nitrogen, Nitrate (Expressed as NO3)	AAB4561	278	UG/L	
MW-8	18-1166	Potassium	AAB4561	4310	UG/L	U
MW-8	18-1166	Sodium	AAB4561	17100	UG/L	
MW-8	18-1166	Sulfate	AAB4561	13700	UG/L	
MW-8	18-1166	Calcium	0218-95-0253	20400	UG/L	
MW-8	18-1166	Magnesium	0218-95-0253	8100	UG/L	
MW-8	18-1166	Potassium	0218-95-0253	6960	UG/L	
MW-8	18-1166	Sodium	0218-95-0253	15000	UG/L	

WELL DATA

Well	Location ID Number	Analyte Code Description	Sample ID Number	Sample Results	Reporting Units	Lab Qualifier
MW-9	18-1234	Alkalinity, Total (Methyl Orange [pH=4.5] end point)	AAB4639	53300	UG/L	
MW-9	18-1234	Calcium	AAB4639	20300	UG/L	
MW-9	18-1234	Chloride	AAB4639	28.2	MG/L	
MW-9	18-1234	Magnesium	AAB4639	5670	UG/L	
MW-9	18-1234	Nitrogen, Nitrate (Expressed as NO3)	AAB4639	944	UG/L	
MW-9	18-1234	Potassium	AAB4639	4490	UG/L	<R
MW-9	18-1234	Sodium	AAB4639	20500	UG/L	
MW-9	18-1234	Sulfate	AAB4639	7760	UG/L	
MW-10	18-1255	Alkalinity, Total (Methyl Orange [pH=4.5] end point)	AAB4678	51700	UG/L	
MW-10	18-1255	Calcium	AAB4678	12900	UG/L	
MW-10	18-1255	Chloride	AAB4678	14.3	MG/L	
MW-10	18-1255	Magnesium	AAB4678	4240	UG/L	U
MW-10	18-1255	Nitrogen, Nitrate (Expressed as NO3)	AAB4678	1450	UG/L	
MW-10	18-1255	Potassium	AAB4678	3320	UG/L	U
MW-10	18-1255	Sodium	AAB4678	16100	UG/L	
MW-10	18-1255	Sulfate	AAB4678	8420	UG/L	
MW-11	18-1275	Alkalinity, Total (Methyl Orange [pH=4.5] end point)	AAB4696	38400	UG/L	
MW-11	18-1275	Calcium	AAB4696	12800	UG/L	
MW-11	18-1275	Chloride	AAB4696	18.5	MG/L	
MW-11	18-1275	Magnesium	AAB4696	4200	UG/L	U
MW-11	18-1275	Nitrogen, Nitrate (Expressed as NO3)	AAB4696	366	UG/L	
MW-11	18-1275	Potassium	AAB4696	3700	UG/L	U
MW-11	18-1275	Sodium	AAB4696	14700	UG/L	
MW-11	18-1275	Sulfate	AAB4696	7770	UG/L	
MW-11	18-1275	Calcium	0218-95-0256	13200	UG/L	
MW-11	18-1275	Magnesium	0218-95-0256	4880	UG/L	
MW-11	18-1275	Potassium	0218-95-0256	4590	UG/L	
MW-11	18-1275	Sodium	0218-95-0256	13900	UG/L	
PCO-1	36-2020	Alkalinity, Total (Methyl Orange [pH=4.5] end point)	AAA5953	71000	UG/L	
PCO-1	36-2020	Chloride	AAA5953	17000	UG/L	
PCO-1	36-2020	Sulfate	AAA5953	9000	UG/L	

WELL DATA

Well	Location ID Number	Analyte Code Description	Sample ID Number	Sample Results	Reporting Units	Lab Qualifier
PCO-1	36-2020	Alkalinity, Total (Methyl Orange [pH=4.5] end point)	AAA5984	65000	UG/L	
PCO-1	36-2020	Calcium	AAA5984	15700	UG/L	J
PCO-1	36-2020	Chloride	AAA5984	21970	UG/L	
PCO-1	36-2020	Magnesium	AAA5984	4700	UG/L	
PCO-1	36-2020	Potassium	AAA5984	2820	UG/L	
PCO-1	36-2020	Sodium	AAA5984	18800	UG/L	
PCO-1	36-2020	Sulfate	AAA5984	9600	UG/L	
PCO-1	36-2020	Alkalinity, Total (Methyl Orange [pH=4.5] end point)	AAA9571	74200	UG/L	
PCO-1	36-2020	Alkalinity, Total (Methyl Orange [pH=4.5] end point)	AAA9571	73600	UG/L	
PCO-1	36-2020	Calcium	AAA9571	23900	UG/L	
PCO-1	36-2020	Chloride	AAA9571	36100	UG/L	
PCO-1	36-2020	Magnesium	AAA9571	6890	UG/L	
PCO-1	36-2020	Nitrogen, Nitrate (Expressed as NO3)	AAA9571	20	UG/L	U
PCO-1	36-2020	Potassium	AAA9571	6320	UG/L	
PCO-1	36-2020	Sodium	AAA9571	26500	UG/L	
PCO-1	36-2020	Sulfate	AAA9571	10300	UG/L	
PCO-1	36-2020	Calcium	AAA9587	24200	UG/L	
PCO-1	36-2020	Magnesium	AAA9587	7120	UG/L	
PCO-1	36-2020	Nitrogen, Nitrate (Expressed as NO3)	AAA9587	420	UG/L	
PCO-1	36-2020	Nitrogen, Nitrate (Expressed as NO3)	AAA9587	411	UG/L	
PCO-1	36-2020	Potassium	AAA9587	4730	UG/L	U
PCO-1	36-2020	Sodium	AAA9587	26500	UG/L	
PCO-1	36-2020	Calcium	AAB2539	15700	UG/L	
PCO-1	36-2020	Calcium	AAB2539	15506	UG/L	
PCO-1	36-2020	Magnesium	AAB2539	4900	UG/L	U
PCO-1	36-2020	Magnesium	AAB2539	4932	UG/L	
PCO-1	36-2020	Potassium	AAB2539	4340	UG/L	U
PCO-1	36-2020	Potassium	AAB2539	4505	UG/L	
PCO-1	36-2020	Sodium	AAB2539	20900	UG/L	
PCO-1	36-2020	Sodium	AAB2539	20791	UG/L	
PCO-3	36-2023	Alkalinity, Total (Methyl Orange [pH=4.5] end point)	AAA5956	250000	UG/L	
PCO-3	36-2023	Chloride	AAA5956	215000	UG/L	

