LANL 1997 ER ID# 56356

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University of California
Environmental Restoration Project, MS M992
Los Alamos, New Mexico 87545
505-667-0808/FAX 505-665-4747

U. S. Department of Energy
Los Alamos Area Office, MS A316
Environmental Restoration Program
Los Alamos, New Mexico 87544
505-667-7203/FAX 505-665-4504

Date: July 14, 1997
Refer to: EM/ER:97-267

Mr. Benito Garcia
NMED-HRMB
P.O. Box 26110
Santa Fe, NM 87502

SUBJECT: ADDITIONAL RESPONSE TO THE NOD FOR RFI REPORT FOR PRSs IN TAs-18 AND 27, (FORMER OPERABLE UNIT 1093)

Dear Mr. Garcia:

Enclosed is a copy of the Los Alamos National Laboratory's response to the New Mexico Environment Department's Notice of Deficiency (NOD) concerning the Resource Conservation and Recovery Act Facility Investigation Report for potential release sites in Technical Areas 18 and 27. A certification form signed by the appropriate officials is also enclosed. Please note that a vertical bar denotes changes or additions to the NOD response of May 1997. A vertical bar was used because strikethroughs and bold were used in the May 1997 response.

If you have any questions regarding the response to the NOD, please contact Gene Gould at (505) 667-0402 or Mike Gilgosch at (505) 667-5794.

Received by ER-RPF
JUL 23 1997

Sincerely,

Jorg Jansen, Program Manager
LANL/ER Project

Sincerely,

Theodore J. Taylor, Program Manager
DOE/LAAO

JJ/TT/rfr

Enclosures: (1) Response to the NOD for RFI Report For PRSs in TAs-18, 27 (Former OU 1093)
(2) Certification

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CERTIFICATION

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

Document Title: Additional Response to the NOD for RFI Report in TAs-18 and 27 (Former OU 1093)

Name: _____ Date: 7-14-97

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

or

Tom Baca, Program Director
Environmental Management
Los Alamos National Laboratory

Name: _____ Date: 7/14/97

Joe Vozella,
Acting Assistant Area Manager of
Environment Projects
Environment, Safety, and Health Branch
DOE-Los Alamos Area Office

or

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

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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 proposal.
18-002(b)	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 proposal.
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 proposal.
18-003(a)	AC	No	Contaminants of potential concern (COPCs) > Screening Action Levels (SAL)s; 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.

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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, the concentrations did not increase at sample locations farther 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 farther 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 residue from plastics. The farthest downchannel samples at PRS 18-010(e) did not show 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 indicate the presence of some contaminants at levels above the respective maximum contaminant level (MCL) and in one instance [PRS 18-003(d)] above the New Mexico Water Quality Commission standards for groundwater. LANL has implemented a corrective action at PRS 18-003(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-18. HE constituents were detected in groundwater within and down-gradient from TA-18 and in water samples from wetland areas within and down-gradient from TA-18. 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-18 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)

The "Sampling and Analysis Plan for Groundwater Investigations in Threemile and Pajarito Canyons" 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 the 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 based on 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 were 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 whether 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, the current soil background UTLs generally had no effect 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 whether the inorganics were 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 the sediment background

UTLs generally had no effect on the conclusions for each PRS. The exceptions were PRSs 18-012(b) and 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 whether they were statistically greater than background eliminated 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 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.

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 18-1666; 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.

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

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 IDs 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 Location 18-1727; 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 61.5 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.

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	8000	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)[a]
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)[a]
1,3-Dinitrobenzene	0.62	3.5	NA	NA (3.7)[a]
2,4-Dinitrotoluene	0.09	NA	NA	NA (73)[a]
HMX	2.84	1800	NA	NA (1800)[a]
Nitrobenzene	0.93	18	NA	NA (3.4)[a]
m-Nitrotoluene	NA	350	NA	NA (370)[a]
o-Nitrotoluene	3.66	350	NA	NA (370)[a]
p-Nitrotoluene	0.82	350	NA	NA (370)[a]
RDX	2.15	3.2	NA	NA (0.61)[a]
TETRYL	0.12	350	NA	NA
1,3,5-Trinitrobenzene	1.3	1.8	NA	NA (1.8)[a]
2,4,6-Trinitrotoluene	0.12	12	NA	NA (2.2)[a]

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
[a] 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	82	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 8.8 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, 1351). This preliminary risk evaluation was performed 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, 0559) which is an acceptable and conservative approach for screening sites (EPA 1996, 1351). 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, 1351). 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 7890 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 15,827 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 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, 1351). This preliminary risk evaluation was performed 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, 0559), which is an acceptable and conservative approach for screening sites (EPA 1996,1351). 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, 1351). 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.

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

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

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 the 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 31.8 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, 67.8 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, 1351). This preliminary risk evaluation was performed 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, 0559), which is an acceptable and conservative approach for screening sites (EPA 1996, 1351). 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, 1351). 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 performed 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, 0559). This is an acceptable and conservative approach for screening sites (EPA 1996, 1351).

Comparison of the maximum detected values for the noncarcinogenic inorganics (11.6 mg/kg, 2.7 mg/kg, 164 mg/kg, and 2.8 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, 1351). 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. 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 18-012(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 18-012(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	616	23000	0.03
		Total	1.2

Note: bolded analytes are retained as COPCs

PRS 18-012(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 respectively, 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 performed 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, 0559), which is an acceptable and conservative approach for screening sites (EPA 1996, 1351).

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, 1351). This resulted in an 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 18-013

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 then 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 performed 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, 0559), which is an acceptable and conservative approach for screening sites (EPA 1996, 1351). 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, 1351). 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 (315 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 - PRS 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, 0559)], 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, 1351). 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, 1351). 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 $4X10^{-8}$ 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	2800	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 performed 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 is discussed separately. However, the water quality standard 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	191	200 (domestic water supply)	50 (drinking water)
	PCO-2	AAA9572	179		
	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	AAA5956	1,000,000	1,000,000 (domestic water supply)	500,000 (drinking water)
	PCO-3	AAA5987	936,000		
	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 relationships of the filtered and unfiltered sample results to the appropriate and applicable water quality standards are 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	AAA9564	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	AAA9539	941,000	1,000,000 (domestic water supply)	500,000 (drinking water)
	MW-2	AAA9542	667,000		
	MW-4	AAA9544	2,000,000		

4-Amino-2,6-dinitroluene, 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		
RDX	MW-1	AAA5957	0.9	NA	NA (17)
	MW-1	AAA9539	1.6		
	MW-1	AAA9563	1.0		
	MW-1	AAB2533	0.6		
	MW-2	AAA5958	1.0		
	MW-2	AAA9542	1.3		
	MW-2	AAA9564	0.9		
	MW-2	AAB2534	0.6		
	MW-3	AAA9543	3.0		
	MW-3	AAA9565	0.9		
	MW-3	AAB2535	0.65		
	MW-4	AAA5960	1.1		
	MW-4	AAA5961	1.1		
	MW-4	AAA9544	0.5		
	MW-4	AAA9545	1.0		
	MW-4	AAA9566	0.9		
	MW-4	AAA9567	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 8. 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 (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		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 sediment background UTLs.

Three organics were detected in the sediment for surface water in the wetland upcanyon from TA-18. Concentrations of these organics at downgradient location, acetone, 2-butanone, and HMX and RDX in surface water samples 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 (0.2 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 tetrylmethyl-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 (2.4 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 tetrylmethyl-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	AAA59339	22.7	NA (1800)
	WL-3	AAA59340	5.4	
	WL-10	AAA59454	2.5	
	WL-10	AAA59455	21.4	
	WL-10	AAA59457	2.85	
	WL-8	AAA59018	1.0	
	WL-8	AAA59029	0.96	
	WL-7	AAA59073	0.8	
	WL-7	AAA59054	0.8	
	WL-7	AAA59095	0.94	
	WL-6	AAA59156	0.8	
	WL-6	AAA59176	3.0	
	WL-5	AAA59216	1.01	
	WL-5	AAA59229	1.5	
	WL-4	AAA59227	0.64	
o-Nitrotoluene	WL-8	AAA59015	0.2	NA (370)
	WL-8	AAA59029	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), 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, 1358)

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

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 Number 14744, Los Alamos, New Mexico. (LASL 1955, 16-0002)

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. The methodology for these comparisons considers carcinogenic, non-carcinogenic, and radiological risk separately; the effects are not additive as implied by the comment.

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 were compared to SDWA MCLs and Region 9 PRGs for tap water.

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 readings 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, one does appear in the SOP. Core sample logs provide stratigraphic information for well boreholes. Well Completion Information forms provide specific details of well installation. Field notebooks provide a record of activity. See Attachment B for a table describing this information and its location in this response.

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 as Plate 1 to Attachment A.

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 impractical; presentation of the results, in tabular form, requires numerous pages. A map is presented as part of the revised Chapter 3, indicating locations of site-wide 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-95-3486, 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. Text is added to the report, as given below, to supply additional information.

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-18 Site History

Pajarito Site (now TA-18) 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.

1.1.2 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.

1.1.3 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 minor radioactivity from uranium contamination (LANL 1992, 16-0026).

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-XS8-0062R-1, Los Alamos, New Mexico. (LANL 1990, 0145)

LANL (Los Alamos National Laboratory), November 18, 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 in 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 1988 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 Work Plan 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 E.

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 - Variances:

Add new text in section 4.1.1.2, page 4-4, end of para. 2: ...in both tanks. **Appendix A, page A-3, Tank/Sludge Sampling, discusses the use of a special long-handled bailer rather than a coliwasa or weighted bottle to sample liquid and sludge from the septic tank.**

Add new text in section 4.1.1.2, page 4-7, end of para. 2: ...monitoring (LANL 1993, 1085). **See Appendix A, page A-2, Groundwater Sampling, second paragraph, for a discussion of the reasons for filtering groundwater samples collected from monitoring wells at this PRS. See page 4-1, paragraphs 4 and 5, for further details and a discussion of a later change to unfiltered samples called for by EPA.**

A hydropunch could not be used to collect groundwater, as originally planned, due to the presence of hard cobbles. For the same reason, subsurface soil at septic tank inflow and outflow lines could not be collected using a hand auger (ER-SOP-6.10). All subsurface soil was collected instead using a teflon core barrel sampler (ER-SOP-6.26).

Note that Table 5-5 of the original RFI Work Plan was modified in response to the EPA's 3/9/94 NOD, reflected in Table 4-1. Chloride and nitrate analyses were later added to better indicate whether subsurface soil samples were in the zone affected by septic discharge. See page 4-2, paragraphs 3 and 4, for a discussion of VOC and SVOC screening of settling tank and septic tank contents using field instruments rather than a mobile chemical van. Sampling of soils and groundwater in the drainfield associated with this septic tank did, however, include VOC and SVOC analyses.

[Since the 1995 RFI Report was completed, VOC and SVOC analyses of septic tank contents have been performed as part of waste characterization, and are reported in Appendix A of the May 1996 Interim Action Plan (LA-UR-96-446) for PRSs 18-003(a-d, g). The septic tank was emptied

and triple-rinsed as per the IA Plan, discussed in the Interim Action Completion Report of September 1996 (LA-UR-96-3340) for these PRSs.]

PRS 18-003(c)), p. 4-23 - Same variances, with same new text added where indicated:

Add new text in section 4.1.2.2, page 4-23, after next to last sentence of para. 1: ...for VOCs. **Appendix A, page A-3, Tank/Sludge Sampling, discusses the use of a special long-handled bailer rather than a coliwasa or weighted bottle to sample liquid and sludge from the septic tank.**

Add new text in section 4.1.2.2, page 4-23, end of para. 2: ...groundwater monitoring. **See Appendix A, page A-2, Groundwater Sampling, second paragraph, for a discussion of the reasons for filtering groundwater samples collected from monitoring wells at this PRS. See page 4-1, paragraphs 4 and 5, for further details and a discussion of a later change to unfiltered samples called for by EPA.**

A hydropunch could not be used to collect groundwater, as originally planned, due to the presence of hard cobbles. For the same reason, subsurface soil at septic tank inflow and outflow lines could not be collected using a hand auger (ER-SOP-6.10). All subsurface soil was collected instead using a teflon core barrel sampler (ER-SOP-6.26).

Note that Table 5-5 of the original RFI Work Plan was modified in response to the EPA's 3/9/94 NOD, reflected in Table 4-1. Chloride and nitrate analyses were later added to better indicate whether subsurface soil samples were in the zone affected by septic discharge. See page 4-2, paragraphs 3 and 4, for a discussion of VOC and SVOC screening of settling tank and septic tank contents using field instruments rather than a mobile chemical van. Sampling of soils and groundwater in the drainfield associated with this septic tank did, however, include VOC and SVOC analyses.

[Since the 1995 RFI Report was completed, VOC and SVOC analyses of septic tank contents have been performed as part of waste characterization, and are reported in Appendix A of the May 1996 Interim Action Plan (LA-UR-96-446) for PRSs 18-003(a-d, g). The septic tank was emptied and triple-rinsed as per the IA Plan, discussed in the Interim Action Completion Report of September 1996 (LA-UR-96-3340) for these PRSs.]

PRS 18-003(d), p. 4-33 - Same variances, with same new text added where indicated:

Add new text in section 4.1.3.2, page 4-33, before last sentence of para. 2: ...background levels. **Appendix A, page A-3, Tank/Sludge Sampling, discusses the use of a special long-handled bailer rather than a coliwasa or weighted bottle to sample liquid and sludge from the septic tank.**

Add new text in section 4.1.3.2, page 4-33, after para. 3: ...distribution box.

See Appendix A, page A-2, Groundwater Sampling, second paragraph, for a discussion of the reasons for filtering groundwater samples collected from monitoring wells at this PRS. See page 4-1, paragraphs 4 and 5, for further details and a discussion of a later change to unfiltered samples called for by EPA.

A hydropunch could not be used to collect groundwater, as originally planned, due to the presence of hard cobbles. For the same reason, subsurface soil at septic tank inflow and outflow lines could not be collected using a hand auger (ER-SOP-6.10). All subsurface soil was collected instead using a teflon core barrel sampler (ER-SOP-6.26].

Note that Table 5-5 of the original RFI Work Plan was modified in response to the EPA's 3/9/94 NOD, reflected in Table 4-1. Chloride and nitrate analyses were later added to better indicate whether subsurface soil samples were in the zone affected by septic discharge. See page 4-2, paragraphs 3 and 4, for a discussion of VOC and SVOC screening of settling tank and septic tank contents using field instruments rather than a mobile chemical van. Sampling of soils and

groundwater in the drainfield associated with this septic tank did, however, include VOC and SVOC analyses.

[Since the 1995 RFI Report was completed, VOC and SVOC analyses of septic tank contents have been performed as part of waste characterization, and are reported in Appendix A of the May 1996 Interim Action Plan (LA-UR-96-446) for PRSs 18-003(a-d, g). The septic tank was emptied and triple-rinsed as per the IA Plan, discussed in the Interim Action Completion Report of September 1996 (LA-UR-96-3340) for these PRSs.]

PRS 18-003(f), p. 4-44 - Variances (new text is slightly different than above):

Add new text in section 4.1.5.2, page 4-44, following para. 2: ...plan for PRS 18-003(f).

Groundwater was collected in the drainfield for this PRS. See Appendix A, page A-2, Groundwater Sampling, second paragraph, for a discussion of the reasons for filtering groundwater. See page 4-1, paragraphs 4 and 5, for further details and a discussion of a later change to unfiltered samples called for by EPA.

A hydropunch could not be used to collect groundwater, as originally planned, due to the presence of hard cobbles. For the same reason, subsurface soil at septic tank inflow and outflow lines could not be collected using a hand auger (ER-SOP-6.10). All subsurface soil was collected instead using a teflon core barrel sampler (ER-SOP-6.26).

Note that Table 5-5 of the original RFI Work Plan was modified in response to the EPA's 3/9/94 NOD, reflected in Table 4-1. Chloride and nitrate analyses were later added to better indicate whether subsurface soil samples were in the zone affected by septic discharge.

PRS 18-003(g), p. 4-52 - Variances:

Add new text in section 4.1.6.2, page 4-52, following para. 1: ...and analysis plan.

Appendix A, page A-3, Tank/Sludge Sampling, discusses the use of a special long-handled bailer rather than a coliwasa or weighted bottle to sample liquid and sludge from the septic tank.

See Appendix A, page A-2, Groundwater Sampling, second paragraph, for a discussion of the reasons for filtering groundwater samples collected from monitoring wells at this PRS. See page 4-1, paragraphs 4 and 5, for further details and a discussion of a later change to unfiltered samples called for by EPA.

A hydropunch could not be used to collect groundwater, as originally planned, due to the presence of hard cobbles. For the same reason, subsurface soil at septic tank inflow and outflow lines could not be collected using a hand auger (ER-SOP-6.10). All subsurface soil was collected instead using a teflon core barrel sampler (ER-SOP-6.26).

Note that Table 5-5 of the original RFI Work Plan was modified in response to the EPA's 3/9/94 NOD, as reflected in Table 4-1. Chloride and nitrate analyses were later added to better indicate whether subsurface soil samples were affected by any septic discharge. See page 4-2, paragraphs 3 and 4, for a discussion of VOC and SVOC screening of settling tank and septic tank contents using field instruments rather than a mobile chemical van.

[Since the 1995 RFI Report was completed, VOC and SVOC analyses of septic tank contents have been performed as part of waste characterization, and are reported in Appendix A of the May 1996 Interim Action Plan (LA-UR-96-446) for PRSs 18-003(a-d, g). The septic tank was emptied and triple-rinsed as per the IA Plan, discussed in the Interim Action Completion Report of September 1996 (LA-UR-96-3340) for these PRSs.]

PRS 18-003(h), p. 4-58 - Variances:

Add new text in section 4.1.7.2, page 4-58, end of para. 1: ...and analysis plan. **Appendix A, page A-3, Tank/Sludge Sampling, discusses the use of a special long-handled bailer rather than a coliwasa or weighted bottle to sample liquid and sludge from the septic tank.**

See page 4-2, paragraphs 3 and 4, for a discussion of VOC and SVOC screening of settling tank and septic tank contents using field instruments rather than a mobile chemical van.

[Since the 1995 RFI Report was completed, VOC and SVOC analyses of septic tank contents have been performed as part of waste characterization, and are reported in Appendix A of the May 1996 Interim Action Plan (LA-UR-96-446) for PRSs 18-003(a-d, g). The septic tank was emptied and triple-rinsed as per the IA Plan, discussed in the Interim Action Completion Report of September 1996 (LA-UR-96-3340) for these PRSs.]

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 - **No variances**

PRS 18-012(b), p. 4-71 - **No variances**

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 - **No variances**

PRS 18-008, p. 4-91 - This PRS has been found, excavated, sampled, and disposed of in accordance with the New Mexico Underground Storage Tank Regulations since the RFI Report was published.

PRS 18-002(a), p. 4-93 - **No variances**

PRS 18-002(b,c), p. 4-105 - Add new text in section 4.4.2, end of third para: ...and ballistic objects. **This PRS is co-located with PRS 18-002(b) and, being a former structure, was not separately sampled.** Add new text in section 4.4.2.2, end of first paragraph: ...and analysis plan. **Note that Figure 4-16 of the RFI Report conforms with sampling locations revised in response to the EPA's 3/9/94 NOD, rather than to Figure 5-15 of the original RFI Work Plan.**

PRS 27-002, p 4-115 - [Variances in sampling 27-002 are already discussed in section 4.4.3.2 para. 4.] Add new text in section 4.4.3.2 at end of para. 2: ...screening assessment (discussed below). **Note that Figure 4-17 of the RFI Report conforms with sampling locations revised in response to the EPA's 3/9/94 NOD, rather than to Figure 5-16 of the original RFI Work Plan.**

PRS 18-005, p. 4-130 - **No variances**

PRS 18-011, p. 4-134 - **No variances**

PRS 18-010(b), p. 4-137 - **No variances**

PRS 18-010(c), p. 4-146 - **No variances**

PRS 18-010(d), p. 4-153 - **No variances**

PRS 18-010(e), p. 4-158 - **No variances**

PRS 18-010(f), p. 4-167 - **No variances**

PCO wells, p. 4-171 - **No variances**

Wetlands, p. 4-186 - **No variances**

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.

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.

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. 55044, Los Alamos, New Mexico. (Environmental Restoration Project 1996, ER ID No. 55044)

Revised Text:

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

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 on LANL Soil SALs, which are equivalent to the EPA Region IX PRGs.

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 on 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 4-16
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 on 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 Work Plan 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.

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 to 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 and with the applicable regulations. TCLP analyses are conducted only 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, DOE Orders addressing radioactive and mixed waste management, and applicable regulations. 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, 1995]*

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 PRS has been modified to conform to the current RFI Report 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 (EPA 1994, 1206). The mercury data for the sample that grossly exceeded holding time were qualified as R, while the other mercury data were qualified as UJ.**

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.**

- ~~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 AAB4517) 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 18-003(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 (EPA 1994, 1206). 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.**

  ~~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,c)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.

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 (EPA 1994, 1206). 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 (EPA 1994, 1206). 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 (EPA 1994, 1206). The data are usable because the inorganic material is extremely stable under proper storage conditions, which were maintained for these samples, and the inorganics 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.

- 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 18-003(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.

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.**

- ~~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.**

- **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
18623	AAB4640 AAB4642 AAB4644 AAB4646	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 that 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 18-003(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 that 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	18-1265	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.**

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.**

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.

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). Additional sampling will be conducted to evaluate the effects of the missed holding times. 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 (EPA 1994, 1206). 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. Additional sampling will be conducted to evaluate the effects of the missed holding times.**

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 18-002(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 4-44a
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 (38 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 (EPA 1994, 1206). 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, which were maintained for these samples, and the inorganics 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 PRS 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 orJ	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%.
18069	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 AAB5146 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 ot 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

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

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.

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.**

- ~~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**

Environmental Restoration Program Controlled Document #207 - Field Notebook.
C. Randall Maynard, Field Team Leader

PART 1 - Operable Unit (OU) 1093
Re-creation of field data for lost Field Notebook, ER Controlled Document #103. Author: C. Randall Maynard, Field Team Leader. OU1093 drilling operations conducted in summer of 1994.

Note: ER Field Notebook #103 was lost Aug 22, 1994, at the Field Office trailer located along Pajarito Road at former TA-27. A diligent search was conducted several times there and at C.R. Maynard's office at TA-41-30-29, home, and vehicle. No coworkers reported any knowledge of its whereabouts, so the notebook is considered lost.

Its contents had been regularly photocopied, so only eleven days' records had to be reconstructed from other field records, such as the Site Safety Officer's Health and Safety Log, Sample Collection Logs, Core Sample Logs, Sample Collection Plan, and database documents (that ordered field data by sample number and by time of collection).

Previously photocopied pages of notebook #103 are on file at the ER Program Records Processing Facility (RPF). They include 1993 field records for OU1093,

11/5/93 - I checked the EOD work area to clean up any remaining debris and hide the 3 boxes of ordnance debris from view by passing traffic. The boxes will need to be monitored for rad by HS-1, tagged as rad-free, and picked up by WX-3. I called Mike Rye to arrange for monitoring & Pete Velarde of WX-3 to arrange for pickup. I'll be on vacation or travel until 11/15.

11/18/93 - Three remaining crates of metallic debris at the bazooka site were checked for rad by Gilbert Garcia of HS-1. Based on an indication of radioactive materials present, he sent Sharon Velarde of HS-1 to monitor specific pieces that I separated from the mass of bazooka debris. Several pieces of aluminum shrapnel registered beta/gamma counts up to 30 mrem/hr at contact, background at a distance of one foot; or 30 dpm. Alpha was background. The contamination is nonremovable and my leather gloves read background. The pieces, about a pound of mass were placed in a plastic zip-lock back together with survey tag # 018747. She also surveyed the scrap metal in the crates down to the crate bottom and found no further contaminated metal.

11/24/93 - Julie Mentenhuis of EM-7 (now CST-7) said the rad fragments have too low an activity to meet

their rappelling gear for cliff work on Friday. The geophysics team did not show up at the bazooka impact site today. I did some videotaping of ordna debris at the parking area below the impact zone.

10/29/93 - It is snowing, so onsite work by the EOD team has been postponed. I called the Emergency Management & Response Office & talked briefly with Jim Walton of the Hazardous Devices Team (Bomb Squa He and Jim Griffiths are both retiring today, so th new contact person is Gary Bequette, also at 667-6

11/1/93 - I videotaped rappelling operations done by the EOD team to check the vertical cliffs at th Bazooka Impact Area for ordnance embedded in the rock. They found only one tail fin in a crack. They ran several sweeps of the flat area between the creek and Pajarito Road to check the line of flight believed to have existed when the bazooka rounds were fired in 1947 (based on two angle-iron posts aligned toward the center of the impact area. These two white-painted markers are located on the south side of Pajarito Road across the road from the old firing pit #4 of former TA-27). No ordnance material of significance was found. The geophysicists from Kaiser Engineering (Gary [illegible] and Martin Miola) are having difficult. [illegible]

Personnel from WX-3 picked up 9 boxes of debris and transported them to the S-Site burning ground for flashing. They apparently picked the material up late on the 19th according to Pete Velarde, so we weren't able to segregate the few items with HE contamination prior to shipment. The EOD team felt that no real hazard was presented by the trace of HE on the few items (shaped-charge cones) on which HE was visible. Al Ebner, in fact, was upset by the amount of attention being paid to such small, unconfined amounts (The answer, of course, is DOT regs) Once the material is burned, WX-3 disposes of the metal scrap at TA-54 via EM-7. Charlie Wharton couldn't,

10/21/93 - Al Ebner requested that Gene Gould authorize the rental of a brush cutter to remove large, dense brush clumps in the flats near the base of the cliff. I relayed Gene's OK, but will notify EM-8 in case such brush removal (estimated 1/4 acre) will disturb any wildlife habitats along the creek there. Razorback Tail fins have been seen but brush prevents using magnetometers. Brush will be cut Monday Oct. 25.

10/22/93 - I called ~~Ben Lar~~ Terri Foxx, EM-8 biologist, regarding the brush cutting necessary (left a phone message, later I told Ben Larsen to relay the message to Terri, which she said she would (Terri was in a meeting)

the boxes as rad-free. WX-3 personnel decided to wait until 0900 on Wednesday to pick up the scrap metal, though we'd discussed (Pete Velarde & I) doing it today. Good thing, since HE-contaminated nose cones have not been segregated by the EOD team as I had asked to do. Al Ebner doesn't want the EOD team to sort through the boxes but rather, due to their cost of $1000/day, spend their time doing ordnance sweeps. I relayed this to Gene Gould with a recommendation that Bob Catherwood, John Longer, & I do the sorting (assuming Catherwood is eligible & available). Gene will decide.

George Marino, HS-5, visited the site to inquire about the falling rock that occurred after last Friday's demolition shot. He was shown the location. Apparently his boss, Susan Alexander, was concerned about the incident, which I had mentioned to Paul Aamodt of EM-13 last Friday (10/15). I agree that extra care needs to be given on this slope due to its many cracks & loose material, and believe the EOD tech who did the post-shot check, Bryan Thompson should have waited longer than one minute to re-enter the shot site. Though hard hats would not have made any difference with a boulder the size of the one that fell (approximately 5-6 ft. in diameter), I think the team should wear them when on steep slopes with loose rocks. I'll discuss this with Charlie Wharton

in a wooden ammunition crate, pieces of which were found. The EOD team suspects the ammo was used as a target for the bazooka firing but escaped destruct. I videotaped the setup for the demolition shot and the shot itself. Several pounds of C-4 plastique explosive was used, causing a small rockslide that narrowly missed one of the EOD techs inspecting the bazooka remains ~~several~~ one (CPM 10/19/73) minutes after the shot. The videotape shows a large boulder toppling past him a few feet away. The hillside is heavily damaged due to the original firing of hundreds of rounds (300 expended motors have been recovered so far), weather shifting of large numbers of boulders during search activities, plus the demolition shots. Hence the hillsi consists of large rocks and boulders resting in loose sand and gravel. The rock is soft enough to fracture when stepped on or rolled.

Today's shot is much larger than the one on Tues. (Oct 12), which rattled buildings at TA-18. Apparently a low cloud over the shot reflected the shock from Tuesday's blast. I phoned the N-2 Group office to check after today's larger blast but they have heard it due to the clear skies. No damage was reported from either detonation by personnel from either TA-18 or TA-54. No comments have been relayed to me from the public.

10/8/93 - I brought a LANL map of the TA-27 area to the EOD crew, took pictures of the types of ordnance remains, and ordered 4 more wooden boxes built by MRI Shipping Office to be used for temporary storage of the debris being found. About 6 cu. ft. of ordnance material has been collected so far, mostly in rusty shredded or bent condition. However, enough components in fairly good condition have been collected to provide a composite of a complete assembly, which I took pictures of. Several have traces of HE, a crumbly white crust. The crew is searching the cliff and lower slope from the outer edges of the fragment "footprint" (500' along the canyon rim) toward the heavily impacted center. Due to the heavy concentration of ordnance debris in this central area it will be done after the edges have been cleared.

10/12/93 - Two unexploded complete bazooka rounds and two possibly unexploded bazooka detonators were uncovered and blown in place by the EOD team using C-4 explosive. Still and video photography of the operation was done by myself (Randy Mynard). The two rounds were separated by about 6 ft. and the two tail assemblies with suspect detonators were about 50 ft east. All were about 1/3 up the slope on the impact area hillside. 3 charges were placed and detonated simultaneously using primacord. Black smoke indicated one or both bazooka rou

A phone message from Matthew McGonagle (?) relayed to me by Vic Hesch indicates alpha activity above background and "high levels" of volatile organics such as napthalene, toluene, and benzene (a carcinogen) in samples from TA18 septic tanks at Rivas 1, 2, and 3. Depending on the concentrations, a possible "mixed waste" situation may exist. I called Bobbie Partain of N at 5:10 PM to ask her to relay to Rick Anderson not to have the septic tanks pumped as he had planned but to wait for further info.

10/7/93 I met with the EOD team at 0800 to discuss the ordnance BIP scheduled this morning. Jim Walton, David Dorsey, & Robert Beistel of the Hazardous Materials Disposal Unit (bomb squad from LAN) were there to bring the plastique explosive used by the EOD team to detonate 2 bazooka fuzes and 2 adjacent remains of the warheads probably still containing HE. Jim Griffiths of EM&R coordinated the notifications & closing of Pajarito Road by PTLA (Proforce guards) and onsite communications by radio.

Prior to the shot Gilbert Garcia and an uncleared Tech of HS-1 arrived to monitor a 2-in piece of metal, a fragment from Lab explosive testing, found to have above background readings of beta/gamma. It was among numerous fragments found by the EOD team on the top of the cliff outside the TA-54 fence

near (or even upon them) and the possibility of damage if "B&P" had to be done. I urged her to have someone show them next week (or whenever they work in TA. where the sites are located and perhaps to have someone on hand. She'll do so and brief them today.

I asked John Longer to pick up the fragment boxes & take them to the site for use in holding fragments & non-explosive debris. He will monitor the non-ordnance fragments for rad on a regular basis, daily if necessary. ~~Such~~ Any fragments with rad levels readings above background will be segregated as possible. mixed (rad + HE) waste for separate handling. UXO can then appropriately label shipments to the S-Site burning area. I asked him to tell Al Ebner to take the team to TA 54 to pick up TLDs today and get a site safety brief (needed for later work at TA-54).

Al Ebner called ~~about 11:45~~ (in morning) to say the team will pick up the TLDs and that UXO is being formulence B&P operations will need to be done soon.

2:00 Gene Gould, John Longer, & I met at the Emergency Management & Response Office with Jim Griffith to resolve what paperwork remains to be done to allow "Blow In Place" to be done. A Special Work Permit (SWP) is needed. A copy of Jim Aldrich's Health & Safety Plan may be useful. Called Keith Bowers to get all pertinent documentation. Jim called Frank Pa...

I called MAT-2 Shipping Office (7-0996) to arrange for 4 ½" plywood wood boxes 2'x2'x2' with nail-on lids and rope handles (size requested by EOD team) to hold metal waste & debris picked up in ground sweeps. Will be burned at HE burning grounds. Talked with carpenter (Kevin or Alex) & gave him program code, box specs, & urgency of need. He'll have 2 boxes by 10/6 in the morning. It is unclear whether non-ordnance waste & ordnance waste without obvious HE is regarded as hazardous for transportation purposes if it is being shipped to burning grounds for removing any HE residuals. Bob Catherwood will find out. If hazardous, special DOT-approved shipping containers will be needed instead of the ones I ordered. Packing material is also needed to wrap the debris in. "Crepe paper" type packing. Pick up boxes at SM-30, southeast corner inside gate.

I notified Don Neeper (7-3832), OUPL for OU 1148 (TA-) of the EOD operations commencing next to his OU that I was the contact person, what was being found (lots of material, fins, rounds in the tuff cliff face, fuzes, etc.), and that there was a strong possibility unexploded rounds & debris would be found on the mesatop in his OU, perhaps even on the north side of the Mesita del Buey road to Area G, TA-54. I told him we would follow the debris northern wherever it led. He is relieved we will be [illegible]

with them (the team). He'll come to tailgate, too. He'll do all notifications if any onsite detonations are needed, such as police, fire dept, DOE, etc.

10/5/93 - Tailgate briefing by me with Jim Walton (EM&R), George Marino (HS-5), Charlie Wharton, Al Ebner, Matt Thompson, Brian Thompson, J.R. Stallings. Discussed hazards of unexploded HE from old TA-27, fragments from old TA-27 or TA-3. Walton said EM&R provides transport of HE to conduct "BIP" (Blow in Place) demolition of UXO (unexploded ordnance) that may be found, and also notifications of various organizations prior to such operations. However, he cautioned, the difficulty may be paperwork, SOPs, & approvals needed prior to onsite detonations (such as closing Pajarito Road.

(1) MEE-4 will have to initiate & follow up all such approvals & documentation, needed, according to Charlie Wharton, the day such UXO is found (if possible).

(2) Secondly, wooden crates for placing all fragments & metal will be needed (non-HE pieces) ASAP in order to clear the surface of extraneous metal so that magnetometry operations can be done. Perhaps Jim Aldrich knows where such crates can be built & how the material is transported for burning (to insure no hidden HE is m...)

off, 20 sec on. Sampling will be done in off phase. Vic Hesch will time pump & alert sampler so sampling will not be disturbed by suction from pump.

Caution, plastic sheeting on concrete floor in CRZ is slick, a trip hazard. No sludge visible beneath clear water. Large flow of ground water from north pipe in sump, hence sample will represent groundwater from around building foundation. Temperature in 70's. Sampler can see float inside sump & tell when pump will come on. Due to nature of water source, Merlin Wheeler (Technical Team leader) decided a general minerals analysis sample was needed. Sampling completed at 1435. Sampling activities for TA-18 septic systems is complete (we assume) for 1993. I called Miglio re: taking Amber 500ml glass ones w/black caps don't seal well & leak into ice cooler sh

★ [Location: Pajarito Canyon 1 m. east of TA-18, north side of Pajarito R (PRS 27-003) in TA-36

10/4/93. Bazooka Impact Area - Meeting with EOD tea 9:30. Environmental Hazards Specialists International, Inc. (explosive ordnance disposal). Belvidere, NC 27919 (Rt 1 Box. Charles E. Wharton, Sr. (President), Al Ebner (site supv.) J. Stallings (Site Safety), Raymond "Matt" Thompson, Brian Thompson (EOD HAZMAT TECHS) will be onsite. (EOD HAZMAT TECH cell phone: 7626-919/9.

George Marion (665-7224) is HS-5 contact. Keri Manz (665-6093) is EM-8 archeologist for Indian Caves at base of cliff. EOD crew has been working with Jim Aldrich (665-4230) on Rendija Canyon impact area. I gave introductory site brief to Wharton & Ebner. Wharton read "Report of Investigation on (OUFL to 0010

from the north blows any gases away from sampler & other team members. No sludge samples were taken due to absence of sludge. Zero α, background β-γ.

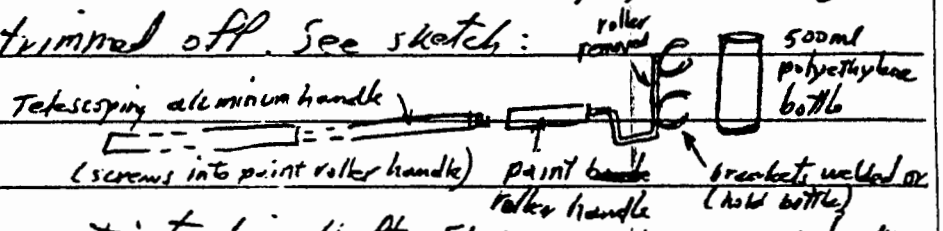
Visitors to location were a video crew who taped the operation & interviewed the Field Team Leader (myself) for an N-2 training video. Barbara Partain (665-5144), N-2, Leslie Knowlton (665-8646) HRD-3, Dan Curry (661-9074) HRD-3.

Septic tank 18-43 (PRS 18-003g) opened 1015. Wind stronger & from east, blowing any gases away from sampling team. John Longer still is using his respirator. Contamination Reduction Zone (CRZ) sits between septic tanks 18-152 and 18-43, so was not moved. Barriers were simply repositioned around other tank (18-43). α = zero, β-γ are background. O_2 = 20.7%, combustibles = zero, H_2S = zero. Organic vapors background = 2.5 ppm, & 6 ppm above background over undisturbed liquid surface. Tank water has lots of floating organic material, sticks, plant matter. Water is clear. Organic vapor above water in sampling container is 7 ppm above background. Floating algae in tank. Organic vapor in breathing zone during sampling is at background levels. Another organic vapor reading in sampling container liquid is 20 ppm above background.

At 1045 one sampling container liquid was 60 ppm above background for organic vapors momentarily. ~~As~~ Sludge not easily available. May have been cleaned out previously. Only able to fill one Volatile Organic vial & one Semi Volatile one

9/29/93 - Setup at Kiva 1 (TA-18) septic tank ~~SA~~ 18-39 (PRS 18-0036) begun 0845. Weather 60's, clear (will warm into 70's as day progresses). Team members again Randy Mynard (FTL), Brian Pals (SSO), John Longer (Rad Control Tech & sampling person), Mike Herka (decon tech), Merlin Wicker (sample handling). Sample labels & forms are prepared by Georgia Johnson on a computer in Bldg 18-257 on 1st day of sampling (if sampling delayed, revised by ha O_2 = 20.7%, H_2S = zero, combustible = 1 ppm, not able to reach Tank with rad meters. Organics are at background (3-6 ppm). Water in tank is lime green. Organic vapors from liquid in sampling container is background.

Sampling being done with extendible aluminum poles with screw-on paint roller modified to hold polyethylene jars with mouth trimmed off. See sketch:



Water depth in septic tank is 4 ft. Sludge organic vapors are backgrou Sampler smells "rotten egg odor" when sampling sludge (H_2S

Coliwasa sampler not being used due to difficulty in ensuring decontamination and lengthy decon process. Above sampler works efficiently for both water & sludge sampling, hence is being used instead of weighted bottle & coliwasa. Poly bottle is changed after each PRS.

Slight oil sheen on water. Sampler handle yesterday (9/28) could not be cleaned of the oil and was discarded. Alconox soap didn't remove it.

(28)

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A)

Field Activity Log - OU1093

Environmental Restoration Project,
Los Alamos National Laboratory (LANL).
Resource Conservation & Recovery Act (RCRA)
Field Investigation for Operable Unit 1093 (LA-UR-93-4
by C. Randall Mynard, Field Team Leader
C. Randall Mynard

Location: Technical Area (TA) 18 in Pajarito Canyon,
Los Alamos County, New Mexico.

Sampling investigation being conducted to determine type of contamination, if any, degree or concentration, and extent at pre-determined locations at TA-18.

Basis for location and plan for sampling: "RFI Work Plan for OU1093".

(Barbara Paxton (N-2) gave us all a site safety briefing)

Date: 9/28/93. Sampling crew: John Longer, Brian Pals, Mike Henke

Weather: Cool morning, warm day, cloudless, low 70's

Sampling location - Septic Tank 18-39 42 CRM 10/27/93 PRS 18-003(b) C CRM 10/27/93 (near Kiva 2). Cover removed at 12:15. No rad detected on inside rim of manhole & was zero, β/γ was background. Instruments: Foxboro Organic vapor analyzer model OVA 128, MSA 361 Combustible gas/O_2/H_2S detector, Eberline Smart Portable (ESP-1) (PN 5018), Ludlum Model 139 (for alpha) (PN 3764). Combustibles zero; Organics at background (4.5 ppm) [12:50], O_2 20.1%, H_2S zero

Received by ER-RAF AUG 23 1994

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)
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				

filename:
p:\julie\TA-18\NOD-LOG.xls

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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ATTACHMENT B

4.0 References

Environmental Restoration Project, January 1995. "RFI Report for Potential Release Sites 18-001(a), 18-001(b), 18-001(c), 18-007, 27-001, 27-003 (Located in Former Operable Unit 1093), Field Unit 2." Los Alamos National Laboratory Report LA-UR-95-295 Los Alamos, New Mexico. (Environmental Restoration Project 1995, 1285).

Gibbons, R.D. "Statistical Methods for Groundwater Monitoring." John Wiley & Sons, Inc. 1994.

LANL (Los Alamos National Laboratory). December 6, 1996. "Hydrogeologic Workplan." Revision 1.0. Los Alamos National Laboratory Report, Los Alamos, New Mexico. (LANL 1996, 1378).

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 characterization wells will be assessed, and recommendations developed regarding the number and proposed locations of additional wells or other sampling locations for Stage 2 sampling. The data from Stage 1 will also be used to refine the list of analyses for which data will be collected in the Stage 2 sampling.

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 anions, 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; concentrations of major cations and anions such as sodium, manganese, chloride, and alkalinity increase downgradient. 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.

For downgradient wells affected by waters from only one of these canyons, comparisons will be made with only the four appropriate upgradient data sets. For those 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* (Gibbons, 1994). 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.

2.4.4.4 Field QC Samples

The type, 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	Standard low concentration method

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

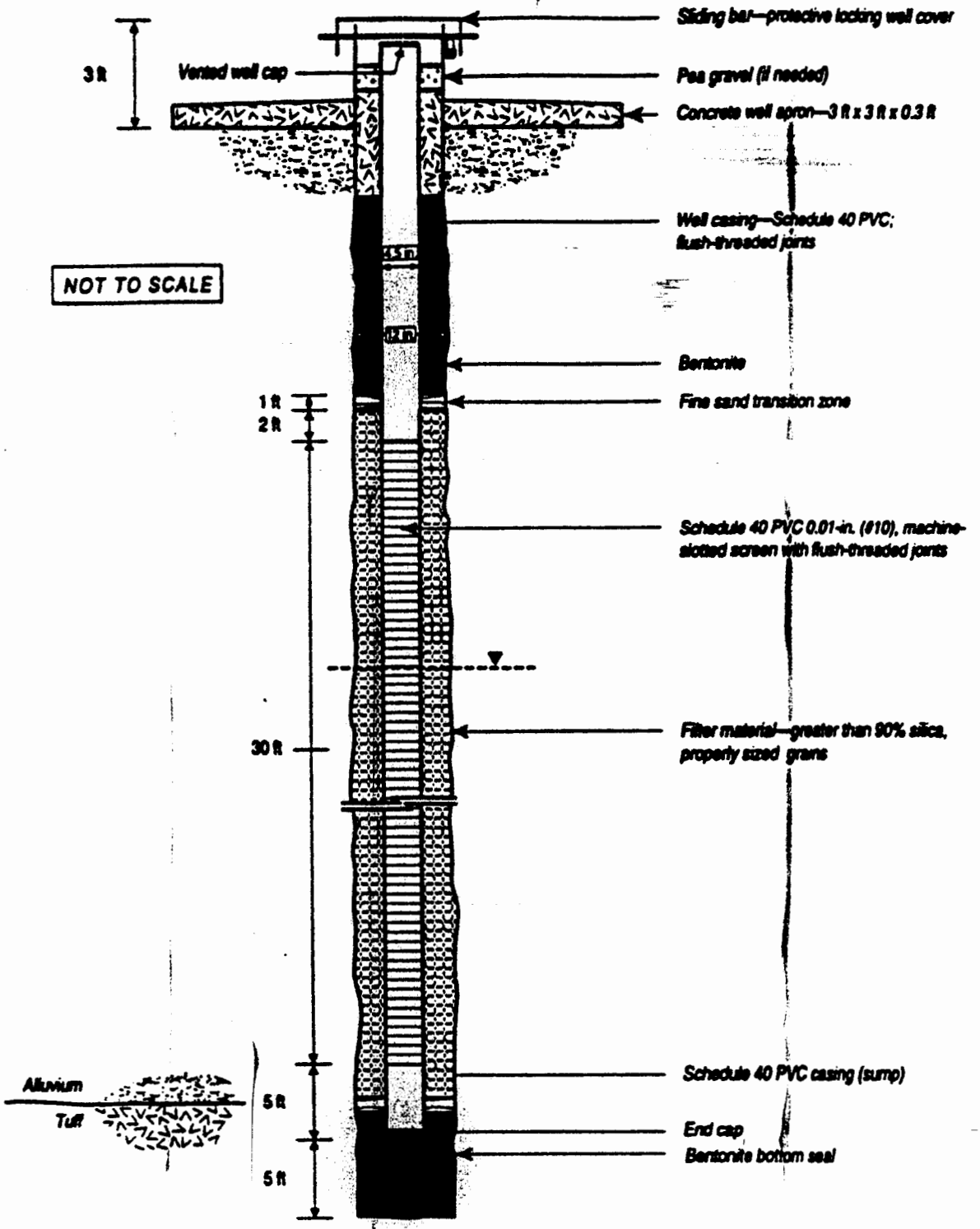


Figure 2.4.4-2. Design of Additional Shallow Monitoring Wells

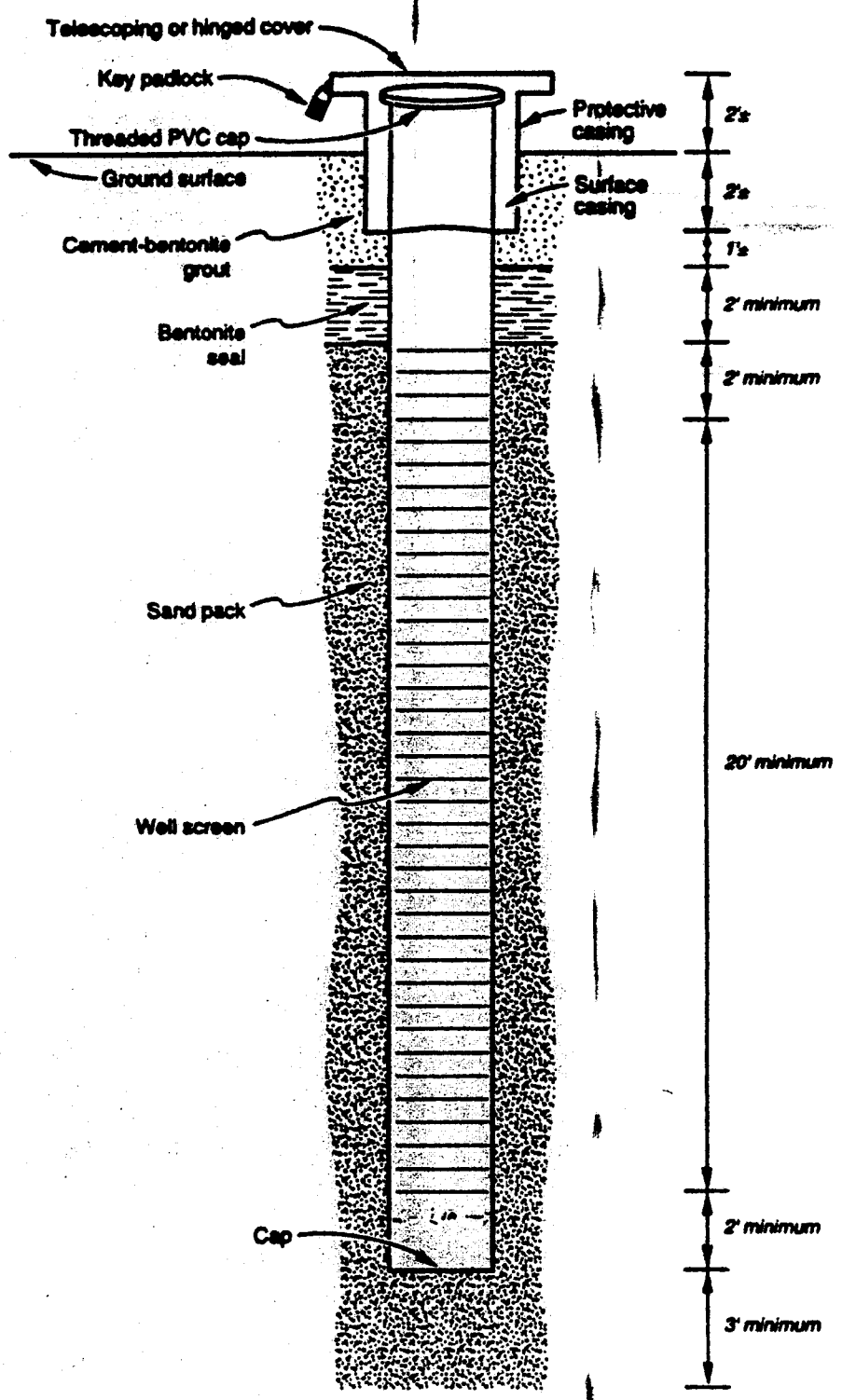


Figure 2.4.4-1. Design of Existing Monitoring Wells

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 1996, 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 of the alluvium, 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. The screened interval will be restricted to the alluvial aquifer.