WELL DATA

Well	Location ID Number	Analyte Code Description	Sample ID Number	Sample Results	Reporting Units	Lab Qualifier
PCO-3	36-2023	Sulfate	AAA5956	14000	UG/L	
PCO-3	36-2023	Alkalinity, Total (Methyl Orange [pH=4.5] end point)	AAA5987	421000	UG/L	
PCO-3	36-2023	Calcium	AAA5987	130000	UG/L	J
PCO-3	36-2023	Chloride	AAA5987	24990	UG/L	
PCO-3	36-2023	Magnesium	AAA5987	30000	UG/L	
PCO-3	36-2023	Potassium	AAA5987	3660	UG/L	
PCO-3	36-2023	Sodium	AAA5987	131000	UG/L	
PCO-3	36-2023	Sulfate	AAA5987	5510	UG/L	
PCO-3	36-2023	Calcium	AAA9590	43000	UG/L	
PCO-3	36-2023	Calcium	AAA9590	41100	UG/L	
PCO-3	36-2023	Magnesium	AAA9590	10000	UG/L	
PCO-3	36-2023	Magnesium	AAA9590	8600	UG/L	
PCO-3	36-2023	Potassium	AAA9590	3900	UG/L	
PCO-3	36-2023	Potassium	AAA9590	4760	UG/L	U
PCO-3	36-2023	Sodium	AAA9590	39000	UG/L	
PCO-3	36-2023	Sodium	AAA9590	50400	UG/L	
PCO-3	36-2023	Calcium	AAB2542	24500	UG/L	
PCO-3	36-2023	Magnesium	AAB2542	53100	UG/L	
PCO-3	36-2023	Potassium	AAB2542	8970	UG/L	
PCO-3	36-2023	Sodium	AAB2542	15900	UG/L	

ATTACHMENT F

SUMMARY OF SAMPLES TAKEN

Summary of Samples Taken
PRS 18-002(a) Firing Site
1994

Location ID	Sample ID	Depth (inches)	Media	Total Metals	HE
18-1300	AAB4861	0-12	surface soil	X	X
18-1301	AAB4861	0-12	surface soil	X	X
18-1303	AAB4862	0-12	surface soil	X	X
18-1307	AAB4862	0-12	surface soil	X	X
18-1310	AAB4871	0-12	surface soil	X	X
18-1312	AAB4871	0-12	surface soil	X	X
18-1313	AAB4871	0-12	surface soil	X	X
18-1315	AAB4871	0-12	surface soil	X	X
18-1322	AAB4880	0-12	surface soil	X	X
18-1324	AAB4880	0-12	surface soil	X	X
18-1326	AAB4880	0-12	surface soil	X	X
18-1327	AAB4880	0-12	surface soil	X	X
18-1331	AAB4889	0-12	surface soil	X	X
18-1334	AAB4889	0-12	surface soil	X	X
18-1335	AAB4889	0-12	surface soil	X	X
18-1337	AAB4889	0-12	surface soil	X	X
18-1342	AAB4898	0-12	surface soil	X	X
18-1344	AAB4898	0-12	surface soil	X	X
18-1345	AAB4898	0-12	surface soil	X	X
18-1352	AAB4907	0-12	surface soil	X	X
18-1354	AAB4907	0-12	surface soil	X	X
18-1356	AAB4907	0-12	surface soil	X	X
18-1357	AAB4907	0-12	surface soil	X	X
18-1362	AAB4916	0-12	surface soil	X	X
18-1365	AAB4916	0-12	surface soil	X	X
18-1366	AAB4916	0-12	surface soil	X	X
18-1367	AAB4916	0-12	surface soil	X	X
18-1370	AAB4925	0-12	surface soil	X	X
18-1373	AAB4925	0-12	surface soil	X	X
18-1375	AAB4925	0-12	surface soil	X	X
18-1376	AAB4925	0-12	surface soil	X	X
18-1380	AAB4934	0-12	surface soil	X	X
18-1384	AAB4934	0-12	surface soil	X	X
18-1385	AAB4935	0-12	surface soil	X	X
18-1387	AAB4935	0-12	surface soil	X	X
18-1391	AAB4944	0-12	surface soil	X	X
18-1394	AAB4944	0-12	surface soil	X	X
18-1395	AAB4944	0-12	surface soil	X	X
18-1397	AAB4944	0-12	surface soil	X	X
18-1700	AAB4953	0-12	surface soil	X	X
18-1702	AAB4953	0-12	surface soil	X	X
18-1703	AAB4954	0-12	surface soil	X	X
18-1704	AAB4954	0-12	surface soil	X	X

Variances from the S&A Plan Table in the RFI Work Plan (Table 5-10, p. 5-57)

There were no variances.

Summary of Samples Taken
PRS 18-002(b)(c)
Firing Site

Location ID	Sample ID	Depth (inches)	Media	Total Metals	HE
18-1075	AAB4440	0-12	soil	X	X
18-1075	AAB4442	25-37	soil	X	X
18-1075	AAB4444	48-60	soil	X	X
18-1075	AAB4445	48-60	soil (field duplicate)	X	X
18-1076	AAB4447	0-12	soil	X	X
18-1076	AAB4449	24-36	soil	X	X
18-1076	AAB4451	48-60	soil	X	X
18-1077	AAB4453	0-12	soil	X	X
18-1077	AAB4455	30-42	soil	X	X
18-1077	AAB4457	48-60	soil	X	X
18-1078	AAB4459	0-12	soil	X	X
18-1078	AAB4461	24-36	soil	X	X
18-1078	AAB4463	48-60	soil	X	X
18-1079	AAB4465	0-12	soil	X	X
18-1079	AAB4467	36-48	soil	X	X
18-1079	AAB4469	48-60	soil	X	X
18-1403	AAB4965	0-12	soil	X	X
18-1404	AAB4966	0-12	soil	X	X
18-1405	AAB4966	0-12	soil	X	X
18-1407	AAB4966	0-12	soil	X	X
18-1410	AAB4975	0-12	soil	X	X
18-1411	AAB4975	0-12	soil	X	X
18-1413	AAB4975	0-12	soil	X	X
18-1414	AAB4975	0-12	soil	X	X
18-1421	AAB4984	0-12	soil	X	X
18-1424	AAB4984	0-12	soil	X	X
18-1425	AAB4984	0-12	soil	X	X
18-1426	AAB4984	0-12	soil	X	X
18-1431	AAB4993	0-12	soil	X	X
18-1433	AAB4993	0-12	soil	X	X
18-1436	AAB4994	0-12	soil	X	X
18-1437	AAB4994	0-12	soil	X	X
18-1441	AAB5003	0-12	soil	X	X
18-1442	AAB5003	0-12	soil	X	X
18-1445	AAB5003	0-12	soil	X	X
18-1446	AAB5003	0-12	soil	X	X
18-1450	AAB5012	0-12	soil	X	X
18-1451	AAB5012	0-12	soil	X	X
18-1453	AAB5012	0-12	soil	X	X
18-1454	AAB5012	0-12	soil	X	X
18-1450	AAB5013	0-12	soil (field duplicate)	X	X
18-1451	AAB5013	0-12	soil (field duplicate)	X	X
18-1453	AAB5013	0-12	soil (field duplicate)	X	X
18-1454	AAB5013	0-12	soil (field duplicate)	X	X
18-1461	AAB5022	0-12	soil	X	X
18-1462	AAB5022	0-12	soil	X	X
18-1463	AAB5023	0-12	soil	X	X
18-1466	AAB5023	0-12	soil	X	X
18-1474	AAB5032	0-12	soil	X	X
18-1475	AAB5032	0-12	soil	X	X
18-1476	AAB5032	0-12	soil	X	X
18-1477	AAB5032	0-12	soil	X	X
18-1481	AAB5041	0-12	soil	X	X
18-1482	AAB5041	0-12	soil	X	X
18-1484	AAB5041	0-12	soil	X	X
18-1486	AAB5041	0-12	soil	X	X
18-1491	AAB5050	0-12	soil	X	X
18-1492	AAB5050	0-12	soil	X	X
18-1493	AAB5050	0-12	soil	X	X

Summary of Samples Taken
PRS 18-002(b)(c)
Firing Site

Location ID	Sample ID	Depth (inches)	Media	Total Metals	HE
18-1494	AAB5050	0-12	soil	X	X
18-1500	AAB5059	0-12	soil	X	X
18-1501	AAB5059	0-12	soil	X	X
18-1502	AAB5059	0-12	soil	X	X
18-1505	AAB5059	0-12	soil	X	X

Variances from S&A Plan Table in RFI Work Plan (Table 5-10, p. 5-57):

There were no variances.

Summary of Samples Taken
PRS 18-003(a) Holding Tank
1994

Loc ID	Sample ID	Depth (ft)	Media	Total Metals	VOCs	SVOCs	Chloride and Nitrate
18-1100	AAB4471	2-4	soil	X	X	X	X
18-1101	AAB4473	2-4	soil	X	X	X	X
18-1032	AAA5805		septic tank liquid	X			
18-1032	AAA5806		septic tank liquid (field duplicate)	X			
18-1032	AAA5807		septic tank sludge	X	X	X	
18-1032	AAA5808		septic tank sludge (field duplicate)	X	X	X	

Variances from S&A Plan Table in RFI Work Plan (Table 5-5, p. 5-30)

1. Soil: Two soil samples were collected instead of three samples.
2. Soil: The soil samples were analyzed for the following additional analytes which were not originally proposed: VOCs, SVOCs, chloride, and nitrate. This provided additional data.
3. Septic Tank Liquid: One septic tank liquid sample and one duplicate were collected instead of two distinct liquid samples. They are considered equivalent.
4. Septic Tank Sludge: The sludge samples were analyzed for the following additional analytes which were not originally proposed: VOCs and SVOCs. This was because of the possible presence of these contaminants.
5. Septic Tank Sludge: One sludge sample and one duplicate sample were collected instead of two distinct sludge samples. They are considered equivalent.