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. All detection limits will be below the applicable standards.

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.)

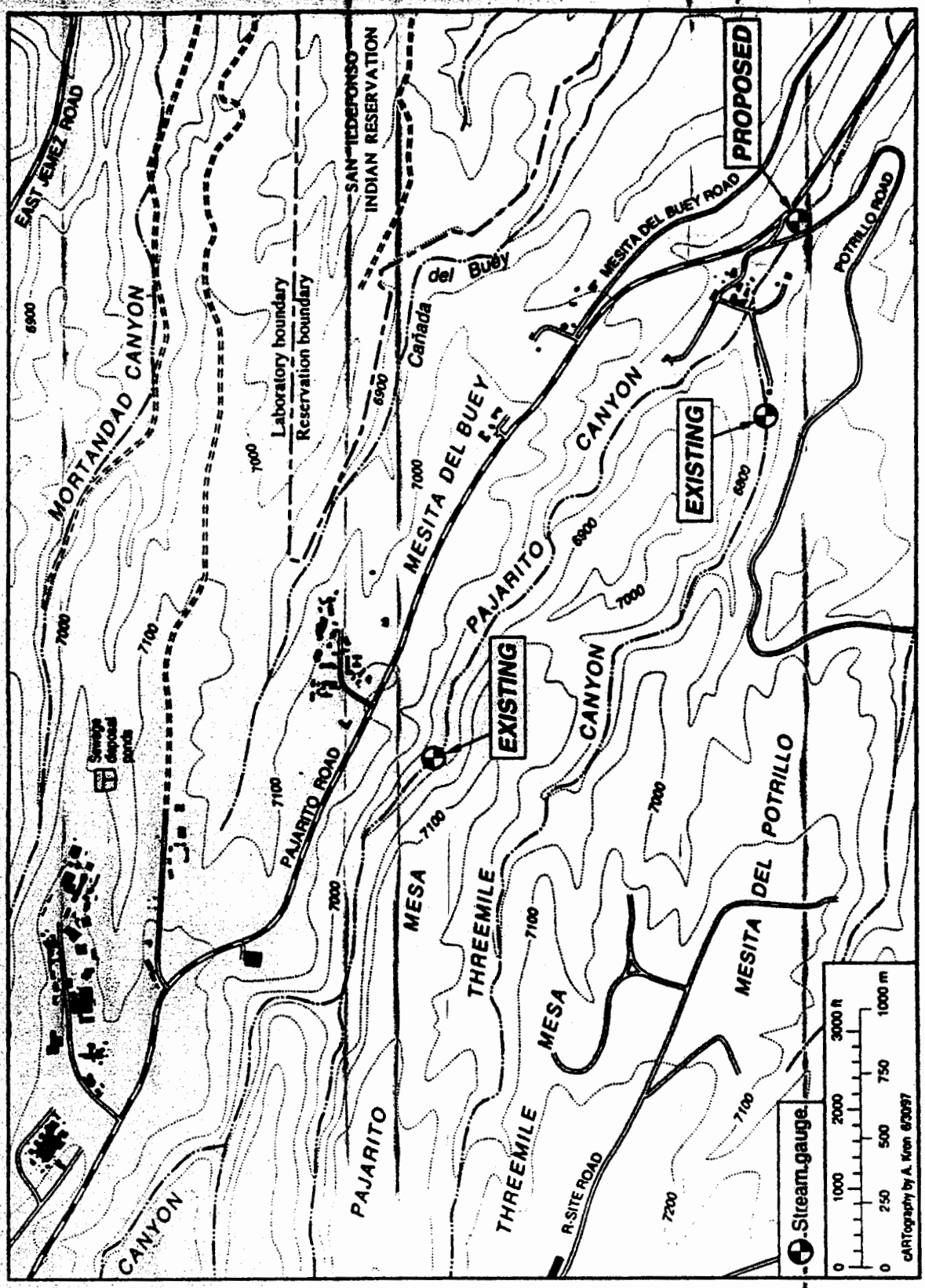


Figure 2.4.3-1. Location of Existing and Proposed Stream Gauges Near TA-18

Table 2.3-1 Sampling Design for Proposed Sampling Locations

Location Description	Location ID	Media	Purpose								
				MET	VOC	SVOC	HE	Major cations/ anions	NO_3	Cl	H-3
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)								
MW-12		Ground-water	Measusre COPCs from PRS 18-003(d); tack changes in HE concentrations								
Pajarito Canyon Stram at downstream 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	Sediment	Obtain sample in 0-6 in depth interval	X	X	X	X				
WL-6	36-2009	Sediment	Obtain sample in 0-6 in depth interval	X	X	X	X				
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 downgradient 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

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	18-10021	Surface Water	Determine water quality of groundwater recharge source	X	X	X	X	X	X	X	
Pajarito Canyon Stream near TA-18 Boundary	18-10025	Surface Water	Determine water quality of groundwater 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
BG-3 Background Well (New), in Threemile Canyon	18-10024	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			
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)								

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 alluvial 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, but will not be equipped with a continuous flow recorder.

The stream flow data, coupled with groundwater elevation measurements, will be used to estimate water-balance relationships for the shallow aquifer.

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(a)	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

2.0 SAP Design

2.1 Overview

The Hydrogeologic Workplan (LANL 1996, 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 two stages, as follows:

Stage 1. Determine Potential Contaminants

- Collect water samples from flowing streams and springs in Threemile and Pajarito Canyons 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. In order to strengthen statistical comparisons with downgradient wells, the upgradient wells will be sampled four times.

- 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 characterization well in Threemile Canyon up-gradient from all potential contaminant sources within TA-18 to determine up-gradient alluvial groundwater quality in Threemile Canyon.

- Record stream flow data and water level elevations in existing shallow 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 alluvial 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 characterization 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 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.

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 wells, and

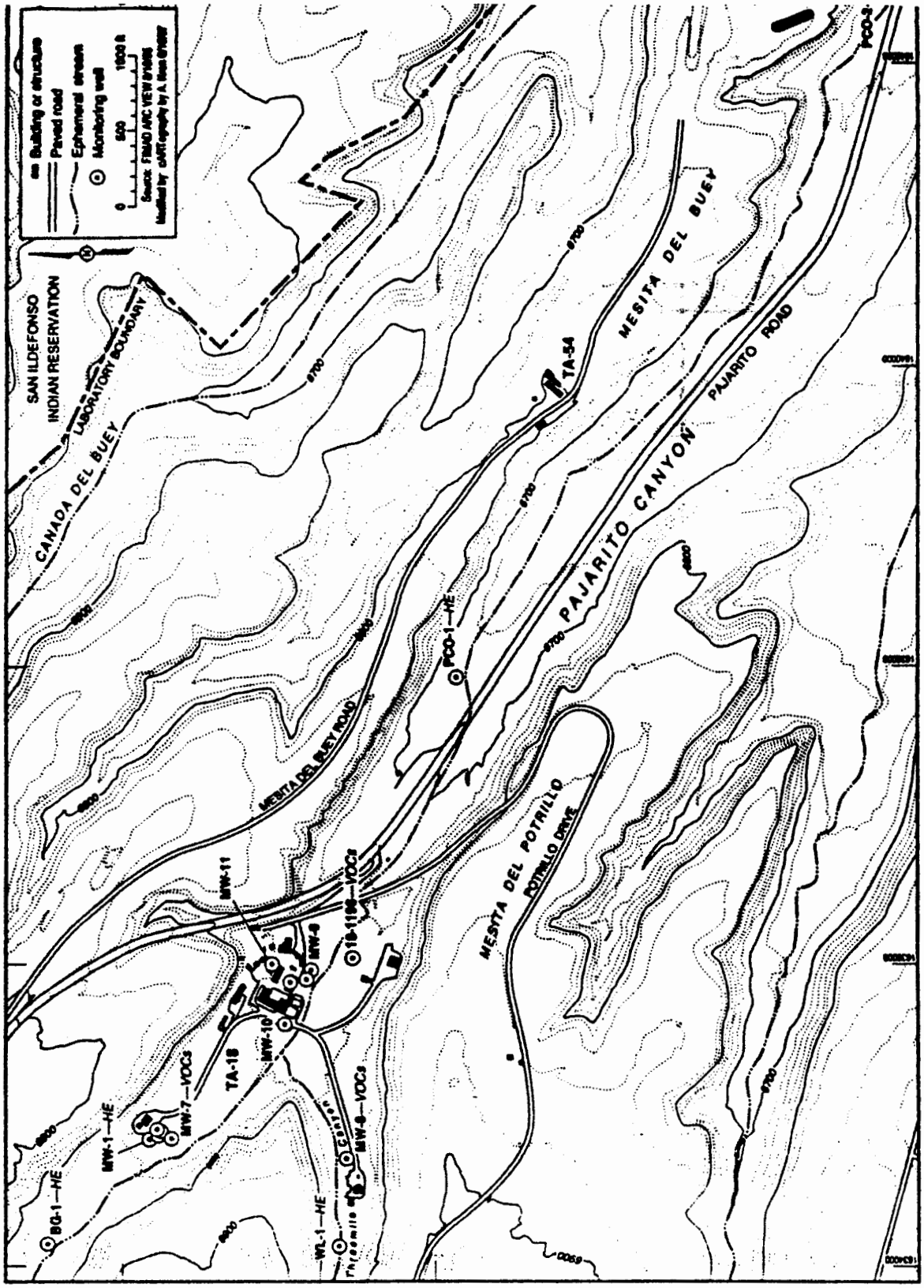


Figure 1-1. HE and VOCs Detected in Alluvial Groundwater by Phase I RFI Sampling at Former OU 1093

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 alluvial 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 (EPA 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 alluvial 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 information on seasonal variability.

Groundwater 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.[illegible]

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? In particular, are the observed concentrations of HE constituents in surface and groundwater related to potential sources within or downgradient from TA-18?

ATTACHMENT A

SAMPLING AND ANALYSIS PLAN FOR GROUNDWATER INVESTIGATIONS IN THREEMILE AND PAJARITO CANYONS

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 C to this NOD response.

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:

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

[3]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

Revised Text:

Table 4-81 is modified as follows:

TABLE 4-81
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	8.23	0.89
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."*

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.

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.

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

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 affect 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.

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. Ephemeral streams are not conventionally "named," beyond referencing the canyon in which they are located. 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.*

~~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 18-28 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).

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:

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 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.iii(3). *Figure 4-24 does not clearly identify those areas which are paved and unpaved.*

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

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*, (Shineldecker 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-18. 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-18. 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 18-010(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 18-30, 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 18-010(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)

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.i(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 because of the high potential for volatilization from surface material. 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, poltcyclic 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, 1085), 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

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 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 organic COPCs ~~detected or~~ suspected of being present in sediments from the drainage ditch west of Building 18-30 **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 18-010(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)

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 supported the generator at this site.** 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.*

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 18-005(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:

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.

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.e.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 August 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.*

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 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 were 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

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.

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 Work Plan 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 the 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.

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, 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)

~~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.

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 18-012(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 18-116 (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.

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 Work Plan 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**

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 Work Plan (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, 1.50 for beta, and 116.83 for gamma.**

~~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(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 18-1285, 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.

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 13.5 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 Work Plan 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:*

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 south-easterly 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.

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 E 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

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 Canyons" (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.

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).)

2.b.ii Section 4.1.1 18-003a-b) Settling Pit, Septic Tank and Drainfield. *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 demonstrates 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.

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 an ER position on closure of septic tanks (and ancillary features) that will address this issue.

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 are 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.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	26.7	12.2	N/A (100)[e]	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)[c]	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

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 1996, 1351)

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 1994, 1167)

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 (HEAST) 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. (Miller 1994, 1169)

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 (EPA 1996, 1351). 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,

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.~~

Background wells. 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 sampling reflect 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.

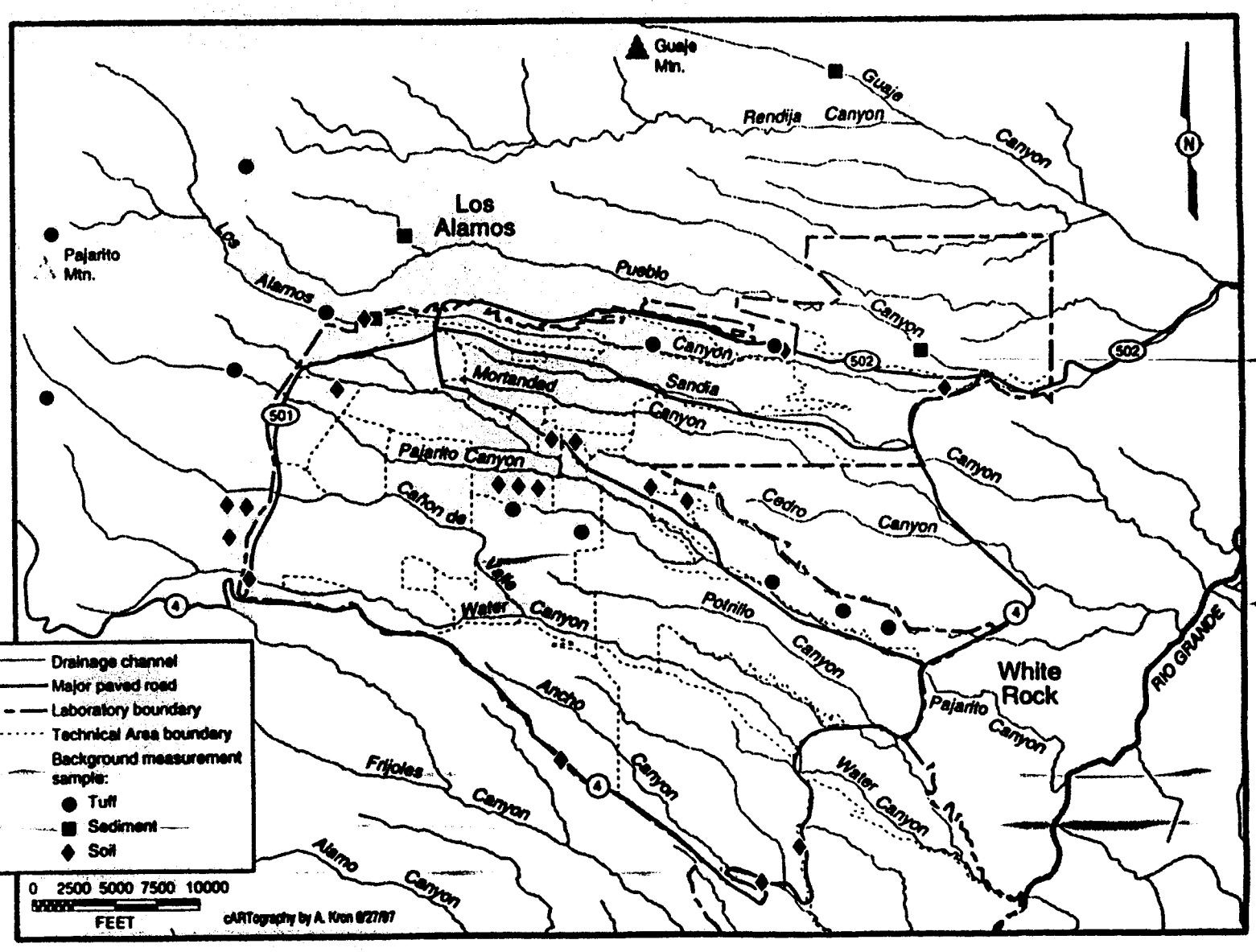


Figure 3.2a LANL sitewide background sampling locations for tuff, sediment, and soil.

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 whether 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 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).

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 responses to Comments 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 available only 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.*

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.

Corrected summaries of samples collected and variances from the sampling plans for each PRS are included in Attachment E.

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	36-2000	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%.**
		AAA5902	36-2001				
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

~~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.

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)

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~~

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.

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 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	18-2016	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%.
16817	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%.

- **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.

~~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.**

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 (EPA 1994, 1206). 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~~

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 60%.

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

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 [illegible]
16797	AAA5984	PCO-1	36-2021	Matrix Spike	Calcium	J	Matrix spike recovery below the established lower limit of 75%.
15800	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	AAA5986	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.
16795	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.

~~their relative insolubility in water made their presence in the groundwater down-canyon from TA-18 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-18 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-18 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-18 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.**

- **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.

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 (EPA 1994, 1206). 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-18 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~~

Table 4-73a is added as follows:

TABLE 4-73a
SUMMARY OF DATA QA/QC PROBLEMS FOR PRS 13-010(f)

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
20461	AA85252 AA85253	13-1783 13-1783	Blind QC	Aluminum Chromium	UJ or J	Blind QC sample recovery below the [illegible] lower limit of 75%.

See Section 3.1.5.1 a description of the data qualifier.

PRS 19-019(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 4-69 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
18824	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

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.

Section 4.6.4.3.1 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.**

- ~~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**

TABLE 4-46a

SUMMARY OF DATA USABILITY PROBLEMS FOR PRS 18-010(d)

Request No.	Sample No.	Location No.	Sample Type	Analytes	Qualifier*	Comments
20313	AA65233 AA65234	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 for a description of the data qualifiers.

[illegible] analytes met the criteria for inclusion in a MCA. The sum of their maximum normalized concentrations was 0.0183, so none of these analytes were retained as COPCs.

Four carcinogenic analytes met the criteria for inclusion in a MCA. The sum of their maximum normalized concentrations was 1.3838. The normalized concentrations of these analytes totaled 1.3871 for sample AAB5233 and 0.0015 for sample AAB5234. Benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene constituted at least 0.3 to at least one sample sum, so these analytes were retained as COPCs.

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).

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

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.

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. 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**

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

DATE: 8-17-94
AUTHOR: V. HESCH
WEATHER: CLEAR/HOT, HIGH CLOUDS
PERSONNEL:
P. GRAM - ALT - FTL
V. HESCH - FTL
C. ABEYTA - SAMPLE DOCUMENTOR
N. NESS - COMPUTOR SUPPORT
B. STAUB - SSO
J. TAYLOR - RST
J. BINGHAM - SAMPLER
D. CORDI - PHOTOGRAPHER
B. TRUJILLO - SAmt DOCUMENTOR
TEXT: SET-UP CRZ & EXCLUSION ZONES AT 0950 hrs AT LOCALE 1640. SAMPLES TAKEN TODAY WILL BE FOR ANALYTICAL RESULTS.

TAIL GATE MTG FROM 0952 hrs TO PPE MODIFIED D-4, TASK-6
AT THIS LOCALE (1640) WE WILL TAKE 4 GRABS FOR ONE SAMPLE AT 1640, 41, 42 & 43 I.D. #s. SAMPLING COMMENCES AT 1005 hrs. FINISHED AT 1019 hrs. COMMENCED DECON OF SAMPLES AT 1036 hrs. FINISHED AT 1050.
MOVED TO LOCAL 1610 WILL SAMPLE AT I.D. #s 1610, 1611, 1613 & 1616. COMMENCED SAMPLING AT 1140 FINISHED AT 1152 hrs. STARTED DECONING SAMPLES AT 1205 hrs.

SIGNATURE: Victor Hesch

DATE: 8-15-94
AUTHOR: V. HESCH

TEXT:

AT 0930 CHRISTY ABEYTA AND V. HESCH ORGANIZED THE CHAIN OF CUSTODY FORMS FOR SAMPLES: AAB4853-60, AAB4863-70, AAB4872-79, AAB4881-88, AAB4890-97, AAB4899-4906, AAB4908-15, AAB4917-24, AAB4926-33, AAB4936-43, AAB4945-52.

THE PINK COPIES WERE RETAINED BY FTL V. HESCH, THE YELLOW & WHITE COPIES WERE DELIVERED TO CST-9. CST-9 WILL FILE THE WHITE COPIES & DELIVER THE YELLOW COPIES TO THE RECORDS PROCESSING FACILITY (RPF).

DATE: 8-16-94
AUTHOR: V. HESCH

AT 1300 hrs V. HESCH & CRISTY ABEYTA WILL RETURN SPENT SAMPLE TO LOCALES 1300, 1310, 1320, 1330, 1340, 1350, 1360, 1370, 1380, 1390 AND 1700. ALL ARE WITHIN TA-18, KIVA 1 AREA. ALSO WILL RETURN SPENT SAMPLES TO TA-18 FOR 18-011 (GENERATOR BLDG).

SIGNATURE: [signature]

DATE: 8-2-94

AUTHOR: V. HESCH

LOCATION: TA-18, KIVA 1

LOCALES: 1300, 1700, 1390

WEATHER: CLEAR/COOL, SOME CLOUDES

PERSONNEL:

K. MCFADDEN - SSO
J. TAYLOR - RCT
P. GRAM - ALT - FTL
V. HESCH - FTL
N. NESS - SUPPORT
B. TRUJILLO - SAMPLER
C. ABEYTA - SUPPORT
J. BINGHAM - DOCUMENTOR
D. CORDI - SUPPORT

TEXT: SET-UP CRZ & EXCLUSION ZONES AT 0900 hrs. CONDUCTED TAIL-GATE MEETING FROM 0928 TO 0935 hrs. ALCONOX USED, TASK 6, LEVEL D-4 PPE COMMENCED SAMPLING LOCALE 1700 AT 0944 hrs. FINISHED AT 1025.

COMMENCED SAMPLING AT LOCALE 1390 AT 1030 hrs, FINISHED AT 1101 hrs.

P. GRAM LEFT SAMPLING AREA & SITE AT 1055 hrs.

SIGNATURE: [illegible]

DATE: 8-1-94

AUTHOR: V. HESCH

WEATHER: CLEAR/COOL, SOME CLOUDS

LOCATION: TA-18, KIVA 1 18-002(a)
LOCALES: 1340, 1350, 1370 & 1380

PERSONEL:

P. GRAM - ALT - FTL - SAMPLER
D. CORDI - SUPPORT
C. ABEYTA - SUPPORT - DOCUMENTOR
V. HESCH - FTL
K. MCFADDEN - SSO
J. TAYLOR - RCT
N. NESS - DOCUMENTOR
J. BINGHAM - SAMPLER

TEXT: SET-UP CRZ & EXCLUSION ZONE AT 0950. TAIL GATE MEETING TOOK PLACE FROM 1050 TO 1101. CHEMICALS MENTIONED WERE JUST ALCONOX. TASK 6, PPE IS LEVEL D-4. VISITORS (GEORGE MARINO & WENDELL SALAS LOGGED IN AT 1040 AND LOGGED OUT AT 1105).

SAMPLED LOCALE 1340 FROM 1110 TO 1150hrs

SAMPLED LOCALE 1350 FROM 1155 TO 1232 hrs.

SIGNATURE: [signature]

DATE: 2-27-94

AUTHOR: V. HESCH

WEATHER: CLEAR/WARM

LOCATION: TA-27 LOCALE 1510

PERSONNEL:
K. MCFADDEN - SSO
D. CORDI - SUPPORT
B. TRUJILLO - DOCUMENTOR
C. ABEYTA - SUPPORT
J. BINGHAM - SAMPLER
P. GRAM - ALT - FTL
V. HESCH - FTL
N. NESS - SUPPORT
J. TAYLOR - RCT

TEXT: SET-UP CRZ & EXCLUSION ZONES AT 0915 hrs. TAILGATE MTG. TOOK PLACE FROM 1030 TO 1035. TODAY WE ARE TAKING ANALYTICAL SAMPLES USING THE HAND BUCKET AUGER. HAZARDS: HEAT STRESS, SNAKES, BUGS etc. PPE LEVEL D-4, TASK 6 OPERATION. SAMPLING TEAM ENTER 1039 hrs TO SUIT-UP FOR SAMPLING. TEAM LEFT FOR EXCLUSION ZONE AT 1058 TO START SAMPLING. RETURNED TO CRZ AT 1120 hrs. TO COMMENCE RAD SCREENING AND DECONNING EQUIPMENT AND PERSONNEL. BROKE FOR LUNCH 1130-1230.

SIGNATURE: [signature]

TOP OF H_2O TO TOP OF PVC IS 9 FT
DEPTH OF H_2O IS 10.2

1.2 x .68 = .82 gal

PARTIAL SAMPLE 1251 hrs

TEMP = 63°F
PH = 6.8
CONDUCTIVITY = 340 µS

CREW ENTERED CRZ AT 1340 TO START SWIPING EQUIPMENT AND MONITORING EQUIP.

BROKE DOWN EXCLUSION ZONE AT 1355 hrs

ARRIVED AT PCO-3 AT 1430 hrs. INSPECTED WATER LEVEL AND FOUND WELL TO BE DRY. WE ARE UNABLE TO SAMPLE AT THIS LOCATION. LEFT PCO-3 AREA AT 1440.

ARRIVED AT FIELD OFFIC AT 1445 AND PROCEEDED TO PACKAGE & LABEL SAMPLES FOR SHIPMENT TO RAD VAN.

NOTE: WE HAVE DATA FOR 1510, 1590, 1610, 1640

SIGNATURE: [illegible]

DATE: 7/26/94

AUTHOR: V. HESCH

WEATHER: CLEAR/PLEASANT

PERSONNEL:
J. BINGHAM - SAMPLER
C. ABEYTA - SUPPORT
BERT TRUJILLO - DOCUMENTER
V. HESCH - FTL
N. NESS - DOCUMENTATION SUPPORT
J. TAYLOR - RCT
K. MCFADDEN - SSO
P. GRALI - ALT FTL
DICK CORDI - SUPPORT

TEXT: STARTED SETTING-UP CRZ, EXCLUSION & SUPPORT ZONES AT 0830 hrs. THE SAMPLING LOCATION IS PCO 1. TAIL GATE MTG TOOK PLACE AT 0952 hrs TILL
CHEMICALS TO BE USED WILL BE ALCONOX & HCL AS PRESERVATIVES.
PPE LEVEL D-2, TASK NO. 1

VH ~~3.61~~ .6X g/FT OF DEPTH, DEPTH = 1.7 ft FROM TOP

1ST VOL DEPTH OF WELL 13.0
13.0 - 1.7 = 11.3 X ~~7.61~~ .68 VH = ~~23.73~~ 7.68 VH g = V

1013 hrs PH = 6.5
CONDUCTIVITY = 280 µS
TEMP = 63° F

SIGNATURE: [signature]

DATE: 7/21/94

CST-9 MOBILE LABORATORY
METALS BY XRF
SCREENING RESULTS

Customer: Merlin Wheeler
Sample Number: SOIL BLANK

Element	Concentration	Detection Limit	Units
K	3.58	0.01	Percent
CA	0.49	0.01	Percent
TI	1006	30	PPM
CR	39	12	PPM
MN	258	16	PPM
FE	1.06	0.001	Percent
NI	<13	13	PPM
CU	<8	8	PPM
ZN	30	5	PPM
AS	<4	4	PPM
SE	<4	4	PPM
CD	<3	3	PPM
SB	<4	4	PPM
BA	219	10	PPM
HG	<5	5	PPM
PB	17	7	PPM
U	<8	8	PPM
TH	17	8	PPM

TEXT: TODAY V. HESCH C. ABEYTA SEGREGATED SPENT SOIL SAMPLES PER LOCALE. ANALYSIS REVIEW WAS DONE BY V. HESCH USING THE SOIL BLANK ANALYSIS (ABOVE) AS A BASELINE.

SIGNATURE: Victor Hesch

DATE: 7-18-94

AUTHOR: V. HESCH

TEXT:

TODAY D. CORDI, C. ABEYTA AND MYSELF (V. HESCH) MADE PREPARATIONS TO RETURN SPENT SOIL SAMPLES (SAMPLES REVIEWED BY BOTH THE RAD & CHEM VANS OF CST-9. WHILE CORDI & ABEYTA SEGREGATED THE SAMPLES INTO LOCALE LOCATIONS, I SPENT TIME REVIEWING THE ANALYTICAL RESULTS FROM THE RAD & CHEM VANS. I DID NOT SEE INDICATIONS OF HIGH LEVELS OF RAD., HE OR HEAVY METALS CONCENTRATIONS. MOST OF WHAT I SAW WAS AT BACKGROUND OR BELOW LEVELS. THE SAMPLES RETURNED WERE ANALYZED FOR RAD., HE, AND METALS. SAMPLES RETURNED WERE AS FOLLOWS:

LOCALE	(AAB) LOCATION #'s	TA
1510	AAB 5062 TO 5069	27
1520	AAB 5072 TO 5079	27
1530	AAB 5081 TO 5088	27
1540	AAB 5091 TO 5098	27
1550	AAB 5100 TO 5107	27
1560	AAB 5110 TO 5117	27
1570	AAB 5119 TO 5126	27
1580	AAB 5128 TO 5135	27
1590	AAB 5137 TO 5144	27
1610	AAB 5156 TO 5163	27
1620	AAB 5165 TO 5172	27

CON'T NEXT PAGE

SIGNATURE: [illegible]

1051 DATE: 7-15-94

AUTHOR: V. HESCH

WEATHER: CLEAR/COOL/SOME CLOUDS

LOCATION: TA-18, PRS 18-011

PERSONNEL:
J. BINGHAM - SAMPLER
C. ABEYTA - SAMPLE COORDINATOR
D. CORDI - SUPPORT
J. TAYLOR - RCT
P. GRAM - ALT - FTL - SAMPLER
V. HESCH - FTL
M. HENKE - EQUIPMENT (HEAVY) DECON
D. RICE - BACKHOE OPERATOR
N. NESS -
B. TRUJILLO -

TEXT: WE WILL BE SAMPLING FOR MERCURY AT OLD GENERATOR PAD 18-011
PPE LEVEL D-5, TASK-10. ONLY CHEMICAL OF CONCERN IS ALCONOX USED FOR DECONNING.

MANY UNDERGROUND UTILITIES ARE AROUND THE DIG AREA. US WEST & LEROY VIGIL OF JCI - UTILITIES CAME OUT TO IDENTIFY LOCATIONS FOR US. TAILGATE MTG TOOK PLACE AT 10:51. PEOPLE ENTERED CRZ TO SUIT-UP FOR SAMPLING AT 11:06. KEN, PETER, JEFF ENTERED EXCLUSION ZONE AT 11:15 FOR SAMPLING. SAMPLED TILL 12:08. TOOK LUNCH BREAK FROM 12:08 TO 1308

SIGNATURE: Vincent Hesch

DATE: 7-13-94

AUTHOR: V. HESCH

TEMP: COOL WEATHER: CLEAR

LOCATION: TA-18, KIVA 1, MW-4

PERSONNEL:
J. BINGHAM - SAMPLER
B. TRUJILLO - SAMPLER
N. NESS - DOCUM
K. MCFADDEN - SSO
V. HESCH - FTL
P. GRAM - ALT-FTL
C. ABEYTA - SAMPLE COORDINATOR
D. CORNI - SUPPORT
J. TAYLAR - RCT
M. HENICE - OBSERVER

TEXT:
TAIL GATE MTG TOOK PLACE FROM 8:15 TO 8:25. WE WILL BE SAMPLING MW-4 AT KIVA 1. CHEMICALS USED WILL BE ALCONOX, HCL, HNO_3 & H_2SO_4. PPE USED WILL BE D-2 & TASK LEVE 1. TEAM ENTERED CRZ TO SUIT-UP TO SAMPLE. ENTERED EXCLUSION ZONE TO SAMPLE AT 8:30, OPENED WELL AT 8:33. G. MARINO VISTIS US FROM 8:35 TO

MW-4 TOP TO H_2O = 13.5 TOTAL DEPTH = 25.7
V = 25.7 - 13.5 X .19 = 2.318 gal

1ST VOL
TEMP = 57°F
CONDUCTIVITY = 130 µS
PH = 6.7
SIGNATURE: [signature]

MW-2 CONTINUED

TEMP = ~~65°F~~ 55°F
3RD VOL CONDUCTIVITY = 130 µS
PH = 7.5

SAMPLE @ 1400 hrs

TEMP = 55°F
CONDUCTIVITY = 120 µS
PH = 7.7

MW-3

TOP TO H_2O 14.4
DEPTH 23.3

V = 23.3 − 14.4 X .19 = 1.69 gal

1ST VOL { TEMP = 55°F
CONDUCTIVITY = 120 µS
PH = 7.3

2nd VOL { TEMP = 55°F
CONDUCTIVITY = 120 µS
PH = 7.3

3rd Vol { TEMP = ~~7.4~~ 55°F
CONDUCTIVITY = 110 µS
PH = 7.4

SIGNATURES: [illegible]

[redacted]

DATE: 7-12-93

AUTHOR: V. HESCH

LOCATION: TA-18 KIVA 1, MW's 1, 2, 3 & 4

PERSONNEL:
J. BINGHAM - SUPPORT SAMPLER
K. MCFADDEN - SSO
P. GRAM - ALT - FTL - SAMPLER
N. NESS - DOCUMENTOR
J. TAYLOR - RCT
D. CORDI - SUPPORT FOR SET-UP
C. ABEYTA - SAMPLE COORDINATOR
V. HESCH - FTL

TEXT:
SET-UP CRZ, EXCLUSION & SUPPORT ZONE AT 9:45. FINISHED AT 10:00. PREPARED SAMPLING EQUIPMENT FROM 10:00 TO 10:30 MOVED OUT OF AREA FROM 10:30 TO 10:40 DUE TO WORKERS OPENING DOORS AT URANIUM SOLUTION REACTOR (SHIVA). TAILGATE MTG TOOK PLACE AT 10:45 TO 10:52. CHEMICALS ALCONOX, HCL, HNO_3 & H_2SO_4 ACIDS WILL BE USED. LEVEL D-2 CLOTHING WILL BE USED - TASK 1.
TODAY WE WILL SAMPLE MW's 1, 2, 3 & 4.
MEASUREMENTS:
FROM TOP TO WATE 12.8' TOTAL DEPTH 25.4'
VOL = 25.4 - 12.8' x .19 = 2.394 gal
MW - 1 @ 11:05
1ST VOL
TEMP = 56 °F
CONDUCTIVITY = 120 µS
PH = 6.4

SIGNATURE: [signature]

MW-6

1ST WELL VOL
TEMP = 60° F
CONDUCTIVITY = 140 µS
PH = 7.1

2nd WELL VOL
TEMP = 59°F
CONDUCTIVITY = 150 µS
PH = 7.5

3rd WELL VOL
TEMP = 57°F
CONDUCTIVITY = 150 µS
PH = 7.1

SAMPLE TAKEN AT 1535 (SAMPLE # 9562)
TRIP BLANK

SAMPLE TAKEN AT 1547 (SAMPLE # 9561)

STARTED BREAK DOWN OF SUPPORT ZONE AT 1548.

WENT TO FIELD OFFICE TO LABLE AND PREPARE SAMPLES FOR SHIPMENT TO RAD VAN

PH = 7.1
CONDUCTIVITY = 180 µS
TEMP = 58°F

SIGNATURE: [illegible]

MW-5

INITIAL WELL VOL
TEMP OF WATER = 65°F
CONDUTIVITY OF WATER = 130 µS
PH OF WATER = 7.0

2nd WELL VOL
PH OF H_2O = 7.6
CONDUCTIVITY OF H_2O = 130 µS
TEMP OF H_2O = 62°F

3rd WELL VOL
PH OF H_2O = 7.2
CONDUCTIVITY OF H_2O = 140 µS
TEMP OF H_2O = 60°F

SAMPLE TAKEN AT 1437 (SAMPLE # 9560)

40 ml - TPH (glass)
40 ml - TPH (glass)
1 l - mod VOC (glass)
500 ml - VOC'S (poly)

FINISHED SAMPLING AT 1454.

STARTED SAMPLING MW-6 AT 1515 hrs

TOTAL DEPTH = 25.3'
WATER 8.9' FROM TOP
TOTAL VOL OF H_2O = (25.3' - 8.9') x .19 = 3.116 gal

SIGNATURE: Vertis Hersch
LH ~~25.3~~ 8.9

SAMPLING TEAM RETURNED TO CRZ AT 9:57 FROM SAMPLING LOCALE 1620. TEAM ENTERED EXCLUSION ZONE TO SAMPLE LOCALE 1630 AT 10:05. ENTERED CRZ FROM SAMPLING LOCALE 1630 AT 10:25

1620 - VOL OF ½ AGGREGATE OR LARGER = 0%
1630 - " " " " " " = 20%

MONITORED SAMPLING TEAM AT 10:26

STARTED DECONING SAMPLE EQUIPMENT AT 10:30.

STARTED BREAK-DOWN OF SUPPORT ZONE AT 10:50 ALSO CRZ, FINISHED A 11:15. MOVED TO LOCALE 1580 & 1570. STARTED SETTING-UP CRZ & SUPPORT ZONE AT 11:50 FINISHE AT 12:10. BRAKE FOR LUNCH. ENTERED CRZ TO SUIT-UP FOR SAMPLING AT 1~~2~~:40. TEAM ENTERED EXCLUSION ZONE AT 12:51 TO SAMPLE LOCALE 1580., FINISHED AT 1305 hrs. WENT TO SAMPLE 1570 AT 1315hrs., FINISHED AT 1330 hrs., ENTER CRZ FOR MONITORING & DECONING. STARTED SHIPPING SAMPLS & DECONING SAMPLING EQUIPMENT AT 1340 hrs. STARTED BREAKING DOWN SUPPORT ZONE AT 1346 hrs. WENT TO FIELD OFFIC TO LABLE & PACKAGE SAMPLES FOR SHIPMENT TO RAD VAN.

SIGNATURE: [illegible]

ENTERED CRZ AT 11:30 TO SUIT-UP FOR SAMPLING. ENTERED EXCLUSION ZONE AT 11:45 TO SAMPLE 18-010 (b)

PERSONNEL:

V. HESCH - FTL
P. GRAM - ALT-FTL
C. ABEYTA - SUPPORT
N. NESS - SUPPORT
K. MCFADDEN - SSO
J. TAYLOR - RCT
J. BINGHAM - SAMPLER
B. TRUJILLO - DOCUMENTOR

FINISHED 18-010 (b) AT 12:15, STARTED SAMPLING 18-012 (b) AT 12:20 AND FINISHED AT 1300 hrs SAMPLING CREW BROKE FROM 1300 hrs TO 1315 hrs. WENT TO SAMPLE 18-010 (c) AT 1317 hrs. FINISHED AT 1340 hrs. STARTED DECONING PERSONNEL AT 1341, STARTED SAMPLE SWIPPING AT 1345, FINISHED AT 1355. MONITORED TEAM MEMBERS FROM 1355 TO 1357. SWIPED TEAM MEMBERS 1357 TO 1359. P. GRAM LEFT FOR FIELD OFFICE TO TRY TO FIX OR RECALL DATA LOST IN COMPUTER. TIME WAS 1408. TEAM STARTED DECONING SAMPLES AT 1405, FINISHED AT 1420. STARTED DECONING SAMPLE UTENSILS AT 1420, FINISHED AT 1445. STARTED BREAK DOWN A 1445. WENT TO FIELD OFFICE ~~FOR LABLE AND SHIP~~ KH TO LABLE & PACKAGE SAMPLES FOR SHIPMENT ~~OF~~ KH TO RAD VAN.

SIGNATURE: [illegible]

THIS IS EAST OF 18-010(b). BREAKS WILL BE TAKEN AT 60 MIN INTERVALS DUE TO TEMP ABOVE 90°F

NOTE: CALL SMITHOUR OR MOHR AT READY BACKHOE OPERATOR TO EXCAVATE FOR 18-011 (GENERATOR BLDG.) FOR FIRST OR SECOND WEEK OF July.

SAMPLING TEAM FINISHED SAMPLING AT 11:35 ENTERED CRZ TO BEGIN SWIPES AND DECON FINISHED AT 12:00, BROKE FOR LUNCH. STARTED TO RELOCATE TO 18-012(2) AT 12:20 FINISHED AT 12:50. ENTERED CRZ TO SUIT-UP FOR SAMPLING. WE WILL TAKE 4 SAMPLES AT THIS LOCALE. STARTED SAMPLING AT 1320 FINISHED SAMPLING AT 1345. SWIPING SAMPLES AT 1350, FINISHED AT ~~1405~~ 1405, STARTED DECONING SAMPLE EQUIPMENT. DECONED SAMPLES FROM 1350 TO 1405. BROKE DOWN ZONES AT 1410.

SIGNATURE: [illegible]

WE DID NOT DO 18-003(e). WE LEFT
CRZ & SUPPORT ZONES SET-UP FOR
TOMMROW 6-30-94 WE PLAN TO DO
18-003(e), 18-012(a), 18-012(b), 18-010(a) &
18-010(b). WE LEFT AREA FOR FIELD TRAILER
AT 1500 hrs. FROM 1330 TILL 1500hrs COLLECTED
SAMPLES WERE SWIPED AND SAMPLE CONTAINERS
AND COLLECTION EQUIPMENT WERE DECONTAMINATED
SAMPLE CONTAINERS WERE LABELED AND
PACKED FROM

CRMA [illegible]

BEGAN BREAKING DOWN THE COMMAND POST AT 11:30, THE CRZ & EXCLUSION AT 11:45. VACATED THE AREA AT 12:00. RECORDED SOME "HITS" WITH THE P.I.D. AT LOCALE 1540. 1.8 ppm OF ORGANICS.