Summary of Samples Taken
PRS 18-003(b)

Loc ID	Sample ID	Depth	Media	Chloride	Nitrate	Total Metals	SVOCs	VOCs	General Minerals (Chemical Oxygen Demand)
18-1114	AAB4482	0-1 ft	surface soil			X	X		
18-1115	AAB4481	0-6 in	surface soil			X	X		
18-1115	AAB4483	0-1 ft	surface soil			X	X		
18-1116	AAB4485	0-5 ft	subsurface soil (field duplicate)	X	X	X	X	X	
18-1116	AAB4487	0-5 ft	subsurface soil (field duplicate)	X	X	X	X	X	
18-1117	AAB4488	0-5 ft	subsurface soil	X	X	X	X	X	
18-1120	AAB4500	0-6 in	surface soil			X	X		
18-1130	AAB4501	0-6 in	surface soil			X	X		
18-1132	AAB4502	0-6 in	surface soil			X	X		
18-1133	AAB4503	0-6 in	surface soil			X	X		
18-1135	AAB4504	0-6 in	surface soil			X	X		
18-1135	AAB4505	0-5 ft	subsurface soil	X	X	X	X	X	
18-1135	AAB4507	5-10 ft	subsurface soil	X	X	X	X	X	
18-1135	AAB4509	10-12 ft	subsurface soil	X	X	X	X		
18-1135	AAB4509	5-10 ft	subsurface soil	X	X	X	X		
18-1135	AAB4509	0-5 ft	subsurface soil	X	X	X	X		
18-1135	AAB4510	0-12 ft	groundwater (field duplicate)	X	X	X	X	X	X
18-1135	AAB4518	0-18 ft	groundwater (field duplicate)			X	X	X	X
18-1135	AAB4732	25-30 ft	subsurface soil	X	X	X	X		
18-1135	AAB4732	30-32 ft	subsurface soil	X	X	X	X		
18-1135	AAB4732	20-25 ft	subsurface soil	X	X	X	X		
18-1135	AAB4732	18-20 ft	subsurface soil	X	X	X	X		
18-1136	AAB4512	0-5 ft	subsurface soil	X	X	X	X		
18-1136	AAB4514	5-8.5 ft	subsurface soil	X	X	X	X		
18-1136	AAB4516	10-25 ft	subsurface soil	X	X	X	X		
18-1136	AAB4517	0-25 ft	groundwater	X		X	X	X	
18-1136	AAB4518	20-25 ft	subsurface soil	X	X	X	X		
18-1136	AAB4519	15-20 ft	subsurface soil	X	X	X	X		
18-1036	AAA5809		septic tank liquid			X			
18-1036	AAA5810		septic tank liquid (field duplicate)			X			
18-1036	AAA5811		septic tank sludge			X			
18-1036	AAA5812		septic tank sludge (field duplicate)			X		X	

Variances from the S&A Plan Table in the RFI Work Plan (Table 5-5, p. 5-30)

1. Sludge: One VOC sample taken was not proposed in this Plan. This provided additional information.
2. Groundwater: The following variations from the Work Plan include taking three samples (two field duplicates) instead of two samples. Two samples were analyzed for chloride, one sample for nitrate, three samples instead of two for metals, and three samples for both SVOCs and VOCs (no samples were listed in the Work Plan). The additional sample was taken and the additional analyses were performed to provide additional data.

Summary of Samples Taken
PRB 18-003(c)

Loc ID	Sample ID	Depth	Media	Chloride	Nitrate	Total Metals	SVOCs	VOCs	General Minerals (Chemical Oxygen Demand)
18-1146	AA34525	0-4 in	surface soil			X	X		
18-1146	AA34526	0-1 ft	surface soil			X	X		
18-1146	AA34528	0-5 ft	subsurface soil	X	X	X	X	X	
18-1147	AA34527	0-1 ft	surface soil			X	X		
18-1147	AA34530	0-5 ft	subsurface soil	X	X	X	X	X	
18-1153	AA34542	0-4 in	surface soil			X	X		
18-1155	AA34543	0-4 in	surface soil			X	X		
18-1156	AA34544	0-4 in	surface soil			X	X		
18-1157	AA34545	0-4 in	surface soil			X	X		
18-1159	AA34546	0-4 in	surface soil			X	X		
18-1165	AA34547	2.5-5 ft	subsurface soil	X	X	X	X	X	
18-1165	AA34549	7.5-10 ft	subsurface soil	X	X	X	X	X	
18-1165	AA34551	7-15 ft	subsurface soil	X	X	X	X		
18-1165	AA34552	0-15 ft	groundwater	X	X	X	X	X	X
18-1166	AA34555	0-5 ft	subsurface soil	X	X	X	X	X	
18-1166	AA34557	5-10 ft	subsurface soil (field duplicate)	X	X	X	X	X	
18-1166	AA34558	5-10 ft	subsurface soil (field duplicate)	X	X	X	X	X	
18-1166	AA34561	0-40 ft	groundwater	X	X	X	X	X	
18-1652	AA35268	0-12 in	sediment soil			X	X		
18-1653	AA35269	0-12 in	sediment soil			X	X		
18-1040	AAA5813		septic tank liquid			X			
18-1040	AAA5814		septic tank liquid (field duplicate)			X			
18-1040	AAA5815		septic tank sludge			X			
18-1040	AAA5816		septic tank sludge (field duplicate)			X			

Variances from the S&A Plan Table in the RFI Work Plan (Table 5-5, p. 5-30)

1. Groundwater: The following variations from the Work Plan include two samples being analyzed for chloride, nitrate, SVOCs and VOCs while these analyses were not listed in the Work Plan. These samples were taken to provide additional information. One general minerals analysis was performed instead of two listed in the Plan. One sample was collected because insufficient water was available for sample collection.
2. Soils-subsurface: The sampling of subsurface soils was not included in the Work Plan, however, eight samples were taken and analyzed for chloride, nitrate, metals and SVOCs. Seven samples were analyzed for VOCs. Subsurface sampling and analyses were performed to provide additional information.