SIGNATURE: [illegible]

NOTE: GET CONTROL NO.S FOR
LOG BOOKS.
COMPLETED SAMPLING LOCALE 1330 @
1435. STARTED SWIPING SAMPLE & TOOLS
@ 14:45, FINISHED @ 1450. STARTED
DECONING SAMPLING TOOLS @ 1450. STARTED
SWIPING SAMPLES @ 1450

WE HAD HOPED TO COMPLETE SAMPLING
AT LOCALES 1330 & 1320. DAY GOT TOO
HOT SO WE STOPPED SAMPLING AFTER
LOCALE 1330. (DID NOT DO 1320)
AT 1450 hrs SAMPLE SWIPES WERE TAKEN
AT 1500 hrs DECONNING OF PERSONNEL
COMMENCED: K. MCFADDEN, B. TRUJILLO, &
J. TAYLOR. SAMPLES WERE DECONED AT
1515 - 1530 hrs. BREAK-DOWN OF SUPPORT
ZONE WAS COMPLETED @ 1515 hrs., &
CRZ BY 1545 hrs.
LABELING & PACKAGING OF SAMPLES
WERE DONE AT THE FIELD OFFIC.
SOIL SAMPLES WERE TAKEN TO RAD
VAN

STARTED TAKING SAMPLE SWIPES
AT 12:13 HTSL, FINISHED @ 12:30
J. BINGHAM LEFT CRZ @ 12:15
K. MCFADDEN " " @ 12:19
B. TRUJILLO " " @ 12:20
J. TAYLOR " " @ 12:30
P. GRAM " " @ 12:45
STARTED DECONING SAMPLE EQUIPMENT @ 12:2
410 FINISHED 12:35
STARTED BREAK-DOWN OF AREA AT 12:45

SIGNATURE: [illegible]

[redacted]

AT 1040 TWO VISITORS VISITED THE COMMAND POST. THEY WERE GEORGE MARINO & WENDELL SALAS, BOTH OF ESH-5. THE CREW FINISHED SAMPLING LOCALE 1600 @ 10:45, ENTERED CRZ @ 10:55. CREW LEFT TO SAMPLE LOCALE 1510 @ 11:00. ENTERED EXCLUSION ZONE 11:00. FINISHED SAMPLING LOCALE 1510 @ 11:2 STARTED SAMPLING LOCALE ~~1~~ 1520 @ 11:55 FINISHED @ 12:46. STARTED DECONING PERSONNE & EQUIPMENT @ 12:35. BROKE DOWN FOR THE DAY @ 12:45.

V. HESCH, C. AREYTA & D. CORDI & P. GRAIN PACKAGED & LABELED SAMPLE JARS FRO. 1:30 TO 2:30. V. HESCH & D. CORDI DELIVERE TO RAD VAN.

NOTE: V. HESCH, D. CORDI & C. AREYTA RETURNED SPENT SOIL SAMPLES BACK TO LOCALES 1640, 1580, 1590, 1610, 1620 & 1630 THE SOIL RETURNED TO THESE LOCALES HAVE BEEN CLEARED THRU RAD & CAM VANS. NO HITS. SOME READINGS FROM RAD SLIGHTLY ABOVE BACKGROUND. REFER TO SCREENING RESULTS FOR LEVELS.

SIGNATURE: [signature]

[redacted]

NOTE:

LOCALES SAMPLED TO DATE: 6-20-94 ARE: 1630, 1620, 1530, 1540, 1550, 1460, 1450, 1590, 1610, 1640, 1580, 1570, 1560. NEED TO DO 1520, 1510 & 1600.

ON 6-21-94 WE DID 1510, 1520 & 1600. THIS COMPLETES RAD & CHEM SURVEYS FOR MOBILE UNITES AT ALL LOCALES AT TA-27.

SIGNATURE: [illegible]

BEGAN SWIPING SAMPLES FOR LOCALES 1580 & 1570 @ 1335
START BREAKDOWN OF EXCLUSION ZONE AT 1345.
FINISHED SWIPING SAMPLES @ 1350. STARTED DECONING SAMPLES @ 1400
K. MCFADDEN EXITED CRZ @ 1335, J. TAYLOR EXITED CRZ @ 1350. N. NESS, P. GRAM EXITED CRZ @ 1400. STARTED BREAK DOWN FOR THE DAY. HE SPOT TESTING REVEALED NO POSITIVE HE. WE DID NOT DO LOCALE 1560. RAN OUT OF TIME. COMMUTERS TO ABQ NEEDED TO LEAVE BY 1445 hrs.

SIGNATURE: [illegible]

ENTERED CRZ FOR SAMPLE SWIPING
AND DECON PROCEEDURES OF PERSONNEL.
D. GRAN EXITED THE CRZ @ 1435
N. NESS ENTERED CRZ @ 1440. SAMPLING
1640 @ LOCALE ~~1440~~ BEGAN @ 1450 hrs. SAMPLING CREW
ENTERED CRZ @ 1533
SAMPLING FOR LOCALE ~~14~~ 1640 @ 1526 hrs.
BEGAN SWIPING SPIKES AT 1535.
K. MCFADDEN EXITED CRZ @ 1550.
BEGAN DECONING SAMPLES @ 1555.
J. TAYLOR EXITED CRZ @ 1605.

NOTE: HE SPOT TESTS WERE TAKEN AT LOCALES 1590, 1610 & 1640. NO POSITIVE RESULTS WERE NOTICIBLE

SIGNATURE: [illegible]

[redacted]

SCULPING SAMPLES COMMENCED AT 16[illegible]
SAMPLE CREW EXITED CRZ AT 1642
COMMENCED DECONING SAMPLES AT 1642
BROKE DOWN WORK AREA 1700.

SIGNATURE: [illegible]

[redacted]

AT 1615 RALPH VIGIL & M. MARTINEZ OF ESA-2 ARRIVED AT THE BAZOOKA IMPACT AREA TO PICK-UP SAMPLES 5200 & 5197 FOR TRANSPORT TO DX-16 FOR ANALYTICAL ANALYSIS FOR HE. VICTOR HESH TURNED OVER SAMPLES AND COC'S TO RALPH VIGIL.

SIGNATURE: Victor Hesch

6/19/99

SAMPLES PER DRS 27-003 AND SRTS ID #s

AAB #	SRTS ID #
AAB5794	1692
AAB5795	1693
AAB5796	1694
AAB5797	1695
AAB5798	1696
AAB 5799	1697
AAB5200 (DUP OF 5799)	1697

1138 TEMP: 86°F - SUNNY, BREEZY

1140	AAB 5794	COLLECTED
1152	AAB 5795	COLLECTED
1200	AAB 5796	COLLECTED
1210	AAB 5797	COLLECTED
1220	AAB 5798	COLLECTED
1230	AAB 5799	COLLECTED
1235	AAB 5200	COLLECTED

SIGNATURE: [illegible] M. Gram

[redacted]

14

DATE: 06/14/1994 TIME: 0900 WEATHER: CLEAR, HOT

0900 ARRIVE AT TA-18/27 FIELD TRAILER - BEGIN TO UNPACK AND PREPARE FOR DRUM SAMPLING - WE WILL BEGIN WITH THE BAZOOKA IMPACT AREA - WE WILL MARK SAMPLING LOCATIONS IN QUADRANTS JUST OFF THE BAZOOKA IMPACT AREA AND COLLECT 6 ANALYTICAL SAMPLES - ~~DOUBLE~~

- TODAY'S TEAM CONSISTS OF PETER GRAM - FIL (ICF KE) KEN MCFADDEN - SSO (MK), JEFF BURGHAM (SAMPLING TECH) - AND BOB TRUJILLO (SAMPLING TECH) - AND JOHN TAYLOR - RCT (BDI) -

KEN AND JOHN HAVE ALREADY CALIBRATED THERE INSTRUMENTS -

0940 - KEN CONDUCTS H&S TAILGATE MEETING -

0955 - TAILGATE MEETING COMPLETE - WE DEPART TRAILER FOR THE BAZOOKA IMPACT AREA

1135 - SITE SET UP IS COMPLETE - WE WILL NOW SAMPLE THE BAZOOKA IMPACT AREA -

1136 - CHRISTE ABEYTA AND DICK CORDE ARRIVE AT SITE

SIGNATURE: Peter S. M. Gram

[redacted]

CRISTY ABEYTA RETURNED TO WORK SITE ~~AT~~ AT 11:00. P. GRAM ENTERED CRZ AT 10:09 TO BEGIN DECON OF EQUIPMENT.

THE SAMPLING CREW FINISHED SAMPLING AT LOCALE 1540 @ 11:32.

BROKE FOR LUNCH AT 12:00. PICKED-UP WENT BACK TO WORK @ 1300, ENTERED CRZ FOR DECON @ 1300.

SAMPLING CREW BEGAN SAMPLING AT LOCALE 1550 @ 1330.

SITE VISITORS CAME @ 1430, WENDELL SALAS, GEORGE MARINO & JOHN ELLIOTT FROM ESA-S. JOHN & WENDELL LEFT @ 2:45.
STARTED DECON OPERATION 14:48
STARTED BREAKING DOWN EXCLUSION & CRZ AT 1500.

BROKE DOWN SAMPLE AREA @ 1515

SIGNATURE: Victor Vasek

[redacted]

KRISTY ABEYTA JOINED US AT 1215 WITH LABLES AND CHAIN OF CUSTODY FORMS.

STARTED SAMPLING locale 1620 AND ALSO ENTERED EXCLUSION ZONE AT 1420.

NOTE TO SELF: ON 6-10-94 WORK INSI FENCED AREA OF TA-36 BEFORE WORKIN OUTSIDE OF FENCE.

EXITING EXCLUSION ZONE & ENTERING CRZ AT 1520. (FINISHED SAMPLING 1620).
EXITED CRZ @ 1600

SIGNATURE: Victor Olesch

[redacted]

(D)

VICTOR HESCH
SURFACE SOIL SAMPLING FOR
OU 1093
GENE GOULD OU1093 PL

18-012(c)

30

10-14-93

THE OUTFALL WE WILL SAMPLE TODAY (18-012C) IS ASSOCIATED WITH TWO (2) SUMPS IN BLDG TA-18-141 WHICH CONTAINED ULTRASONIC CLEAN S USED TO CLEAN BERYLLIUM PARTS AND ALSO URANIUM & PLUTONIUM PARTS. ETHANOL 190 WAS THE PRIMARY SOLVENT USED IN THE CLEANING PROCESS. THE ETHANOL MAY HAVE SPILLED INTO THE DRAINS ASSOCIATED WITH THE SUMPS AND DISCHARGED FROM AN OUTFALL EAST OF BLDG. 141 INTO A DRAINAGE DITCH. THE BUILDING, TA-18-141 IS UNDERGOING MAJOR CHANGES, THE SUMPS WILL BE FILLED LEVEL WITH THE FLOOR WITH CONCRETE. THE SUMPS & OUTFALL HAVE NOT BEEN USED FOR SEVERAL YEARS.

AS NOTED THROUGH A CHANGE ~~LEVEL~~ ORDER TO THE SSHSP, LEVEL "D" CLOTHING WAS USED FOR THIS SAMPLING PROJECT. BY SPRAYING THE GENERAL AREA (SAMPLING) WITH DEIONIZED WATER TO KEEP DOWN AIRBORNE DIRT & OTHER PARTICULATES. TAILGATE MEETING WAS AT 0940 TIME ENTERED FOR RAD CHECK WAS 0953

to the SCF will have the Red Van container deleted, of course. CST-2 will have to decide ~~how~~ what to do with the Red Van chain of custody form once the sample is received. Each sample will therefore appear on 2 chain of custody forms, one of which (the Red Van one) will typically include several samples.

JM CKM 5/4/94

Aug. 5, 1994 Continued drilling hole TA-18-1086 from 10 ft depth previously drilled when a boulder was encountered. Boulder was finally penetrated and hole continued to 20 ft. This # is the last of the 3 background sampling wells west of Kiva 1. Well PVC screen was installed, well was surged and then bailed.

I talked at length with Kaiser Engineering Inc. employee Tad Tucker, who is heading a crew of utility surveyors checking the underground utilities at TA-18 to update utility drawings for the Lab's "As-Built" program. He works for David O'Flynn of Kaiser. I pointed out the area west of Building 18-30 where we will need to drill to sample the inactive septic system & chemical line manhole, and where the acid line from Bldg 30 once entered a collection tank pit, supposedly knocked down and buried years ago. I asked them to keep me informed of the utilities they find in this area, since no one has complete drawings of the various utilities, Kiva control circuits, etc. that are in the paved drive west of the bldg. I also called Mel Smithson of JCI Utilities to specify point where their drawings & equipment show lines to be.

C. R. Maynard

(8/2/94 contd)

Tyson Lansford sustained a minor puncture wound in the palm of his right hand (10AM). Since it was due to a rusted burr on the drill auger, I recommended he obtain a tetanus shot. Rad is below background & no organic vapor was detected at the 5-10 ft interval the auger was at when Tyson received the cut, and the area is not considered a Potential Release Site. Therefore the cut is considered non-contaminated. ~~However the boss for both report~~ Therefore he does not have to report to HS-2 (clinic) for evaluation, according to the Site Safety Officer 8/2/94 10AM

This borehole (TA-18-1063) is mostly in clay, so has much less water than 1060. Drilled to 32 ft. Both holes have PVC screen pipe in them to permit water sampling later.

1600 Moved drill rig across creek to begin hole TA-18-1066. Once in position, however, the engine couldn't be started due to what seems to be an electrical problem. The drill rig therefore had to be left in place. I okayed this with the PTLA Captain via cellular phone about 1715.

August 3, 1994 - The drillers worked on the rig in the morning, then began drilling hole TA-18-1066 after lunch. Samples were taken of soil from 0-5 ft and 5-10 ft deep, then the auger stopped on a rock. The hole was redrilled 2 ft west but the hole was not drilled straight, causing binding on the auger. The hole was redrilled again, but still hit a rock before groundwater was reached.

Tyson Lansford said he got a tetanus shot for his hand puncture.

C. R. Maynard

(7/25/94 contd.)

0930 - Set up at Kiva 2 to retake 16 surface soil screening samples for SVOC analysis. The CST-9 Chem Lab had done the missing analysis of the original samples (AAG ~~4475-4450 and 44~~ 4519-4524 and 4532-4541). The new sample numbers (one SVOC bottle for each) are AAG 4716-4731. The samples were taken at 10:30.

1300 - Set up at Kiva 1 settling pit TA-18-105. This is PRS 18-003(o). Two shallow boreholes will be drilled to 5 ft. The presence of an overhead powerline to adjacent building TA-18-168 (Sheba nuclear test reactor), a adjacent water line on the west side of the settling pit, and a septic sewer line on the east side of the settling pit necessitated sampling on the north (paved) side of the settling pit. The lid on the pit was raised to locate the inflow pipe so that the boreholes could be placed close to this pipe & avoid the adjacent utility pipes. The east borehole is location TA-18-1100 & the west one is TA-18-1101. Note: tank inside settling pit is full

Upon conferring with Merlin Wheeler it was decided to redrill the west hole to the south side of the settling pit in order to sample on both the inflow and outflow ~~upstream & downstream side~~ CRM 7/28/94 of the ~~pipe~~ settling pit. The sample will be collected from only the redrilled hole, which will retain location ID TA-18-1101

1400 - Took remaining groundwater sample at Kiva 1 drainfield, southwest borehole TA-18-1135.

C. R. Maynard

7/26/94

vapor reading on sample was 15 ppm.

In discussions with Merlin Wheeler, Field Team Manager, the issue of whether the sample contains infectious material was determined as follows: SOP 1.03 R1 Attachment C, section B, deals with shipping preparations for samples from inactive septic systems and lagoons. It appears to say that, because certain conditions are not favorable to human pathogens in inactive septic systems (assuming there is no source of new waste and new pathogens), such samples ~~cannot be~~ are not infectious. Merlin (who conducted a technical review for this SOP) concluded that the samples can be handled as other environmental samples are. CEM 7/26/94

The SOP can, however, be read differently, as was done by myself, the Field Team Leader, and Tyson Lanford, Deputy Field Team Leader, on our first reading of the SOP. Our initial reading was that, if conditions in the septic system are shown to be unfavorable for human pathogens, the Field Team Manager is permitted to conclude that the samples are not infectious. The SOP lists no criteria upon which to base the determination that conditions are unfavorable for human pathogens, such as what pH, what temperature, what O_2 level, which gases, etc. Since there are no ways given to make such measurements nor criteria to meet, we are forced to conclude our interpretation ~~was~~ of the SOP was incorrect and Merlin's is correct, particularly since he reviewed and signed the SOP. Despite the strong odor of excrement, the samples will be handled as noninfectious.

C. R. Mirand

July 21, 1994 - 0830 Began again to install a well casing in hole TA-18-1233. Hit a rock and bound auger. Took all morning to free auger & attempt to set well casing. Did not succeed, so will try again later. Moved to southeast corner of drainfield.

1220 Began drilling borehole TA-18-1234. Hit rocks at depth so moved hole 2 ft north. Drill rig had U-joint problems so drilling was suspended for repairs.

July 22, 1994 - Repairs were made on drill rig drive train but torque on auger may be low. 1000 - Sparks were seen in drill rig engine compartment so drilling was halted. Rig is overheating & torque is insufficient. Hydraulic pump was adjusted & drilling attempted again. Works better. 11:15 Hole (TA-18-1234) bottomed out at 23 ft. Groundwater at 12 ft. Temperature 81°F. Looks like a good well, plenty of water.

1335 - Move rig to hole TA-18-1233 to check for water in previously drilled hole. Water was present, so hole was flushed, then bailed. Due to approaching thunderstorm, work was concluded once drill rig was repositioned at location for next drillhole in northwest part of the drainfield.

July 25, 1994 Began drilling 0700 on hole in northwest corner of drainfield, borehole TA-18-1230. Took about 1 hr. to do the borehole. Moved next to center hole, TA-18-1231. Began drilling there at 12:40. 13:45 Began drilling northeast hole, TA-18-1232.

C. K. Maynard

July 13, 1994 - 11:45 Begin drilling at Kiva 2 septic tank (TA-18-42) outflow line, 2 ft south of line. This hole is location ID TA-18-1147. Hole 2 ft north of line is location TA-18-1146. Temperature 89°F.

12:30 Begin drilling north hole, TA-18-1146. Temperature 84°F, thunderheads looming overhead.

July 14, 1994 - Spent much of the morning tracking down results of the Rad Van & Chem Van screening of soil samples from the septic tanks & drainfields of the 3 Kivas at TA-18. Not all had been completed by the Chem Van and 16 samples for the screening locations at Kiva 2 had been analyzed for high explosive instead of SVOCs as requested. Therefore all 16 will need to be recollected (for SVOCs only).

Based on SVOCs (since the metals analysis had not yet been done on samples sent in June 20), six locations at the Kiva 3 septic tank & drainfield were chosen for complete analyses. They were collected between noon and 1:00 PM.

July 18, 1994 - 0930 Begin deepening borehole TA-18-1135 in southwest corner of Kiva 1 drainfield. A PVC wellscreen will be installed (that is, a well will be installed) in order to improve water flow sufficiently for sampling. Cloudy & cool today. Temperature 69°F, 60% chance of rain. Stopped drilling due to drilling carburetor & thermostat problems.

C. L. Merrill

July 6, 1994 - 10:30 Begin drilling first of 2 holes to groundwater at Kiva 1 drainfield, PRS 18-003(b). Hole is near southwest corner of drainfield, location TA-18-1135. Temperature 85°F, clear skies. Hit rocks at 7 ft deep after sampling first five feet. Hole moved 2 ft west, hit another boulder or cobble at 2½ ft. Noon. Temperature 86°F.

1315 - Temperature 90°F. Hole moved 2 ft east of first hole. Still unable to get complete core, so chose to use cuttings. However, insufficient material for a complete curation sample for 5-10 ft interval (Omitted metals analysis container). Since cuttings were used, VOC analyte may show little.

1600 - Insufficient water for sampling, so sample will be taken in the morning after the hole fills overnight.

July 7, 1994 - 1115 - Due to restriction on site access by uncleared personnel, the team was unable to begin work until late morning. This may delay taking water samples. Began drilling 11:30 at southeast corner of Kiva 1 drainfield, location TA-18-1136. Temperature 82°F. Hit a rock at about 8 ft. Used a center bit (nice hollow stem) to continue drilling to 25 ft. Groundwater was reached at 18 ft. Groundwater sample will be taken later.

C. R. Morris

and 4592, then broke for lunch prior to drilling second five-foot interval. Temperature 95°F at 12:15.

Resumed drilling at 1330. Temperature 91°F. Organic vapors at background on second depth interval (5-10 ft). Groundwater is at 6.2 ft below ground surface, hence no composite is needed for analysis of soil cuttings below ten feet (the lowest sample). 1515 - Temperature 101°F, however the temperature on the Questemp Area Heat Stress Monitor fluctuates 3° in 2 minutes. Due to slow flow rate in the borehole, it will be deepened to 15 ft in order to try to improve the flow rate. Groundwater sample will be taken tomorrow. Due to deepening of hole, a cuttings composite will be needed afterall.

~~June 31~~ July 1, 1994 - 1000 Begin packing hole (TA-18-1195) as auger is withdrawn from around drive point, which will be left in place. The groundwater sample will be taken Tuesday, July 5 due to holding-time restrictions and the likelihood the sample would not get shipped prior to the holiday weekend. Cuttings composite sampled from previous day's drilling, kept ~~in a stainless steel bowl~~ CRM 7/1/94 covered in a plastic bag overnight (not on ice).

July 5, 1994 - Borehole TA-18-1195 has some water in it from slow seepage of groundwater over the holiday weekend. It will be sampled. 10:30 Temperature 82°F. Sampling was not completed due to insufficient water for two one-liter bottles (general minerals

C. R. Memard

→ CRM 4/29/94

June 28 - Unable to have site access due to major audit of NIS-6 at TA-18, plus high temperature (upper 90's). Spent the morning loading equipment into the 12-passenger van.

June 28 - Begin drilling at Kiva 3 drainfield, 0940. Two drill holes will be done to 10 ft. to collect soil and groundwater. Water flowing in an adjacent creek is only about 3 ft. below ground surface. Temperature is 84°F. Surface beta/gamma 137 cpm on location TA-18-1196. For hole TA-18-1195, readings are 122 cpm. Hole 1196 is on the northeast corner of the drainfield and is the first being drilled. Hole 1195 is on the northwest corner.

Groundwater is at about 5 ft deep, so no cuttings have been generated to reach it below the lowest level of soil sampled. Therefore no analysis of cuttings is needed. Temperature 93°F at noon. Organic vapors at background. Beta/gamma readings of samples are below background. Break for lunch at 1300. Will take groundwater sample afterward.

1445 - Begin drive point work with drill rig. Temperature 99°F!! 1500 - Temperature ~~105~~ 101°F (may be a record high). Due to high temperature, the water sample will be taken tomorrow. The drive point will be left in the hole overnight.

CRM 4/29/94

June 29, 1994 - 9:45 Begin ~~sampling~~ bailing groundwater from hole TA-18-1196. Temperature 84°F. Filter paper will be needed to get clean water samples. Water sampling began 11:05. Quit 12:00. Rain after lunch, so no sampling w/rig.

C. L. Maynard

Samples are being taken using a stainless steel spoon, & soil is homogenized in a stainless steel bowl. Sampling began 1100 and was completed at 1215, for 16 samples

6/23/94 - 1000 Begin setup at Kiva 1 for surface soil screening samples at septic tank and drainfield. Temperature 76°F. 1030 Begin sampling. Beta/gamma readings range from ~~102~~ 118 - 148 cpm. Organic vapors at background (0.2 ppm) at septic tank. Sampling completed at 11:15. Background beta/gamma is 88 cpm. Sampling at drainfield began 11:25.

An audit team is present, consisting of Doug Pippen (ESA-4), Larry Souza (ER-PO), Cleovis Martinez (LATA ER), Tim Ickes (LATA - Los Alamos Technical Associates - ER), Bob Enz (DOE), Ed Essington (EES-15), Roger Ferenbaugh (EES-15).

Sampling at Kiva 1 drainfield was completed at 1200. Temperature 84°F. Beta/gamma of surface ranged from 102 to 136 cpm. Organic vapor was background.

Our 12-passenger van will be ready tomorrow.

C. R. Maynard

June 16, 1994 - No sampling today, though rad ~~screening~~ survey of surface radiation is planned for tomorrow in the septic drainfields in TA-18. CFM 6/16/94

CST-9 Sample Coordination Facility notified us that they had dropped & broken ~~the~~ five samples to be analyzed for high explosives. These ~~HE~~ sample numbers are AAB 2512, 2514, 2518, 2520, and 2522. All were in 125 ml glass bottles. HE sample bottles in the appropriate curation samples will be used to replace them. The curation samples are (for each of the broken samples) AAB 2513, 2515, 2519, & 2521. Curation sample 2523, the backup for 2522, was not taken due to insufficient material, so no replacement for the lost sample 2522 is available from curation. However, the Rad Van sample sent to the CST-9 Rad Van has some sample material remaining and will be repackaged for HE analysis. A new chain of custody form will be hand written transferring the Rad Van sample (a sealed polyethylene bag) back to me. I will repackage it in a 125 ml glass bottle and include it on a new chain of custody form (also hand written) transferring the 5 HE analysis samples directly to the SCF (since all have been directly or indirectly screened by the Rad Van).

I notified both the Rad Van (Chris McCombe) and Kyle Gay of the SCF of what I proposed doing. The SCF will, however, check on whether the HE analysis might be affected by either lack of refrigeration (the curation

C.F. Maynard

For TA-27-1059, Beta/gamma is 136 cpm., organic vapor is background (0.2), HE spot test is negative Temperature 86°F. Break for lunch at 12:50.

1:45 Begin drilling newly added hole TA-27-1045, hole E2 of Firing Pit 5. Temperature 89°F. Breeze from west. Beta/gamma on the surface 115 cpm. Organic vapor background HE spot test negative. Sampling completed 1500.

Merlin Wheeler, Field Team Manager 6/14/94

Set up at Firing Point C west of Firing 2, 0900 - 1000.

Drilling began with west borehole at 11:10
Location ID TA-18-1079
Background beta-gamma at surface 109 cpm
Background PID 0.2 ppm
0-12" Sample collected at 11:15
Beta-gamma 84 cpm
MCW ~~25-35"~~ 36-48 Sample collected at 11:25 Beta-gamma - 90 cpm
~~50~~ 46-60" Sample collected at 11:30 Beta-gamma 70 cpm
PID readings on all samples - 0.2 ppm
Log C.R. Maynard: HE spot test negative on all samples. CRM 6/14/94

1:30 Begin drilling center hole, TA-18-1075. Due to unavailability of 125 ml poly bottles, we are using 250 ml bottles for metals & U-Th
C.R. Maynard

drilling at this Firing Pit was as an observer only. No HE was found in the previous samples taken here, therefore it is believed safe to continue in his absence. Drilling will be ten feet away from the pit center in both cases. Three drillers are present: Dennis Ratliff, Peter (Randy) Valdez, and Donald Chavez, all of Stewart Brothers, Inc.

The safety standdown was called due to incidents occurring with other field teams, the issue of rattlesnakes and Gene Gould's desire for operations to be careful and done with deliberation.

Samples from the east hole have no organic vapors (background, i.e. 0.2 ppm). Beta/gamma is 112 cpm (background is 63 cpm). HE spot test on each sample was negative.

1305 - Begin drilling north hole, Firing Pit 1 (TA-27-1008). Temperature 80°F. HE spot test negative. Organic vapors background (0.2 ppm). Beta/Gamma 105 cpm on the surface.

George Marino, HSE-5, asked us to place "Slow" highway signs near each end of the trailer parking area to aid traffic safety. Based on concern expressed by Phil Romero of HSE-5 due to drilling that was done near road. For that work, "Slow" signs were placed 300 ft either side of working area, traffic cones were placed in a row 150 ft. up-traffic on lane nearest working area, and a row

July 8, 1994

Beta/gamma 98 cpm on surface. Negative HE spot test. Sample 0-12 in deep & its curation sample were obtained but subsurface boulder prevented obtaining other 2 samples from that borehole. Redrilled one ft. north of first hole. Will retain location ID no. (TA-27-1016) for both due to closeness of holes. Boulder is in the hole also. Again in hole 1 ft. south of first hole. Fourth try 2 ft. W. of first hole (from which 0-12 in. samples were taken) also has a boulder. Therefore only the surface sample & its curation sample were taken.

1600 - Attempt abandoned for the day.

~~July~~ June 9, 1994 - 11:45 Begin drilling at Firing Pit 4, at the north edge of Pajarito Road. Due to the center point (surveyed) of the firing pit being only 2 ft from the edge of the paving, the holes to be drilled are oriented 10 ft Northeast and 10 ft Northwest. This allows maximum distance from the highway while remaining in the firing pit (now buried). Beta/gamma reading is 108 cpm on the surface. Nearby utilities are a telephone cable 10 ft. north of both holes. No other utilities. Temperature 81°F.

11:50 First hole is the northwest hole, TA-27-1044. Beta/gamma is 108 cpm. Spencer Seppanen is substituting for Jennifer Pope. Tyson Lansford is present as is a 3rd driller from Stewart Bros., Donald Chavez. A second sampling team, led by Victor Hesch is nearby

was negative at each of 3 depths. Organic vapors were at background (0.2 ppm). Beta/Gamma 92 cpm on surface. Sampling completed 10:50. Move to east hole.

11:00 - begin drilling at east hole, Firing pit 3 (TA-27-1030). Beta/Gamma 110 cpm on surface. Temperature 82°F. Organic vapors at background levels. Neg. HE. Sampling completed at 11:40.

1330 - Drilling begins on center hole, Firing Pit 3 (TA-27-1029). Temperature 86°F. Organic vapors background. Beta/gamma at background (126 cpm). HE test ~~is~~ negative.

1405 - Drilling south hole, Firing Pit 3 (TA-27-1032). Beta/gamma 112 cpm. HE test negative. Temp. 87°F. Organic vapor background (0.2 ppm).

1540 - Drilling west hole, Firing Pit 3 (TA-27-1033). HE spot test neg, organic vapor 0.2 ppm, beta/gamma 96 cpm background. Temperature 88°F. Sampling completed 1645.

Wed. ~~July~~ June 8, 1994 - 10:30 starting to drill south hole at Firing Pit 1, TA-27. This Firing Pit lies within the TA-36 Firing area fence, so the crew has read & signed the TA-36 site specific Brief. Escort papers are on hand for uncleared members of the

June 3, 1994

1315 - Reentered exclusion zone. Drilling resumed on south hole, firing pit 2 (site ID TA-27-1015). Temperature 82°F, wind still from east, medium breeze (but mostly light). High thin overcast, sunny. No curation sample for 3rd sample depth (50-60) due to insufficient core material.

1445 - Drilling center hole, TA-27-1016, firing pit 2.

1530 - ~~Finish~~ Break. Resume sampling in center hole.

1615 - Finish sampling for the day. South hole and center hole sampling completed.

June 6, 1994 - Hole TA-27-1019 (location ID). Drilling began at 10:30. Air temperature 79°F. HE test on 0-18 in. interval is negative. Drilling is encountering subsurface cobbles occasionally. Heart rate monitoring is being done according to heat stress monitoring tables. A heat stress monitor is now in operation onsite, a Questemp°15 Area Heat Stress Monitor, serial KL4030016. Firing pit 2 seems to be slightly offset from the surveyed location since the west hole penetrated undisturbed gravel of the natural canyon bottom sediments rather than fill, as was found in the south and center holes. Finished west hole, firing pit 2 by 12:15. Unable to collect curation sample for 50-60 in. depth due to gravel & insufficient soil. Organic Vapors were background (0.2 ppm), beta/gamma was ~~84~~ 114 cpm (background) 6/6/94. Subsurface readings were below background.

1994 Field Activity Log, OU 1093

RCRA Field Investigation, Los Alamos Natl. Lab

(RFI workplan for OU 1093, LAUR 93-422).

by C. Randall Mynard, Field Team Leader

for drilling operations in TA-18, TA-27 (TA-36)

Field operations for OU 1093 in 1994 will be to conduct subsurface soil and perched groundwater collection at various locations at TA-18 and former TA-27 (now part of TA-36). This will be done using a drilling rig operated & equipped by Stewart Brothers, Inc. The field sampling crew is composed of LANL, ICF Kaiser Engineering, Morrison-Knudsen, Inc, Environmental Dimensions, Inc., and Stewart Brothers.

Equipment being used: CME ME-40 buggy-type drill rig, Lancia steam cleaner, 5-ft split spoon.

Operation: split-spoon sampling of subsurface soil from 0 to 5 ft deep using a hollow core auger.

Location: buried firing pits of former TA-27, used for implosion tests 1945-47. See the RFI workplan for OU 1093 for complete list of potential contaminants, which include depleted uranium (U^{238}), lead, Thorium, high explosive.

Monitoring instruments: alpha: Tracer Ionter Model 43-10 ser 112657, Ludlum 2221 serial 108867, beta/gamma Ludlum model 2221 serial 108862 with pancake probe 44-9 serial 112194. Air monitoring is done using HNU model PI 101 serial 401084 photoionization detector (PID), miniram aerosol monitor model DDM-3 serial 6049.

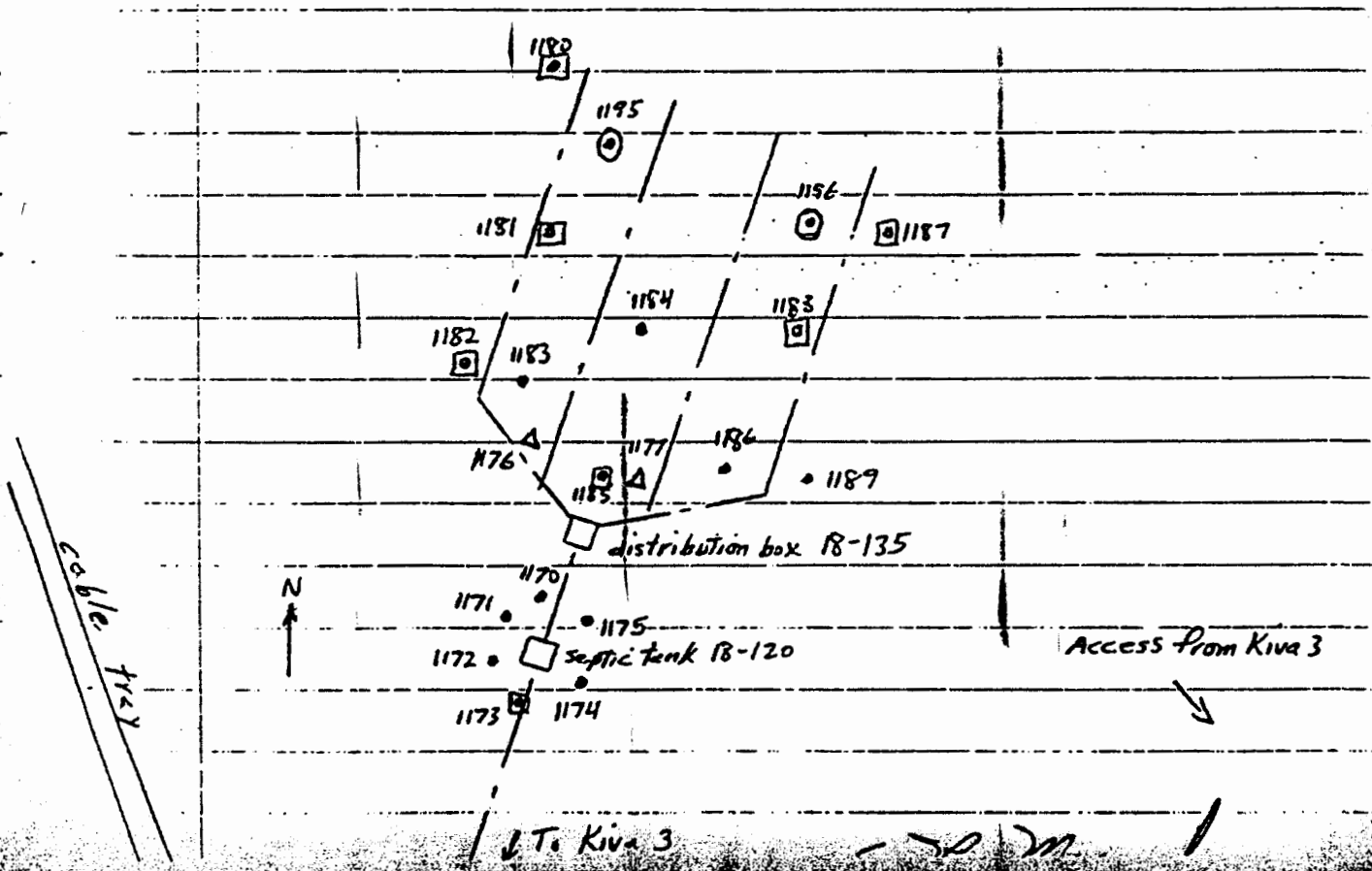
C. Mynard

From Fig 5-12 - Sampling locations at PRS 18-003(d), Kiva 3 septic system.
Location of drainlines is based on drawings, not field data (though drainfield location is visible as a depression.
Sample locations are approximate.

Sample location ID #s are 18-XXXX. Only last 4 digits are shown

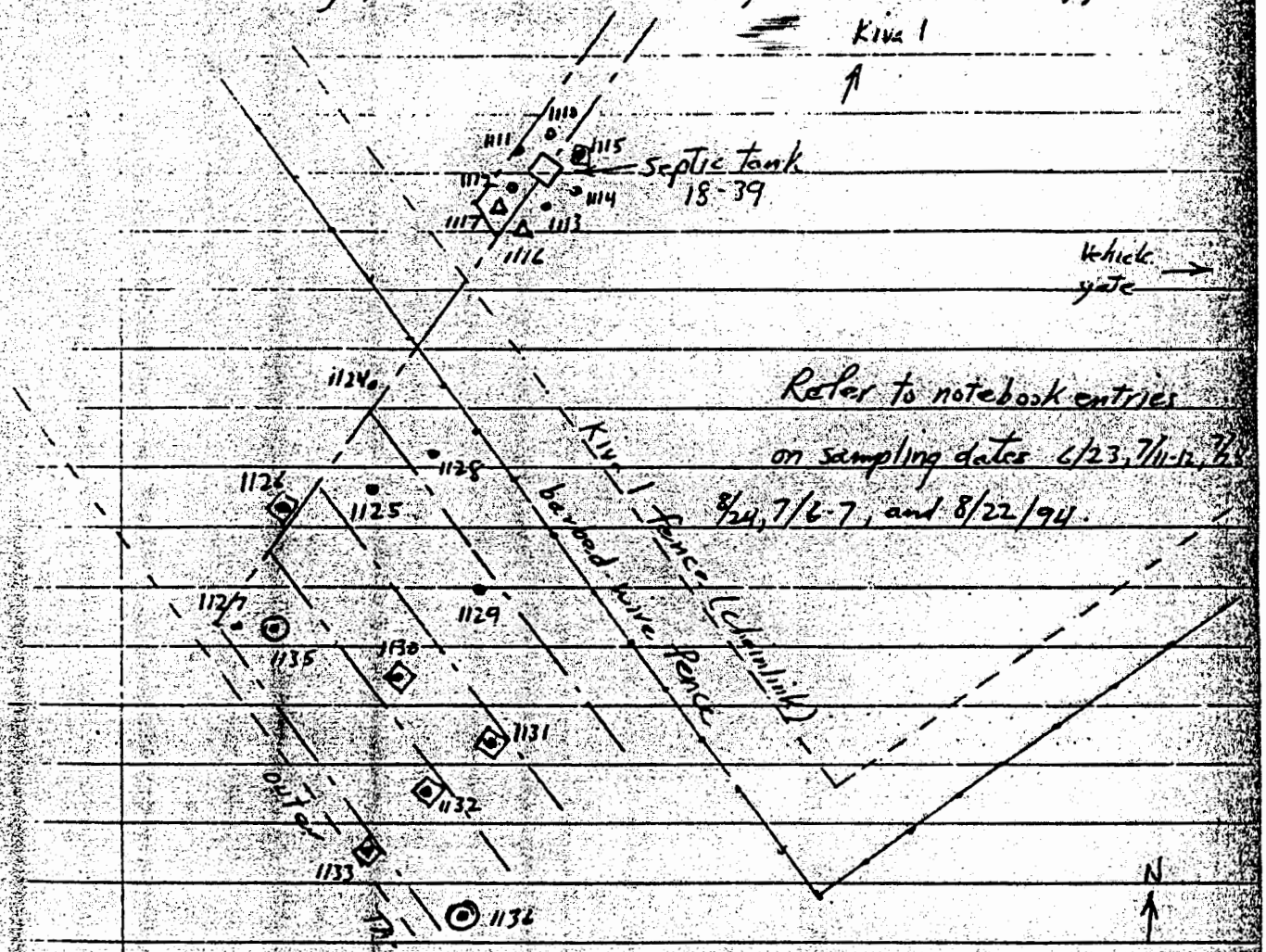
- • surface soil sample location (screening sample) ⊡ (analyzed sample)
- △ subsurface soil sample location
- ⊙ subsurface soil & groundwater sample location

Refer to notebook entries for sampling dates 6/24, 6/28-29, 6/30, 7/5, & 7/14



Annotated Field Maps
from OU 1093 RFI Workplan

From
Fig 5-10 - Sampling locations ~~conducted~~ LKM 11/18/94 at PRS 18-003(a&b) Kiva 1 septic system. Note: drainline locations are based on drawings, not field data. Sample locations are approximate.



Refer to notebook entries on sampling dates 6/23, 7/11-12, 7/18, 8/24, 7/6-7, and 8/22/94.

Sample location IDs are 18-XXXX (only last 4 digits are shown on map)
• surface soil sample location (screening sample) ⊡ (analyzed sample)
△ subsurface soil sample location
⊙ subsurface soil and groundwater

(Aug 24 cont'd.)

1140 - work at TA-18 is completed & drillers were released to EES-4 along with decon Trailer.

Aug 25, 1994 -(Thursday)

Field operations have been completed by the drilling team at OU 1093, Though Vic Hesch's team continues to do surface sampling here. We inventoried all our equipment & supplies and took them to ICF Kaiser Inc. for storage. Returned the rental van after it was monitored for rad. Demobilized team.

Aug 26, 1994

I picked up containers of soil and water that had been screened by the CST-9 Rad Van and took them to the TA-27 waste storage transportainers for storage ~~prior~~ pending final lab analyses. Backup samples are in storage at the EES-4 Sample Management Facility at TA-3-271.

This completes field notes for the 1994 field season

C. K. Maynard
Field Team Leader
EES-4 TA-41-30-209
667-7335

* See errors noted, next page

(Aug 22 cont'd.)

Tyson therefore picked up a metal detector from ICF Kaiser, Inc and relocated the nails that had been placed June 23.

1340 - Surface soil samples were collected at locations 18-1126, -1130, -1131, -1132, and -1133, chosen based on analytical results of screening samples collected here earlier.

NOTE: The original field notebook, ER Controlled Document #103, was lost this day. Entries for Aug 8-22, 1994 have therefore been recreated as well as possible. Entries below are, in contrast, original entries in a controlled document (#207).

C. R. Maynard

Aug 23, 1994 - Last day using drill rig.

0900 - Set up in the southwest corner of the paved area west of Bldg TA-18-30 at hole 18-1254. Collected groundwater samples there, then moved to nearby hole 18-1255, east of transportainer TA-18-247. Again the crew remained as far as possible from the transportainer, which contains radioactive sources. Weather clear, 80's.

1000 - Collected groundwater sample from hole 18-1255. This hole was made a permanent monitoring well.

(Aug 19 contd.)

manhole cover. Inspection inside it revealed it to be septic Tank 18-41, abandoned and filled with sand to the base of the entry shaft. PRS 18-003(f). Transportainer next to it was moved aside by member of N15-6 to allow access by drill rig. Septic Tank is 35 ft east from the TA-18 fence west of Bldg. 18-30 or 60 ft. west of Bldg 18-30, 5 ft. north of a line perpendicular to the southwest building door.

0915 - Drilled through asphalt paving 7 ft. southwest of septic tank 18-41. Hole is 18-1242. Collected subsurface soil in a 2-4 ft depth interval to check for contamination from inactive septic Tank.

1000 - Drilled hole 18-1241 6 ft southeast of septic Tank 18-41 near the sewer inflow line. Also done through asphalt paving, but to 10 ft. deep.

1150 - Drill rig was positioned over septic Tank manhole and hollow stem auger was lowered inside, pushing through sand inside septic Tank 18-41 to collect sludge in bottom.

1325 - Drillers, The 550, and Tyson Lansford returned to Pajarito Canyon west of Kiva 1 to clean up area where background wells were drilled. Left that area at 1400.

(Aug 17 cont'd)

far enough to reach the end of the auger, even when drilling has stopped to extract the core from the center of the auger. Since water cannot enter the split spoon sampler except via the opening at the bottom of the auger, the enclosed core sample inside the split spoon sampler should remain free of sewer water contamination.

Therefore the subsurface soil samples collected in the 0-10 ft depth interval should not be contaminated by the punctured sewer line. The samples will therefore be sent for analysis as originally planned.

JCI Utilities disposed of soil around the break that became contaminated during the excavation. The broken sewer line was repaired and the excavation filled with clean soil. However the dirt that filled the drill hole is mixed with sewer water that filled the hole prior to excavation. Further drilling at this location might allow contamination to reach the perched aquifer, not only harmful to the aquifer but defeating the original purpose of sampling the groundwater for sewer contaminants. Therefore the hole will be abandoned and no attempt will be made in this location to drill to groundwater. Due to adjacent overhead ~~line~~ utility lines, no nearby spot exists where drilling could be relocated safely.

(Aug 17 contd.)

single restroom of Bldg 18-147 and warned the occupants about the ruptured sewer line. Showed the problem to Evelyn Mullin and Jim Spach. Crew took lunch break about 1100 to await utility people.

Drawings we are using, ENG-C 35578 of 1967 and ENG-C 37508 of 1969 ("As Built") are incorrect in the location of the sewer line from septic tank 18-152, showing it to head east and intersect with line from septic tank 18-43, then south to manhole 18-47 at the northeast corner of Bldg 18-28. The line should lie just east of the storm drain, according to where these drawings show the line. In fact, this line or a second one runs from septic tank 18-152 directly to manhole 18-47. JCI Utilities didn't show a line at this location. It unfortunately lies in the 2 ft wide x 4 ft long zone we could drill in (to miss overhead utilities).

1315 - Charlie Barnett of JCI Utilities arrived & we removed the lid after much effort on manhole 18-47. Two lines enter it, one from the north and one from the northwest, the latter being the one we penetrated. Thus the line from septic tank 18-152 must not connect upstream to the line from septic tank 18-43, but rather connect at manhole 18-47.

A review of all drawings we have reveals that ENG-R 1063 of 1955 has the line from septic tank

(Aug 16 cont'd.)

1300 - Began drilling hole 18-1250 in northeast corner of drainfield, just west (outside) of the TA-18 fence. Again collected subsurface soil samples to 10 ft deep. Rad was background, organic vapors 0.2 ppm.

1400 - Began drilling hole 18-1252 in the east central part of drainfield next to the fence. (All holes are being marked with numbered stakes for later survey) Collected subsurface soil samples to 10 ft deep.

1500 - Began drilling hole 18-1253 in southwest corner of drainfield. Collected five subsurface soil samples & completed work at 1600. Returned rig and equipment inside TA-18 via Kiva 1 gates.

Aug 17, 1994

0910 - Began drilling hole 18-1285 in paved area east of Bldg 18-147, south of hole 18-~~1253~~ 1275 (PRS 18-003h) and 10 ft southeast of septic tank 18-152. This location is in a paved storm drainage gully that runs along the north side of Bldg 18-28. Hole is one foot from the drain grating and in the bottom of the gully. Location has been chosen to avoid overhead electrical/communication lines as drill rig is erected, be sufficiently close to septic tank 18-152 to sample subsurface soil and groundwater for septic tank leakage, avoid a cryogenic pipe on the outside wall of Bldg 18-28, and be on a horizontal surface rather than side of the gully.

subsurface soil. Rad level was background, organic vapor 0.2 ppm. Weather - overcast, high 80's. Hole did not reach groundwater, so will be deepened tomorrow.

Aug 12, 1994 0900 - Continued drilling hole 18-1275 south of bldg TA 18-1. Drilled to 49 ft & took cuttings composite sample of subsurface soil. Bailed & surged well. Weather clear, 90°F. Completed work on well at 1415.

Aug 15, 1994 Monday morning set up drill rig at Kiva 2 drainfield, southeast corner, at hole 18-1166. Drilled Aug 4, this well is 40 ft. deep. Weather overcast, 70's. 1055 - Took groundwater sample. Rad was background but organic vapors were 6 ppm inside the well casing, indicating possible contamination of groundwater with organic solvents. Reading was background at mouth of casing.

Moved rig to nearby hole 18-1165, 12½ ft deep. Took groundwater sample at 1145. Didn't take field blank since Merlin Wheeler feels it is meaningless at TA-18. Completed sampling at 1430.

Moved rig to Kiva 1, through the outer fence, and to the meadow west of Bldg 18-30. This is the location of inactive septic drainfield PRS 18-003(f), where we will drill tomorrow.

C. L. Maynard

utility lines. Since the manhole couldn't be located, we abandoned attempts to drill next to it. Such drilling would be quite close to ~~poorly located~~ uncertain GRM 10/19/94 positions of buried sewer and electrical lines, anyway.

1315 - Located west of Bldg TA-18-30 in southwest corner of paved area near fence. Hole TA-18-1254 started at 1445, located 14 ft from the west fence and 25 ft north of the south fence. This places the drill hole in the southeast corner of the inactive drainfield (PRS 18-003F). Rad in subsurface soil is background, organic vapors 0.2 ppm. Collected subsurface soil samples 1500-1620. Weather clear to partly cloudy, upper 80's.

Crew tried to maximize distance from the north end of transportainer TA-18-247 due to slight radiation field from rad sources stored there. Transportainer is north of drill site about ~~20-25 ft~~ 10/19/94 GRM 15-20 ft. Rad at drill hole working area is background.

Aug 10, 1994

0845 - Continued drilling hole TA-18-1254 west of Bldg 18-30. Well drilled to 15 ft depth, bailed & surged. Cuttings placed in plastic bags for later placement in drums. Rad background, organic vapor 0.2 ppm. Cuttings sample collected. Weather clear, 85°F.

Aug. 8, 1994

Groundwater sampling was ~~done~~ attempted at background sample wells BG-2 and BG-3 in Pajarito Canyon west of TA-18-23 (Kiva 1). Weather clear, 70's. Site Safety Officer is Bob Stasik, Morrison Knudsen Inc.

★ [Note: error discovered in previous Field Log entry for Aug 1, 1994, page 58: location ID TA-18-1060 (BG-1 hole) is westernmost, not easternmost, of 2 adjacent holes TA-18-1060 and 18-1063 (BG-2).]

0950 - Obtained groundwater sample from BG-2 (location TA-18-1063), which is 26 ft deep. Hole is 30 ft east of hole TA-18-1060 (BG-1) and about 30 ft north of the creek.

Unable to obtain sufficient water from hole BG-3 (location TA-18-1066), which is south of hole BG-1 about 30 ft south of the creek. BG-3 has had all weekend to fill with water. Cancelled groundwater sample AAB 2458, since Merlin Wheeler felt it was not worth redrilling the hole for obtain what is essentially a duplicate of groundwater samples from BG-1 and BG-2.

Set up drilling at Kiva 2 drainfield (PRS 18-003c) in the northeast corner. Began drilling hole TA-18-116 at 1300. Collected subsurface soil samples. Rad was background, organic vapors 0.2 ppm. Hole depth

DATE: 8-18-94
AUTHOR: V. HESCH
WEATHER: CLEAR/HOT
PERSONNEL:

P. GRAM ALT- FTL
C. ABEYTA - SUPPORT
J. BINGHAM - DOCUMENTOR
V. HESCH - FTL
B. STAUB - SSO
N. NESS - SUPPORT
B. TRUJILLO - SAMPLER
D. CORDI - PHOTOGRAPHER

TEXT: ARRIVED AT TA-18, KIVA 2 AT 0915 hrs. SET-UP CRZ & EXCLUSION ZONES AT 0950 hrs.

LOCALES TO BE SAMPLED TODAY WILL BE 1420, 1430 & 1440. SAMPLING COMMENCED AT 1019hrs & ENDED AT 1055hrs FOR 1430.

COMMENCED SAMPLING LOCALE 1420 AT 1107hrs & FINISHED AT 1147hrs

STARTED SWIPING & DECONING SAMPLES AT 1157.

COMMENCED SAMPLING LOCALE 1440 AT 1220 and FINISHED AT 1250.

SIGNATURE: [illegible]

DATE: 8-19-94
AUTHOR: V. HESCH
WEATHER: CLEAR/COOL HIGH CLOUDS
PERSONNEL:
D. GRAM - ALT - FTL - SAMPLER
V. HESCH - FTL
J. TAYLOR - RCT
B. STAUB - SSO
B. TRUJILLO - DOCUMENTOR
J. BINGNAM - SAMPLER
C. ABEYTA - SUPPORT

LOCATION: EAST OF KIVA 1, TA-18
MAGAZINE SITE, 18-005
ANALYTICAL & RAD SAMPLES WILL BE TAKEN
TEXT: CRZ & EXCLUSION ZONE
WERE SET-UP AT 0900 hrs. TAIL
GATE MTG TOOK PLACE AT 0952 hrs.
SAMPLE LOCALE IS 18-005, I.D.#s
IS ABB5297-5301. SAMPLING COMMENCED
AT 1012 hrs., Ended AT 1027 hrs

COMMENCED SAMPLE SWIPING &
DECONNING AT 1140. COMMENCED
BREAK-DOWN AT 1155 hrs

WENT TO FIELD OFFICE AT 1230 hrs
TO LABLE & PACKAGE SAMPLES FOR
SHIPMENT TO RAD & CHEM VANS

SIGNATURE: [signature]

DATE: AUGUST 24, 1994
AUTHOR: RICHARD CORDI
WEATHER: HOT & HUMID — PARTIAL OVERCAST
PERSONNEL:
R. CORDI — FTL
V. HESCH — SUPPORT
P. GRAM — ASST FTL
J. TAYLOR — RCT
K. McFADDEN — SSO
J. BINGHAM — DOCUMENTOR
C. ABEYTA — SAMPLING

LOCATION: TA-18 / KIVA 2 / PRS 18-002(b)
ANALYTICAL AND RAD. SAMPLES TO BE TAKEN.
INITIALLY: SAMPLE LOCATIONS 1470 & 1480
SAMPLE IDs FOR 1470: AAB5024-5031
SAMPLE IDs FOR 1480: AAB5033-5040

0830 FIELD TEAM ARRIVES TA-18. A DELAY WAS ENCOUNTERED DUE TO RANDY MYNARD REQUIRED OUR RESERVED SECURITY GUARD TO COMPLETE HIS FIELD SAMPLING AT KIVA 1. WHEN THIS TASK WAS COMPLETED, OUR FIELD TEAM PROCEEDED TO KIVA 2 FOR FIELD SAMPLING.
1015 ARRIVED AT KIVA 2. SET UP EXCLUSION, CRZ AND SUPPORT ZONE. R. CORDI & C. ABEYTA STAKED SAMPLE LOCATIONS AT SAMPLE LOCATIONS 1470, 1480, 1490, 1500.
1115 TAILGATE MEETING: CONCERNS & CONSIDERATIONS ABOVE KIVA 2 (SOUTH SIDE) ON NORTH-FACING CANYON WALL. SURFACE SOIL SAMPLING — TASK #6.
HAZARDS: HE RESIDUALS, LEAD, BERYLLIUM, URANIUM, THORIUM. HEAT STRESS, SLIPS, TRIPS, FALLS, BACK INJURY, BIOLOGICAL.
PPE: LEVEL D4

[redacted]

DATE: 8-25-94
AUTHOR: RICHARD CORDI
WEATHER: CLEAR & COOL. HEAVY RAIN THE NIGHT BEFORE. GROUND IS SATURATED.
PERSONNEL:
R. CORDI – FTL
V. HESCH – SUPPORT
P. GRAM – ASS'T FTL / SAMPLER
J. TAYLOR – RCT
K. McFADDEN – SSO
J. BINGHAM – DOCUMENTOR
B. TRUJILLO – SUPPORT
N. NESS – SUPPORT / COMPUTER SUPPORT

LOCATION: TA-18 / WEST & SOUTH OF KIVA #2
PRS 18-002(b)
SAMPLING: ANALYTICAL & RAD. SAMPLES TO BE TAKEN AT SAMPLE LOCATIONS–
#1410 – AAB 4967–4974
#1490 – AAB 5042–5049
#1500 – AAB 5051–5058

0910 ARRIVED AT SAMPLING LOCATION. SET UP EXCLUSION, CRZ, SUPPORT ZONES.

0944 TAILGATE MEETING. HAZARDS: HE RESIDUALS, Pd, Be, HEAT STRESS, SLIPS, TRIPS, FALLS, BACK INJURY, BIOLOGICAL, SNAKES, URANIUM, THORIUM. PPE – LEVEL D4.

1000 SAMPLING TEAM LEAVES THE CRZ FOR SAMPLE LOCATION 1500, THEN ON TO 1490.

1100 A DIAMONBACK RATTLESNAKE WAS KILLED BY THE JCI LAWNMOWER CREW IN THE GRASSY AREA ON THE EAST END OF KIVA #2. THIS IS APPROX. 1/4 MILE FROM THE FIELD TEAM OUT IN THE FIELD SAMPLING. THE SNAKE WAS ABOUT 30" LONG. PRETTY GREEN COLOR. 7 RATTLES.

1125 FIELD TEAM RETURNS TO THE CRZ WITH SAMPLES FROM #1490 & #1500.

[redacted]

DATE: 8-26-94
AUTHOR: RICHARD CORDI
WEATHER: CLEAR & HOT
PERSONNEL:
R. CORDI - FTL
V. HESCH - SUPPORT
J. TAYLOR - RCT
K. McFADDEN - SSO
J. BINGHAM - SAMPLING
B. TRUJILLO - DOCUMENTOR
C. ABEYTA - SUPPORT/DECON

LOCATION: TA-18/KIVA #1/SOUTH EAST SIDE.
PRS 18-002(a)
SAMPLING: ANALYTICAL SAMPLES TO BE TAKEN WITH HAND AUGER. SURFACE SAMPLE TASK #6
SAMPLE LOCATIONS: 1340 AND 1350
#1340 - AAB4898
#1350 - AAB4907

0845 ARRIVED AT KIVA #1 AND SET UP EXCLUSION, CRZ, AND SUPPORT ZONES.

0935 TAIL GATE MEETING.
PAST MONITORING RESULTS FOR THIS AREA SHOWS NO SIGNIFICANT RAD READINGS OR CHEMICALS.
HAZARDS: HE RESIDUALS, LEAD, BERYLLIUM, URANIUM, THORIUM.
PPE: LEVEL D4

0950 SAMPLING TEAM LEAVES THE CRZ FOR SAMPLING SITES 1340 AND 1350. WE WILL TAKE 4 GRABS FOR ONE SAMPLE SET. SAMPLES TAKEN TODAY WILL BE FOR ANALYTICAL RESULTS.

1044 SAMPLING TEAM EXITED FROM EXCLUSION ZONE INTO CRZ TO START SWIPING AND DECONING.

1130 RETURNED TO FIELD OFFICE, LABELED SAMPLES AND DELIVERED TO RAD & NUCM LABS

8-30-94 (CONTINUED)
TO SAMPLING LOCATION 18-012(a), END OF KIVA #3.
ANALYTICAL SAMPLES TO BE TAKEN AT SAMPLE SITES #AAB5286 AND AAB5287.

1145 SETTING UP EXCLUSION, CRZ, AND SUPPORT ZONES.
1200 UPON INVESTIGATING THE STAKES AT 18-012(a), AAB5283 AND AAB5285 WERE FOUND DISPLACED BY THE LAWN MOWING CREW. THESE TWO SAMPLE SITES HAD BEEN CHOSEN FOR THE ANALYTICAL SAMPLE SITES. SAMPLE STAKES FOR AAB5282 AND AAB5284 WERE FOUND IN PLACE. AFTER AGAIN REVIEWING THE METAL'S XRF SCREENING ANALYSIS, IT WAS DECIDED ALL FOUR SITES WERE RELATIVELY CLOSE IN METALS DETECTION. THE DECISION WAS MADE TO SAMPLE SITES AAB5282 AND AAB5284 INSTEAD.

1215 LOCATED ALL SAMPLE STAKE SITES FOR 18-010(e).
1245 SAMPLING COMPLETED. DECONNED SAMPLES AND SAMPLING EQUIPMENT. TORE DOWN ZONES AND LEFT TA-18. RETURNED TO FIELD OFFICE TO LABEL AND ICE SAMPLES. COMPUTER PRINTER
1400 DOESN'T WORK — BACKUP PRINTER FROM KAISER IS BEING BROUGHT DOWN TO THE FIELD OFFICE.
1515 COCs COMPLETED - SAMPLES DELIVERED.

RCC

SIGNATURE: Richard Ford.

[redacted]

8-31-94 (CONTINUED)

1240 SAMPLING COMPLETED AND DECONNING OF SAMPLES AND EQUIPMENT BEGAN.
ZONES TORN DOWN.

1345 EXITED KIVA #3 AREA AND DEPARTED TA-18.

1400 ARRIVED FIELD OFFICE AND PREPARED SAMPLES FOR DELIVERY TO RAD AND CHEM VANS.

SIGNATURE: [illegible]

[redacted]

DATE: 9-2-94
AUTHOR: RICHARD CORDI
WEATHER: CLEAR AND WARM - POSSIBLE RAIN LATER IN THE DAY.
PERSONNEL:
R. CORDI - FTL
V. HESCH - SUPPORT/DECON
C. ABEYTA - COMPUTER SUPPORT/DECON
J. TAYLOR - RCT
K. McFADDEN - SSO
B. TRUJILLO - DOCUMENTOR
P. GRAM - SAMPLER

LOCATION: OUTFALLS NORTHEAST OF KIVA #2, IN THREE MILE CANYON, TA-18
PRSs 18-010(f) AND 18-003(c)

SAMPLING: SURFACE-SOIL SAMPLES TO BE TAKEN FOR ANALYSIS OF METALS, RAD, SVOCs.
SAMPLE ID #s:
18-003(c): AAB5264 → AAB5267
18-010(f): AAB5258 → AAB5261
TASK #8.

0900 ARRIVED TA-18. SET UP EXCLUSION, CRZ, SUPPORT AREAS.
1000 TAILGATE MEETING.
HAZARDS: Pb, SOLVENTS
SLIPS, TRIPS, FALLS, BACK INJURIES, BIOLOGICAL.
PPE: LEVEL D4

1005 SAMPLING TEAM ENTERS EXCLUSION ZONE TO BEGIN SAMPLING.
1050 STARTING TO RAIN - SAMPLING IS ALMOST COMPLETED.
1055 SAMPLING COMPLETED - TEAM RETURNS TO BE DECONNED.

DATE: 9-6-94
AUTHOR: RICHARD CORDI
WEATHER: SLIGHT OVERCAST - POSSIBLE RAIN LATER IN THE DAY.

PERSONNEL:
R. CORDI - FTL
V. HESCH - SUPPORT / DECON
N. NESS - COMPUTER / SUPPORT / DECON
J. TAYLOR - RCT
K. McFADDEN - SSO
B. TRUJILLO - SAMPLER
J. BINGHAM - DOCUMENTOR
P. GRAM - ALT. FTL.

LOCATION: TA-18, KIVA #1, OUTSIDE FENCE ON SOUTH SIDE. PRS 18-002(a).

0845 ARRIVED AT TA-18 SAMPLING LOCATION AND SET UP SUPPORT, CRZ AND EXCLUSION ZONES. ENTRY IS THROUGH PERSONNEL GATE ON SOUTH SIDE OF KIVA #1 AREA.

ANALYTICAL SAMPLES WILL BE TAKEN TODAY.

LOCALE #	AAB #
1360	AAB 4916
1370	AAB 4925
1380	AAB 4934
1380	AAB 4935
1390	AAB 4944
1700	AAB 4953
1700	AAB 4954

NEED TO TAKE ONE RINSATE AND PE SAMPLES ALSO.

0920 TAILGATE MEETING:
ANALYTICAL SAMPLING TASK #6
HAZARDS: HE Pd Ro Il Th HOT STAFF

DATE: 9-7-94
AUTHOR: R. CORDI
WEATHER: COOL AND CLEAR
PERSONNEL:
R. CORDI — FTL
V. HESCH — SUPPORT
C. ABEYTA — SUPPORT/DECON
N. NESS — COMPUTER/DOCUMENTOR
J. TAYLOR — RCT
K. McFADDEN — SSO
B. TRUJILLO — SAMPLER
J. BINGHAM — ~~DOCUMENTOR~~ SUPPORT
P. GRAM — SUPPORT/ALT. FTL

LOCATION: TA-18, EAST OF KIVA #1, PRS 18-002(a)
0830 ARRIVED TA-18, SET UP ZONES TO SAMPLE.
SAMPLING: ANALYTICAL SAMPLES TO BE TAKEN.

LOCALE #	AAB #
1300	4861
1300	4862
1310	4871
1320	4880
1330	4889

TASK #6
0900 TAILGATE MEETING:
HAZARDS: HE RESIDUALS, Pb, Be, U, Th
HEAT STRESS, SLIPS, TRIPS, FALLS, SNAKES
PPE: LEVEL D4
0920 SAMPLING TEAM ENTERS EXCLUSION ZONE TO BEGIN SAMPLING.

1120 SAMPLING COMPLETE - TEAM RETURNS TO THE CRZ.
1125 TEAM MEMBERS EXIT THE CRZ, FOLLOWING HP AND HS SCRUBBING.
1200 DECONNING COMPLETED. ZONES DISMANTLED. RETURN TO FIELD OFFICE [illegible]

[redacted]

9-8-94 (CONTINUED)

1235 INTERNAL COLLECTION TANK HAS BEEN UNCOVERED. DECISION IS MADE TO TAKE SAMPLES WHILE AREA IS EXPOSED IN LIEU OF WAITING TWO WEEKS TO RETURN TO THE AREA. TA-18 IS BEING CLOSED AS OF 9-9-94 FOR TWO WEEKS.

SPECIAL WASTE COLLECTION TANK 18-013
SAMPLE #'s
AAB 5307, 5308, 5309, 5310, 5321
DRAWING OF TANK ON PAGE 88 OF THIS BOOK.

1310 SAMPLING TEAM BEGINS TO COLLECT SAMPLES WITHIN THE CONCRETE TANK WITH A HAND AUGER. THE AUGER IS DECONNED BETWEEN EACH SAMPLE SITE.

1442 LAST SAMPLE IS TAKEN.

1455 SAMPLE TEAM LEAVES THE CRZ.
SAMPLES ARE DECONNED AND ICED.
ZONES ARE TORN DOWN.

1538 TEAM LEAVES TA-18 AND RETURNS TO FIELD OFFICE. SAMPLES WILL BE PUT IN FREEZER OVERNIGHT AND PROCESSED TOMORROW

Rce

SIGNATURE: Richard Cordi

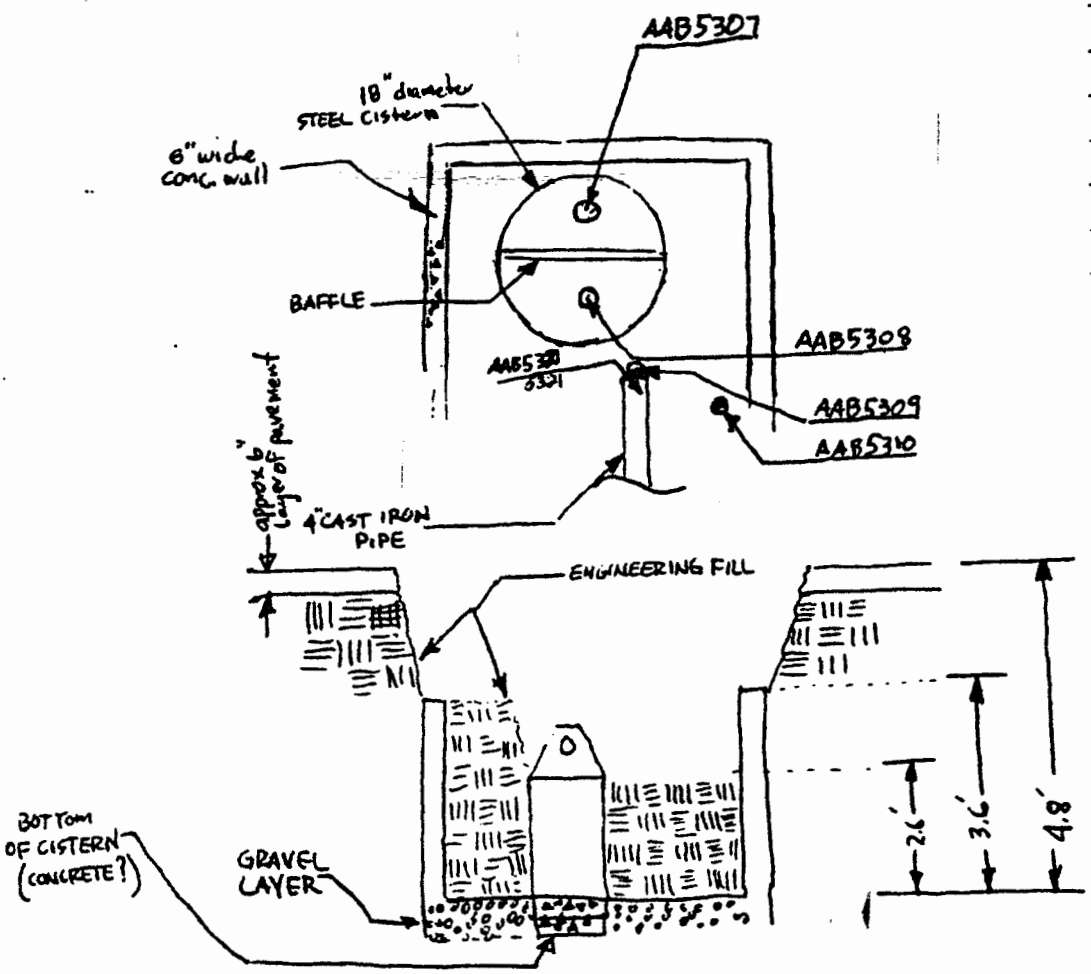
[redacted]

88

9-12-94

DRAWING OF SAMPLE LOCATIONS AND PICTORIAL SCHEMATIC OF THE VAULT AT 18-013.

CONCRETE VAULT NORTH OF KIVA



RCC

SIGNAMPE

10/24/94

12:30 MOVED TO NEW SAMPLE LOCATION FOR ~~PRESITE~~ PRS-010d (STORM SEWER OUTFALL

1245 SAMPLING TEAM ENTERED CRZ TO SUIT-UP FOR SAMPLING.

1258 SAMPLING OF 010d COMMENCED. SAMPLS ARE FOR SCREENING.

1318 SAMPLING OF 010d ENDED

" DECONNING OF PERSONNEL COMMENCED ALSO RAD SCREENING.

1338 STARTED DECONNING SAMPLE CONTAINERS.

1343 FINISHED " " "

1400 BROKE ZONES AND MOBILIZED BACK TO FIELD OFFICE TO PREPARE & PACKAGE SAMPLES FOR DELIVER TO CST-3 & RAD VAN.

SAMPLES TAKEN AT 18-010d TO RAD & CHM VAN.

SAMPLES TAKEN AT 18-010b TO CST-3 FOR LAB ANALYSIS.

SIGNATURE: [illegible]

10/25/94

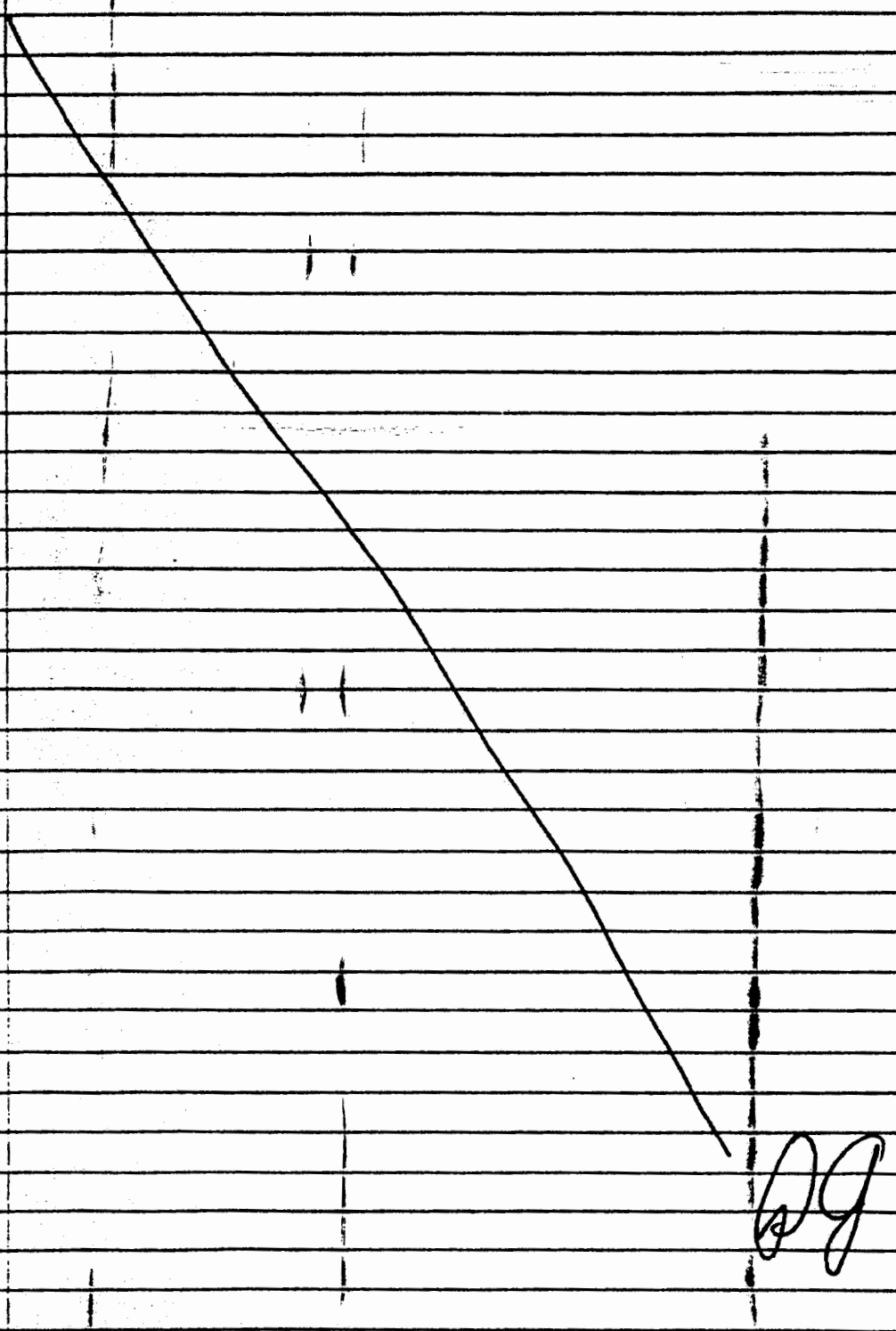
SAMPLING TEAM ENTERED CRZ TO COMMENCE SAMPLING LOCATIONS 1400, 1410 & 1420 AT 1319 hrs. TEAM ENTERED EXCLUSION ZONE AT 1330 hrs TO COMMENCE SAMPLING. SAMPLING COMMENCED AT 1336 AND ENDED AT 1418 hrs. TEAM ENTER CRZ FOR DECONING AT 1435. TEAM EXITED CRZ AT 1450 hrs., DECONING OF SAMPLE CONTAINERS @ 1452. FINISHED DECONING AT 1520 hrs., STARTED SITE BREAK DOWN. AT 1600 hrs PACKAGED & LABLED SAMPLES FOR DELIVERY TO CST-3 FOR LABORATORY ANALYSIS

SAMPLES COLLECTED TODAY:

1470, 1480, 1490, 1500, 1400, 1410 & 1420

SIGNATURE

[redacted]



11/16/94 CONTINUED:

1125 COLLECTED SAMPLE 5326, 10" TO 16" DEEP

1152 " " 5327, 12" TO 18" "

1204 " " 5328, 10" TO 16" "

1212 " " 5329, 10" TO 16" "

1218 " " 5330, 12" TO 18" "

1226 " " 5331, 12" TO 18" "

1230 ENTERED CRZ ZONE FOR DECONTAMINATION

1330 BEGAN BREAKDOWN OF CRZ, THE EXCLUSION ZONE WAS THE PERMANENT CHAIN-LINK FENCE W/GATE AROUND THE SEWAGE LAGOONS.

1335 BEGAN PROCESSING THE SAMPLES i.e., CHAIN-OF-CUSTODY FORMS & LABELING FOR SHIPMENT TO CST-9. ALL SAMPLES COLLECTED WERE FOR SVOCS & PAD CONSTITUENTS.

SIGNATURE: [illegible]

116 5217		1746 } duplicate
5218		1746 }
5219		1747
5220		1749
5221		1750
5222		1754
SUCCA 5217 - 53 11		
5219 - 53 12		
53 13		
5220 - 53 14		
5221 - 53 15		
53 16		
53 17		
53 18		
5222 - 53 19		
53 20		

(E)

FIELD LOG BOOK FOR OU1093
FIELD ACTIVITIES AT TA-18 AND TA-36

SITE WORK PLAN: LA-UR-93-422

WETLANDS SAMPLING AND MONITOR WELL
SAMPLING IN TA-18 AND TA-36
(PUEBLITO AND THREE MILE CANYON)

PREPARED BY: PETER E. M. GRAM OU1093 F

Peter E. M. Gram

9/24/93

WE HAVE DECIDED TO USE ST - THROUGH ST IS NOT REQUIRED BY THE SS HAP.-

I WILL GO UP TO TA-18 TO OBSERVE [illegible] QUALITY CONTROL - BOTH MAO RICHARD WILL ATTEMPT TO SET UP

1005 ARRIVE AT TA-18 - FIRST ORDER OF BUSINESS IS TO ASSIGN SITE ID NUMBERS TO INDIVIDUAL SAMPLING LOCATIONS

FOR WL-8:

AAA 5901 = SITE ID # 36-2000 (WATER)
AAA 5902 = 36-2001 (WATER)
AAA 5903 = 36-2000 (SED)
AAA 5904 = 36-2001 (SED)
AAA 5905 = 36-2002 (SED)
AAA 5906 = 36-2003 (SED)

FOR WL-7:

AAA 5907 = 36-2004 (WA
AAA 5908 = 36-2004 (DUP OF AAA 5907) (WA
AAA 5909 = 36-2005 (WA
AAA 5910 = 36-2004 (SE
AAA 5911 = 36-2005 (SE
AAA 5912 = 36-2000 (SE
AAA 5913 = 36-2006 (DUP OF 5912) (SE
AAA 5914 = 36-2007 (SE

ALSO WILL OBTAIN COC, AND ASSIGN TRUCK AAA [illegible] TO THE TRIP BLANK, FIELD BLANK, AND REVISITE

9/24/93

1235 AAA5903 1 collected sample w/ shovel

Bγ - 88cpm
PID - 0ppm
HE Test Kit - negative
- minor clays, sands, & silts
- minor cobbles & gravels
- high organic staining - SATURATED

1300 AAA 5904 1

Bγ - 99cpm
PID - 0ppm
HE TEST Kit - Negative
SAMPLE DESCRIPTION - SAME as AAA5903

1320 AAA 5905 1

Bγ - 79cpm
PID - 0ppm
HE TEST KIT - negative
Sample Description - Same as AAA 5903

1340 AAA 5906

Bγ
PID - 0ppm
HE TEST Kit - negative
Sample Description: Same as AAA 5903

9/27/93 - DAY TWO OF WETLANDS/GW SAMPLING.

0710 ARRIVE AT BM-9 TO PICK UP ICE, COOLERS, AND TRIP BLANK.

0745 DEPART BM-9.

0755 ARRIVE AT CP - BETH HOWLER, JOHN BONGIELLO, AND RICHARD HAKER ARE ALL HERE.

COOLERS LEFT ON DAY ICE ARE IN GOOD CONDITION - [illegible] MOD COLD. WE WILL SUBMIT THESE TO THE RAD VAN THIS MORNING.

WE WILL TRY TO SAMPLE WETLANDS LOCATIONS WL-7 AND WL-6 TODAY.

TRIPLICATE NUMBERS FOR WL-7 HAVE BEEN ESTABLISHED (SEE PAGE 2). TRIPLICATE NUMBERS FOR WL-6 ARE:

WL-6

	SAMPLE CODE
AAA 5915	36-2008 (WATER)
AAA 5916	36-2009 (WATER)
AAA 5917	36-2008 (SED)
AAA 5918	36-2009 (SED)
AAA 5919	36-2010 (SED)
AAA 5920	36-2011 (SED)

TRIP BLANK NUMBER AAA 5965

9/20/[illegible]

1000 AAA 5907 - H_2O sample

Temp 10.5°C

Conductivity = 200 µMho

pH = 8.6

1010 AAA 5908 - Duplicate of AAA 5907.

1025 AAA 5909 about 2' of water

Temp = 9°C

Cond = 200 µmho

pH = 8.5

1040 AAA 5910

pipe cores, seds and clays

high organic content (predominantly roots)

high strength (from cleaning drain)

organic odor odor

O2 HNU HE screening - negative

Barrels beta 88 cpm

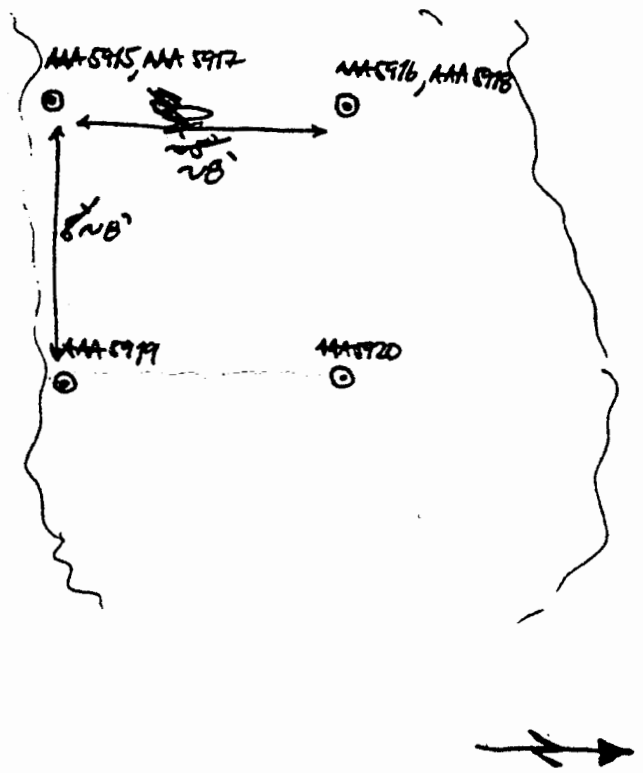
1110 AAA 5911

GB 32 = 92 cpm

HE = negative 0.2 ppm

Description: [illegible]

SAMPLE LOCATION MAP FOR WL-6



1500 AAA 5917

SILT AND CLAYS, ABUNDANT ORGANIC MATTER, PREDO
ROOTS LEAVES, ORGANIC STAINING, ORGANIC ~~[illegible]~~ ODOR

BG 86 CPM

HNU - 0

He⁻ negative

1515 AAA 5918

CLAYS, SILTS, AND SANDS, MINOR TRACES OF TURF, HIGH OR
CONTENT (MOSTLY ROOTS) ~~[illegible]~~ BLACK STAINING (FROM
ORGANIC DECAY) - ORGANIC DECAY ODOR

7/28/93 - DAY THREE OF WETLANDS/GW SAMPLING.

0730 - MEETING AT CP AFTER PICKING UP RLG AND COOLERS - RICHARD WINKER, BETH HOOVER, JOHN DONQUILLO, PETER GRAM, (THE GW PURGE SAMPLING TEAM) - B3 PREP

WE WILL SAMPLE WL-5 TODAY, AND PREPARE A REASH SAMPLE.

WL-5 TRIPLE A NUMBERS:	SITE ID NUMBERS
AAA5921	36-2012 (WATER
AAA5922	36-2013 (WATER
AAA5923	36-2012 (SED)
AAA5924	36-2013 (SED)
AAA5925	36-2014 (SED)
AAA5926	36-2015 (SED)

TRIP BLANK FOR 7/28 AAA5967

FIELD BLANK FOR 7/28 AAA5968

AAA NUMBERS FOR WL-4:	SITE ID NUMBERS
AAA5927	36-2016 (WATER
AAA5928	36-2017 (WATER
AAA5929	36-2016 (SED)
AAA5930	36-2017 (SED)
AAA5931	36-2018 (SED)
AAA5932	36-2019 (SED)

9/28/95

1340 AAA5923 Sediment

HE - not detected
BY - 3 to 90cpm
PID - 0ppm
Description: clays to coarse sands, high organic content (pred. roots) organic decay staining + odor.

1350 AAA 5924

HE - not detected
BY - 34 - 124cpm
PID - 0ppm
Description: clays + silts, minor interbedded clays to coarse sands, high organic content organic staining + odor

1410 AAA 5925

HE - not detected
BY - 36 - 120cpm
PID - 0ppm
Description: Same as AAA5924

1430 AAA 5926

HE - not detected
BY - 20 to 112cpm
PID - 0ppm
Description: clay to coarse sands
[illegible]

9/25/93

0945 AAA 5927
Temp - 13°C
Conduct - 200 uM
pH - 6.6

1005 AAA 5928
Temp - 10°C
Conduct - 195 uM
pH - 7.4

1030 AAA 5929

BZ - 50 to 112 cpm
HE - not detected
PID - 0 ppm
Description - clays to coarse sands, high organic content, smell, and dec

1045 AAA 5931

BZ - 70 to 112 cpm
HE - negative
0 ppm
Description: moderately sorted med to coarse sands, minor silts & clays, minor to moderate organics, black organics staining

1530 - WENT TO REZENWATER COOLERS. -

~~1630~~

1615 - OBRAZT POLO OFFICE / CD. -

TEDDLE A #S AND SITE ID #S FOR WK-1

WK-1

TEDDLE A #S		SITE ID #S
AAA 5945	(WATER)	18-2009
AAA 5946	(WATER)	18-2010
AAA 5947	(DUPLICATE OF AAA 5946) 5946	18-2010
AAA 5948	(SOIL)	18-2009
AAA 5949	(SOIL)	18-2010
AAA 5950	~~DUP OF AAA 5949~~ (SOIL)	18-2011
AAA 5951	(SOIL)	18-2012
AAA 5952	(SOIL) DUP OF AAA 5951)	18-2012

FIELD BLANK	AAA 5971
FIELD BLANK	AAA 5972
FIELD BLANK	AAA 5973
FIELD BLANK	AAA 5974

MONDAY 10/4/1993

AAA5933
1446 Temp 16.5°C
cond 135 µMHOS
ph 7.8

AAA5934
1458 Temp 17.0°C
cond 145 µMHOS
ph 8.0

AAA5935
1514 ~~Clay & medium~~ ~~Medium to coarse~~ sands with intermixed silt and clay, moderate organic content (predom. c
some organic staining mild organic odor.
HE test NEG.
Beta Gamma 71-90 cpm
OVA 2PPM

AAA5936
1527 Same as previous. but Clay to medium sands, mi
organics.
HE test NEG.
Beta Gamma 74-96 cpm
OVA [illegible]

10/5/98 TUESDAY, DAY 6 OF GW/WETLANDS SAMPLING

0705 ARRIVE AT SCF FOR ICE, COOLERS, AND THE TRIP BLANK

0745 - ARRIVE AT PADUCAH OFFICE, WHEELER, HENKE, AND HANKEL ARE PRESENT.-

WE WILL GET BOTTLE SETS TOGETHER TO SAMPLE WL-1 AND WL-2 - DW WETLANDS NEAR OA-18.-

- MR. LOUIZOPOULOS SAYS THAT HE DOES NOT THINK WE NEED TO SAMPLE 2 ~~LOCATIONS~~ ADDITIONAL LOCATIONS IN THESE WETLANDS SINCE THEY ARE SO SMALL AND SINCE THERE WILL BE AN ADDITIONAL SAMPLING EFFORT IN THE AREA IN THE SPRING OF 1999.- WE DECIDED TO JUST SAMPLE ONE LOCATION AT THE WESTERN END OF THE WETLANDS.- THIS WILL BE WL-1.-

0815 - WE MOBILIZE FROM THE PADUCAH OFFICE TO OA-18.-

0845 - I WILL CALIBRATE THE pH AND CONDUCTIVITY METER
- RICHARD DUPOUNT SAYS THAT HE ALREADY CALIBRATED THE H & S METERS.-

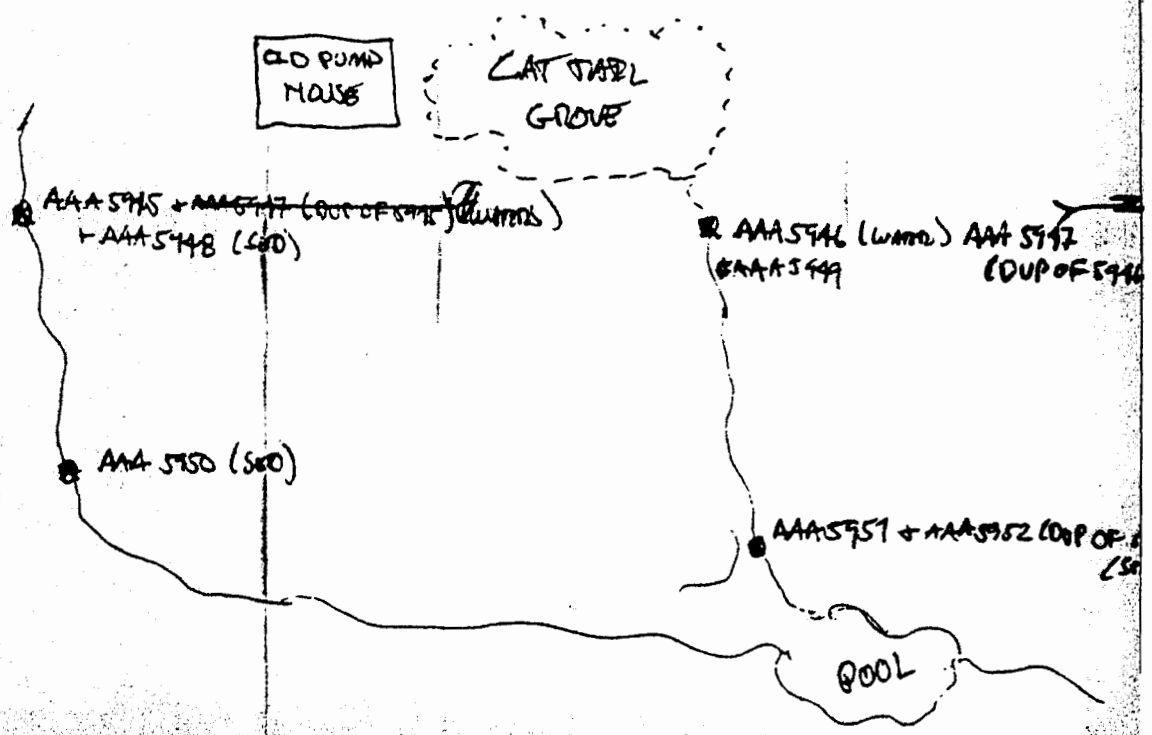
0850 - I CALL KATHY BRAUER TO LET HER KNOW THAT WE WILL BE IN THE WETLANDS IF SHE WOULD LIKE TO COME LOOK AT THESE WETLANDS.-

0930 RICHARD CONDUCTS TAILGATE SAFETY MEETING

1119 10/5/93 TUESDAY
AAA 5951
HE TEST NEG
BETA GAMMA 78-97 cpm
OVA 1 ppm
Clay silts to sands. Moderate organics. Slight organic odor.