Summary of Samples Taken
PRS 18-003(d)

Loc ID	Sample ID	Depth	Media	Chloride	Nitrate	Total Metals	SVOCs	VOCs	General Minerals (Chemical Oxygen Demand)
18-1173	AAB4568	0-6 in	surface soil			X	X		
18-1176	AAB4569	0-12 in	subsurface soil			X	X		
18-1176	AAB4571	0-5 ft	subsurface soil	X	X	X	X	X	
18-1177	AAB4573	0-5 ft	subsurface soil (field duplicate)	X	X	X	X	X	
18-1177	AAB4574	0-5 ft	subsurface soil (field duplicate)	X	X	X	X	X	
18-1180	AAB4586	0-6 in	surface soil			X	X		
18-1181	AAB4587	0-6 in	surface soil			X	X		
18-1182	AAB4588	0-6 in	surface soil			X	X		
18-1185	AAB4570	0-12 in	surface soil			X	X		
18-1187	AAB4589	0-6 in	surface soil			X	X		
18-1188	AAB4590	0-6 in	surface soil			X	X		
18-1195	AAB4591	0-5 ft	subsurface soil	X	X	X	X	X	
18-1195	AAB4591	0-5 ft	subsurface soil			X			
18-1195	AAB4593	5-10 ft	subsurface soil	X	X	X	X	X	
18-1195	AAB4595	10-15 ft	subsurface soil	X	X	X	X		
18-1195	AAB4596	10-15 ft	groundwater	X	X	X	X		X
18-1196	AAB4597	0-5 ft	subsurface soil	X		X	X	X	
18-1196	AAB4597	0-5 ft	subsurface soil			X			
18-1196	AAB4601	5-10 ft	subsurface soil	X		X		X	
18-1196	AAB4604	0-10 ft	groundwater	X		X		X	X
18-1196	AAB4604	0-10 ft	groundwater			X	X		
18-1044	AAA5822		tank liquid			X		X	
18-1044	AAA5824		tank liquid			X		X	
18-1044	AAA5825		tank liquid (field duplicate)			X		X	
18-1044	AAA5826		tank sludge			X		X	
18-1044	AAA5827		tank sludge (field duplicate)			X		X	

Variances from the S&A Plan Table in the RFI Work Plan (Table 5-5, p. 5-30)

1. Tank Liquid: Two samples were analyzed for VOCs, while no VOC analyses were listed in the Work Plan. This variation occurred because screening data indicated the presence of VOCs.
2. Tank Sludge: Two samples were analyzed for VOCs, while no VOC analyses were listed in the Work Plan. This variation occurred because screening data indicated the presence of VOCs.
3. Groundwater: Three samples were taken instead of the two listed in the Work Plan. Two samples were analyzed for chloride (none listed) and three instead of two samples were analyzed for metals. Two samples were analyzed for SVOCs and one was analyzed for VOCs. No SVOC or VOC analyses were listed in the Work Plan. These variations occurred because screening data indicated the presence of VOCs in the septic tank.
4. Soils-subsurface: The sampling of subsurface soils was not included in the Work Plan, however, eleven samples were taken and analyzed as follows: eight for chloride, six for nitrate, eleven for metals, eight for SVOCs, and seven for VOCs. Subsurface sampling and analyses were performed because
5. Soils-surface: Seven samples were taken instead of the eight listed in the Work Plan and analyzed as follows: seven for metals, seven for VOCs (instead of the sixteen listed for Mobile Lab analysis), and no samples were analyzed for VOCs (instead of the sixteen listed for Mobile Lab analysis). These differences in sampling and analyses occurred because

SUMMARY OF SAMPLES TAKEN
PRS 18-003(f) SEPTIC TANK
1994

Loc ID	Sample ID	Depth	Media	Total Metals	VOCs	SVOCs	Chloride and Nitrate	General Minerals
18-1240	AAB4640	2-4 ft	sludge	X	X	X	X	
18-1241	AAB4642	2-3.5 ft	soil	X	X	X	X	
18-1241	AAB4644	8.5-10 ft	soil	X	X	X	X	
18-1242	AAB4646	2.5-4 ft	soil	X	X	X	X	
18-1250	AAB4648	3.5-5 ft	soil	X	X	X	X	
18-1250	AAB4650	8.5-10 ft	soil	X	X	X	X	
18-1251	AAB4652	0-5 ft	soil	X	X	X	X	
18-1251	AAB4654	8-10 ft	soil	X	X	X	X	
18-1252	AAB4656	2.5-3.5 ft	soil	X	X	X	X	
18-1252	AAB4658	8.5-10 ft	soil	X	X	X	X	
18-1253	AAB4660	3.5-5 ft	soil	X	X	X	X	
18-1253	AAB4662	8-10 ft	soil	X	X	X	X	
18-1253	AAB4663	8-10 ft	soil (field duplicate)	X	X	X	X	
18-1254	AAB4666	2.5-5 ft	soil	X	X	X	X	
18-1254	AAB4668	7.5-9 ft	soil	X	X	X	X	
18-1254	AAB4670	10-15 ft	soil	X		X	X	
18-1254	AAB4671	0-15 ft	ground water	X	X	X	X	X
18-1255	AAB4673	1-2.5 ft	soil	X	X	X	X	
18-1255	AAB4675	8-10 ft	soil	X	X	X	X	
18-1255	AAB4677	10-23 ft	soil	X		X	X	
18-1255	AAB4678	0-28 ft	ground water	X	X	X	X	X
18-1255	0218-95-0255		ground water	X	X			

Variances from the S&A Plan Table in the RFI Work Plan (Table 5-5, p. 5-32)

1. Septic Tank Liquid: No septic tank liquid samples were collected and analyzed. Two samples were originally proposed. The reason they were not collected and analyzed was that there were no liquids present. When the septic tank was deactivated, it was backfilled with sand.
2. Sludge: One sludge sample was collected and analyzed instead of two sludge samples. The sampling method, drilling, did not allow collection of 2 samples.
3. Sludge: Additional analyses were performed on the sludge sample which were not originally proposed: VOCs, SVOCs, Chloride, and Nitrate. These additional analyses were run to fully evaluate the septic tank.
4. Soil: Seventeen soil samples and one soil duplicate sample were collected and analyzed instead of 8 soil samples.
5. Soil: Additional analyses were performed on most of the soil samples which were not originally proposed: VOCs, SVOCs, Chloride, and Nitrate. These additional analyses were run because of the possible presence of these contaminants in the tank. However, VOC analyses were not performed on two of the soil samples: AAB4670 and AAB4677.
6. Groundwater: Two groundwater samples were proposed in the RFI Work Plan and were collected at the time of the Phase I investigation.
A third sample (0218-95-0255) was collected at a later date and was identified in Figure 4-5 of the RFI Report. The third sample was collected to evaluate the effect of not filtering the sample.
7. Groundwater: The following additional analyses were performed on samples AAB4671 and AAB4678 which were not originally proposed: VOCs, SVOCs, Chloride, and Nitrate. These additional analyses were run because of the possible presence of these contaminants.
8. Sediment: Sediment samples were not collected at the outfall as originally proposed. The reason for this was because the outfall could not be located.

SUMMARY OF SAMPLES TAKEN
PRS 18-003(g) SEPTIC SYSTEM
1994

Loc ID	Sample ID	Depth	Media	Total Metals	VOCs	SVOCs	Chloride and Nitrate	General Minerals
18-1045	AAA5828		septic tank liquid	X	X	X		
18-1045	AAB5829		septic tank liquid (field duplicate)	X	X	X		
18-1045	AAA5830		sludge	X	X	X		
18-1275	AAB4690	3.5-5 ft	soil	X	X	X	X	
18-1275	AAB4692	7-10 ft	soil	X	X	X	X	
18-1275	AAB4693	7-10 ft	soil (field duplicate)	X	X	X	X	
18-1275	AAB4695	10-21 ft	soil	X		X	X	
18-1275	AAB4696	0-45.1 ft	ground water	X	X	X	X	X
18-1275	0218-95-0256		ground water	?	X	?	?	?
18-1275	0218-95-0257		ground water	?	X	?	?	?

Variances from S&A Plan Table in RFI Work Plan (Table 5-5, p. 5-31):

1. Sludge: One sludge sample was collected and analyzed instead of two samples because there was only enough sludge for one sample.
2. Soil: The soil samples were analyzed for chloride and nitrate which was not proposed in the plan. This provided data on possible wash release to soils.
3. Ground Water: Three ground water samples were collected and analyzed instead of the one proposed sample. This provided additional data.
4. Ground Water: The ground water sample (AAB4696) was analyzed for chloride and nitrate which were not porposed in the plan. This provided data on possible effect of waste disposal on ground water.

SUMMARY OF SAMPLES TAKEN
PRS 18-003(h) SEPTIC SYSTEM
1994

Loc ID	Sample ID	Depth	Media	Total Metals	VOCs	SVOCs	Chloride and Nitrate
18-1046	AAA5832		septic tank liquid	X	X	X	
18-1046	AAA5833		septic tank liquid (field duplicate)	X	X	X	
27-1266	AAB4700	3-4 ft	soil	X	X	X	X
27-1266	AAB4703	8-10 ft	soil	X	X	X	X

Variances from Sampling Plan in RFI Work Plan (Table 5-5, p. 5-31)

1. Septic Tank Liquid: One sample and one duplicate of the septic tank liquid was collected instead of two distinct samples. They are considered equivalent.
2. Sludge: No sludge samples were collected because none were present.
3. Ground water: No ground water samples were collected because the well could not be completed.

SUMMARY OF SAMPLES TAKEN
PRS 18-005(a)
SOIL CONTAMINATION
MAGAZINE SITE
1994

Loc ID	Sample ID	Depth	Media	Total Metals	HE
18-1670	AAB5297	0-12 in	soil	X	X
18-1671	AAB5298	0-12 in	soil	X	X
18-1672	AAB5299	0-12 in	soil	X	X
18-1673	AAB5300	0-12 in	soil	X	X
18-1674	AAB5301	0-12 in	soil	X	X

Variances from S&A Plan in RFI Work Plan (There is no S&A Plan Table)

*There were no variances.