1130 AAA 5952
HE TEST NEG
BETA GAMMA 79-91 cpm
OVA 1 ppm
Same as AAA 5951
Used 1 l glass amber bottle for HE sample

MAP OF WL-1



10/12/93 TUESDAY. DAY 7 OF GW/WETLANDS SA

1100 ARRIVED AT TA-18 MET DENNIS RATLIFF AND SHANE WHITE OF CRUMBS BROTHERS. ALSO AT TA-18 WERE DAVID OFLYNN AND TOM PFEIFFER (LLF SURVEY) - DENNIS AND SHANE WILL GO PICK UP AN ORGANIC SELENIUM AND DRUMS. - RICK VASAHR (SERVING AS SSO AND HPT) AND I WILL GO GET MORE EQUIPMENT AT THE TRANSPORTATION - AND MEET THE DRILLERS AND TOM BACK AT TA-18.

1200 MET BACK AT TA-18 - JOHN RONQUILLO ALSO ARRIVES. - TOM, JOHN, RICK, AND I WILL GO OD THREE MILE CANYON TO SHOW TOM THE THREE CANYON SAMPLING LOCATIONS.

1245 - WE RETURN BACK TO THE TA-18 SITE ENTRY GATE - THE DRILLER RETURNS. WE WILL BREAK FOR LUNCH AND BEGIN THE WELL DEVELOPMENT THIS AFTERNOON -

(WE WILL DEVELOP WELLS MW-1, MW-2, MW-3 AND MW-4) -

1315 - RETURN FROM LUNCH AND BEGIN BRINGING EQUIP UP TO THE LAST PURGE TA-18.

1345 - RICK CONDUCTS H.&S. BRIEFING - PRESENT AT BRIEFING; JOHN RONQUILLO, PETER GRUM, SHANE WHITE, DENNIS RATLIFF, AND RICK HARMON.

TEMP: 13.5 C
CONDUCTIVITY: 130 uMOHS
PH: 7.8
} 10-15 GALLONS OF H_2O

~~BACK~~ UP

TEMP: 13.C
CONDUCTIVITY 120 uMOHS
PH: 7.8
} 15-20 GALLONS OF H_2O

1510 WATER IS STARTING TO CLEAR, BUT STILL QUITE TURBID. WE WELL LET WELL RECOVER AND CONTINUE TO BAIL.

TEMP: 13.C
CONDUCTIVITY: 125 uMOHS
PH: 7.8
} 20-25 GALLONS

TEMP: 13.C
CONDUCTIVITY: 120 uMOHS
PH: 7.8
} 25-30 GALLONS

TEMP: 13c
CONDUCTIVITY: 120 uMOHS
PH: 7.8
} 30-35 GALLONS

TEMP: 13c
CONDUCTIVITY: 120 uMOHS
PH: 7.8
} 35-40 GALLONS

TEMP:
CONDUCTIVITY:
} 40-45 GALLONS

10/13/93 WEDNESDAY. DAY 8 OF GW/OBTLANDS SAMPLING

0740 ARRIVE AT TA-18 (AFTER WAITING NOT REEK HANKOR AT THE ICF OFFICE) - PRESENT AT CRIB WERE DENNIS RUTLEDGE AND SHANE WHITE (OF STRUNTZ BROS. ORDLANDS) AND JOHN RAVAIOLLO.-

0805 SECURITY SCREENING OF REFRESH AND OUR WAIV COMPLETED.
- WE MEET BRIEFLY WITH TONY BERGER - JUST TO LET HIM KNOW WE WERE HERE - AND WITH THE CROW OFFICE.-
- WE GET CLEARANCE TO GO INTO THE KOWA 1 AREA - AND HEAD UP TO KOWA-1.-

WE WILL FINISH DEVELOPING THE LATER WELLS TODAY (LATER MW-2, MW-3, AND MW-4) - WE WILL DEVELOP THESE WELLS JUST AS WE DID WITH MW-1.- WE WILL ~~PUMP OFF~~ BAIL WATER FROM THE WELL UNTIL WE STOP MAKING GAINS IN LOWERING THE APPARENT TURBIDITY OF THE WATER.- i.e.- WELL BAIL UNTIL THE WATER APPEARS AS CLEAN AS IT SEEMS IT WILL GET.-
- AND THE WATER QUALITY PARAMETERS HAVE STABILIZED.-
- AT A MINIMUM WE WILL BAIL 5 WELL VOLUMES FROM THE WELL - HOWEVER, ~~THEREFORE~~ WE REMOVED MANY ~~MORE~~ TONES THIS OBVIOUS FROM MW-1 YESTERDAY SINCE THERE WAS SO MUCH SEDIMENT IN THE WELL - AND THIS IS EXPECTED TODAY.-

0830 REEK CONDUCTS H&S MEETING.

0840 & CALIBRATE PH & CONDUCTIVITY METER
REEK ALREADY CALIBRATED THE H&S METERS AT THE ICF OFFICE THIS MORNING

0915 DAVE OFLIN, ~~DAVI~~ TOM PFEIFFER AND JOHN LONGER VISITED THE SITE. RICK WAACKER GAVE A SITE HEALTH SAFETY BRIEFING TO THE VISITORS

PH: 7.2
TEMP: 12°
CONDUCTIVITY: 120 uMhos
} 15-20 GALLONS

PH: 7.4
TEMP: 13°C
CONDUCTIVITY 120 uMhos
} 20-25 GALLONS

PH: 7.1
TEMP: 12.5°C
CONDUCTIVITY 120 uMhos
} 25-30 GALLONS OF H2O

0945 DENNIS RATCLIFFE MENTIONED HE IS PRETTY SURE CASING IS CRACKED - WELL IS NOT CLEANING UP AT ALL

PH: 7.2
TEMP: 13
CONDUCTIVITY 120 uMhos
} 30-35 GALLONS

PH: 7.4
TEMP: 13°C
CONDUCTIVITY 125 uMhos
} 35-40 GALLONS

PH: 7.6
TEMP: 13°C
CONDUCTIVITY: 120 umhos

} 5-10 GALLONS

PH: 7.4
TEMP: 14°C
CONDUCTIVITY: 125 umhos

} 10-15 GALLONS

PH: 7.4
TEMP: 13.5°C
CONDUCTIVITY: 125 umhos

} 15-20 GALLONS OF H_2O

1100 WELL DEVELOPMENT OF MW-3 COMPLETED. THE WELL PRODUCED CLEAN WATER FROM THE FIRST BAIL PULL. — HOWEVER THERE WERE SEVERAL INCHES OF SEDIMENT ON THE WELL BOTTOM. — WE BAILED MORE OF THIS OUT, BUT SAND DOES STILL REMAIN — BUT, IN GENERAL, THE WELL IS PRODUCING LOW TURBIDITY WATER. ~~AND, THEREFORE, DEVELOPMENT WAS INTERRUPTED~~

1110 MOBILIZED TO LATER MW-4.

1115 STARTED DECONTAMINATION EQUIPMENT.

LACEF	MW-4 DATA

OVA - 0 PPM
TOTAL DEPTH 26'
DEPTH TO WATER 14.2'

1200 DEVELOPMENT OF LATER MW-4 COMPLETED. - WELL WATER OBSERVATION WAS VERY CLEAN - HOWEVER THERE WAS SOME SEDIMENT (~3") IN THE BOTTOM OF THE WELL. - WE BAILED ALOT OF THIS OUT AND I EXPECT THE WATER WELL CLEAN BACK UP AFTER THEY ARE ALLOWED TO SET. -

NOTE: MW-2, MW-3, AND MW-4 RECHARGED ALOT AS QUICKLY AS WE COULD BAIL - AND, THEREFORE, OUR DRAWDOWN DID NOT DRAW THEM DOWN VERY MUCH. - MW-1, HOWEVER, WAS WORK ABLE TO BAIL DOWN TO ~~~1'-3' OR WATER RECHARGED BY THE WELL~~ ~ 1'-3' FROM THE BOTTOM OF THE HOLE. -

1205 - WE BEGAN OBSERVATION FROM THE RIG, - AND STARTED BEGAN DECONTAMINATE ALL DOWN HOLE EQUIPMENT AND THE RIG DERRICK. -

1230 DROVE FOR LUNCH

1330 RETURNED TO PA-18 - TO PICK UP THE RIG AND THE STEAM CLEANER

~~1400~~ - CHECK ON PROGRESS COMPLETE - WILL MEET HS-1 ROP AT ~~PA-1~~ KUA-1 TO SCREEN THE RIG AND STEAM CLEANED.

1405 - HS-1 ROP COMPLETES RAD SCREEN AND RE-ENTERS THE RIG AND OTHER GEAR.

~~1415~~ - ARRIVE BACK AT SECURITY PORTAL TO LEAVE PA-18

1430 LEAVING PA-18

10/20/1983 WEDNESDAY DAY 9 OF OCS SIMULATIONS

1400 ARRIVE AT PAD 1 AFTER CHECKING OUT TO THE SITE
MEET AT PAD 14 - TODAY'S SIMULATION DEBRIEF
REVIEW WITH (OF CO.) - THE SSO AND HPI,
JOHN RODRIGUEZ, AND DAVE GRAM (FL) -

- WE WILL ATTEMPT TO CANCEL THE 4 LREF WELLS
TODAY.

1405 - I OBSERVED THE PH AND CALIBRATION MODE -
RICK BARKER HAS ALREADY OBSERVED THE HFS
INSTRUMENT.

- SCHEDULE TO BE DRAWN TODAY MOB

MW-1	MAA 5957
MW-2	MAA 5958
MW-3	MAA 5959
MW-4	MAA 5960
	MAA 5961 (DUP OF 5960)

DUO	MAA 5976	TRIP BLANK DOC 10/20/83
	MAA 5977	FIELD BLANK DOC 10/20/83

SITE ID #'S	MOB
MW-1	18 - 2013
MW-2	18 - 2014
MW-3	18 - 2015
MW-4	18 - 2016

10-20-93

LACEF, MW 1 - Well Sampling TA-18

1440

volume bailed

T = 14°C

cond = 135 µmho

pH = 8.0

0 ppm fid

0-2 gal

T 13.5 C

cond 125 µmho

pH 8.1

2-4 gal

1620 BEGIN SAMPLING MW-3

BORE HOLE HEAD SPACE: BACKGROUND

DEPTH TO WATER ~ 15.

Ph 7.8
TEMP 14.8°C
CONDUCTIVITY 135 µM/S
} 0 - 2 GALS

Ph 7.5
TEMP 14.8°C
CONDUCTIVITY 125 µM
} 2 - 4 GALS

Ph 7.5
TEMP 13.5°C
CONDUCTIVITY 125 µM
} 4 - 6 GALS

1630 AMA 5959

Ph 7.6
TEMP 12.5°C
CONDUCTIVITY 128 µM

1635 JOHN RANGUELLO INFORMS ME THAT THE WIRE USED TO TIE OFF THE BAILER BRACE WHILE RETRIEVING THE BAILER FROM THE HOLE - WE DO NOT HAVE ANY WAY OF RECOVERING THE BAILER W/ US - BUT WE WILL TRY TO CONTINUE TO BAIL AND SAMPLE THE WELL

10/21/93 THURSDAY DAY 10 OF GW SAMPLING

7:00

1315 ARRIVE AT KBUA 1 ARRIVE TO SAMPLE MW-4 - PRESENT ARE PETER GRAM (PTZ), RICK NAWKOR (SSO, HPT) AND DOUG NEWQUIZZO.-

RICK HAS ALREADY CALIBRATED THE H&S INSTRUMENTS & WILL CALIBRATE THE Ph and CONDUCTIVITY METER-

1335 RICK CONDUCTS H&S FIELD GATE MEETING

1345 BEGIN SAMPLING MW-4

BORE HOLE HYDROSPACE REMOVING (FED) BACKGROUND (2
TOTAL DEPTH TO WATER 14.5'

Ph 7.6
TEMP 13.5°C
CONDUCTIVITY 128 µM
} 0-2 GALS

Ph 7.5
TEMP 13.5°C
CONDUCTIVITY 125 µM
} 2-4 GALS

Ph 7.1
TEMP 13.5°C
CONDUCTIVITY 125 µM
} 4-6 GALS

1230 TONY [illegible] OF MS-1 [illegible] AND [illegible] OUR SAMPLES
WE WILL GO TO THE CP PREPARE THE SAMPLES
[illegible] HERE, AND DELIVER SAMPLES TO THE RED VAN
AT TA-21

1515 ARRIVE AT TA-21 RED VAN — NO [illegible] TO PILOT
SAMPLES — MAKE A FEW PHONE CALLS TO BA49 — THEY
WILL SEND SOMEONE OUT TO TAKE THE SAMPLES

1630 BM-1 CDP ARRIVES TO RECEIVE SAMPLES

1600 DEPART TA-21

11-2-93

AAA5953 continued 5-10 gallons

pH 6.5

conductivity 160 µmhos

temp (°C) 12°C

pH 6.8
cond 160 µmho
temp 12°C
} 10-15 gallons

pH 6.8
cond 160 µmho
temp 12°C
} 15-20 gallon

pH 6.8
cond 160 µmho
temp 12°C
} 20-25

temp 12 °C
cond 160
pH 6.8
} water sample

11-12-93

PCO 2 continued

Temp 13°C pH ~~220~~ 7.3 Cond. 220 µmho		2-4 gal 7.3
Temp 13°C cond 220 µmho pH 7.3		4-6 gal
Temp 13°C cond 220 µmho pH 7.3		sample @ 1500 AAA 5954
Temp 13°C cond 220 µmho pH 7.3		sample AAA 5955 (duplicate of AAA 5954) @ 1515

11/3/93 WEDNESDAY DAY 12 OF GW SAMPLING

1100 ARRIVE AT CP WITH RICK WALKER - WE WILL WAIT HERE FOR KEN HANSEL TO ARRIVE SO THAT WE CAN SAMPLE PCO-3.

WE HAVE SPENT THE MORNING TRYING TO GAIN ACCESS TO PCO-3 WHICH IS NOW CONTROLLED BY M-2 - MIKE MONTOYA OF M-2 IS APPARENTLY IN CHARGE OF ACCESS FOR M-2. - I CONTACTED HIM YESTERDAY MORNING (TUESD TO GET CLEARANCE TO GET IN - BUT HE WAS NOT IN WHEN I CALLED - I DID LEAVE A MESSAGE WITH THE GROUP OFFICE TO HAVE HIM CALL ME - HE NEVER GOT BACK TO ME YESTERDAY - (NO MESSAGES WERE LEFT WITH THE RCF KE OFFICE OR ON MY OFFICE ~~MESS~~ VOICE MAIL) - I CALLED MIKE THIS MORNING AT 0800 - I INFORMED HIM OF MY NEED TO GET INTO PCO-3 - HE IMMEDIATELY ASKED IF HE COULD HAVE ANOTHER DAY TO GET THINGS TOGETHER - AND I ~~REFERRED~~ ~~MY PCO~~ REITERATED MY NEED TO GET INTO PCO-3 TODAY - HE SAID HE WOULD TRY - BUT I FEEL THAT HE WAS OVERALL QUITE UNRESPO

- HE DID TELL ME THAT HE WOULD HAVE SOME O BRING ME A KEY THAT I COULD PICK UP AT T TA-15 (M-2) GROUP OFFICE - HE ALSO SAID T PROTOCOL BEYOND THAT WOULD BE TO CALL A CELLULAR PHONE WITH US OUT THERE AND T

SAMPLING SUMMARY AND SITE IDs FOR PCO-S

WELL	SITE ID	SAMPLE TRIPPLE A #
PCO-1	36-2020	AAA 5953
PCO-2	36-2021	AAA5954, AAA 5955
PCO-3	36-2022	AAA5956

TRIP BLANK FOR 11/2/93 AAA5980

FIELD BLANK FOR 11/2/93 AAA 5981

TRIP BLANK FOR 11/3/93 AAA 5982

FIELD BLANK FOR 11/3/93 AAA 5983

AAA 5983 FIELD BLANK COLLECTED AT 111

1145 AAA 5982 TRIP BLANK COLLECTED

1200 ROCK HYS LABORATORY CALIBRATED THE HYS INSTRU
I WILL NOW CALIBRATE THE Ph AND CONDUC
MEETING

1210 ROCK CONDUCTS DAILY SITE SAFETY MEETING

6.4 depth to water from top of steel casing

1325 Temp 14°C
pH 6.8
Conductivity 1600 µmho } 25-30 gal

1340 Sample AAA5956
Temp. 16°C
pH 6.8
Cond. 1650

1400 SAMPLING COMPLETE - WE WILL CLEAN UP SITE PACKAGE SAMPLES AND DELIVER SAMPLES TO THE RAD VAN.

1500 WE DEPART SITE FOR THE RAD VAN.

1555 DROP SAMPLES AT RAD VAN

1615 - THE LAST OF THE SAMPLES WERE SIGNED OVER TO EM-9. - THIS COMPLETES THE FIRST PHASE OF WETLANDS/GROUNDWATER SAMPLING IN THREE MILE AND RAMSEY CANYONS FOR OU1093

— MERLE POWELL CALIBRATED THE "PANICKLE GM" THIS MORNING AND BRIAN BALL CALIBRATED THE H&S INSTRUMENTS THIS MORNING AS WELL, & CALIBRATED THE pH and DO INSTRUMENTS.—

THE SAMPLES WE WILL TAKE TODAY ARE:

PCO-1

AAA5984	ANALYTICAL SAMPLE/GW VERIFICATION SM
AAA5985	FIELD BLANK FOR 2/22/94
AAA5986	TRIP BLANK FOR 2/22/94

NOTE THAT AAA5984 WILL BE ANALYZED FOR TPH
— THIS IS TO MEET THE REQUEST OF THE CRA FOR THE SAMPLING PROGRAM BEING CONDUCTED AT TA-18 AS PART OF A TANK REMOVAL.—

1435 BRIAN CONDUCTS H&S MEETING

1445 BEGIN SAMPLING PCO-1
OVA reading in casing = 2.4 ppm (CH4)
R.Z. 2.4 ppm (CH4)

DTW - 2.7' from casing
TD - 13.3'
water column = 10.6'
purge vol. = 6.89 or ~ 7 gal

2/23/94

0800 ARRIVE AT ECF OFFICE - BRIAN AND MIKE MAKE CALIBRATIONS THE PH AND HP INSTRUMENTS - I CALLED BRET (CST-9) AND INFORMED TO DROP OFF YESTERDAYS SAMPLES AT THE RAD VAN AT 0900 -

0830 I CALLED GARETTE LUTAN (AT) AND INFORMED FOR THE PERIMETER KEY FOR PCO-3 - KEN WILL PICK IT UP (AT TA-15) EARLY THIS AFTERNOON.

0845 DEPART FOR RAD VAN.

0900 ARRIVE RAD VAN - AND TURN OVER SAMPLES TO CST-9 - WE WILL NOW HEAD OVER TO PCO-2

0930 ARRIVE AT PCO-2 -
- WE WILL SAMPLE PCO-2, AND TAKE A DUPLICATE HERE IF THERE IS ENOUGH WATER (ENOUGH RECHARGE). - THE SAMPLES WILL BE:

AAA 5987	THE ENVIRONMENTAL (GROUNDWATER) SAMPLE FOR PCO-
AAA 5988	EE GROUNDWATER SAMPLE DUPLICATE OF AAA 5987
AAA 9537	FIELD BLANK FOR 2/23/94
AAA 9538	TRIP BLANK FOR 2/23/94

0945 - I WILL CALIBRATE THE WATER QUALITY INSTRUMENTS (PH, TDS) -

0955 BRIAN CONDUCTS MHS MEETING

SAMPLES FOR PCO-3:

AAA 5987 - ENVIRONMENTAL GROUNDWATER SAMPLE
AAA 5988 - DUPLICATE OF AAA 5987
AAA 9537 - FIELD BLANK
AAA 9538 - TRIP BLANK

1230 OVA CASING READING FOR PCO-3 - 6 ppm above BKGD. - BZ - 1ppm (BKGD)

WATER LEVEL IN PCO-3 (OTW) => 3.9'
TD 18.9'
WATER ~~LEVEL~~ COLUMN - 15.0'
WELL BORE (PURGE) VOLUME = 10 gallon

1235 PUTTER RETURNS

TIME/VOL	pH	TEMP	COND	COMMENTS
1239/DRY	6.6	44°F	1480	WEAK TEA
1245/8-10 gallons	6.7	44°F	1470	SULFUR OD AFTER DRY

1255 - WELL BAILED DRY - 17 GALLONS HAVE BEEN PURGED TO THIS POINT

1257/17 GALLONS	6.7	44°F	1420

WE WILL TRY TO LET THE WELL RECOVER AND PURGE A TOTAL OF 3 VOLUMES

1325 30 gal pH-6.8 Temp 44°F Conduc 1390 turb, odor
Let well recover before sampling.

1335 AAA 5987

24 BB
2/25/94

1010 WE HAVE ARRIVED AT KIWI 1 TO SAMPLE THE LACET WELL. TODAY'S FIELD TEAM CONSISTS OF PETER GRAM (FTL) AND DAVID O'FLYNN (SAMPLING TECH.) OF TCF ICE, MIKE POOL (HPT) OF GDI AND BRIAN PAILS (SSO) OF IMK. - DAVE HAS REPLACED KEN ON THE JOB - (KEN HAS MOVED TO ANOTHER JOB SITE).

BRIAN PAILS CALIBRATED THE H&S INSTRUMENTS EARLIER THIS MORNING AND MIKE CALIBRATED THE HP INSTRUMENT. I WILL NOW CALIBRATE THE WATER QUAL. PARAMETER METERS

1015 TODAY WE WILL START WITH SAMPLING OF LACET MW-1. SAMPLES WILL BE:

AA 9539 - ENVIRONMENTAL GROUNDWATER SAMPLE
AAA 9540 - FIELD BLANK FOR 2/25/94
AAA 9541 - TRIP BLANK FOR 2/25/94

1020 I HAVE CALIBRATED THE INSTRUMENTS AND ARE ALL WILL CONTINUE SETTING-UP THE SAMPLING SITE

1025 BRIAN CONDUCTS H&S MEETING

DAVID, MIKE AND I WILL NOW GO SAMPLE MW1

LACET MW-1:

1030 Crew entered MW1
OVA - casing at 1.4 ppm (bkg)
BZ at 1.4 ppm (bkg)

2/24/94

Time	vol	pH	Temp	Conduc.	Comment
1415	init.	6.9	52°F	150	cloudy, trace of sediment
1422	1-2 gal	6.9	51°F	140	same
1427	2-3 gal.	6.8	52°F	140	Same
1432	3-4 gal	6.8	52°F	130	Same
1437	4-5 gal	6.8	52°F	140	Same

1440 AAA 9542 Sample collected

pH 6.8
temp 52°F
cond. 140

1455 SAMPLING OF MW-2 COMPLETE, WE WILL BREAKDOWN AND DO PAPERWORK.

1500 AAA9541 - TRIP BLANK COLLECTED

1515 AAA9540 - FIELD BLANK COLLECTED

1550 PAPERWORK AND SITE DEMOB COMPLETE, WE ARE PREPARED TO DEPART SITE AND HAVE CALLED THE GUARD TO COME GET US.

2/25/94

MW3 Water level

DTW - 17.4'

TD - 23.3'

~~Mix~~ 1st water col - 5.9'

purge vol. - 1 gal.

MW4 Water Level

DTW - 17.6'

TD - 26.1'

water col. - 8.5'

purge vol. - 1.4 gal

MW4

Time/vol	Temp	pH	condue	comments
1025/0-1gal	52°F	7.3	160	turbid sediment
1030/1-2gal	52°F	6.8	150	mildly turbid cloudy
1034/2-3gal	52°F	6.8	150	cloudy
1040/3-4	52°F	6.7	160	cloudy
1043/4-5	52°F	6.8	160	cloudy
1113/Sample	52°F	6.8	130	cloudy

MW3

Time/vol	pH	Temp	Condue	Co
1027/0-1gal.	7.2	52°F	150	
1032/1-2gal	6.8	52°F	140	
1037/2-3gal	6.8	52°F	160	
1034/sample	6.8	52°F	140	

1050 AAA 9543 Sample collected at MW3.

1110 AAA 9544 Sample collected at MW4.

1125 AAA 9545 Duplicate sample of MW4.

1135 AAA 9546 Field blank sample collected.

ICE SAMPLES

1200 SAMPLING COMPLETED, WELL DEMOB SITE, BREAK FOR LUNCH AND RETURN TO FINISH SAMPLE PACKAGING AND PAPER WORK.

1205 AAA 9547 - TRIP BLANK SAMPLE COLLECTED

7/7/1994

SPRING QUARTER OF GROUNDWATER SAMPLING FOR THE PCO SERIES AND LACGF SERIES WELLS NOW INCLUDING MW-5 AND MW-6 – OU1093.

0730 I ARRIVE AT THE OU1093 OFFICE TRAILER AT TA-27 TO BEGIN PREPARING FOR THE START OF THE SPRING QUARTER OF GROUNDWATER SAMPLING – I WILL WORK ON THE DATA BASE DEVELOPED BY JUDITH COHN TO CONFIGURE IT FOR THE GROUNDWATER SAMPLING EFFORT.

THE COMPLETE FIELD TEAM FOR THIS EFFORT CONSISTS OF:

PETER GRAM – FIELD TEAM LEADER (FTL) OF ICF KB
NICHOLAS HESCH – ALTERNATE FTL OF LANL
KEN McFADDEN – ~~SEAHE~~ SITE SAFETY OFFICER OF NK
JOHN TAYLOR – HEALTH PHYSICS TECHNICIAN OF BOI
NANCY NESS – SAMPLER – OF ICF KB
BERT TRUJILLO – SAMPLER – OF ICF KB
JEFF BOUCHAM – SAMPLER – OF LANL
AND CRISTY ABEYTA – SAMPLER/SITE SUPPORT OF LANL

7/7/1994

0915 KEN HAS ALREADY CALIBRATED HIS H&S INSTRUMENTS, JOHN HAS SOURCE CHECKED HIS HPT INSTRUMENTS AND I WILL CALIBRATE THE WATER QUALITY INSTRUMENTS AT THE SAMPLING LOCATION.-

0945 JOHN TAYLOR WILL MAKE THE TRIP TO GO TO HS-1 AND CALIBRATE HIS INSTRUMENTS (AS PART OF THE PERIMR-REQUIRED-WEEKLY CALIBRATION) - WE WILL DEPART TO MW-18 WHEN JOHN RETURNS -

~~0945~~ 1145 - JOHN RETURNS FROM HS-1.

1150 - WE ~~DEPART~~ DEPART TO MW-18.-

1215 - WE HAVE BEEN PROCESSED THROUGH THE SECURITY GATE. AND WE WILL NOW BREAK FOR LUNCH

1256 - WE MOBILIZE TO MW-5 AND BEGIN SITE SET UP

1:305 - KEN CONDUCTS THE TAILGATE SAFETY MEETING

1315 - I WILL NOW CALIBRATE THE WATER QUALITY METERS

1325 - BEGIN SAMPLING MW-5

[illegible]/1999

1500 - ARRIVE AT MW-6 - AND PREPARE TO SAMPLE.

MW-6 WELL DATA.

DEPTH TO WATER -	TOTAL DEPTH	VOLUME
8.9 ft	25.3 ft	3.116 gal

VOLUME 1	pH	7.1
0-3	conductivity	140
	temp	60°
VOLUME 2	pH	7.5
3-6	conductivity	150
	temp	~~60°~~ 59°
VOLUME 3	pH	7.1
6-9	conductivity	150
	temp	57°

~~1547~~ 1541 SAMPLE AAA 9561

pH	7.1
conductivity	180
temp	58°

~~1555~~ 1555 SAMPLING OF MW-6 COMPLETE - LOCK WELL ~~[illegible]~~ DEMOBILIZE THE SETUP AND RETURN TO THE OFFICE TRAILER TO PACKAGE SAMPLES AND COMPLETE PAPERWORK

1640 - SAMPLE PREP. COMPLETE - WELL DEPTH SAMPLES [illegible]

7/12/94

1015 SITE SET UP COMPLETE, BOTH SITES TOGETHER, - THE CREW WILL GET READY TO DO SAMPLE. DECK CONTOR (SITE SUPPORT / SAMPLER) ARRIVES

~~MW-1 DATA~~

1016 I WILL CALIBRATE THE WATER QUALITY INSTRUMENTS, KEN AND DOUG HAVE ALREADY CALIBRATED THEIR INSTRUMENTS

1020 KEN CONDUCTS FINAL DATE MONITORING.

MW-1 WELL DATA:

Depth to water	Total Depth	Volume
12.8 ft	25.4 ft	2.39 gal

Volume 1	pH	6.4
0-2.5	Conductivity	120
	Temp	56°
Volume 2	pH	6.8
2.5-5	Conductivity	120
	Temp	56°
Volume 3	pH	6.6
5-7.5	Conductivity	120
	Temp	56°

1130 SAMPLE AAA9563

pH	6.8
Conductivity	110
temp	58°

MW-3 well data:
Depth to water 14.4 ft Total Depth 23.3 Volume 1.69 gal

Volume 1 pH 7.1
0-2 conductivity 120
temp 56°

Volume 2
2-4 pH 7.3
conductivity 120
temp 55°

Volume 3 pH 7.4
conductivity 110
temp 55°

1443 Sample AAA 9566
pH 7.3
conductivity 100
Temp 55°

~~1500 SAMPLE COLLECTION COMPLETE GW~~

1453 FIELD BLANK AAA 9568 COLLECTED

1505 SAMPLE COLLECTION COMPLETED FOR THE DAY
WE WILL BREAK DOWN AND RETURN TO ~~MT 185~~ ZT
TO ACCLIFY SAMPLES AND COMPLETE PAPERWORK AND
PAPERWORK

1600 TRIP BLANK AAA 9569 COLLECTED

1605 ~~SAMPLE PROCESSING COMPLETE - DRIVE OUT~~

WELL DATA FOR MW-4
wellcover opened @ 8:33

DEPTH TO WATER	TOTAL DEPTH	VOLUME
13.5 ft	25.7 ft	2.318 gal

0840	Volume 1	pH	6.7
	0-2.5	conductivity	130
		temp	~~54~~ 55°
0849	Volume 2	pH	6.8
	2.5-5	conductivity	130
		temp	53°
0857	Volume 3	pH	6.8
	5-7.5	conductivity	140
		temp	52°
0906	Sample AAA 9566		
		pH	7.2
		conductivity	130
		temp	55°
0923	Sample AAA 9567		
		pH	7.2
		conductivity	130
		temp	55°

0935 - SAMPLE COLLECTION COMPLETE
WE WILL BREAK DOWN SITE AND RETURN TO MW-27
TO PREPARE SAMPLES

0950 SITE BREAK DOWN COMPLETE
[illegible]

7/26/94 (CONTINUED)

0940 JOHN HAS ALROKOY CALIBRATED HRS HP INSTRUMENTS AND KOW HAS CALIBRATED HRS H&S INSTRUMENTS.

0945 SAMPLING DATA FOR PCO- SERIES WELLS.

WELL	SITE ID	AAA #
PCO-1	36-2020	9571
PCO-2	36-2021	9572
PCO-2	36-2021	9573 (DUP OF 9572)
PCO-3	36-2022	9574

AAA9575 FIELD BLANK FOR 7/25/94
AAA9576 TRIP BLANK FOR 7/25/94

0950 KOW CONDUCTS H&S MEETING.

1000 Field team enters exclusion zone to start sampling

1010 PETER enters exclusion to help field team with sampling
Well data for PCO-1
Well cover opened @ 1013

depth to water 1.7ft to top of water
Total depth total depth ~~14ft~~ 13ft to the top of pvc piping
volume ~~23.43 gal~~ 7.68 gal

1013 Volume 1 pH 6.5
0-8 Conductivity 280
temp ~~60°~~ 63°

1030 Volume 2 pH 6.8
8-16 Conductivity 260
temp 60°

PK 9 M Dunn

7/26/94

1300 Dick Cordi & Victor Hoch left site to go to TA-36 to pick up key for PCO-3 fence

1318 due to extremely low recovery in the well the general minerals aliquot will not be collected

1340 AAA-1575 Sample - field blank taken

1346 sampling complete - field team entering the CRZ

1348 Victor Hoch and Dick Cordi arrived back at site

1350 site teardown started

1410 OBTAIN PCO-2 FOR PCO-3
NANCY WILL RETURN TO THE TRAILER TO ~~[illegible]~~ PROCURE CHAIN OF CUSTODY FORMS AND SAMPLE LABELS

1415 ARRIVE AT PCO-3 TO BEGIN SUB SET UP.

1430 KEN AND I POP THE LID ON PCO-3 TO SEE IF THERE IS WATER IN THE WELL.
- HNU READING FROM PCO-3 IS 0.2 ppm (BKGD)
- WELL IS DRY - WE WILL NOT SAMPLE PCO-3

1437 - WE OBTAIN PCO-3 FOR THE SUPPORT TRAILER
WE WILL PACKAGE SAMPLES AND COMPLETE PAPERWORK

1440 - WE WILL NOT COLLECT A DUPLICATE SAMPLE DUE TO PCO-2 BEING SO LOW IN WATER AND PCO-3 BEING DRY.
- THE DUPLICATE WAS TO BE COLLECTED AT PCO-2; HOWEVER,

7/27/94

WE WILL CONTINUE TO DO SURFACE SAMPLING AT
PA-27 - SEE VERBAL HOSCHE LOG FOR INFO

0750 I CALLED KYLE GITY OF CET-4 TO INFORM HIM
THAT SAMPLE AAA 9571, (FROM PCO-1) REQUIRES
A DETECTION LIMIT OF < 1 PPB FOR BENZO-A
PYRENE AND < 10 PPB FOR NAPHTHALENE —
THIS INFO WAS NOT INCLUDED ON THE COC —
BUT KYLE ASSURED ME THAT HE WOULD GET THIS
INFO INCLUDED WITH THE SAMPLES PRIOR TO SHIPPING
TODAY —

OU 1093 SURFACE SAMPLING TEAM

SOIL & MONITOR FIELD LOG CY 1994

6/9/1994

2

THERE WERE POL LOCATED 1630 WE HAVE:

1631

1630

1633 1632 1636 1637 N

1634

1635

1126 TEMP 80° F

~~AAA~~

1109 AAB 5774 1115

5775 1121

5776 1126

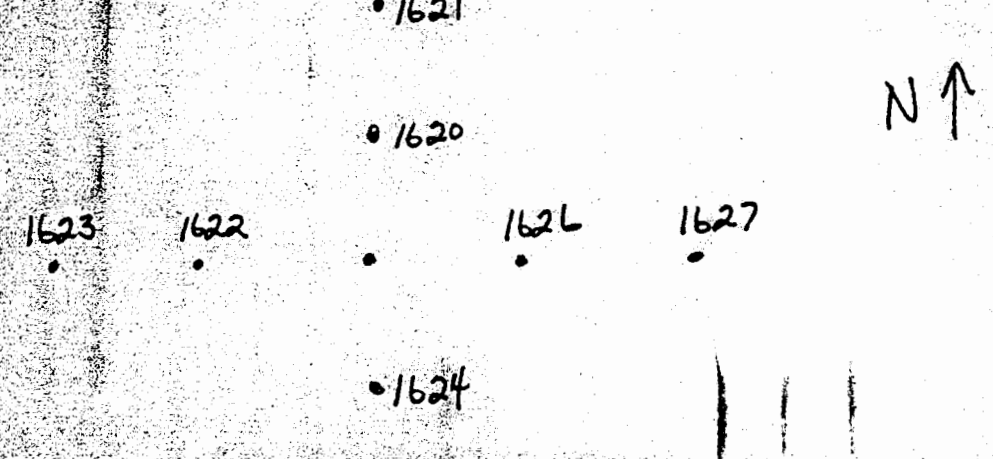
5777 1131

5778 1136

6/9/1994

SAMPLE COLLECTION TIMES FOR LOCALE 1620

✓ ☆	AAB5165	COLLECTED AT → TIME	1452
✓ ☆	AAB5166	"	1457
✓ ☆	AAB5167	"	1500
✓ ☆	AAB5168	"	1505
✓ ☆	AAB5169	"	1509
✓ ☆	AAB5170	"	1514
✓ ☆	AAB5171	"	1519
✓ ☆	AAB5172	"	1523



6/10/77

SAMPLE COLLECTION TIMES FOR LOCATE 1550

AFB AAB #	SITE ID NUMBER	COLLECTION
✓ AAB 5100	1550	1344
✓ AAB 5101	1551	1344
✓ AAB 5102	1552	1358
✓ AAB 5103	1553	1403
✓ AAB 5104	1554	1408
✓ AAB 5105	1555	1413
✓ AAB 5106	1556	1418
✓ AAB 5107	1557	1424

ALSO SAMPLED LOCATE 1510 - ON 6/10

COLLECTION TIMES ADD TO THE RECORDED

6/19/94

SAMPLE COLLECTION TIMES FOR PRS 27-003

~~AAB 5194~~

SAMPLE #	SZB ID #	COLLECTION TIME
☆ AAB 5194	27-1692	1140
☆ AAB 5195	27-1693	1152
☆ AAB 5196	27-1694	1200
☆ AAB 5197	27-1695	1210
☆ AAB 5198	27-1696	
☆ AAB 5199	27-1697	
AAB 5200	27-1697	

6/15/1994

SAMPLE COLLECTION TIMES FOR LOCALE 1450

AAB #	SITE ID #	COLLECTION TIME
☆ AAB5004	1450	~~1400~~ 1548
☆ AAB5005	1451	1555
☆ AAB5006	1452	1600
☆ AAB5007	1453	1605
☆ AAB5008	1454	1610
☆ AAB5009	1455	1616
☆ ~~AAB5010~~ AAB5010	1456	1621
☆ AAB5011	1457	1627

6/16/94

SAMPLE COLLECTION TIMES FOR LOCATION 1670

AAB #	SITE ID #	COLLECTION #
5756	1670	1340
5757	1611	1348
5758	1612	1353
5759	1613	1357
5760	1614	1407
~~5760~~ 5761	1615	1406
~~5763~~ 5762	1616	1412
5763	1617	1417

SAMPLE COLLECTION TIMES FOR LOCATION 1640

AAB #	SITE ID #	COLLECTION #
5783	1640	1457
5784	1641	1458
5785	1642	1503
5786	1643	1508
5787	1644	1512
5788	~~1640~~ 1645	1516
5789	~~1641~~ 1646	1521
5790	1647	1526

6/20/94

WE WILL SAMPLE LOCATIONS 1560 AND 1520 TODAY AND TRY TO BEAT THE RAIN

SAMPLE COLLECTION TIMES FOR LOCATION 1560

SAMPLE AAB#	SITE ID #	COLLECTION
5110	1560	
5111	1561	
5112	1562	
5113	1563	
5114	1564	
5115	1565	
5116	1566	
5117	1567	

WE DID NOT BEAT THE RAIN - WE'LL TRY TO COLLECT LOCATION 1520 TOMORROW.-

6/22/94

WE WILL SAMPLE IN THE MOST MOVE (WEST) OF KIWA-2 TODAY - IN THREE MILE CANYON - WE ARE DOWNED BY RANDY'S AND TYSON'S CREW - THEY WILL BE SAMPLING INSIDE THE PIT AS OF KIWA-2 - WE WILL SAMPLE LOCALES 1400 AND 1410 THIS MORNING

SAMPLE COLLECTION TIMES FOR LOCALE 1410 - 1410 NOT COLLECTED DUE

AAB #	SITE ID #	COLLECTION TIME
4967	1410	
4968	1411	
4969	1412	
4970	1413	
4971	1414	
4972	1415	
4973	1416	
4974	1417	

SAMPLE COLLECTION TIMES FOR LOCALE 1400

AAB #	SITE ID #	COLLECTION TIME
4957	1400	
4958	1401	
4959	1402	
4960	1403	
4961	1404	
4962	1405	
4963	1406	
4964	1407	

OU 1130 DAY - MET WITH
STEPHEN DE PAULA
OF DX-11 TODAY

2/28/97

WE WILL COLLECT FIXED LAB SAMPLES (COMPOSITE SAMPLES) - FOR LOCALES 1550 AND 1540 TODAY.

SAMPLE COLLECTION TIMES FOR LOCALE 1550

AAB#	SITE ID #'S	COLLECTION TIME
5108		
~~5108~~ 5109		

SAMPLE COLLECTION TIMES FOR LOCALE 1540

AAB#	SITE ID #'S	COLLECTION TIME
5099		

6/30/94

WE WILL RETURN TO THE KOWA 3 AREA OF TA-18, TO CONTINUE SCREENING SAMPLE THE VARIOUS DITCHES AND OUTFALLS / AREAS, -010, OR, AND IN THIS AREA.

WE WILL BEGIN WITH THE SCREENING SAMPLES BELOW THE 18-003(e) OUTFALL.

SAMPLE COLLECTION TIMES FOR 18-003(e)

AABH	SITE ID #	COLLECTION TIME
5270		
5271		
5272		
5273		

WE WILL NOW SAMPLE THE MOST OUTSIDE 3 SAMPLES IN THE DITCH ASSOCIATED WITH OUTFALL 18-010(b) - WE WILL COLLECT THESE 3 SAMPLES BECAUSE THEY ARE ALL EAST OF THE OTSLO TRAIL AND WE CAN REACH THEM W/O MOVING OUR RIG.

COLLECTION TIMES FOR 3 18-010(b) DITCH SAMPLES

AABH	SITE ID #	COLLECTION TIME
5212		
5213		
5214		

6/31/1994

WE WILL NOT SAMPLE TODAY

7/5/1994

THE TEAM WILL NOW SAMPLE BELOW OUTFALL 18-012(b)

SAMPLE COLLECTION TIMES FOR ~~18-011~~ 18-012(b) SCREENING SAMPLES:

AREA	SITE ID #	COLLECTION TIME
5288	1666	
5289	1667	
5290	1668	
5291	1669	

THE TEAM WILL NOW SAMPLE THE 18-010(c) SURFACE DRAINAGE SCREENING SAMPLES

SAMPLE COLLECTION TIMES FOR ~~18-100~~ 18-010(c)

AREA #	SITE ID #	COLLECTION TIME
5223	1724	
5224	1725	
5225	1726	
5226	1727	

7/6/1994

SAMPLE COLLECTION TIMES FOR LOCALE 1570

AAB#	SITE ID #'s	COLLECTION TI
5127	1570	
	1572	
	1573	
	1576	

SAMPLE COLLECTION DATA FOR LOCALE 1580

AAB#	SITE ID #'s	COLLECTION TI
5136	1580	
	1581	
	1583	
	1584	

- WE WILL STOP SAMPLING NOW AND PREPARE TO SAMPLE GROUNDWATER FROM THE NEW SERIES WELLS TOMORROW

7/8/94

WE WILL RETURN TO TK-18, KEWA 1 AREA

TO CONTINUE 18-002(a) SCREENING SAMPLES

WE WILL SAMPLE AT SAMPLING LOCATIONS 1310 AND 1320

SAMPLE COLLECTION DATA FOR LOCATION 1310

AAB#	SITE ID #	COLLECTION TIME
4863	1310	
4864	1311	
4865	1312	
4866	1313	
4867	1314	
4868	1315	
4869	1316	
4870	1317	

SAMPLE COLLECTION DATA FOR LOCATION 1320

AAB #	SITE ID #	COLLECTION TIME
4872	1320	
4873	1321	
4874	1322	
4875	1323	
4876	1324	
4877	1325	

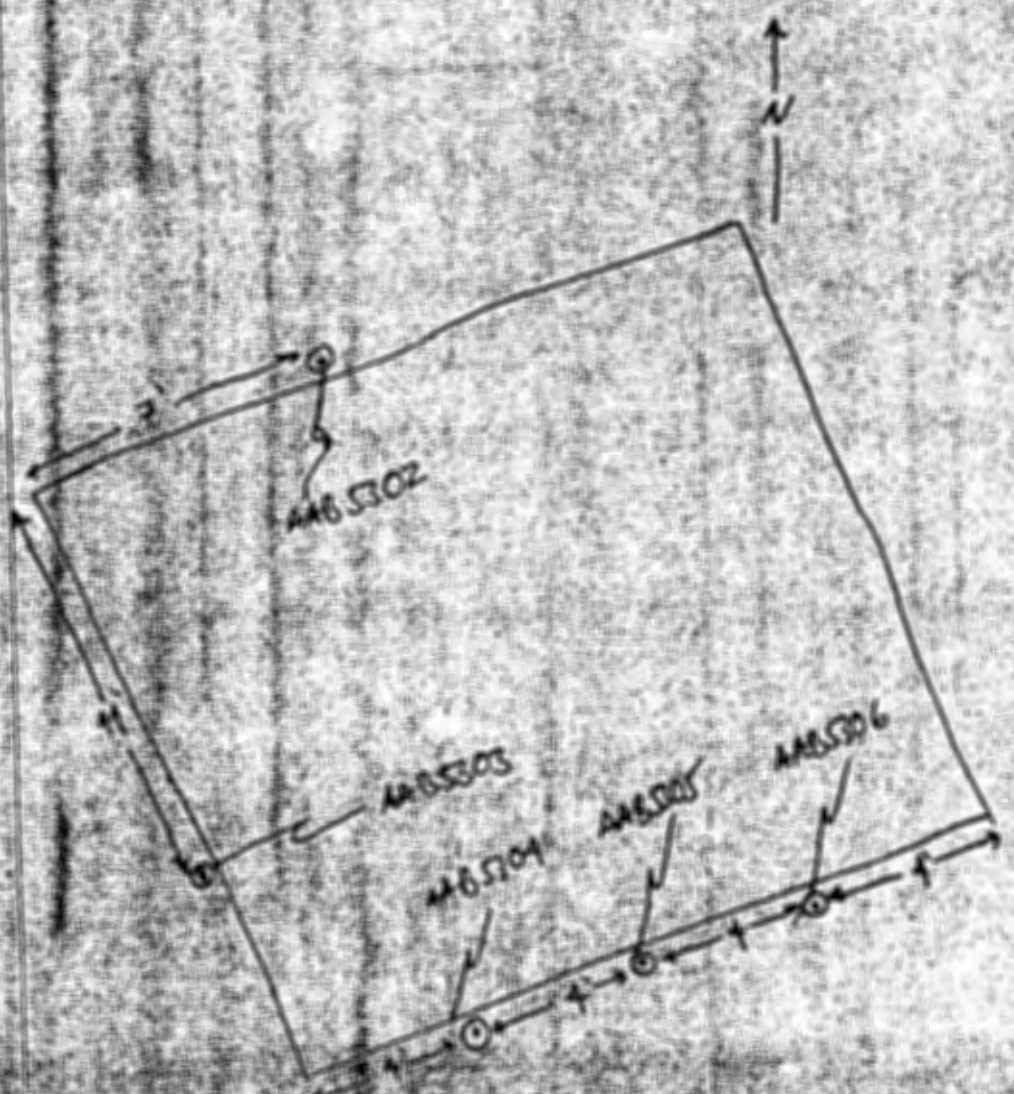
7/12/94

WE WILL SAMPLE THE LAST OF SOIL GAS WELLS TODAY - SEE MY GROUNDWATER LOG BOOK.