SUMMARY OF SAMPLES TAKEN
PRS 16-010(b) STORM DRAIN OUTFALL
1994

Loc ID	Sample ID	Depth	Media	Total Metals	SVOCs
16-1297	AAB4712	0-6 in	soil	X	X
16-1298	AAB4713	0-6 in	soil	X	X
16-1714	AAB5205	0-6 in	sediments (Chem Van screening sample)		X
16-1715	AAB5206	0-6 in	sediments (Chem Van screening sample)		X
16-1716	AAB5207	0-6 in	sediments (Chem Van screening sample)		X
16-1717	AAB5208	0-6 in	sediments (Chem Van screening sample)		X
16-1718	AAB5209	0-6 in	sediments (Chem Van screening sample)		X
16-1719	AAB5210	0-6 in	sediments (Chem Van screening sample)		X
16-1720	AAB5211	0-6 in	sediments (Chem Van screening sample)		X
16-1746	AAB5217	0-6 in	sediments	X	X
16-1746	AAB5218	0-6 in	sediments (field duplicate)	X	X
16-1747	AAB5219	0-6 in	sediments	X	X
16-1749	AAB5220	0-6 in	sediments	X	X
16-1750	AAB5221	0-6 in	sediments	X	X
16-1754	AAB5222	0-6 in	sediments	X	X

Variances from the S&A Plan Table in the RFI Work Plan (Table 5-12, p. 5-68)

There were no variances.

SUMMARY OF SAMPLES TAKEN
PRS 18-010(c) STORM DRAIN OUTFALL
1994

Loc ID	Sample ID	Depth	Media	Total Metals	SVOCs
18-1724	AAB5227	0-12 in	sediments	X	X
18-1727	AAB5228	0-12 in	sediments	X	X

Variances from S&A Plan Table in RFI Work Plan (5-12, p. 5-88)

There were no variances.

SUMMARY OF SAMPLES TAKEN
PRS 18-010(d) STORM DRAINAGE
1994

Loc ID	Sample ID	Depth	Media	Total Metals	SVOCs
18-1728	AAB6233	0-6 in	sediments	X	X
18-1730	AAB6234	0-6 in	sediments	X	X

Variances from S&A Plan Table in RFI Work Plan (Table 5-12, p. 5-68)

There were no variances.

SUMMARY OF SAMPLES TAKEN
PRS 18-010(a) STORM DRAIN OUTFALL
1994

Loc ID	Sample ID	Depth	Media	Total Metals	SVOCs
18-1732	AAB5249	0-12 in	sediments	X	X
18-1733	AAB5250	0-12 in	sediments	X	X
18-1734	AAB5251	0-12 in	sediments	X	X
18-1735	AAB5252	0-12 in	sediments	X	X
18-1738	AAB5253	0-12 in	sediments	X	X
18-1739	AAB5254	0-12 in	sediments	X	X
18-1742	AAB5255	0-12 in	sediments	X	X

Variances from S&A Plan Table in RFI Work Plan (Table 5-12, p. 5-68)

There were no variances.

SUMMARY OF SAMPLES TAKEN
PRS 16-010(f) STORM SEWER OUTFALL
1994

Loc ID	Sample ID	Depth	Media	Total Metals	SVOCs
16-1762	AA36262	0-12 in	soil	X	X
16-1763	AA36263	0-12 in	soil	X	X

Variances from S&A Plan Table in the RFI Work Plan (Table 5-12 p. 5-35).

There were no variances.

SUMMARY OF SAMPLES TAKEN
PRS 18-011 SOIL CONTAMINATION SITE
1994

Loc ID	Sample ID	Depth	Media	Mercury
18-1675	AAB5302	0-6 in	soil	X
18-1676	AAB5303	0-6 in	soil	X
18-1677	AAB5304	0-6 in	soil	X
18-1678	AAB5305	0-6 in	soil	X
18-1679	AAB5306	0-6 in	soil	X

Variances from S&A Plan Table in RFI Work Plan (Table 5-10, p. 5-57)

There were no variances.

SUMMARY OF SAMPLES TAKEN
PRS 18-012(a) OUTFALL
1994

Loc ID	Sample ID	Depth	Media	Total Metals	SVOCs
18-1662	AAB5286	0-12 in	sediments	X	X
18-1664	AAB5287	0-12 in	sediments	X	X

Variances from S&A Plan Table in RFI Work Plan (Table 5-3, p. 5-44):

1. The sediments were analyzed for SVOCs which was not originally proposed. This provided additional data.

SUMMARY OF SAMPLES TAKEN
PRS 18-012(b) OUTFALL
1994

Loc ID	Sample ID	Depth	Media	Total Metals	SVOCs
18-1666	AAB5292	0-12 in	sediments	X	X
18-1667	AAB5293	0-12 in	sediments	X	X
18-1667	AAB5294	0-12 in	sediments (field duplicate)	X	X

Variances from the S&A Plan Table in the RFI Work Plan (Table 5-6, p. 5-44)

There were no variances.

SUMMARY OF SAMPLES TAKEN
PRS 16-012(c) OUTFALL
1994

Loc ID	Sample ID	Depth	Media	Total Metals	SVOCs
16-1048	AAA5844		sediments	X	X
16-1048	AAA5845		sediments (field duplicate)	X	X

Variances from the S&A Plan Table in RFI Work Plan (Table 5-6, p. 5-44)

1. One sediment sample and one duplicate sample were collected and analyzed instead of two distinct sediment samples. There was not sufficient space between the outfall and the stream channel to collect two distinct samples.

SUMMARY OF SAMPLES TAKEN
PRS 18-013 WASTE TANK
1994

Loc ID	Sample ID	Depth	Media	Total Metals	VOCs	SVOCs
18-1680	AAB5307	4.2-4.8 ft	soil	X	X	X
18-1681	AAB5308	4.2-4.8 ft	soil	X	X	X
18-1682	AAB5309	4.2-4.8 ft	soil	X	X	X
18-1683	AAB5310	6.3-6.8 ft	soil	X	X	X
18-1770	AAB5321	0-0 in	soil	X	X	X

Variances from S&A Plan Table in RFI Work Plan (Table 5-5, p. 5-44):

1. Residues within the catch tank and soil within the concrete pit surrounding the catch tank were not sampled because the catch tank and the concrete pit had been backfilled with soil.
2. Five samples were collected instead of four. Four backfill samples and one gravel sample were collected instead of two residue samples and two soil samples. This provided additional data.
3. The soil samples were analyzed for total metals which was not originally proposed. This provided additional data.

SUMMARY OF SAMPLES TAKEN
WETLANDS
1994

Wetland Area 1

Loc ID	Sample ID	Depth	Media	Total Metals	HE	VOCs	SVOCs	Chloride	General Minerals
18-2009	AAA5945		surface water	X	X	X	X	X	X
18-2009	AAA5948	6-18 in	sediment	X	X	X	X		
18-2010	AAA5946		surface water	X	X	X	X	X	X
18-2010	AAA5947		surface water (field duplicate)	X	X	X	X	X	X
18-2010	AAA5949	6-18 in	sediment	X	X	X	X		
18-2011	AAA5950	6-18 in	sediment	X	X	X	X		
18-2012	AAA5951	6-18 in	sediment	X	X	X	X		
18-2012	AAA5952	6-18 in	sediment (field duplicate)	X	X	X	X		

Wetland Area 3

Loc ID	Sample ID	Depth	Media	Total Metals	HE	VOCs	SVOCs	Chloride	General Minerals
18-2001	AAA5935	6-18 in	sediment	X	X	X	X		
18-2002	AAA5934		surface water	X	X	X	X	X	X
18-2002	AAA5936	6-18 in	sediment	X	X	X	X		
18-2003	AAA5937	6-18 in	sediment	X	X	X	X		
18-2004	AAA5938	6-18 in	sediment	X	X	X	X		

Wetland Area 4

Loc ID	Sample ID	Depth	Media	Total Metals	HE	VOCs	SVOCs	Chloride	General Minerals
36-2016	AAA5927		surface water	X	X	X	X	X	X
36-2016	AAA5929	6-18 in	sediment	X	X	X	X		
36-2017	AAA5928		surface water	X	X	X	X	X	
36-2017	AAA5930	6-18 in	sediment	X	X	X	X		
36-2018	AAA5931	6-18 in	sediment	X	X	X	X		
36-2019	AAA5932	6-18 in	sediment	X	X	X	X		

Wetland Area 5

Loc ID	Sample ID	Depth	Media	Total Metals	HE	VOCs	SVOCs	Chloride	General Minerals
36-2012	AAA5923	6-18 in	sediment	X	X	X	X		
36-2013	AAA5922		surface water	X	X	X	X	X	X
36-2013	AAA5924	6-18 in	sediment	X	X	X	X		
36-2014	AAA5925	6-18 in	sediment	X	X	X	X		
36-2015	AAA5926	6-18 in	sediment	X	X	X	X		

SUMMARY OF SAMPLES TAKEN
WETLANDS
1994

Wetland Area 6

Loc ID	Sample ID	Depth	Media	Total Metals	HE	VOCs	SVOCs	Chloride	General Minerals
36-2008	AAA5917	6-18 in	sediment	X	X	X	X		
36-2009	AAA5916		surface water	X	X	X	X	X	X
36-2009	AAA5918	6-18 in	sediment	X	X	X	X		
36-2010	AAA5919	6-18 in	sediment	X	X	X	X		
36-2011	AAA5920	6-18 in	sediment	X	X	X	X		

Wetland Area 7

Loc ID	Sample ID	Depth	Media	Total Metals	HE	VOCs	SVOCs	Chloride	General Minerals
36-2004	AAA5908		surface water (field duplicate)	X	X	X	X	X	X
36-2004	AAA5910	6-18 in	sediment	X	X	X	X		
36-2005	AAA5909		surface water	X	X	X	X	X	X
36-2005	AAA5911	6-18 in	sediment	X	X	X	X		
36-2006	AAA5912	6-18 in	sediment	X	X	X	X		
36-2006	AAA5913	6-18 in	sediment (field duplicate)	X	X	X	X		
36-2007	AAA5914	6-18 in	sediment	X	X	X	X		

Wetland Area 8

Loc ID	Sample ID	Depth	Media	Total Metals	HE	VOCs	SVOCs	Chloride	General Minerals
36-2000	AAA5903	6-18 in	sediment	X	X	X	X		
36-2001	AAA5902		surface water	X	X	X	X	X	X
36-2001	AAA5904	6-18 in	sediment	X	X	X	X		
36-2002	AAA5905	6-18 in	sediment	X	X	X	X		
36-2003	AAA5906	6-18 in	sediment	X	X	X	X		

Variances from S&A Plan Table in RFI Work Plan (Table 5-15, p. 5-91):

1. Wetland Area 2: Sampling was not conducted because of its small size. Because Wetland 2 was not sampled, 14 surface water samples were collected instead of 16 samples.
2. Wetland Area 6: One surface water sample through error (AAA5915) was not sampled for SVOCs.
3. All Areas: The surface water samples were analyzed for chloride which was not originally planned.