7/05/94

WE WILL SEARCH AROUND THE PRS 18-011 ROCKET GENERATOR BUILDING PAD AT TA-18. WE WILL BE SEARCHING FOR MERCURY AND RAD SENSITIVE. THE SAMPLES WILL BE PROCESSED WITHIN THE HOURS (W) BE SUBMITTED TO CST-9 WITH THE ATTACHED SPECIAL NOTICE.

SAMPLING DATA FOR PRS 18-011



3/16/09

OUTPO OVERALL MISSIONS.

7/26/09

- WE WILL SAMPLE THE PCO SENTRY WELLS TODAY
SEE MY GROUNDWATER LOG BOOK

7/27/94

SHIPPING DATA FOR LOCKER 1520

MAG#	SITE 20 #s	LOCKER TRAY
5080	27-1521	1375
	27-1523	
	27-1525	
	27-1527	

8/1/94

SAMPLING DATA FOR LOCATION 1370

AAB#	SITE ID#	COLLECTION TOTAL

SAMPLING DATA FOR LOCATION 1380

AAB	SITE ID#	COLLECTION TOTAL

8/2/44

SAMPLE COLLECTION DATA FOR LOCALE 1300

AAB#	SITE-ID #	COLLECTION TIME
4853	1300	
4854	1301	
4855	1302	
4856	1303	
4857	1304	
4858	1305	
4859	1306	
4860	1307	

8/17/92

SAMPLE COLLECTION DATA FOR LOCALE 1590

AAB#	SITE ID #	COLLECTION DA
5145	1591	1400
	1593	1415
5146	1594	
	1595	

SAMPLE COLLECTION DATA FOR LOCALE 1560

AAB#	SITE ID #	COLLECTION DA
5118	1562	1440
	1564	
	1565	
	1566	

THIS COMPLETES ALL SAMPLING (FIXED LAB & SCREENING
FOR PRS 27-002

8/19/94

WE WILL SAMPLE THE MAGTHERE SITE PRS 18-005a TODAY - WE WILL COLLECT FIVE ANALYTICAL SAMPLES - USING THE HAND AUGER - SAMPLES WILL BE COLLECTED FROM A DEPTH OF 0-12".

PRS 18-005a SAMPLE DATA

AAB #	SITE ID #	COLLECTION TIME
5297	1670	
5298	1671	
5299	1672	
5300	1673	
5301	1674	

8/19/94

8/23/99

WE WILL SAMPLE THE UPSTREAM DITCH ASSOCIATED WITH OUTFALL PRS - 18-010(b) - NOTE: WE COLLECTED TOW SCREENING SAMPLES FROM BELOW THE OUTFALL - ~~10/7~~ 4/23/99 THESE SAMPLES WERE SUPPOSED TO HAVE BEEN COLLECTED FROM THE DITCH UPSTREAM THE OUTFALL. THEREFORE THE SAMPLES DO NOT HAVE THE CORRECT SCREENING SAMPLES FOR ~~18-100~~ 18-010(b) OUTFALL - NEW LAB NUMBERS AND ~~SAS~~ ID NUMBERS HAVE BEEN ASSIGNED FOR THOSE SAMPLES - AND ANALYTICAL SAMPLES (PRIMO LAB SAMPLES) WILL BE SELECTED BASED ON THOSE BW SAMPLES. - FURTHER, RANDY MINNICK (NEW COLLECTED THE 2 ANALYTICAL (PRIMO LAB) SAMPLES FROM BELOW THE OUTFALL - WITHOUT COLLECTING SCREENING SAMPLES ~~BY OVERSIGHT~~ WITHOUT KNOWING TO BUY THE PROPER SAMPLE ~~COLLECTION TODAY~~ 8/23/99 LOCATIONS ON THEREFORE, WE WILL NOT COLLECT NEITHER THE SCREENING SAMPLES (AS ANALYTICAL SAMPLES HAVE ALREADY BEEN SELECTED) NOR THE PRIMO LAB SAMPLES (AS RANDY CREW HAS ALREADY COLLECTED THEM).

8/24/91

WE WILL GO UP TO KRUK 2 MEGA PRS 78-002(b), TO CONTINUE SCRUBBING SAMPLING. WE WILL SAMPLE LOCALES 1470 AND 1480

SAMPLE DATA FOR LOCALE 1470

AAB#	SITE ID #	COLLECTION TIME
5024	1470	
5025	1471	
5026	1472	
5027	1473	
5028	1474	
5029	1475	
5030	1476	
5031	1477	

SAMPLE COLLECTION DATA FOR LOCALE 1480

AAB#	SITE ID #	COLLECTION T
5033	1480	
5034	1481	
5035	1482	
5036	1483	
5037	1484	
5038	1485	
5039	1486	
5040	1487	

8/25/94 (CONTINUED)

SAMPLE COLLECTION DATA FOR LOCALE 1500

AAB #	SITE ID #	COLLECTION TIME
5051	1500	
5052	1501	
5053	1502	
5054	1503	
5055	1504	
5056	1505	
5057	1506	
5058	1507	
~~5054~~ 8/28/94		

8/30/99

THE TEAM COLLECTED FIXED LAB SAMPLES (BASED ON SCREENING RESULTS FROM PRS 18-010(c), 18-012(a), 18-012(b), KEWT 3 AREA TA-18

SAMPLE COLLECTION DATA FOR PRS 18-010(c)

AAB#	SITE ID #	COLLECTION TIME
5227	1724	0932 ~~8/30~~ 8/31/99
5228	1727	0919

SAMPLE COLLECTION DATA FOR PRS 18-012(b)

AAB#	SITE ID #	COLLECTION TIME
5292	1666	1006
5293	1667	1027
5294 (DUP OF 5293)	1667	1027

SAMPLE COLLECTION DATA FOR PRS 18-012(a)

AAB#	SITE ID #	COLLECTION TIME
5286	1662	1220
5287	1664	1237

11/10/99

SOIL SAMPLING AT OU1093 TA-18.

0830 FIELD TEAM FOR DAYS ACTIVITIES: PETER GRAHAM (ICF KE) FIELD TEAM LEADER, ROBERT SPAUB (OF MK), SSO, JOHN TAYLOR (OF ED;) HPT, NANCY NBIS (OF ICF KE) DWIGHT BATZELL (OF ICF KE) AND JEFF BINGHAM (OF LANL) SAMPLING TECHNICIANS.

0835 THE TEAM ARRIVES AT TA-18 - THE OU1130/OU1093 SAMPLING TEAM PLANNED TO DRILL IN THE OU1130 PRS 36-003(a) LATCH PROJ TODAY; HOWEVER, NO SECURITY POLICE OFFICER WAS AVAILABLE TO ACCOMPANY THE TEAM. THEREFORE, THE TEAM WILL WORK IN TA-18 OU1093 TODAY IN AN AREA ~~OU 99~~ THAT DOES NOT REQUIRE A PELA ESCORT.

0900 NANCY AND I DRIVE TA-18 TO GO BACK TO ICF TO GET OU1093 POLES, PAPERWORK AND ADDITIONAL EQUIPMENT NECESSARY FOR SURFACE SOIL SAMPLING AT 1093. THE REST OF THE TEAM WILL STAY BACK AND BEGIN SITE SET UP.

~~99 11/9/99~~
0 11/10/99

1020 NANCY AND I ARRIVE BACK AT OU1093. WE WILL FINISH SITE SET UP AND PREPARE TO SAMPLE THE 18-010(d) DRAINAGE DITCH.

1025 BOB HAS ALREADY CALIBRATED HIS HIS INSTRUMENT (PID); JOHN HAS COMPLETED HIS INSTRUMENT CALIBRATION (ALPHA-RAY CALITOR AND RANGER GM) - NANCY AND I WILL GO OVER THE RESULTS FROM THIS FOUR

11/1/94 (CONT.)

1135 JOHN WILL SMEAR THE SAMPLES AND SAMPLING EQUIPMENT FOR EQUIPMENT RELEASE AND WATER CHARACTERIZATION.

1140 ALL SMEARS USING ABSORBENT SAMPLE AND EQUIPMENT DECON COMP 11/1/94 IS WITNESSED.

1147 DECON IS COMPLETED BY 11/1/94 ~~TEAM IS~~ BY 11/1/94 WE WILL NOW BREAK DOWN THE SITE AND MOVE TO THE 18-003(c) SEPTIC TANK OUTFALL.

1210 - WE WILL WAIT TO GET A BUNDO TO GET US THROUGH THE KWA 3 PENS SO THAT WE CAN GET TO 003(c)

1225 - ARRIVE AT 003(c). - WE WILL BREAK FOR A SHORT LUNCH

1260 - TEAM RESUMES CRZ TO SUIT UP.- 2 SAMPLES WILL BE COLLECTED FROM BELOW THE 18-003(c) OUTFALL

SAMPLE COLLECTION DATA FOR FIELD LAB ANALYSIS - 18-003(c)

SAMPLE #	SITE ID #	COLLECTION TIME
AAB 5274	18-1654	
AAB 5275	18-1655	

THESE LOCATIONS WERE SELECTED BASED ON THE SCREENING DATA AND CORRESPOND TO THE 2 MOST UPSTREAM SCREENING SAMPLE LOCATIONS (~~JUST BELOW~~ 11/10/94 DIRECTLY BELOW THE OUTFALL AND APPROXIMATELY 8 FEET DOWN STREAM)

11/10/84

QUICK AT THE TA-27 OFFICE TRAILER

1415 DEPART SITE FOR TA-27 OFFICE TRAILER - WE WILL STOP AND PRESERVE THE LUCIATE QUICK LOOKS REQUIRED ALONG THE WAY (AT THE TA-18 TRAIL POSITIONS).

1420 SAMPLE PRESERVATION COMPLETE - WE DEPART FOR TA-27

1425 ARRIVE AT TA-27 TO DELIVER SAMPLE PACKETS

DS-1

Los Alamos National Laboratory Environmental Restoration
Well Completion Information Form

Item # 27

Page 1 of

Technical Area TA-18
Operable Unit 1093
Signature [signature]

Site Work Plan RFI WORK PLAN - OU 1093
Inclusive Sample Identifier: TA-18-1060
AAB 2435 to 2442
Date 11-15-94

Owner LANL
Installer Stewart Brothers
Installation Date 8/1/94
Filter Pack Length (ft) 29
Well Type Classification M

KEN HAVE ALREADY CALIBRATED THEIR H&S AND HP INSTRUMENTS.

0955 NANCY ARRIVES AT SITE TO PICK UP THE RAD VAN ALIQUOT FROM THE REMOTE SAMPLE - SHE WILL LABEL AND DESCRIBE THE SAMPLE AND WILL RETURN FOR THE OTHER REMOTE ALIQUOTS AFTER DELIVERING RAD VAN ALIQUOT -

1005 I WILL LEAVE THE CRZ AND ACTIVATE THE APPROPRIATE ALIQUOTS FROM THE RB.

11/21/94

1010 JEFF AND DWIGHT WILL PERFORM DECON AND SLIGHT DEMOBILIZATION. NANCY WILL CONDUCT AMBIENT SOME RAD SURVEYS AND SMEARS PRIOR TO DECON FOR OUTSIDE CHARACTERIZATION. WHEN HE FINISHES HE, KEN, AND BART WILL GO COLLECT THE PHOTO OUTFALL SAMPLES.

1020 KEN, BART AND MANLEY DEPART TO COLLECT PHOTO OUTFALL SAMPLES - DWIGHT AND JEFF CONTINUE SLIGHT DEMOB AND DECON WORK.

1035 - SAMPLERS FROM RETURNS - WITH PHOTO OUTFALL SAMPLES

1100 NANCY AND CHARISSE RETURN TO PICK UP THE REMAINING RB ALIQUOTS

1105 NANCY AND CHARISSE - PROCESS ~~SAMPLES~~ 11/21/94 (LABEL ETC.) AND DISCHARGE SAMPLES - REST OF CREW WILL CONTINUE SITE DEMOB.

MW-11

Los Alamos National Laboratory Environmental Restoration
Well Completion Information Form

Site Work Plan EFI Work Plan - OU 1093

Technical Area TA-18

Inclusive Sample Identifier: TA-18-1275

Operable Unit OU-1093

AHB 4690 to 4696

Signature [signature]

Date 9-15-94

Owner LANL

Installer Stewart Brothers

Installation Date 8/1/94

Filter Pack Length (ft) 24

Well Type Classification M

Formation of Completion (US/RC)) Alluvium

Well Completion Method S

Zone of Completion D

Casing Elevation (ft MSL) 6740.13

Open/Screen Depth (FTFD)* 28

Casing Depth (ft) 47

Open/Screen Length (ft) 20

Casing Diameter (in.) 2

Open/Screen Area (in/ft)

Seal End Depth (FTFD) 47

Flow Relationship D

Screen Material PVC

Cap Material

Riser Material PVC

Cap Type LC

WELL TYPE CLASSIFICATIONS

M - Monitor Well
P - Production Well
T - Test Well
O - Other (specify) _____

FLOW RELATIONSHIP

U - Upgradient
D - Downgradient
C - Cross Gradient
O - Onsite
N - Not known
B - Background

CAP TYPE

LC - Locking
SL - Slip-on
TR - Threaded
NO - None
SC - Screw-on
OT - Other (specify) _____

WELL COMPLETION METHODS

C- Porous Concrete
F - Gravel Pack
H - Horizontal Galley
O - Open End
P - Perforated/Slotted
S - Screen
T - Sand Front
W - Walled
X - Open
O - Other (specify) _____

CAP MATERIALS

CT - Concrete
CR - Copper
FI - Fiberglass
GI - Galvanized Iron
WI - Wrought Iron
SS - Stainless Steel
OM - Other Material
TE - Teflon
PV - PVC
RK - Rock or Stone
ST - Steel
TI - Tile
CS - Coated Steel
WD - Wood
NO - None
OT - Other (specify) _____

ZONES OF CONCERN

A - Artesian
C - Confined
H - Aequitard
G - Aquiclude
M - Multisystem
S - Semi-confined
U - Unconsolidated

* FTFD = feet from datum.

SOP 10 R035.1

MW-7

Los Alamos National Laboratory Environmental Restoration
Well Completion Information Form

Site Work Plan RFI Work Plan OU 1093

Technical Area TA-18

Inclusive Sample Identifier: TA-18-1135

Operable Unit 1093

HAB 4505 to 4518

Signature [signature]

Date 11-15-94

Owner LANL

Installer Stewart Brothers

Installation Date 7/6/94

Filter Pack Length (ft) 24

Well Type Classification M

Formation of Completion (US/RC)) Alluvium

Well Completion Method S

Zone of Completion A

Casing Elevation (ft MSL) 6755.5

Open/Screen Depth (FTFD)* 8

Casing Depth (ft) 30

Open/Screen Length (ft) 20

Casing Diameter (in.) 2

Open/Screen Area (in^2/ft)

Seal End Depth (FTFD) 30

Flow Relationship D

Screen Material Sch 40 PVC

Cap Material

Riser Material Sch 40 PVC

Cap Type LC

WELL TYPE CLASSIFICATIONS

M - Monitor Well
P - Production Well
T - Test Well
O - Other (specify) _____

FLOW RELATIONSHIP

U - Upgradient
D - Downgradient
C - Cross Gradient
O - Onsite
N - Not known
B - Background

CAP TYPE

LC - Locking
SL - Slip-on
TR - Threaded
NO - None
SC - Screw-on
OT - Other (specify) _____

WELL COMPLETION METHODS

C- Porous Concrete
F - Gravel Pack
H - Horizontal Galley
O - Open End
P - Perforated/Slotted
S - Screen
T - Sand Front
W - Walled
X - Open
O - Other (specify) _____

CAP MATERIALS

CT - Concrete
CR - Copper
FI - Fiberglass
GI - Galvanized Iron
WI - Wrought Iron
SS - Stainless Steel
OM - Other Material
TE - Teflon
PV - PVC
RK - Rock or Stone
ST - Steel
TI - Tile
CS - Coated Steel
WD - Wood
NO - None
OT - Other (specify) _____

ZONES OF CONCERN

A - Artesian
C - Confined
H - Acquitard
G - Aquiclude
M - Multisystem
S - Semi-confined
U - Unconsolidated

* FTFD = feet from datum.

SOP 5.01 RC 3.9.2

MW-8

Los Alamos National Laboratory Environmental Restoration
Well Completion Information Form

Site Work Plan RFI Work Plan OU 1093

Technical Area TA-18

Inclusive Sample Identifier: TA-18-1166

Operable Unit 1093

AAB 4555 to 4561

Signature [signature]

Date 11-15-94

Owner LANL

Installer Stewart Brothers

Installation Date 8/4/94

Filter Pack Length (ft)	34	Well Type Classification	M
Formation of Completion (US/RC))	Alluvium	Well Completion Method	S
Casing Elevation (ft MSL)	6747.79	Zone of Completion	U
Casing Depth (ft)	38	Open/Screen Depth (FTFD)*	6
Casing Diameter (in.)	2	Open/Screen Length (ft)	30
Seal End Depth (FTFD)	38	Open/Screen Area (in²/ft)	
Screen Material	PVC Sch 40	Flow Relationship	D
Riser Material	PVC Sch 40	Cap Material	
		Cap Type	LC

WELL TYPE CLASSIFICATIONS

M - Monitor Well
P - Production Well
T - Test Well
O - Other (specify) _____

FLOW RELATIONSHIP

U - Upgradient
D - Downgradient
C - Cross Gradient
O - Onsite
N - Not known
B - Background

CAP TYPE

LC - Locking
SL - Slip-on
TR - Threaded
NO - None
SC - Screw-on
OT - Other (specify) _____

WELL COMPLETION METHODS

C- Porous Concrete
F - Gravel Pack
H - Horizontal Galley
O - Open End
P - Perforated/Slotted
S - Screen
T - Sand Front
W - Walled
X - Open
O - Other (specify) _____

CAP MATERIALS

CT - Concrete
CR - Copper
FI - Fiberglass
GI - Galvanized Iron
WI - Wrought Iron
SS - Stainless Steel
OM - Other Material
TE - Teflon
PV - PVC
RK - Rock or Stone
ST - Steel
TI - Tile
CS - Coated Steel
WD - Wood
NO - None
OT - Other (specify) _____

ZONES OF CONCERN

A - Artesian
C - Confined
H - Aquitard
G - Aquiclude
M - Multisystem
S - Semi-confined
U - Unconsolidated

* FTFD = feet from datum.

Los Alamos National Laboratory Environmental Restoration
Well Completion Information Form

Technical Area TA-18
Operable Unit 1093
Signature [illegible]

Site Work Plan [illegible] - OU 1093
Inclusive Sample Identifier: TA-18-1234
AAB 9634 to 4639
Date 11-15-94

Owner LANL
Installer Stewart Brothers
Installation Date 7/21/94

Filter Pack Length (ft)	19	Well Type Classification	M
Formation of Completion (US/RC))	Alluvium	Well Completion Method	S
Casing Elevation (ft MSL)	6732.91	Zone of Completion	U
Casing Depth (ft)	21	Open/Screen Depth (FTFD)*	5
Casing Diameter (in.)	2	Open/Screen Length (ft)	15
Seal End Depth (FTFD)	21	Open/Screen Area (in²/ft)	
Screen Material	PVC	Flow Relationship	D
Riser Material	PVC	Cap Material	
		Cap Type	

WELL TYPE CLASSIFICATIONS

M - Monitor Well
P - Production Well
T - Test Well
O - Other (specify) _____

FLOW RELATIONSHIP

U - Upgradient
D - Downgradient
C - Cross Gradient
O - Onsite
N - Not known
B - Background

CAP TYPE

LC - Locking
SL - Slip-on
TR - Threaded
NO - None
SC - Screw-on
OT - Other (specify) _____

WELL COMPLETION METHODS

C- Porous Concrete
F - Gravel Pack
H - Horizontal Galley
O - Open End
P - Perforated/Slotted
S - Screen
T - Sand Front
W - Walled
X - Open
O - Other (specify) _____

CAP MATERIALS

CT - Concrete
CR - Copper
FI - Fiberglass
GI - Galvanized Iron
WI - Wrought Iron
SS - Stainless Steel
OM - Other Material
TE - Teflon
PV - PVC
RK - Rock or Stone
ST - Steel
TI - Tile
CS - Coated Steel
WD - Wood
NO - None
OT - Other (specify) _____

ZONES OF CONCERN

A - Artesian
C - Confined
H - Aquitard
G - Aquiclude
M - Multisystem
S - Semi-confined
U - Unconsolidated

* FTFD = feet from datum.

SOP 11 [illegible]

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MW-10

Los Alamos National Laboratory Environmental Restoration
Well Completion Information Form

Site Work Plan RFI Workplan OU 1093

Technical Area TA-18

Inclusive Sample Identifier: TA-18-1255

Operable Unit 1093

4673 to 4678

Signature

Date 11-15-94

Owner LANL

Installer Stewart Brothers

Installation Date 8/10/94

Filter Pack Length (ft) 14

Well Type Classification M

Formation of Completion (US/RC)) Alluvium

Well Completion Method S

Zone of Completion U

Casing Elevation (ft MSL) 6735.90

Open/Screen Depth (FTFD)* 10

Casing Depth (ft) 20

Open/Screen Length (ft) 10

Casing Diameter (in.) 2

Open/Screen Area (in²/ft)

Seal End Depth (FTFD) 20

Flow Relationship D

Screen Material PVC

Cap Material

Riser Material PVC

Cap Type LC

WELL TYPE CLASSIFICATIONS

M - Monitor Well
P - Production Well
T - Test Well
O - Other (specify) _____

FLOW RELATIONSHIP

U - Upgradient
D - Downgradient
C - Cross Gradient
O - Onsite
N - Not known
B - Background

CAP TYPE

LC - Locking
SL - Slip-on
TR - Threaded
NO - None
SC - Screw-on
OT - Other (specify) _____

WELL COMPLETION METHODS

C- Porous Concrete
F - Gravel Pack
H - Horizontal Galley
O - Open End
P - Perforated/Slotted
S - Screen
T - Sand Front
W - Walled
X - Open
O - Other (specify) _____

CAP MATERIALS

CT - Concrete
CR - Copper
FI - Fiberglass
GI - Galvanized Iron
WI - Wrought Iron
SS - Stainless Steel
OM - Other Material
TE - Teflon
PV - PVC
RK - Rock or Stone
ST - Steel
TI - Tile
CS - Coated Steel
WD - Wood
NO - None
OT - Other (specify)

ZONES OF CONCERN

A - Artesian
C - Confined
H - Acquitard
G - Aquiclude
M - Multisystem
S - Semi-confined
U - Unconsolidated

* FTFD = feet from datum.

SOP 5.0 RC 3.5.6

RFP 2975, Tab 26
Core Sample Logs, 81 pages

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | **CORE SAMPLE LOG**

Borehole ID TA-28-[illegible] TA/OU 10-13 Drill Depth From 0' To 37' Page 1 of 4
Driller [illegible] Box #(s) N/A Start Date/Time 11/15 End Date/Time 1:10
Drilling Equip./Method CME-45 Sampling Equip./Method Cont. Core Barrel

Depth (Feet)	Recovery (Feet or %)	Field Screening Results (Units)	Field Screening Results (Units)	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0	100%	N/A	N/A	N/A	Silty Sand (Fine)			[illegible]
1	60%				Gravelly Sand (Fine to Coarse) w/ Cobbles			
4	80%				Gravelly Sand ~~(Fine to Coarse)~~ w/ Large Cobbles			Mostly Gravel from Silty 2
					Gravelly Sand (Fine to Coarse) w/ Cobbles			
6	100%				Sandy Silt w/ Gravel (lt. Brown)			less moist
8					Silty Sand w/ Cobbles			moist
					Silty Sand w/ Cobbles			moist
10								

Prepared By [illegible] Date 8/1/94 Checked By _____ Date _____

R1

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID _____ TA/OU _____ Drill Depth From _____ To _____ Page 3 of _____

Driller _____ Box #(s) _____ Start Date/Time _____ End Date/Time _____

Drilling Equip./Method _____ Sampling Equip./Method _____

Depth (Feet)	Recovery (Inch per Inch %)	Field Screening Sampling Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
20					Silty sand			
22					layers of Silts, Clayey & sand			
24								
26								
					Boulder			Pushed to sides
28					layers Silts, Clay & Sand			
30								

Prepared By _____ Date _____ Checked By _____ Date _____

R1

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY — CORE SAMPLE LOG

Borehole ID 1063 TA/OU 1 Drill Depth From 0 To ____ Page 1 of ____

Driller ____ Box #(s) ____ Start Date/Time 7/15/95 End Date/Time ____

Drilling Equip./Method ____ Sampling Equip./Method ____

Depth (Feet)	Recovery (%)	Field Screening Results	Sample Type	Interval Core in Box	Lithology - Petrology - Soil	Sample ID	Lab Use	Notes
0					[illegible]			
					[illegible]			
2					[illegible]			
	0%				[illegible]			
	0%				[illegible]			
4					[illegible]			
					Silty Sand w/ [illegible]			
					Light Brown Silty Sand w/ [illegible]			
6					Tuff Boulder			[illegible]
8					Coarse to Med. Sand w/ Some Silts & Gravel			[illegible]
					Clayey Sand w/ Gravel			[illegible]
10					~~Clayey Sand~~			

Prepared By [illegible] Date 8/2/94 Checked By ____ Date ____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY — CORE SAMPLE LOG

Borehole ID _____ TA/OU _____ Drill Depth From _____ To _____ Page 3 of _____

Driller _____ Box #(s) _____ Start Date/Time _____ End Date/Time _____

Drilling Equip/Method _____ Sampling Equip/Method _____

Depth Interval	Lithology - Pedology - Soil	Sample Type	Sample Id	Notes
21	Coarse sand (gravel)			No cuttings drill distant
22				
23	Sandy Clay			Cuttings + drilling
	Fine gravel			cuttings
25	Sandy Clay			cuttings
30				

Prepared By _____ Date _____ Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID: A-1 TAOU: _____ Drill Depth From: _____ To: _____ Page 1 of _____

Driller: _____ Box #(s): _____ Start Date/Time: _____ End Date/Time: _____

Drilling Equip./Method: _____ Sampling Equip./Method: _____

Depth	Recovery	Blows	Penetration	Core Dia.	Lithology - Description - Rock	Field Screening	Lab Results	Remarks
10					Tuff Rubble			Never [illegible]
15					~~Silty sand~~ layers of silty clays & clayey silts, and coarse sands.			H_2O drilling
20								

Prepared By: _____ Date: 8/5/94 Checked By: _____ Date: _____

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LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 27-1007 TA/OU TA-27 Drill Depth From 0 To 3 Page 1 of ____

Driller STEARNS Box #(s) ____ Start Date/Time ____ End Date/Time ____

Drilling Equip/Method DIAMOND CORE Sampling Equip/Method ____

Depth (Feet)	Recovery (Feet)	Blow Count	Field Screening	Sample Number	Description of Core in Box	Lithology - Petrology - Soil	Sample Type	Sample Number	Notes
1						SILTY SANDY BROWN			
2									
3									
4									
5									

Prepared By Spencer Seppanen Date 6/8/94 Checked By [illegible] Date 6/3/94

Page

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

TH-07

Borehole ID: 1091 TA/OU: 1093 Drill Depth From: 0 To: 5 Page: 1 of 1

Driller: Stewart Brothers Box #(s): N/A Start Date/Time: [illegible] End Date/Time: [illegible]

Drilling Equip/Method: CME-45 HSA Sampling Equip/Method: Cont. Core

Depth (Feet)	Recovery (Feet)	Blows	Field Screening	Temp in Deg C	Lithology · Pedology · Soil	Sample Log	Sample Line	Notes
0'		N/A	Bkgd OV Bal HE	N/A	Lt. brown sandy silt		N/A	
2'					Lt. brown sandy silt w/ gravel			
					Lt. brown sandy silt w/ gravel			
4'								
6'								
8'								
10'								

Prepared By: HE Date: 6/13/94 Checked By: _____ Date: _____

Prepared by Date Checked by Date

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

TA-27 Borehole ID 1110 TAOU 1093 Drill Depth From 0' To 5' Page 1 of 1

Driller Stewart Brothers Box #(s) N/A Start Date/Time 2:45 End Date/Time 4:5

Drilling Equip./Method CME-45 HSA Sampling Equip./Method Cont. Core

Depth (Feet)	Recovery (%)	Blow Counts (Per 6 Inches)	Field Screening Results	Depth in Core (Feet)	Lithology - Petrology - Soil	Collection Log	Sample	Notes
0'		N/A	BG OV Field HS	N/A	Lt. Brown Silty Sand w/ Gravel & Cobbles		N/A	Having problems retrieving samples!
2'	50%							
4'	100%				Lt. Brown Silty Sand w/ Gravel & Cobbles			
	100%				Lt. Brown, Silty Sand w/ Gravel & Cobbles.			
6'								
8'								
10'								

Prepared By [signature] Date 6/3/94 Checked By _____ Date _____

B1

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

TA-27
Borehole ID: 1018 TAOU: 1093 Drill Depth From: 0' To: 5' Page 1 of 1

Driller: Stewart Brothers Box #(s): N/A Start Date/Time: 1:30 End Date/Time: 3:00

Drilling Equip./Method: CME-45 HSA Sampling Equip./Method: Cont. Core

Depth (Feet)	Recovery (Feet)	Blow Counts	Field Screening	Lithologic Contact	Lithology - Petrology - Soil	Organic Carb.	Carbonate Carb.	Notes
0'		N/A	BK, RAD OV JE	N/A	Lt. Brown Silty Sand w/ Gravel		N/A	
2'					Lt. Brown Silty Sand w/ Gravel			
					Lt. Brown Silty Sand w/ Gravel			
4'					Tuff Boulder			
					Brown Silty Sand w/ Gravel			
6'								
8'								
10'								

Prepared By: [signature] Date: 6/ /94 Checked By: _____ Date: _____

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LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole No. TA-22-1029 TAOU 1093 Drill Depth From 0 To 5 Page 1 of 1

Driller Stevens Brothers Box #(s) N/A Start Date/Time 1/30 2:35 End Date/Time 2:00

Drilling Equip./Method CME-45 HSA Sampling Equip./Method Cont. Core

Depth (Feet)	Recovery (Feet)	Total Depth Drilled (Feet)	Sampling Method	% Recovery of Core in Box	Lithology · Petrology · Soil	Drillers Log	Lithologic Unit	Notes
0'		N/A	Poly SV Bed TE	N/A	Lt. Brown Silty Sand w/ Gravel		N/A	
					Brown Silty Sand			moist increasing
2'					Brown Silty Coarse Sand			
					Brown Silty Coarse Sand w/ Gravel			
4'								
6'								
8'								
10'								

Prepared By RE Date 6/7/92 Checked By _____ Date _____

B1

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

TA 41 Borehole ID 1031 TAOU 1093 Drill Depth From 0 To 5 Page 1 of 1

Driller Stewart Brothers Box No. N/A Start Date/Time 11:10 End Date/Time 2:15

Drilling Equip/Method CME-45 HSA Sampling Equip/Method Cont. Core

Depth	Lithology · Petrology · Soil	Notes
0'	Lt. Brown Silty Sand	
2'	moist. Brown Silty Sand	
	Coarse Sand	
4'	Silty Clay	
	moist. Tuff very weathered	very weathered Tuff
6'		
8'		
10'		

Prepared By [illegible] Date 6/7/94 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

TA-22 Borehole ID 1233 TAOU 1093 Drill Depth From 0 To 5 Page 1 of 1

Driller Alberson Brothers Bit #(s) N/A Start Date/Time 2:40 End Date/Time 3:45

Drilling Equip./Method CME-45 HSA Sampling Equip./Method Cont. Core

Depth	Sample Interval	Recovery	Blows	Penetration Resistance	Lithology · Pedology · Soil	Sample	Field Screening	Notes
0'	1233 1	N/A	Bag Rad OV HE	N/A	Lt. Brown Silty Sand		N/A	
2'					Silty Sand w/ Gravel			
4'	1233 2				Weathered Tuff Boulder			
					Silty Sand w/ Gravel			
6'								
8'								
10'								

Prepared By # Date 6/7/94 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY — CORE SAMPLE LOG

Borehole ID: [illegible] TA/OU: [illegible] Drill Depth From: [illegible] To: [illegible]

Driller: [illegible] Bit(s): [illegible] Start Date/Time: [illegible] End Date/Time: [illegible]

Drilling Method: [illegible] Sampling Equip./Method: [illegible]

Lithology – Petrology

[illegible]

BECOMES MOIST

SAND fg to vcg BROWN
WITH GRAVEL MOIST

SILTY SAND fg–[illegible]
WITH GRAVEL & COBBLES
MOIST

Prepared By: [illegible] Date: 6/9/94 Checked By: [illegible] Date: 6/13/94

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID: TA27-1057 TAOU: 1093 Drill Depth From: 0' To: 5' Page 1 of 1

Driller: Stewart Brothers Box Size: N/A Start Date/Time: 8:45 End Date/Time: 9:30

Drilling Equip Method: CME-45 HSA Sampling Equip Method: Cont. Core

Depth (Feet)	Sample Number	Sample Type	Sample Interval	Sample Recovery	Lithology - Pedology - Soil	Geophysical Log	Lithologic Sample	Notes
0'			N/A	BKG Rad HE & VOC	N/A	Sandy Silt w/ Gravel		N/A	2½ Ft. Split-Spoons
2'								
						Sandy Silt w/ Gravel		
4'								
						Brown Clay		
						Coarse Sand w/ Gravel		
6'								END OF HOLE
8'								
10'								

Prepared By: TE Date: 6/14/94 Checked By: _____ Date: _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID TA 22-1059 TA/OU 1093 Drill Depth From 0' To 5' Page 1 of 1

Driller Stewart Brothers Box #(s) N/A Start Date/Time 11:15 End Date/Time 12:45

Drilling Equip/Method CME-45 HSA Sampling Equip/Method Cont. Core

Depth (Feet)	Recovery (Feet and Tenths of Feet)	Field Screening Results Sample Number	Field Screening Results	Lithology Contacts (Feet in Bold)	Lithology - Petrology - Soil	Organic Clay	Unified Soil	Notes
0'		N/A	Blk Red HE OV	N/A	Lt. Brown Sandy Silt		N/A	2½" S.S.
2'					Coarse Sand w/ Silts			
4'					Brown Silty Clay w/ Gravel			
6'								
8'								
10'								

Prepared By [illegible] Date 6/14/94 Checked By _____ Date _____

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0

2

4

Boulder Tuff

Lt. Brown Sandy Silt w/ Gravel

6

STOPED DRILLING

8

10

Prepared By _____ Date 6/14/94 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID: TA-18 1115 TA/OU: 1093 Drill Depth From: 0 To: 5' Page 1 of 1

Driller: Geo Brothers Box #(s): N/A Start Date/Time: 1115 End Date/Time: 45

Drilling Equip./Method: CME-45 HSA Sampling Equip./Method: Cont. Core

Depth (Feet)	Sample Interval	Field Screening Results	Lab Screening Results	Total Recovery in Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0'		N/A		N/A	Brown Silty Sand w/ Gravel		N/A	NO Pictures
2'								
4'					Silty Sand w/ Gravel			Tile Pipe
6'								
8'								
10'								

Prepared By: [illegible] Date: 7/12/94 Checked By: _____ Date: _____

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LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID: TA-18 10760 TAOU: 1093 Drill Depth From: 0' To: 5' Page 1 of 1

Driller: Brothers Box #(s): N/A Start Date/Time: 4:00 End Date/Time: 5:00

Drilling Equip/Method: CME-45 HSA Sampling Equip/Method: Cont. Core

Depth (Feet)	Sample Number	Sample Interval	Recovery	Penetration Rate (Min/6 in)	Lithology - Petrology - Soil	Sample Type	Sample Interval	Notes
0'	30	N/A	BLG	N/A	Silty Sand w/ Pumice Gravel		N/A	2 1/2' S.S.
2'			BLG		Dark Brown Silty Sand			
4'			BLG					
6'								
8'								
10'								

Prepared By: [illegible] Date: 6/15/94 Checked By: _____ Date: _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID TH18-1093 TAOU 1093 Drill Depth From 0' To 5' Page 1 of 1

Driller Abbott Brothers Size 8(c) N/A Start Date/Time 3:30 End Date/Time 4:00

Drilling Equip/Method CME-45 HSA Sampling Equip/Method Cont. Core

Depth (Feet)	Sample Number	Sample Type	Sample Length	Sample Recovery	Total Depth of Core in Hole	Lithology - Petrology - Soil	Weight Log	Lithologic Code	Notes
0'			N/A	BG	N/A	Sandy Silt		N/A	3½' S.S.
2'						Coarse Sand w/ silts & Tuff cobbles			
4'				BG		Brown Silty Coarse Sand w/ Gravel (moist.)			moist increase
6'									
8'									
10'									

Prepared By [illegible] Date 6/15/94 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID TA-18 1100 TA/OU 1093 Drill Depth From 0' To 4' Page 1 of 1

Driller Stewart Brothers Box #(s) N/A Start Date/Time 2/28 End Date/Time

Drilling Equip./Method CME-45 HSA Sampling Equip./Method Cont. Core

Depth (Feet)	Recovery (Net Rec. Over 2')	Field Screening Results	Field Screening Results	Location of Core in Box	Lithology - Petrology - Soil	Geology Log	Analytical Unit	Notes
0'		N/A	BKG Rad CY	N/A	Lt. Brown silty sand w/ Gravel		N/A	
2'					Dark brown silty sand w/ Gravel			☒ VOC
4'								
6'								
8'								
10'								

Prepared By FE Date 7/28/94 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID TA-RE-1135 TAOU 1093 Drill Depth From 0' To ____ Page 1 of 4

Driller Stewart Brothers Box #(s) N/A Start Date/Time ____ End Date/Time ____

Drilling Equip Method CME-45 HSA Sampling Equip Method Cont. Core

Depth (Feet)	Recovery (Feet and %)	Field Screening Results	Field Screening Results	Total Number of Cans in Box	Lithology · Pedology · Soil	Subsurface Log	Lithologic Log	Notes
0'		N/A	PID 0 RAD 0	N/A	Silty sand w/ Gravel		N/A	1st Hole had auger refusal at 3 Ft. West and had auger refusal 2' East location.
2'					Coarse Sand w/ Gravel & Cobbles			
4'					Coarse Sand w/ Cobbles			
6'					Coarse Sand w/ Cobbles			
8'					Gravel 1" → 4" Diameter			
10'								

Prepared By [illegible] Date 7/6/94 Checked By ____ Date ____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 1135 TA/OU _____ Drill Depth From _____ To _____ Page 3 of 4

Driller _____ Box #(s) _____ Start Date/Time _____ End Date/Time _____

Drilling Equip./Method _____ Sampling Equip./Method _____

Depth (Feet)	Percent Core Recovered	Core Diameter (Inches)	Core Interval Depth (Feet)	Depth Scale	Lithology of Core in Box	Lithology · Petrology · Soil	Geologic Log	Geologic Unit	Notes
18						No cuttings recovered			Depth = previous hole
20									No cuttings
22						Sandy silt			
24									
26						Coarse sand / silty clay lenses			Cuttings are a mixture of coarse sand & silty clay
28									

Prepared By TE Date 7/1-1/94 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY — BORE HOLE LOG

Date Drilled: 11/30 Nov 1993 Core Depth From 0 To 24 Page 1 of 2

Drilling Method: N/A Start Date/Time: End Date/Time:

Drilling Contractor: CME-45 Sampling Type/Method: Cont. Core

FS4

Depth	Recovery	Lithology Description/Soil	Remarks
0'	N/A	Brown Silty Sand w/ some Gravel	
	0%	Gravel & Cobbles to 4" Diameter	No Recovery
2'			
4'			
6'		Brown Silty Sand w/ Gravel	
		Silty Sand w/ Gravel & Cobbles	
8'		Silty Coarse Sand w/ Coarse Gravel	
		Dacite Boulder	
10'		Silty Sand	Cuttings
12'			

Prepared By: [illegible] Date: 8/7/94 Checked By: Date:

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

CORE SAMPLE LOG

Cont. Core

					Description			
	100%				Brown Silty Sand w/ Gravel			Dry Fractured
	100%				Brown Silty Sand w/ Gravel Moist.			VOC
2.5'	80%				Brown Silty Sand (Wet) w/ Gravel & Cobbles Moist.			
5'								

Prepared By [illegible] Date 7/13/94 Checked By ____ Date ____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID: [illegible] TA/OU: 10-13 Core Depth From: 0 To: 12.5 Page: 1 of 1

Driller: [illegible] Box #(s): 8/14 Start Date/Time: 1190 End Date/Time:

Drilling Equip./Method: CME-45 Sampling Equip./Method: [illegible]

Depth	Sample Interval	Sample Number	Recovery	Blow Counts	Lithology - Geology - Soil	Sample Type	Sample Number	Notes
0					Silty Sand Dark Brown			
2					Course Sand w/ Some Gravel & Silts			
4								Vx
					~~Silty Sand~~ Silty Silt			
6					Course Sand Clean			
8								Hc
								Vx
					Silty Sand			
10					Course Sand			Course Clr Black
12.5								

Prepared By: [illegible] Date: 8/2/94 Checked By: _____ Date: _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 11-2 TA/OU _____ Drill Depth From _____ To _____ Page 1 of 4

Driller _____ Box #(s) _____ Start Date/Time _____ End Date/Time _____

Drilling Equip./Method _____ Sampling Equip./Method _____

Depth (Feet)	Percent Core Recovery	Field Screening Results	Field Screening Results	Fractionation of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
10'					layers of coarse sands, silty clay or inorganic clayey silts			Cuttings
12'								
14'								
16'								
18'								
20'								

Prepared By [illegible] Date 8/1/94 Checked By _____ Date _____

R1

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID _____ TA/OU _____ Drill Depth From _____ To _____ Page 4 of 4

Driller _____ Bit Size _____ Start Date/Time _____ End Date/Time _____

Drilling Equip Attached _____ Sampling Equip/Method _____

Depth (Ft)	Lithology	Petrology	Soil	Moisture	Lithology · Petrology · Soil	Core Loss	Sample Type	Notes
30'					Layers of coarse sand, silty clay and clayey silts.			Cuttings
32'								
34'								
36'								
38'								
40'								Tight

Prepared By _____ Date 9/8/94 Checked By _____ Date _____

R1

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID TA-18-87 TAOU 1093 Drill Depth From 0 To 5' Page 1 of 1

Driller Stewart Brothers Box #(s) N/A Start Date/Time 1:00 End Date/Time

Drilling Equip/Method CME-45 HSA Sampling Equip/Method Cart. Core

Depth (Feet)	Recovery (Feet)	Recovery (%)	Field Screening Results	Lithologic Contacts (Depth in Feet)	Lithology · Porosity · Soil	Graphical Log	Sample Log	Notes
0'		N/A	BKG Red UV	N/A	Lt. Brown Silty Sand		N/A	
2'	0%				Gravelly Sand			No Recovery Cutting up
	0%							
4'					Coarse sand w/ Gravel & silts			
					Coarse Sand w/ silts			Increase in moisture
6'								
8'								
10'								

Prepared By _____ Date 7/5/94 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID: TA-18 1196 TAOU: 1093 Drill Depth From: 0' To: 10' Page 1 of 1

Driller: Stewart Brothers Box #(s): N/A Start Date/Time: 9:41 End Date/Time:

Drilling Equip Method: CME-45 HSA Sampling Equip Method: Cont. Core

Depth (Feet)	Recovery (Inches)	Field Screening Results	Field Screening Results	Penetration Resistance (Blows per 6 in)	Lithology · Petrology · Soil	Geologic Log	Lithologic Log	Notes
0'		N/A		N/A	Lt. Brown Silty Sand w/ Gravel		N/A	
2'					Silty Sand w/ Gravel			☒ USC NO RECOVERY Lost Sample
					Hi-Tech			NO RECOVERY
4'					Lt. Brown Silty Sand w/ Gravel			
					Coarse Sand w/ Silts & Gravel			moist increase
6'					Coarse Sand w/ Gravel & Silts			= HCO Table
8'					Coarse Sample w/ Gravel & Silts			☒ USC
10'								

Prepared By: [signature] Date: 7/5/94 Checked By: _____ Date: _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

Prepared By _____ Date 7/22/92 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID 330 TA/OU _____ Drill Depth From _____ To _____ Page 2 of 2

Driller _____ Box #(s) _____ Start Date/Time _____ End Date/Time _____

Drilling Equip./Method _____ Sampling Equip./Method _____

Depth (Feet)	Sample Recovery	Sample Recovery Estimate	Sample Recovery Method	Total Depth of Core in Box	Lithology - Petrology - Soil	Sample Log	Chemical Soil	Notes
7.5					Silty Sand w/ Gravel			
8	100%	N/A	Dry	10%				
9	100%	N/A	Dry	4 ft	Cobbles w/ Clay Sand			
10								Above H2O Table

Prepared By TE Date 7/25/94 Checked By _____ Date _____

R1

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID TA-13-12335 TA/OU 1012 Drill Depth From 5 To 10 Page 1 of 1

Driller [illegible] Box #(s) N/A Start Date/Time 1:45 End Date/Time

Drilling Equip/Method CME-45 Sampling Equip/Method Cont. Core Barrel

Depth (Feet)	Recovery (feet per foot %)	Field Borehole Marker Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lab Sample (Unit)	Notes
0	100%	N/A	BKG	N/A	Moist, Silty Sand w/ organics			
2	90%				~~Silty SS~~ Sandy Silt			☒ VOC
4	100%				Coarse Sand w/ Silts & Cobbles			
	0				Cobbles			No Recovery
	0		1.0 ppm		Cobbles			No Recovery
6	90%		Red BKG		Silty Sand w/ Cobbles ↓ MOIST INCREASE		☒ VOC	
8	90%		1.0 ppm Red BKG		Coarse Clean Sand			
10	100%				Coarse Silty Sand w/ Cobbles			

Prepared By FE Date 7/25/94 Checked By _____ Date _____

R1

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID ____ TA/OU ____ Drill Depth From ____ To ____ Page 2 of 2

Driller ____ Box #(s) ____ Start Date/Time ____ End Date/Time ____

Drilling Equip./Method ____ Sampling Equip./Method ____

Depth (Feet)	Recovery (Feet of Core)	Field Screening Results	Field Screening Results	Top/Bottom of Core in Box	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
10					Silty Sand w/ cobbles			Drilled from 10 - 20 W/ center Bit w/ Air Straight cuttings
12					water			
					coarse Sand and clay layers			
14					silty Sand w/ cobbles			
16								
18								
20								Auger refusal Tight

Prepared By T. Lanford Date 7/20/94 Checked By ____ Date ____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID TA-18-1242 TA/OU 1093 Drill Depth From 0' To 4' Page 1 of 1

Driller Stewart Butler Box #(s) H/12 Start Date/Time 9:05 End Date/Time

Drilling Equip./Method CME 95 HSA Sampling Equip./Method Cont Core Barrel

Depth (Feet)	Recovery (Feet per Foot)	Field Screening Results (Organic Vapors)	Field Screening Results (Radiation)	Collected for Chemical Analysis (Sample)	Lithology - Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0	0%	N/A			Asphalt Pavement			
1 2	100%		BKG		Silty Coarse Sand w/ Gravel & Cobbles (Fill MAT'l)			
4	100%		BKG	X	Silty Coarse Sand w/ Gravel & Cobbles (Fill MAT'l)		X	VOC

Prepared By TC Date 8/19/94 Checked By _____ Date _____

R1

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID TA-18-1257 TA/OU 1093 Drill Depth From 0' To 10' Page 1 of 1

Driller Stewart Brothers Box #(s) N/A Start Date/Time 9:15 End Date/Time

Drilling Equip./Method CME-55 HSA Sampling Equip./Method Cont Core Barrell

Depth (Feet)	Recovery Rate (ft/hr) or %	Field Borehole Analytical Sample Number	Field Screening Results	Lithologic Contacts of Core Barrel Box	Lithology · Petrology · Soil	Depth Log	Collapse Log	Notes
0				Land				No Pictures Taken
1	20%	N/A	10ppm		Gravel & Cobbles w/ Brown Silty Sand			Sampled Recovery Mat'l
2								
4'	20%		4 ppm					
								VOC
6'	0%				Cobbles			Drilled from 5'-7.5' 0% Recovery Redr. Hole 2' to North
8								Tried Sampling Time to Recover
9	60%				Silty Sand w/ Gravel & Cobbly			VOC
10'								

Prepared By TE Date 8/16/94 Checked By _____ Date _____

R1

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID: TA-12-1259 TAOU: 1093 Drill Depth From: 0 To: 10 Page: 1 of 1

Driller: Stewart Bothwell Box #(s): N/A Start Date/Time: 7:40 End Date/Time:

Drilling Equip./Method: CME 45 HSA Sampling Equip./Method: Cont. Core Barrel Simple

Depth (Feet)	Recovery (Total Rec. Over Int.)	Field Screening Results	Location of Core Sample	Lithology - Petrology - Soil	Geologic Log	Geologic Unit	Notes
0	100%	N/A	BKG	Silty brown Sand			No Pictures
2'	0%			Gravel & Cobbles			Cuttings
	0%			Gravel & Cobbles			
4'	100%	BKG	X	Silty Brown Sand w/ Gravel & Cobbles			VOC
6'	50%			Silty Brown Sand w/ Gravel & Cobbles			Cuttings
8'	50%			Coarse Sand			
	100%		X	Silty Clay			VOC
10'							

Prepared By: [illegible] Date: 8/16/99 Checked By: Date:

R1

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID: TA-0U-[illegible] Hole Depth From: [illegible] To: [illegible] Page [illegible] of [illegible]

Drilling Co.: [illegible] Drill Rig: [illegible] Start Date/Time: [illegible] Finish Date/Time: [illegible]

Drilling Fluid Method: [illegible] Sampling Equip Method: [illegible]

Lithology Description [illegible]

Prepared By: [illegible] Date: 8/10/94 Checked By: _____ Date: _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY — CORE SAMPLE LOG

Borehole ID: TA-18-275 TA/OU: 1513 Drill Depth From: 0' To: 49' Page 1 of 5

Driller: Stewart Bros. Drs. Box #(s): N 4 Start Date/Time: 2:35 End Date/Time:

Drilling Equip/Method: CME 45 HSA Sampling Equip/Method: Cont. Core

Depth	Recovery	Blow Counts	Field Test	Photo/Video	Lithology · Pedology · Soil	Geologic Log	Chemical Log	Notes
0'		N/A	Bkg	N/A	Asphaltic Concrete			No Photos Taken
3'	70%		RAD OK		Brown Silty Sand w/ some gravel			
4'	70%				Brown Silty Sand w/ some Gravel			Nail Found Fill mat'l ☒ VOC
6'	100%				Sandy Silt			
	0%				Cobbles			Rock in shoe
8'	90%				Coarse Sand Clean			☒ VOC
10'								

Prepared By: [illegible] Date: 8/11/94 Checked By: _____ Date: _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID 20 TA/OU _____ Drill Depth From _____ To _____ Page _____ of _____

Driller _____ Box #(s) _____ Start Date/Time _____ End Date/Time _____

Drilling Equip Method _____ Sampling Equip Method _____

Depth	Lithology - Petrology - Soil	Sample Type	Notes
20'	Silty Clay		
22'	xxxxy Silt		= H_2O
	Silty Clay		moist
24'			mst
			wet.
26'			
28'			
30'			

Prepared By _____ Date _____ Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID _____ TA/OU _____ Drill Depth From _____ To _____ Page _____ of _____

Driller _____ Size (in) _____ Start Date/Time _____ End Date/Time _____

Drilling Equip Method _____ Sampling Equip Method _____

Depth (ft)	Sample Interval	Sample Number	Sample Type	Recovery (in)	Lithology / Petrology / Soil	Sample Depth	Depth Unit	Notes
40'					Layers of silts & coarse sands.			
42'								
44'								
46'								
48'								
								49' Stopped drilling

Prepared By _____ Date _____ Checked By _____ Date _____

ASSESSMENT of POTENTIAL SHALLOW GROUNDWATER TRANSPORT of RADIONUCLIDES at CRITICAL EXPERIMENT FACILITY, TA-18 LOS ALAMOS NATIONAL LABORATORY

January 1991

Los Alamos Technical Associates, Inc.

P.O. Box 410 / 1650 Trinity Drive / Los Alamos, NM 87544 / (505) 662-9080

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1.0 INTRODUCTION

1.1 Scope of Work

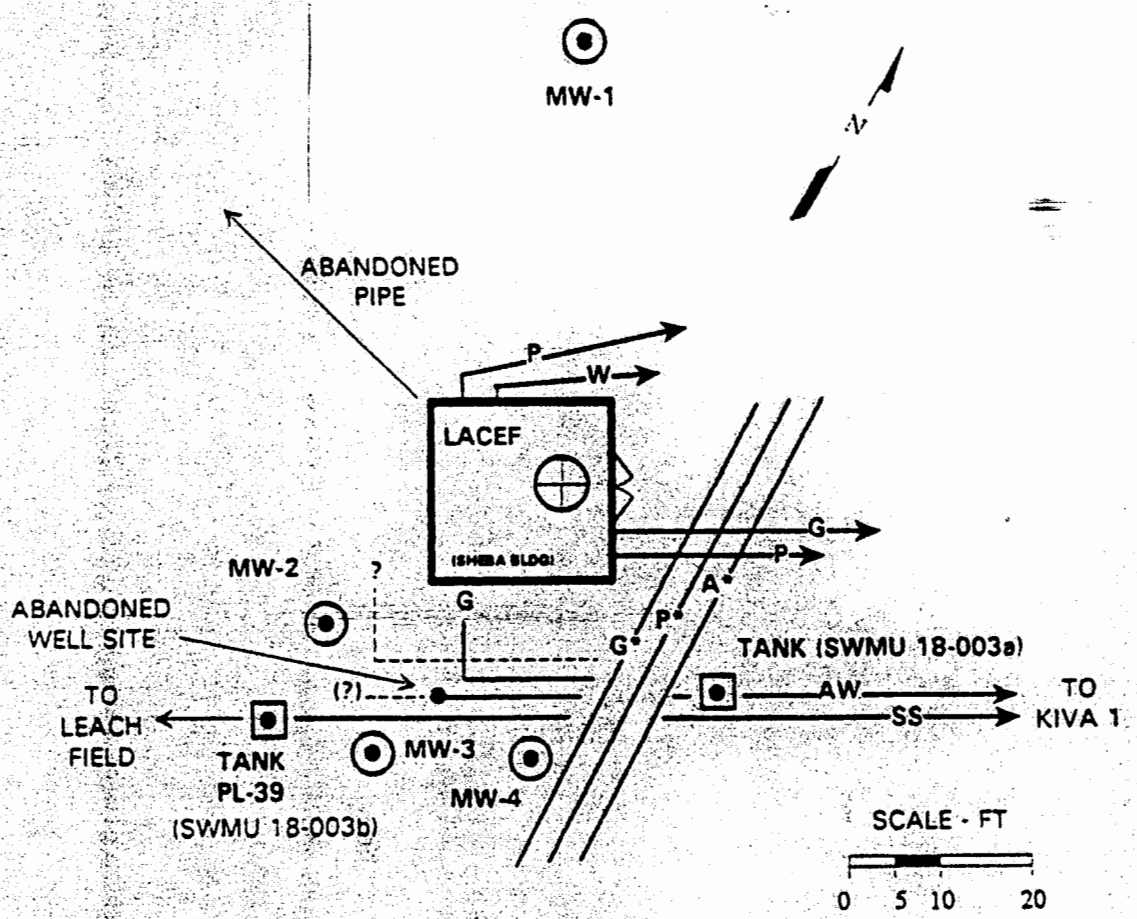
This document contains the results from work performed by Los Alamos Technical Associates, Inc. (LATA) under Task Order 005 of Subcontract #9-X50-8196N-1 with the Los Alamos National Laboratory (LANL).

The objective of work performed under this task order was to provide technical support to LANL in assessing the potential for transport of radionuclides by shallow groundwater at the Los Alamos Critical Experiment Facility (LACEF) at TA-18 in Pajarito Canyon. The information in this report is to be included in a revised Safety Analysis Report (SAR) for the LACEF. The work involved a survey of existing site facilities and utilities in the vicinity of KVa-1, geologic and hydrologic investigations, design and installation of four shallow groundwater monitoring wells around the LACEF (generally referred to as the Sheba building), sampling of soil and groundwater (including radiochemical analysis of these samples), compilation of the analytical results, and preparing recommendations for an ongoing monitoring program.

This report addresses the concerns of NRC Ref 70, Revision 3, Sections 2.4.13.1 through 2.4.13.4, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants," as they pertain to the limited scope of work of this project.

1.2 Facility Description

The location of the LACEF and the monitoring wells is illustrated in *Figure 1-1*. (Approximate utility locations are shown in *Figure 1-2*.) The LACEF will be used to conduct solution criticality experiments related to reactor design. The facility consists of a 6-ft diameter steel caisson (closed at one end), with a stainless steel liner set vertically in the ground. The open end of the caisson is flush with a concrete pad. A steel cover with various experimental fittings is bolted in place during experiments. The caisson is bedded in concrete at a depth of approximately 12 ft, and the annulus between the caisson and the undisturbed soil around it is filled with concrete. A metal building with two doors at opposite ends encloses the concrete pad. The concrete pad measures approximately 20 ft square. The perimeter of the concrete filling the annulus reportedly does not extended beyond the edge of the pad. The primary concern motivating the need for this investigation is the very small potential for leakage of radioactive solutions from the experiment activities into the surrounding soil and groundwater.



LEGEND

—— AW ——	= abandoned acid water line (vitreous clay pipe)
—— SS ——	= sanitary sewer line
—— P ——	= underground power electric
—— G ——	= gas
—— A ——	= air
—— W ——	= water
----- ? -----	= found, but not identified
----- (?) -----	= (interpolated location)
•	= lines are grouped, exact sequence not determined

(All underground utility locations approximate, as determined by Pan Am World Services, Utilities Division.)

Figure 1-2. Underground Utility Locations Relative to the LACEF Building

2.0 AREA DESCRIPTION

2.1 Geological Formations

Los Alamos National Laboratory (LANL) is located on the Pajarito Plateau (*Figures 2-1, 2-2,* and *2-3).* The volcanic and sedimentary rocks forming the Pajarito Plateau, and its subsurface are made up of the Tesuque Formation, Puye Formation, basaltic rocks of Chino Mesa, Tschicoma Formation, and Bandelier Tuff.

The Tesuque Formation consists of siltstones and sandstones with lenses of clay and conglomerate. Many beds in this formation are permeable and, where saturated, yield water to a well. Some of the beds are relatively impermeable and, thereby, restrict vertical and lateral movement of groundwater within the formation. The upper 1000 ft of this formation consist of coarser sediments which yield larger amounts of water to wells than do the finer sediments that are predominate to the east of the area (Purtymun, 1984).

The Puye Formation is a channel fill deposit consisting of pebbles, cobbles, small boulders, and a poorly consolidated, silty, sandy conglomerate. The formation is highly permeable and, when saturated, yields large amounts of water to wells.

The basaltic rocks of the Chino Mesa consist of a series of basalt flows and interflow breccias. Basalt flows, separated by interflow breccias, are permeable and, when saturated, will yield water. Open joints and cavities in thick basalt flows also yield water. However, steepening of the contours on the surface of the main aquifer along the Rio Grande indicates that thick basalt flows form a barrier to the movement of ground water *(Figure 2-4)*.

The Tschicoma Formation, the major part of the interior mass of the central Jemez Mountains, consists of volcanic flow rocks. This formation has low permeability and retards and restricts groundwater movement. There are limited open joints and interflow breccias within the formation that could yield appreciable amounts of water.

The Bandelier Tuff is a sequence of rhyolite ash flows and pumice, and the tuff itself ranges from non-welded to welded. Bandelier Tuff is above the main groundwater body, but in areas on the flanks of the Sierra de los Valles, small amounts of perched water discharge from springs (Purtymun, 1984).

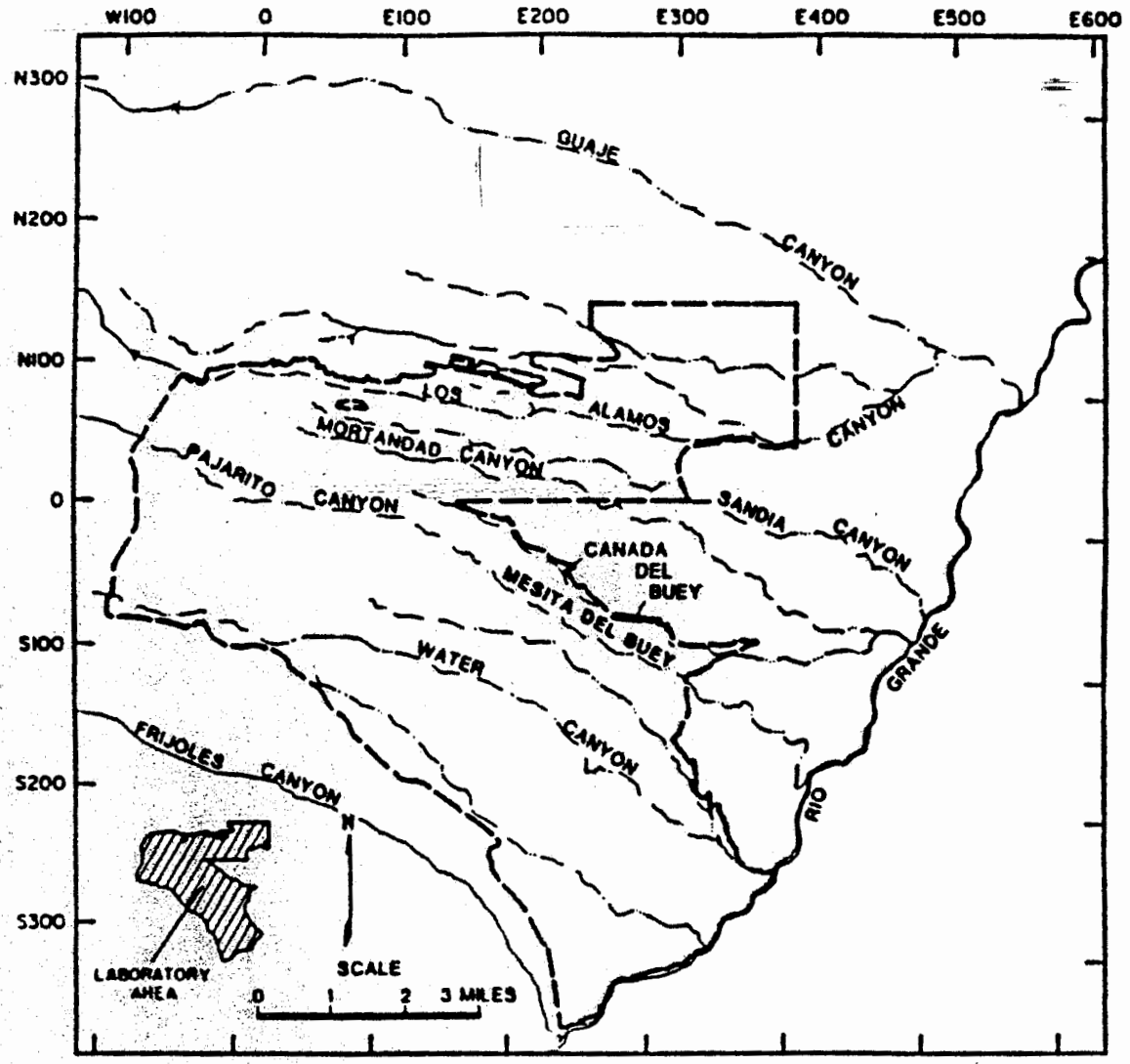


Figure 2-2. Map of Los Alamos Area Showing Various Canyons (Purtymun, 1984)

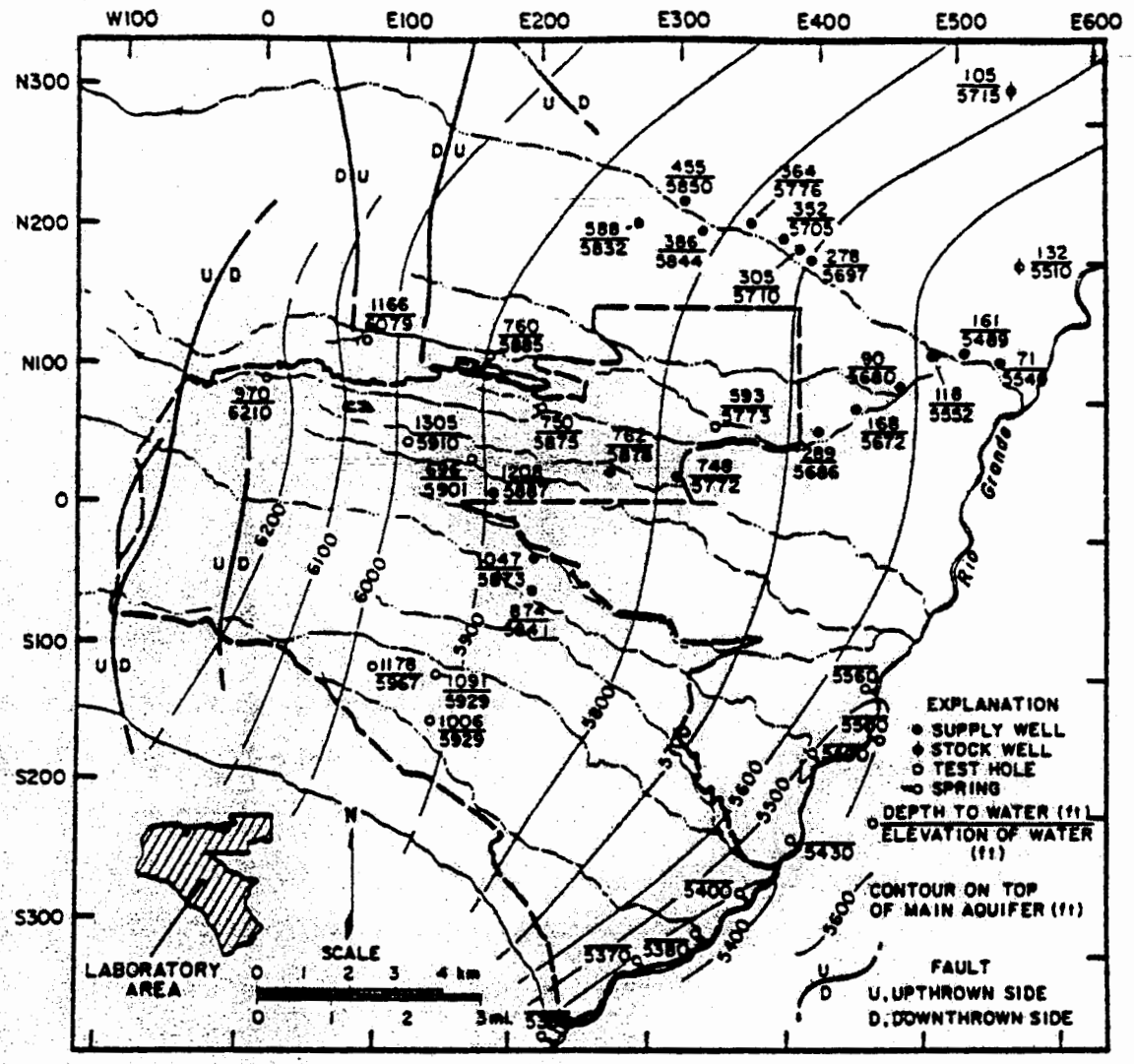


Figure 2-4. Generalized Contours on the Surface of the Main Aquifer (Purtymun, 1984)

The hydraulic gradient of the aquifer averages about 60 ft/mi in the Puye Formation and increases to about 100 ft/mi as water enters the less permeable sediments along the eastern edge of the Tesuque Formation.

2.1.2 Hydrology of the Pajarito Canyon Area

TA-18 is located in Pajarito Canyon. The canyon has a large drainage area that heads on the flanks of the Sierra de Los Valles to the west of the Pajarito Plateau. The alluvium in this canyon is derived from Bandelier Tuff and the Tschicoma Formation. It is composed of silts and clays, sand and gravels, and large boulders. The alluvium varies in thickness and is underlain by Bandelier Tuff (Devaurs and Purtymun, 1985). The stream following in this canyon is perennial on the flanks of the mountains across the western half of the plateau and intermittent across the eastern half of the plateau where it passes through TA-18 to the Rio Grande. There are several large borrow pits in the eastern section of the canyon where gravels and sands were once removed. These pits fill with water when there is a large volume of surface runoff in the canyon.

A study was performed (Devaurs, 1985) to determine if there were perched aquifers below Mesita del Buey (located in the mesa immediately north of Pajarito Canyon) between the mesa top and the upper surface of the main aquifer. It was determined by data collected during construction of two supply wells (wells PM-2 and PM-4) drilled into the main aquifer at Mesita de Buey that there were no perched water aquifers below it. Three test holes, two in Pajarito canyon (wells denominated "T" series), and one in Area G (test hole ST-1), were completed dry into the basalts (*Figure 2-5*) (Devaurs, 1985). Seven test holes (PCO and PCM series,) were completed through the alluvium into the top of the tuff. In spring of 1985, precipitation was estimated to be 8.3 in., compared to a 2.6 in. average over a 30-yr period (Bowen, 1985). Surface runoff was very high, and water was found in four test holes (PCO-1 to 4) in the alluvium. During construction of these four test holes, it was noted that cuttings from the underlaying tuff packed against the auger were dry, indicating little infiltration of water from the alluvium into the underlaying tuff. The remaining three test holes, drilled at the flanks of the canyon to a depth of 60-127 ft, were dry. The test holes drilling results document that perched water in Pajarito Canyon is confined to the alluvium in the stream channel and does not extend to the flank of the canyon (Devaurs and Purtymun, 1985).

2.2 Groundwater Use in the Pajarito Well Field

The well field in the area of TA-18 is the Pajarito Field, which consists of wells PM-1 through PM-5. Wells PM-1 and PM-3 supply the community of White Rock. Water from wells PM-2, PM-4, and PM-5 can also be used to supply White Rock, or the output can be lifted vertically through two booster stations (about 800 ft) into the LANL or the Los Alamos community area. Wells PM-1, PM-2, and PM-3 in the Pajarito Field produced 11,010 x 10^6 gal for the period of 1965-1982. *Table 2-1* contains production data from the

TABLE 2-1

TOTAL PRODUCTION FROM THE PAJARITO WELL FIELD BETWEEN 1947-82*

Well Number	Pumpage (10^6 gal)	Field Production (%)
PM-1	1,593	14
PM-2	5,863	53
PM-3	3,478	32
PM-4	76	1
PM-5	---	---
Total	11,010	100

* Purtymun, 1984

Pajarito well field and other well fields of the Los Alamos area. The wells in the Pajarito Field penetrated the main aquifer in the lower part of the Puye and Tesuque Formations. The saturated thickness of the Puye Formation in the Pajarito Field ranges from 50-535 ft, with an average thickness of 270 ft. The saturated thickness of the Tesuque formation ranges from 890-1700 ft, with an average thickness of 1470 ft. The average pumping rate is 1215 gpm, and the average specific capacity is 31 gpm/ft of drawdown or an average drawdown of 40 ft (Purtymun, 1984). Rate of movement of water in the combined thickness of 1740 ft of Puye and Tesuque Formations in the Pajarito Field is 95 ft/yr (Purtymun, 1984). ***Table 2-2*** contains average hydrologic characteristics of the Pajarito Field and other fields in the main aquifer for the Los Alamos area. Other data of note concerning the main aquifer are shown in ***Figures 2-6, 2-7, and 2-8***.

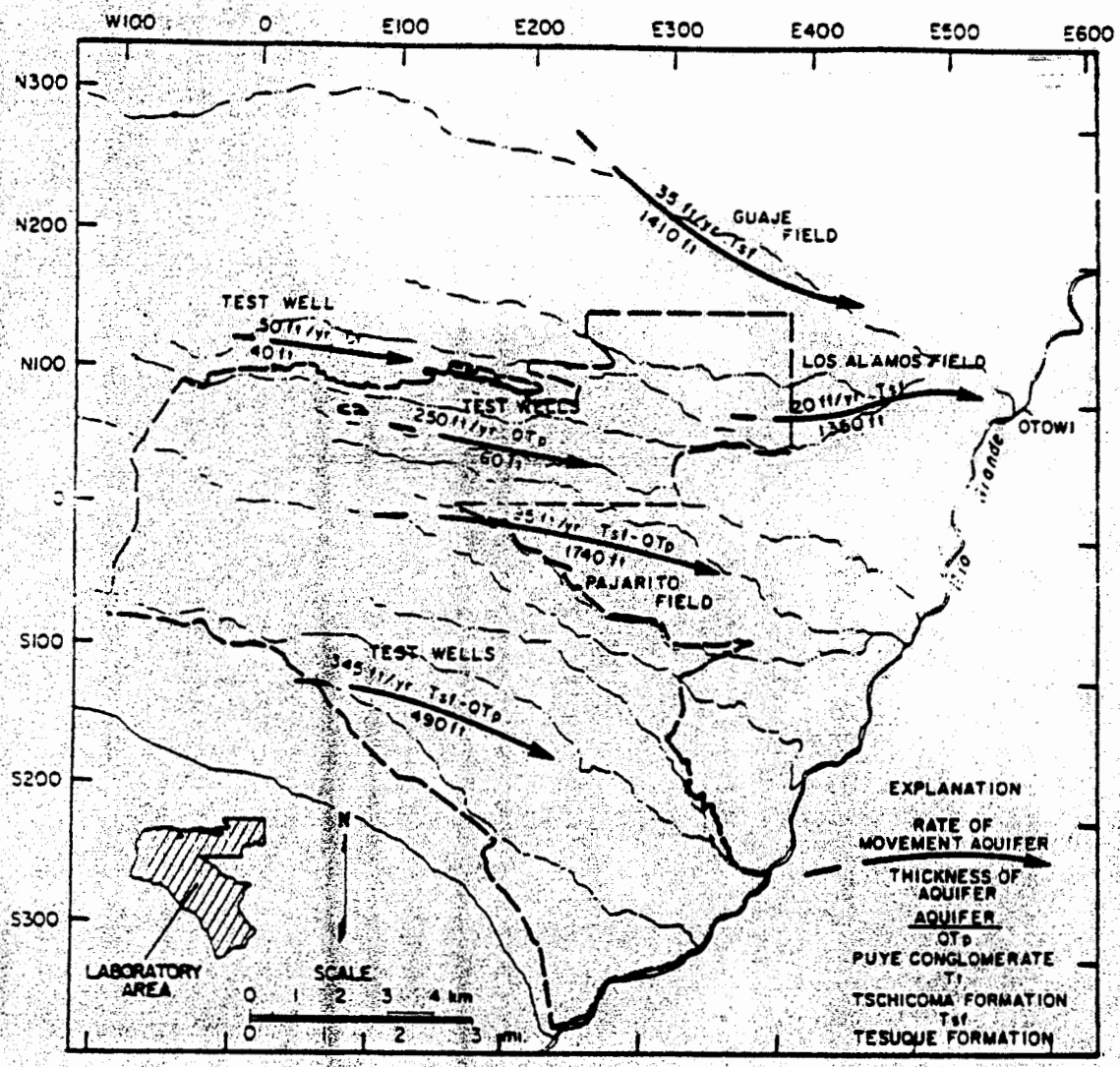


Figure 2-6. Rate of Movement of Water in the Main Aquifer (Purtymun, 1984)

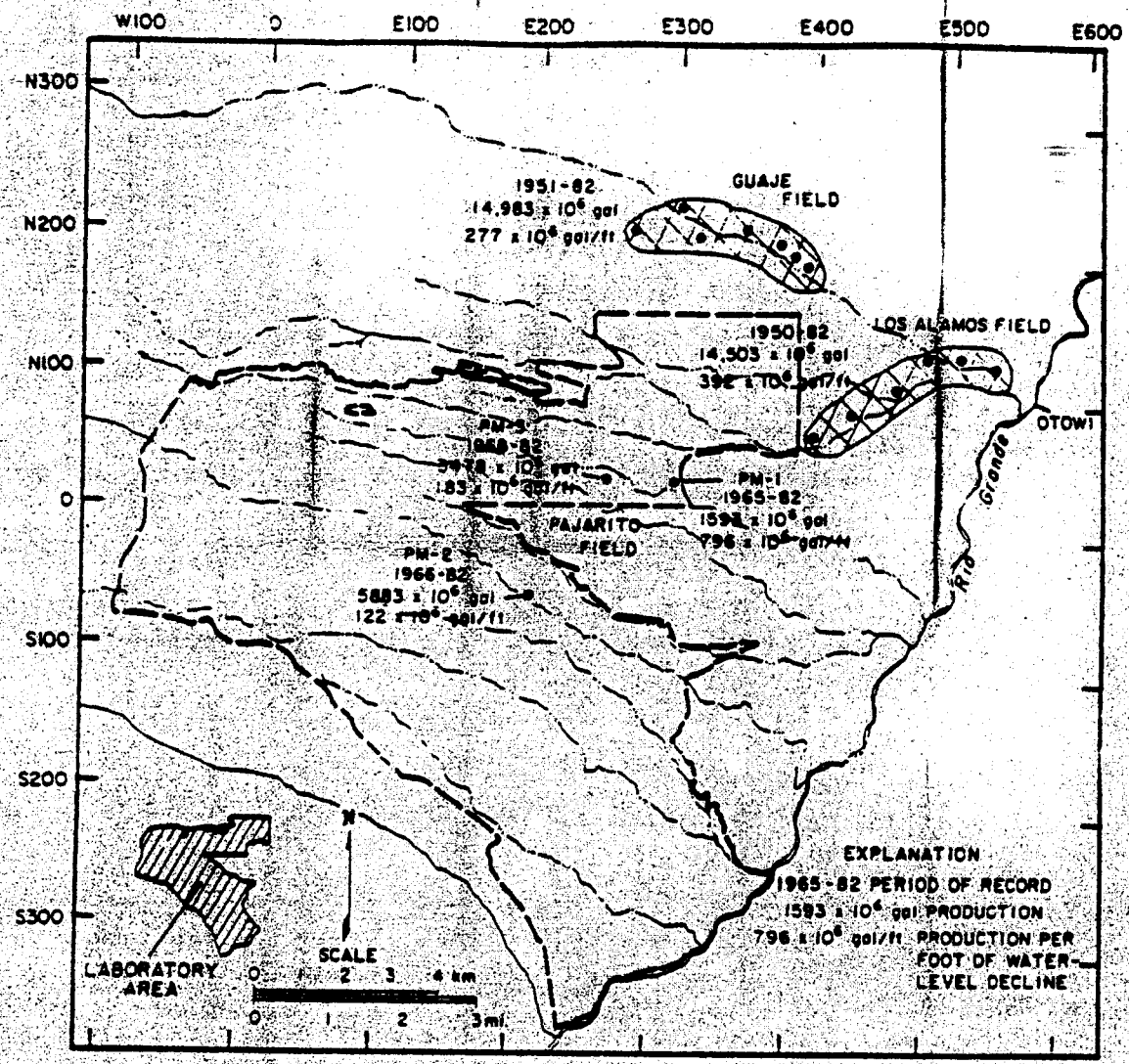


Figure 2-8. Water Level Declines Related to Production (Purtymun, 1984)

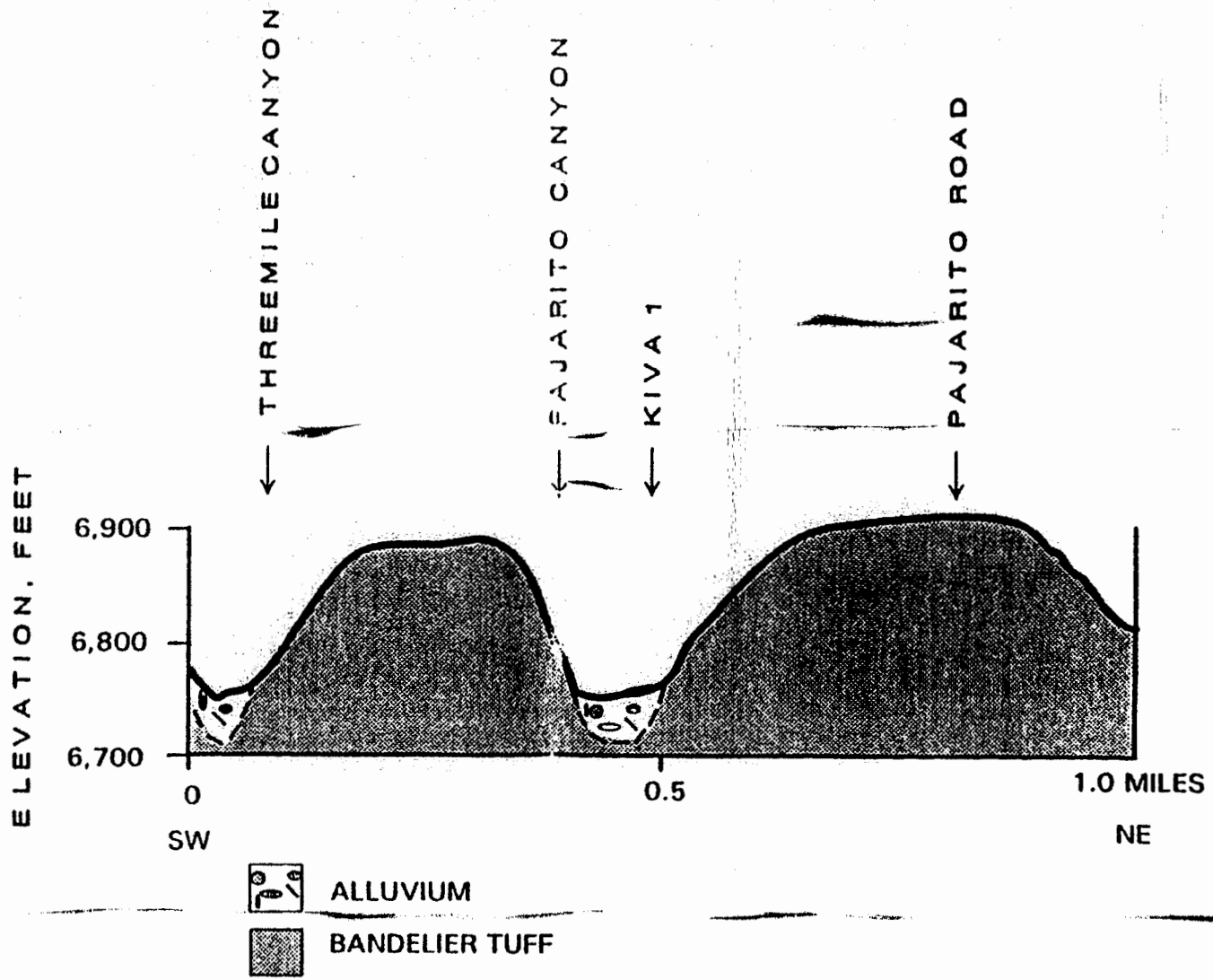


Figure 3-1. Generalized Cross Section Through the Kiva 1 Area

and groundwater around the LACEF, and to place wells that can be used for monitoring groundwater during operation of the LACEF. The actual well locations are shown in Figure 1-1. Well MW-1 was sited up gradient to establish a baseline for soils and for groundwater arriving at the LACEF site, while the remaining three wells were placed in what was judged to be the optimal pattern for detecting any releases down gradient from the LACEF.

The drilling and well construction presented no problems, although the initial location for MW-3 resulted in intercepting a vitreous clay pipe at about 5 ft. A split spoon sampler was driven through the pipe just below the 5 ft level. At this point the well was abandoned for safety and further analytical purposes. However, it was decided to include the sample for analysis. It was later determined that this was an abandoned acid waste line from a holding tank servicing Kiva 1, designated as SWMU 18-003a under LANL's RCRA plan. Utilities drawings provided prior to drilling made no mention of the line, although research after the pipe was found turned up older drawings that did show it (Section 4.3.1).

The drilling was done with an 8 in. hollow stem auger string with a top drive rig. All holes were split spoon sampled every 5 ft with a 24 in. length spoon. Cuttings were contained in plastic bags until analyses were performed. All wells were drilled to a depth of 25 ft. Completion consisted of placing a 20 ft joint of 2 in. PVC screen to the bottom of the hole, with 2 in PVC casing to the surface. The casing and screen were thoroughly steam cleaned prior to use. The annulus was filed to within 3 ft of the surface with 10/20 silica sand and then the casing was grouted in place. A cylindrical metal well head with a cast iron cover was placed in the wet grout and set flush with the ground. A concrete collar about 2.5 ft in diameter was formed around each well head for protection against damage and water infiltration. Lockable expansion-type well plugs were placed in the top of the casing after completion. The wells were developed with a hand pump after completion, with all water contained in drums. A typical as-built well diagram is shown in *Figure 3-3*. *Figure 3-4* shows a perspective view of the wells relative to the experiment caisson.

3.3 Sampling Approach

To obtain the necessary soil samples, a split spoon sampler was driven ahead of the auger every 5 ft. The spoon was then retrieved and opened. Prior to the sample being handled, a health physics technician monitored each sample. The sample was then photographed and described before being thoroughly mixed and sieved. A 500 mℓ sample bottle was filled for each sample interval. A separate sample of river bank soil was taken on the east side of the Rio Grande about 100 m upstream from the Otowi Bridge, as an environmentally distinct control. Duplicate samples were assigned with individual sample numbers as a laboratory quality control measure.

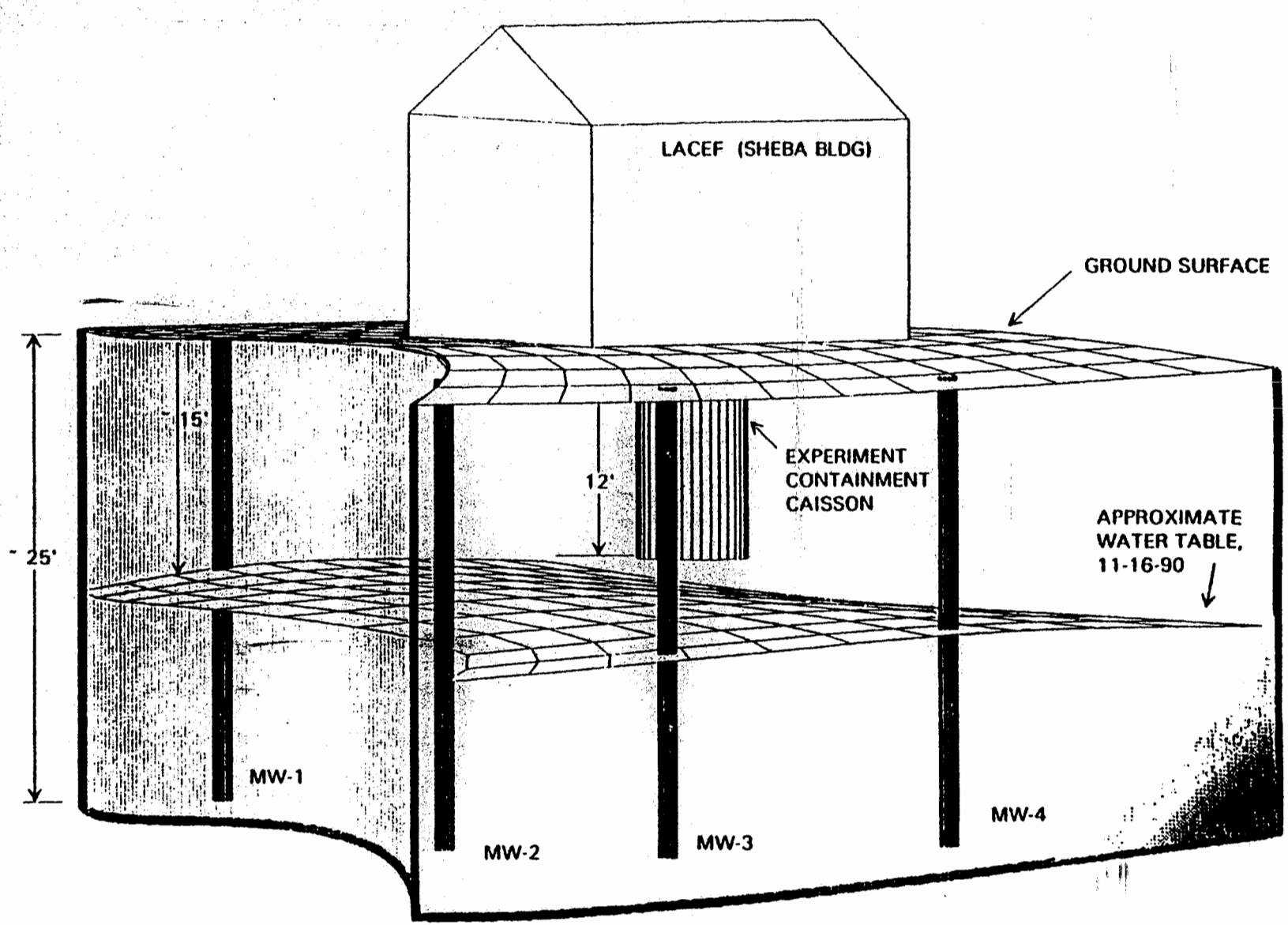


Figure 3-4. Isometric View of LACEF and Monitoring Wells, looking approximately upgradient

4.0 ACCIDENT EFFECTS

4.1 Probable Accident Scenario

The LACEF was designed to handle liquid criticality experiments contained within the steel caisson. Radioactive materials within the caisson itself have virtually no chance of migrating to the groundwater if the caisson remains structurally sound. This leaves, however, two probable accident scenarios. If the caisson has developed a fracture, a spill of radioactive liquids within the caisson may release radionuclides into the concrete surrounding the caisson. Potential migration of radioactive material through the concrete was not examined in this study.

The second scenario involves a spill outside the caisson itself during placement of liquid into the caisson. Radionuclides in that case could enter the soil, migrate downward and outward, and possibly intercept the highly seasonal water table in the vicinity.

4.2 Potential Pathways of Groundwater Contamination

There are two potential pathways of contamination of significance in the vicinity of the LACEF facility. Spilled material on the surface could be washed into Pajarito Creek, located about 100 m southwest of the LACEF with subsequent recharge to groundwater. However, the stream bed has been channelized through the area of TA-18 with earthen berms between the buildings and the stream channel, forming a barrier to surface transport. Additionally, the stream is intermittent and usually dry except for period of peak runoff in the spring and early summer. Therefore, although Pajarito Canyon eventually discharges into the Rio Grande below White Rock, it is considered very unlikely that any surface transport of radionuclides into the watercourse would occur. The approximate water table surface for the existing conditions is shown in Figure 3-4.

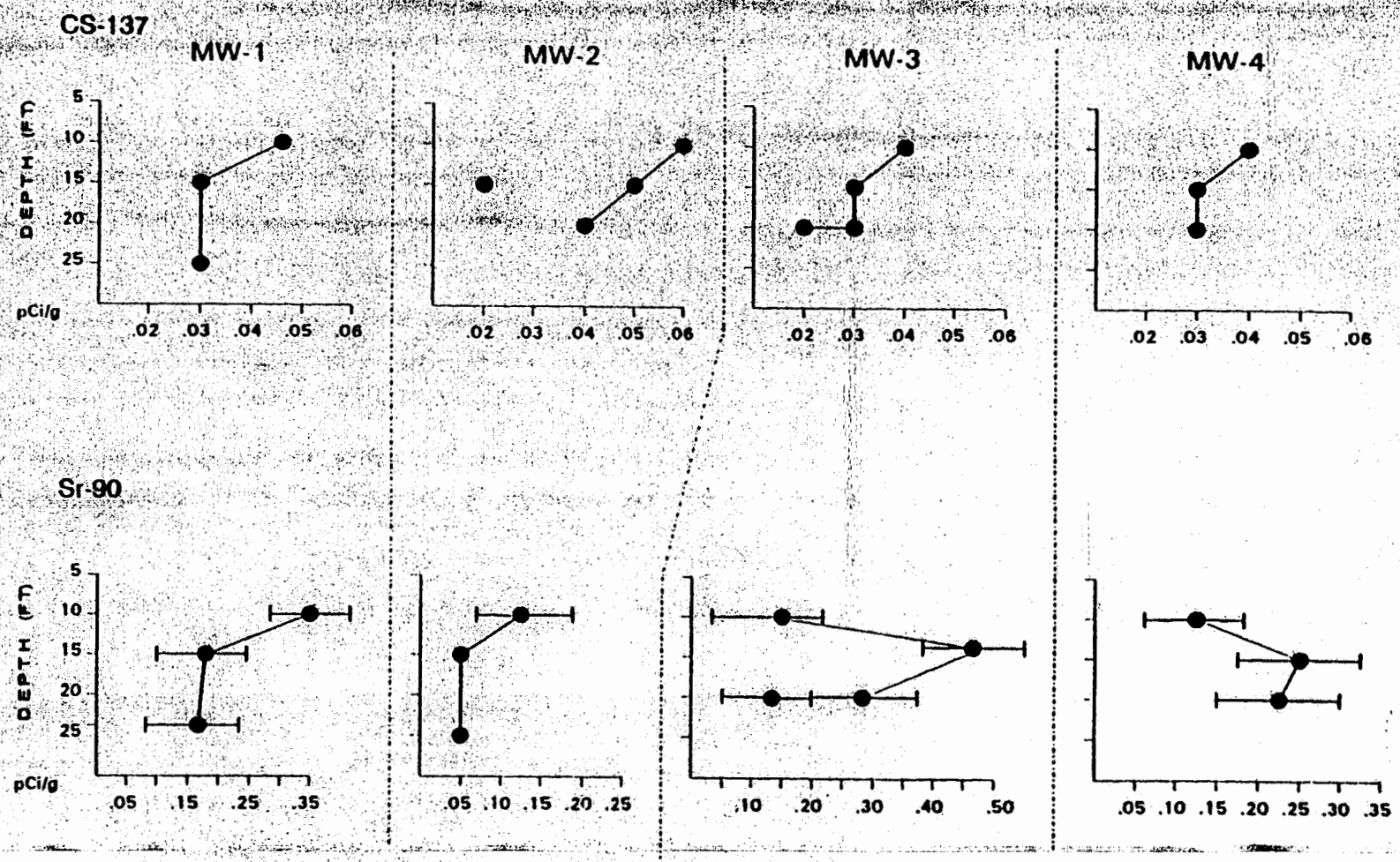
The second potential pathway of a spill would be introduction into the subsurface or downward migration through the soil, intercepting the shallow, perched water table present in the canyon alluvium. The seasonal nature of the water table makes this pathway more likely than runoff contamination in Pajarito Creek. Although definitive tests to determine the precise axis of flow of the shallow groundwater through the alluvial aquifer were beyond the scope of this project, wells MW-2, MW-3, and MW-4 were located to intercept groundwater flow past the LACEF from the most likely directions of transport. As was discussed earlier, other studies have shown that there is no hydraulic connection between the perched canyon aquifers and the main aquifer supplying municipal uses. There are no wells drawing from the alluvial aquifer downgradient from the LACEF. Therefore, any accidental release of radionuclides allowed to reach the perched aquifer should have no measurable effect on any downgradient groundwater users.

TABLE 4-1

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES (pCi/g)

Well Number	Well Depth (ft)	Element				
		^{137}Cs[a]	^{90}Sr[a]	^{234}U[b]	^{235}U[c]	^{238}U[c]
MW-1	10.0-11.25	<0.05	0.35 ± 0.09	0.10 ± 0.03	<0.05	0.10 ± 0.02
	15.0-16.75	<0.03	0.17 ± 0.07	0.10 ± 0.03	<0.05	0.08 ± 0.03
	25.0-27.0	<0.03	0.16 ± 0.08	0.11 ± 0.03	<0.05	0.07 ± 0.02
MW-2	10.0-11.5	<0.06	0.13 ± 0.06	0.13 ± 0.03	<0.05	0.14 ± 0.03
	15.0-16.25	<0.05	<0.05	0.10 ± 0.03	<0.05	0.10 ± 0.02
	15.0-16.25	<0.02	<0.05	0.16 ± 0.03	<0.05	0.14 ± 0.03
	20.0-21.5	<0.04	<0.05	0.12 ± 0.03	<0.05	0.11 ± 0.02
MW-3	10.0-11.25	<0.04	0.15 ± 0.08	<0.05	<0.05	<0.05
	15.0-16.25	<0.03	0.48 ± 0.09	0.14 ± 0.06	<0.05	0.11 ± 0.06
	20.0-21.5	<0.02	0.27 ± 0.09	0.11 ± 0.03	<0.05	0.13 ± 0.03
	20.0-21.5	<0.03	0.12 ± 0.07	0.12 ± 0.03	<0.05	0.09 ± 0.02
MW-4	10.5-11.25	<0.04	0.13 ± 0.06	0.17 ± 0.03	<0.05	0.16 ± 0.03
	15.0-16.5	<0.03	0.25 ± 0.07	0.10 ± 0.02	<0.05	0.07 ± 0.03
	20.0-21.0	<0.03	0.22 ± 0.08	0.15 ± 0.03	<0.05	0.15 ± 0.03
AH[d]	5.0-6.5	<0.03	0.14 ± 0.12	3.11 ± 0.15	0.10 ± 0.03	1.56 ± 0.11
Background[e]		0.04 ± 0.03	0.21 ± 0.08	0.09 ± 0.03	<0.05	0.07 ± 0.03

a. Equipment used on these samples had a minimum detection limit of 0.1 pCi/g
b. Equipment used on these samples had a minimum detection limit of 0.03 pCi/g
c. Equipment used on these samples had a minimum detection limit of 0.05 pCi/g
d. An abandoned hole (AH) was also tested.
e. Sample was collected at the Otowi Bridge area.



● = ANALYTICAL RESULT (Two dots at same depth indicate duplicate samples.)

⊢⊣ = ERROR LIMITS

Note: Dot locations are representative only. See Table 4-1 for actual concentration values.

Figure 4-1. Radionuclide Concentrations in Soil (continued)

4.4 Hydraulic Conductivity, Hydraulic Gradient, and Transport Rates

The well data shown in Table 4-3 allow for estimating the rate of transport of any isotope introduced into the groundwater as a result of experiment activities with the LACEF. Table 4-3 lists the data gathered on the four wells.

TABLE 4-3

MONITORING WELLS DATA AS OF NOVEMBER 16, 1990

Well Number	Total Depth (ft)	Depth to Water Level (ft)	Well Head Δ Elevation (ft)	Water Level Δ Elevation (ft)	Hydraulic Conductivity K (ft/day)
MW-1	25.42	14.50	0.0 *	0.0 *	0.021
MW-2	26.50	16.00	-0.42	-1.08	0.021
MW-3	26.50	15.83	-0.50	-0.83	0.012
MW-4	26.08	14.83	-0.25	-0.08	0.035

* MW-1 was used as the elevation reference.

The hydraulic gradient (total head difference/length) is quite shallow. Calculating the hydraulic conductivity (K) from the results of a modified slug test yields a mean value of 0.022 ft/day (0.007 m/day). While this value falls within the expected range of K values of 0.001 to 0.10 m/day for clay, sand, and gravel mixes (Bouwer, 1978), it should be considered only an approximation. Because of the multitude of factors not studied in this project, (e.g., sorption rates, seasonal water table changes) the hydraulic conductivity calculated is only an order of magnitude approximation. More extensive well tests would be necessary to give a precise number to the hydraulic conductivity.

The scope of work involved here did not include examination of any of the vertical components of radionuclide migration or long term pumping tests necessary for calculation of the volume rate of flow for this perched aquifer. Longer-term monitoring data, transport modeling, and additional aquifer testing would develop a more complete picture of the annual behavior of the aquifer.

- laboratory testing to determine sorption coefficients for the specific soils found at the LACEF site relative to the radionuclides of concern.

- drilling of more wells in a pattern at the site to allow development of injection well tests using tracer elements and direct measurement of some of the calculated parameters.

- additional exploratory drilling to determine the exact profile of the alluvium in the vicinity of TA-18.

- more frequent (or constant) monitoring during and immediately following conduction of experiments at the LACEF.

APPENDIX: CALCULATION METHOD AND DRAWDOWN DATA

A.1 Calculation Method for Hydraulic Conductivity

Because of the geometry and nature of the constructed wells, it was decided to use a modified slug test or "rate-of-rise test" to approximate the hydraulic conductivity of the perched aquifer.

The basic data were gathered using an electric well sounder to measure the static water level in each well after several undisturbed days. The wells were then rapidly bailed with a hand bailer to lower the water level as much and as fast as possible. The water level rise was measured at set time increments.

The calculation method used was developed by Bouwer (1978). The well geometry is shown in Figure 3-3. The equation is

$$K = \frac{r_c^2 \ln (R_e/r_w)}{2L_e} \frac{1}{t} \ln \frac{y_0}{y}$$

where

- K = hydraulic conductivity,
- R_e = effective radial distance over which the head is dissipated,
- r_w = radial distance between well center and undisturbed aquifer,
- L_e = height of screened section through which groundwater enters,
- y_0 = y at time zero,
- y = y at time (t), and
- t = time since y_0.

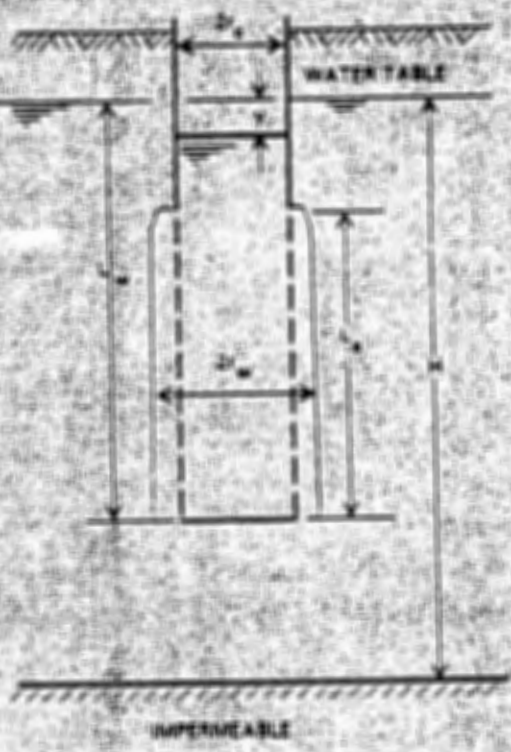


Figure A-1: Well Geometry Used in Calculations

A.2 Plots of Drawdown Data from Slug Tests

The plots in this section show a semi-logarithmic plot and accompanying data from the well tests (Thompson, 1987).

REGRESSION COEFFICIENT = -.9476515

Test Results for PM-1 TEST DATA

TIME (seconds)	WATER LEVEL (feet)	DRAWDOWN (feet)	H/H0
0	16.50	0.75	1
60	16.17	0.34	.4533333
120	16.17	0.34	.4533333
180	16	0.17	.2266666

REGRESSION COEFFICIENT = -.9984602

Test Results for PM-4 TEST DATA

TIME (seconds)	WATER LEVEL (feet)	DRAWDOWN (feet)	H/H0
0	17.83	3.00	1
60	17	2.17	.7233333
120	16.5	1.67	.5566667
180	16	1.17	.39

X AXIS:
LOG TIME, min

Y AXIS:
LOG H/H0

Figure A-2. Plots of Well Drawdown Data (concluded)

LA-12883-MS

UC-903 and UC-940
Issued: January 1995

Geologic and Hydrologic Records of Observation Wells, Test Holes, Test Wells, Supply Wells, Springs, and Surface Water Stations in the Los Alamos Area

W. D. Purtymun

Los Alamos
NATIONAL LABORATORY

the canyon, we installed additional observation wells and some moisture-access holes near the new treatment plant.

Five observation wells (CDBO-5 through CDBO-9) and two moisture-access holes (CDBM-1 and CDBM-2) were drilled and completed in 1992 (Figs. VII-O through VII-U). The holes were cored, producing 7.25-in.-diam holes and 3-in.-diam cores. The observation wells were gravel packed, while in the moisture-access holes the annulus between the hole wall and casing was packed with sand. Two holes, CDBO-6 and CDBO-7, encountered water perched in the alluvium (Table VII-D). This perched water is probably the result of a discharge to waste from well PM-4 that occurs when the well is started. The discharge is necessary so that the water pressure in the line can be increased gradually. Discharge directly into the line at start-up would result in a high pressure which would rupture the transmission line from the well to the tank.

Graphic presentation of logs and completion data for the observation wells and moisture-access holes are shown in Figs. VII-O to VII-U. Logs and completion data of the observation wells are found in Table VII-D and for the moisture holes in Table VII-E.

REFERENCES

M. Devaurs, "Core Analyses and Observation Well Data from Mesita del Buey Disposal Areas and in Adjacent Canyons," Los Alamos National Laboratory document LA-UR-85-4003.

M. Devaurs and W. D. Purtymun, "Hydrologic Characteristics of the Alluvial Aquifers in Mortandad, Cañada del Buey, and Pajarito Canyons," Los Alamos National Laboratory document LA-UR-85-4002.

B. Gallaher, Los Alamos National Laboratory, personal communication, 1992.

W. D. Purtymun, "Source Document Compilation: Los Alamos Investigations Related to the Environment, Engineering, Geology, and Hydrology, 1961–1990," Los Alamos National Laboratory document LA-12733-MS (1994), chapters 128, 138, and 155.

W. D. Purtymun, Los Alamos National Laboratory, unpublished data (field notes), 1985 and 1992.

W. D. Purtymun and W. R. Kennedy, "Geology and Hydrology of Mesita del Buey," Los Alamos Scientific Laboratory report LA-4660 (1971).

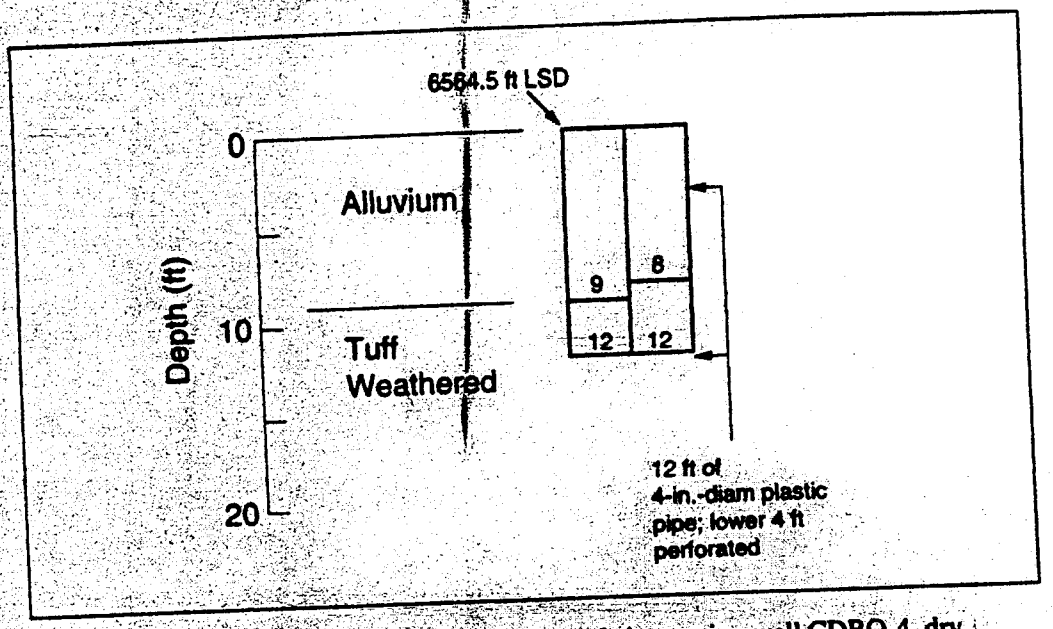


Fig. VII-G. Geologic log and casing schedule of observation well CDBO-4, dry (Purtymun 1985).

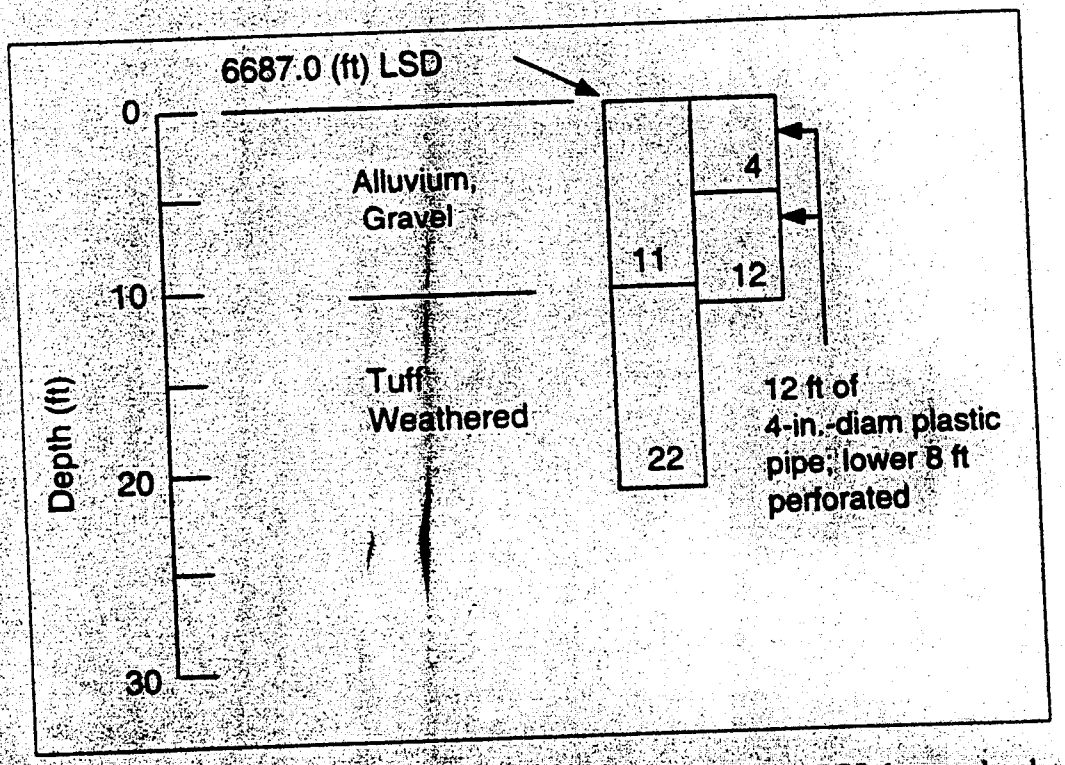


Fig. VII-H. Geologic log and casing schedule of observation well PCO-1, water level 13 ft (Purtymun 1985).

TABLE VII-B. Geologic Logs and Construction Data for Observation Wells in Pajarito Canyon (3 Obs. Wells)

1. Observation Well PCO-1

Elevation (LSD) 6687.0 ft — Water Level: 1.3 ft (1985)

Geologic Log	Thickness (ft)	Depth (ft)
Alluvium, light brown, gravel, cobbles, and boulders in a matrix of clay, silt, and sand	11	11
Tuff, light reddish brown, weathered, quartz and sanidine crystal fragments, a few rock fragments of latite and rhyolite	11	22

Construction
12.3 ft of 4-in.-diam plastic pipe set 0 to 12.3 ft, lower 8 ft perforated. Cement 0 to 2 ft; gravel packed 2 to 12 ft.

2. Observation Well PCO-2

Elevation (LSD) 6618.3 ft — Water Level: 6.3 ft (1985)

Geologic Log	Thickness (ft)	Depth (ft)
Alluvium, light brown, gravels, cobbles, and boulders in a matrix of of clay, silt, and sand	9	9
Tuff, light reddish brown, nonwelded to moderately welded, quartz and sanidine crystal fragments, a few small rock fragments	13	22

Construction
9.5 ft of 4-in.-diam plastic pipe set 0 to 9.5 ft, lower 8 ft perforated. Cement 0 to 1 ft; gravel packed 1 to 9 ft.

3. Observation Well PCO-3

Elevation (LSD) 6546.3 ft — Water Level: 3.1 ft (1985)

Geologic Log	Thickness (ft)	Depth (ft)
Alluvium, light brown, gravel with a few cobbles in a matrix of silty sand	12	12
Tuff, light gray to light brown, weathered, some quartz and sanidine crystal fragments, a few small rock fragments in a matrix of weathered tuff, mostly silts and clay	8	20

Construction
17.7 ft of 4-in.-diam plastic pipe set 0 to 17.7 ft, lower 12 ft perforated. Cement 0 to 2 ft; gravel packed 2 to 18 ft.

Source: Purtymun 1985.

Environmental Restoration Program

SAMPLE COLLECTION LOG

AAA9577
Affix Sample Sticker here

Date 10/19/94 Time 10:00

Technical Area 18 Operable Unit 1093

Name (Print) T. Lansford

Signature

Sample Type Water - Ground

QA/QC Type None

Composite: ○ Yes ◉ No

Composite Type: None

Sample Location MW-1, Kiva 1 area, Pajarito Canyon

Location ID	Start Depth	End Depth	Units
18-2013	0	0	

These Samples were collected using LANL ER SOP

Analysis	Container	Preservative	C of C Control No.
Metals(EPA6010)	500 ml Polyethylene	HNO3	1093-0022
Minerals,General(Std Methods)	1 L Polyethylene-A	HNO3	1093-0022
Minerals,General(Std Methods)	1 L Polyethylene-B	H2SO4	1093-0022
Mobile Rad Van(alpha,beta,gamma)	500 ml Polyethylene	Ice	1093-0029
Pu(Isotopic)+U(Total)	1 L Polyethylene	HNO3	1093-0022
Semi-VOCs(EPA8270)	1 L Amber Glass	Ice	1093-0022
VOCs(EPA8260)	40 ml Amber Glass-A	HCl	1093-0022
VOCs(EPA8260)	40 ml Amber Glass-B	HCl	1093-0022

Weather Clear Sunny

Sample Description water

Field HE N/A

Field Stake No N/A

Field RAD N/A (c/m)

CGI N/A (% LEL)

○ FID ◉ PID - Results N/A (ppm)

Photo (Roll, Frame, Azimuth, Subject, Participants):

Comments:

Temp - 53°F
pH - 6.6
TDS - 160
Well depth - 25.6'
Water - 12.4'

[illegible] prior to sampling

Investigation Program

SAMPLE COLLECTION LOG

Date 10/18/94 Time 1:45

Technical Area 18 Operable Unit 1093

Name (Print) T. Lansford

Signature

Sample Type Water - Ground

QA/QC Type None

Composite: ○ Yes ◉ No

Composite Type: None

Sample Location MW-3, Kiva 1 area, Pajarito Canyon

AI AAA9579 Place Sticker Here

Location ID	Start Depth	End Depth	Units
18-2015	0	0	

These Samples were collected using LANL ER SOP

Analysis	Container	Preservative	C of C Control No.
Metals(EPA6010)	500 ml Polyethylene	HNO3	1093-0024
Minerals,General(Std Methods)	1 L Polyethylene-A	HNO3	1093-0024
Minerals,General(Std Methods)	1 L Polyethylene-B	H2SO4	1093-0024
Mobile Rad Van(alpha,beta,gamma)	500 ml Polyethylene	Ice	1093-0029
Pu(Isotopic)+U(Total)	1 L Polyethylene	HNO3	1093-0024
Semi-VOCs(EPA8270)	1 L Amber Glass	Ice	1093-0024
VOCs(EPA8260)	40 ml Amber Glass-A	HCl	1093-0024
VOCs(EPA8260)	40 ml Amber Glass-B	HCl	1093-0024

Weather Warm Clear & Slight Breeze

Sample Description Water

Field HE N/A

Field Stake No N/A

Field RAD N/A (c/m)

CGI N/A (% LEL)

○ FID ◉ PID - Results N/A (ppm)

Photo (Roll, Frame, Azimuth, Subject, Participants):

Comments:

Temp - 55°F

TDS - 130

pH - 6.7

Depth Well 23.4'

Water - 14.0'

4 Gal Bailed prior to sampling

SAMPLE COLLECTION LOG

Date 10/18/94 Time 1:30

Technical Area 18 Operable Unit 1093

Name (Print) T. Lansford

Signature [signature]

Sample Type Water - Ground

QA/QC Type Field Blank

Composite: ○ Yes ◉ No

Composite Type: None

Sample Location Kiva 1 area, Pajarito Canyon

AAA9581

Affix Sample Sticker Here

Location ID	Start Depth	End Depth	Units
18-2016	0	0	

These Samples were collected using LANL ER SOP

Analysis	Container	Preservative	C of C Control No.
Metals(EPA6010)	500 ml Polyethylene	HNO3	1093-0026
Minerals,General(Std Methods)	1 L Polyethylene-A	HNO3	1093-0026
Minerals,General(Std Methods)	1 L Polyethylene-B	H2SO4	1093-0026
Mobile Rad Van(alpha,beta,gamma)	500 ml Polyethylene	Ice	1093-0029
Pu(Isotopic)+U(Total)	1 L Polyethylene	HNO3	1093-0026
Semi-VOCs(EPA8270)	1 L Amber Glass	Ice	1093-0026
VOCs(EPA8260)	40 ml Amber Glass-A	HCl	1093-0026
VOCs(EPA8260)	40 ml Amber Glass-B	HCl	1093-0026

Weather Warm & Clear

Sample Description D. I. Water

Field HE N/A

Field Stake No N/A

Field RAD N/A (c/m)

CGI N/A (% LEL)

○ FID ◉ PID - Results N/A (ppm)

Photo (Roll, Frame, Azimuth, Subject, Participants):

N/A

Comments:

SAMPLE COLLECTION LOG

AAA9583
Sample Sticker Here

Date 10/18/94 Time 11:40

Technical Area 18 Operable Unit 1093

Name (Print) T. Lansford

Signature [signature]

Sample Type Water - Ground

QA/QC Type Trip Blank

Composite: (●) Yes ( ) No

Composite Type: Spatial

Sample Location Kiva 1 area, Pajarito Canyon

Location ID	Start Depth	End Depth	Units
18-2013	0	0	
~~18-2014~~	~~0~~	~~0~~	
~~18-2015~~	~~0~~	~~0~~	
~~18-2016~~	~~0~~	~~0~~	

These Samples were collected using LANL ER SOP

Analysis	Container	Preservative	C of C Control No.
VOCs(EPA8260)	40 ml Amber Glass-A	HCl	1093-0028
~~VOCs(EPA8260)~~	~~40 ml Amber Glass-B~~	~~HCl~~	~~1093-0028~~

JP 10/19

Weather Clear & Warm

Sample Description Qt. water

Field HE N/A

Field Stake No N/A

Field RAD N/A (c/m)

CGI N/A (% LEL)

( ) FID (●) PID - Results N/A (ppm)

Photo (Roll, Frame, Azimuth, Subject, Participants):

NA

Comments:

Los Alamos National Laboratory Environmental Restoration Program

SAMPLE COLLECTION LOG

Date 10/19/94 Time 4:45

Technical Area 18 Operable Unit 1093

Name (Print) R. Lansford

Signature [signature]

AAA9585

Affix Sample Sticker Here

Location ID	Start Depth	End Depth	Units
18-2024	0	0	

Sample Type Water - Ground

QA/QC Type None

Composite: ○ Yes ◉ No

Composite Type: None

Sample Location MW-6, Near Bldg 31, TA-18

These Samples were collected using LANL ER SOP

Analysis	Container	Preservative	C of C Control No.
Mobile Rad Van(alpha,beta,gamma)	500 ml Polyethylene	Ice	1093-0039
Semi-VOCs(EPA8270)	1 L Amber Glass	Ice	1093-0031
Total Petroleum Hydrocarbons(TPH)	1 L Amber Glass	HCl	1093-0031

Weather Clear & Sunny

Sample Description Water

Field HE N/A

Field Stake No N/A

Field RAD N/A (c/m)

CGI N/A (% LEL)

○ FID ◉ PID - Results N/A (ppm)

Photo (Roll, Frame, Azimuth, Subject, Participants):

Comments:

Temp - 56°F

PH - 6.6

TDS - 260

Depth of Well - 25.0'

Water 8 1/2'

Bailed ≈ 4 Gal prior to Sample

SAMPLE COLLECTION LOG

AAA9587
Affix Sample Sticker Here

Date 10/20/94 Time 3:15

Technical Area 18 Operable Unit 1093

Name (Print) ~~T. Lunsford~~ J. Pope 10/20/94 H

Signature J. Pope

Sample Type Water - Ground

QA/QC Type None

Composite: ○ Yes ◉ No

Composite Type: None

Sample Location PCO-1, Pajarito Canyon

Location ID	Start Depth	End Depth	Units
36-2020	0	0	

These Samples were collected using LANL ER SOP

Analysis	Container	Preservative	C of C Control No.
Metals(EPA6010)	500 ml Polyethylene	HNO3	1093-0033
Minerals,General(Std Methods)	1 L Polyethylene-A	HNO3	1093-0033
Minerals,General(Std Methods)	1 L Polyethylene-B	H2SO4	1093-0033
Mobile Rad Van(alpha,beta,gamma)	500 ml Polyethylene	Ice	1093-0039
Pu(Isotopic)+U(Total)	1 L Polyethylene	HNO3	1093-0033
Semi-VOCs(EPA8270)	1 L Amber Glass	Ice	1093-0033
Total Petroleum Hydrocarbons(TPH)	1 L Amber Glass	HCl	1093-0033
VOCs(EPA8260)	40 ml Amber Glass-A	HCl	1093-0033
VOCs(EPA8260)	40 ml Amber Glass-B	HCl	1093-0033

Weather OVERCAST

Sample Description WATER

Field HE NA

Field Stake No 36-2020

Field RAD NA (c/m)

CGI NA (% LEL)

○ FID ◉ PID - Results NA (ppm)

Photo (Roll, Frame, Azimuth, Subject, Participants):

Comments:

WATER TABLE @ 1'

Depth of WELL @ 13'

Temp - 56°F

pH - 6.8

TDS - 290

BAILED @ 8 gallons prior to sampling

Temp ≃ 56 °F

TDS ≃ 280

pH ≃ 6.8

Prior to Sampling

Los Alamos National Laboratory Environmental Restoration Program

SAMPLE COLLECTION LOG

AAA9589

Affix Sample Sticker Here

Date 11/25/09 Time 1300

Technical Area 18 Operable Unit 1093

Name (Print) J. Pope

Signature Jason Pope

Sample Type Water - Ground

QA/QC Type None

Composite: ○ Yes ◉ No

Composite Type: None

Sample Location PCO-3, Pajarito Canyon

Location ID	Start Depth	End Depth	Units
36-2022	0	0	

These Samples were collected using LANL ER SOP

Analysis	Container	Preservative	C of C Control No.
Metals(EPA6010)	500 ml Polyethylene	HNO3	1093-0035
Minerals,General(Std Methods)	1 L Polyethylene-A	HNO3	1093-0035
Minerals,General(Std Methods)	1 L Polyethylene-B	H2SO4	1093-0035
Mobile Rad Van(alpha,beta,gamma)	500 ml Polyethylene	Ice	1093-0039
Pu(Isotopic)+U(Total)	1 L Polyethylene	HNO3	1093-0035
Semi-VOCs(EPA8270)	1 L Amber Glass	Ice	1093-0035
VOCs(EPA8260)	40 ml Amber Glass-A	HCl	1093-0035
VOCs(EPA8260)	40 ml Amber Glass-B	HCl	1093-0035

Weather Cloudy

Sample Description WATER

Field HE NP

Field Stake No 36-2022

Field RAD NA (c/m)

CGI NA (% LEL)

○ FID ◉ PID - Results NF (ppm)

Photo (Roll, Frame, Azimuth, Subject, Participants):

Comments:

WATER TABLE @ 5.7'
WELL DEPTH 17.1'
≈ 12 gallons bailed prior to sampling

PRIOR TO SAMPLING
PH ≈ 6.8
TDS ≈ 490
TEMP ≈ 58°F

During Sampling
PH 6.8
TDS 520
Temp 58°F

Los Alamos National Laboratory Environmental Restoration Program

SAMPLE COLLECTION LOG

AAA9591

Affix Sample Sticker Here

Date 10/25/94 Time 1430

Technical Area 18 Operable Unit 1093

Name (Print) J. Pope

Signature J. Pope

Sample Type Water - Ground

QA/QC Type Field Blank

Composite: ○ Yes ◉ No

Composite Type: None

Sample Location PCO-3, Pajarito Canyon

Location ID	Start Depth	End Depth	Units
36-2022	0	0	

These Samples were collected using LANL ER SOP

Analysis	Container	Preservative	C of C Control No.
Metals(EPA6010)	500 ml Polyethylene	HNO3	1093-0037
Minerals,General(Std Methods)	1 L Polyethylene-A	HNO3	1093-0037
Minerals,General(Std Methods)	1 L Polyethylene-B	H2SO4	1093-0037
Mobile Rad Van(alpha,beta,gamma)	500 ml Polyethylene	Ice	1093-0039
Pu(Isotopic)+U(Total)	1 L Polyethylene	HNO3	1093-0037
Semi-VOCs(EPA8270)	1 L Amber Glass	Ice	1093-0037
VOCs(EPA8260)	40 ml Amber Glass-A	HCl	1093-0037
VOCs(EPA8260)	40 ml Amber Glass-B	HCl	1093-0037

Weather Clear

Sample Description WATER

Field HE NA

Field Stake No 36-2022

Field RAD NA (c/m)

CGI NA (% LEL)

○ FID ◉ PID - Results NA (ppm)

Photo (Roll, Frame, Azimuth, Subject, Participants):

Comments:

Los Alamos National Laboratory Environmental Restoration Program

SAMPLE COLLECTION LOG

AAA9593

Affix Sample Sticker Here

Date October 26, 1994 Time 1105

Technical Area 18 Operable Unit 1093

Name (Print) J. Pope

Signature J. Pope

Sample Type Water - Ground

QA/QC Type Trip Blank

Composite: ○ Yes ◉ No

Composite Type: None

Sample Location PCO-series, Pajarito Canyon

Location ID	Start Depth	End Depth	Units
36-2021	0	0	

These Samples were collected using LANL ER SOP 06.03

Analysis	Container	Preservative	C of C Control No.
VOCs(EPA8260)	40 ml Amber Glass-B	HCl	1093-0041

Weather CLEAR

Sample Description D.I. WATER

Field HE NA

Field Stake No NA

Field RAD NA (c/m)

CGI NA (% LEL)

○ FID ◉ PID - Results NA (ppm)

Photo (Roll, Frame, Azimuth, Subject, Participants):

NA

Comments:

Los Alamos National Laboratory Environmental Restoration Program

SAMPLE COLLECTION LOG FOR SAMPLE ID 0218-95-0005

Date April 19, 1995 Time 1138

Technical Area 18 Operable Unit 1093

Name (Print) ~~Nancy Nace~~ CATHERINE GETZ

Signature

Sample Type Water - Ground

QA/QC Type None

Composite: ○ Yes ◉ No

Composite Type: None

Sample Location MW-5

Grabs:

Location ID	Start Depth	End Depth	Units
1 18-2023	0	0	

These Samples were collected using LANL ER SOP 06.03

ID	Analysis	Container	Preservative	C of C Control No.
01	RVGROSSAB+RVGROSSG	500 ml Polyethylene	Ice	1093-95-0006
02	SEMI	1 L Glass	Ice	1093-95-0005
03	TPH	1 L Amber Glass	HCl/Ice	1093-95-0005

Weather Snowy

Sample Description slightly turbid, light brown, no odor, no sheen

Photo (Roll, Frame, Azimuth, Subject, Participants):

NA

Comments: Tony Moreland of HMED collected splits; TD 29.43', DTW 12.33' purged 8 gals; pH 6.6

Field Screening:

Loc ID	Screening Method	Result	Units	Comments
18-2023	PID	0	ppm	NA

Los Alamos National Laboratory Environmental Restoration Program

SAMPLE COLLECTION LOG FOR SAMPLE ID 0218-95-0007

Date April 19, 1995 **Time** 945

Technical Area 18 **Operable Unit** 1093

Name (Print) ~~Nancy Ness~~ Catherine Goetz

Signature [illegible]

Sample Type Liquid

QA/QC Type Trip Blank

Composite: ○ Yes ◉ No

Composite Type: None

Sample Location MW-5 and MW-6 Wells and PCO-1 and PCO-2 Wells

Grabs:

	Location ID	Start Depth	End Depth	Units
1	NA	0	0	

These Samples were collected using LANL ER SOP

ID	Analysis	Container	Preservative	C of C Control No.
01	VOAGCMS	40 ml Amber Glass-A	HCl	1093-95-0005

Weather cloudy, cold, snowy

Sample Description Trip blank performed by CST-3

Photo (Roll, Frame, Azimuth, Subject, Participants):

NA

Comments:

NA

Field Screening:

Loc ID	Screening Method	Result	Units	Comments
NA	PID	NA	ppm	NA

Los Alamos National Laboratory Environmental Restoration Program

SAMPLE COLLECTION LOG FOR SAMPLE ID 0236-95-0502

Date April 19, 1995 Time CG 1405

Technical Area 36 Operable Unit 1093

Name (Print) ~~Nancy Nase~~ Catherine Gocke

Signature

Sample Type Water - Ground

QA/QC Type Field Duplicate

Composite: ○ Yes ◉ No

Composite Type: None

Sample Location PCO-1

Grabs:

	Location ID	Start Depth	End Depth	Units
1	36-2020	0	0	

These Samples were collected using LANL ER SOP 06.03

ID	Analysis	Container	Preservative	C of C Control No.
01	HEXP	1 L Amber Glass	Ice	1093-95-0005
02	ISOPU+ISOTH+TU	1 Gal Polyethylene-A	HNO3	1093-95-0005
03	RVGROSSAB+RVGROSSG	500 ml Polyethylene	Ice	1093-95-0006
04	SEMI	1 L Amber Glass	Ice	1093-95-0005
05	METTAL	500 ml Polyethylene	HNO3	1093-95-0005
06	TPH	1 L Amber Glass	HCl	1093-95-0005
07	VOAGCMS	40 ml Amber Glass-A	HCl	1093-95-0005
08	VOAGCMS	40 ml Amber Glass-B	HCl	1093-95-0005

Weather clear cold

Sample Description SEE COMMENTS

Photo (Roll, Frame, Azimuth, Subject, Participants):

NA

Comments:

duplicate of 0236-95-~~504~~ CG 501

See this sample for description

Field Screening:

Loc ID	Screening Method	Result	Units	Comments
36-2020	PID	0	ppm	NA

Los Alamos National Laboratory Environmental Restoration Program
SAMPLE COLLECTION LOG FOR SAMPLE ID 0218-95-0001

Date April 20, 1995 **Time** 1005

Technical Area 18 **Operable Unit** 1093

Name (Print) Nancy Ness

Signature Nancy Ness

Sample Type Water - Ground

QA/QC Type None

Composite: ○ Yes ◉ No

Composite Type: None

Sample Location MW-1

Grabs:

	Location ID	Start Depth	End Depth	Units
1	18-2013	0	0	

These Samples were collected using LANL ER SOP 06.03

ID	Analysis	Container	Preservative	C of C Control No.
01	HEXP	1 L Glass	Ice	1093-95-0007
02	ISOPU+ISOTH+TU	1 Gal Polyethylene-B	HNO3	1093-95-0007
03	RVGROSSAB+RVGROSSG	500 ml Polyethylene	Ice	1093-95-0008
04	SEMI	1 L Glass	Ice	1093-95-0007
05	METTAL	500 ml Polyethylene	HNO3	1093-95-0007
06	VOAGCMS	40 ml Amber Glass-A	HCl	1093-95-0007
07	VOAGCMS	40 ml Amber Glass-B	HCl	1093-95-0007

Weather Cloudy, windy and cold

Sample Description moderately turbid, light brown, no odor, no sheen

Photo (Roll, Frame, Azimuth, Subject, Participants):
NA

Comments:
good recharge

Field Screening:

Loc ID	Screening Method	Result	Units	Comments
18-2013	PID	0	ppm	NA

Los Alamos National Laboratory Environmental Restoration Program

SAMPLE COLLECTION LOG FOR SAMPLE ID 0218-95-0003

Date April 20, 1995 Time 0925

Technical Area 18 Operable Unit 1093

Name (Print) Nancy Nass

Signature Nancy Nass

Sample Type Water - Ground

QA/QC Type None

Composite: ○ Yes ◉ No

Composite Type: None

Sample Location MW-3

Grabs:

Location ID	Start Depth	End Depth	Units
1 18-2015	0	0	

These Samples were collected using LANL ER SOP 06.03

ID	Analysis	Container	Preservative	C of C Control No.
01	HEXP	1 L Glass	Ice	1093-95-0007
02	ISOPU+ISOTH+TU	1 Gal Polyethylene-B	HNO3	1093-95-0007
03	RVGROSSAB+RVGROSSG	500 ml Polyethylene	Ice	1093-95-0008
04	SEMI	1 L Glass	Ice	1093-95-0007
05	METTAL	500 ml Polyethylene	HNO3	1093-95-0007
06	VOAGCMS	40 ml Amber Glass-A	HCl	1093-95-0007
07	VOAGCMS	40 ml Amber Glass-B	HCl	1093-95-0007

Weather cloudy, windy and cold

Sample Description moderately turbid light gray-green, no odor, no other

Photo (Roll, Frame, Azimuth, Subject, Participants):
NA

Comments:
moderate recharge

Field Screening:

Loc ID	Screening Method	Result	Units	Comments
18-2015	PID	0	ppm	N/A

Los Alamos National Laboratory Environmental Restoration Program

SAMPLE COLLECTION LOG FOR SAMPLE ID 0228-95-0504

Date April 20, 1995 Time 1225

Technical Area 36 Operable Unit 1093

Name (Print) Nancy Nase

Signature Nancy Nase

Sample Type Water Ground

QA/QC Type None

Composite: ○ Yes ◉ No

Composite Type: None

Sample Location POD-3

Grabs:

Location ID	Start Depth	End Depth	Units
1 36-2022	0	0	

These Samples were collected using LANL ER SOP 04.03

ID	Analysis	Container	Preservative	C. of C Control No.
01	HEXP	1 L Amber Glass	Ice	1093-95-0007
02	ISOPU+ISOTH+TU	1 Gal Polyethylene-A	HNO3	1093-95-0007
03	RVGROSSAB+RVGROSSC	500 ml Polyethylene	Ice	1093-95-0008
04	SEMI	1 L Amber Glass	Ice	1093-95-0007
05	METTAL	500 ml Polyethylene	HNO3	1093-95-0007
06	VOAGOMS	40 ml Amber Glass-A	HCl	1093-95-0007
07	VOAGOMS	40 ml Amber Glass-B	HCl	1093-95-0007

Weather partly cloudy windy and cool

Sample Description [illegible]

Photo (Roll, Frame, Azimuth, Subject, Participants) NA

Comments: Well [illegible] dry then recharged to 5 feet when sample was collected

Field Screening

Line ID	Screening Method	Result	Units	Comments
36 2022	PID	0	ppm	NA

ATTACHMENT C

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
POO-3	36-2023	Sulfate	AAA5956	14000	UG/L	
POO-3	36-2023	Alkalinity, Total (Methyl Orange [pH=4.5] end point)	AAA5987	421000	UG/L	
POO-3	36-2023	Calcium	AAA5987	130000	UG/L	J
POO-3	36-2023	Chloride	AAA5987	24890	UG/L	
POO-3	36-2023	Magnesium	AAA5987	30000	UG/L	
POO-3	36-2023	Potassium	AAA5987	3680	UG/L	
POO-3	36-2023	Sodium	AAA5987	131000	UG/L	
POO-3	36-2023	Sulfate	AAA5987	5510	UG/L	
POO-3	36-2023	Calcium	AAA9590	43000	UG/L	
POO-3	36-2023	Calcium	AAA9590	41100	UG/L	
POO-3	36-2023	Magnesium	AAA9590	10000	UG/L	
POO-3	36-2023	Magnesium	AAA9590	8600	UG/L	
POO-3	36-2023	Potassium	AAA9590	3900	UG/L	
POO-3	36-2023	Potassium	AAA9590	4760	UG/L	U
POO-3	36-2023	Sodium	AAA9590	39000	UG/L	
POO-3	36-2023	Sodium	AAA9590	50400	UG/L	
POO-3	36-2023	Calcium	AAB2542	24500	UG/L	
POO-3	36-2023	Magnesium	AAB2542	53100	UG/L	
POO-3	36-2023	Potassium	AAB2542	8970	UG/L	
POO-3	36-2023	Sodium	AAB2542	15900	UG/L	

ATTACHMENT D

REVISED FIGURES

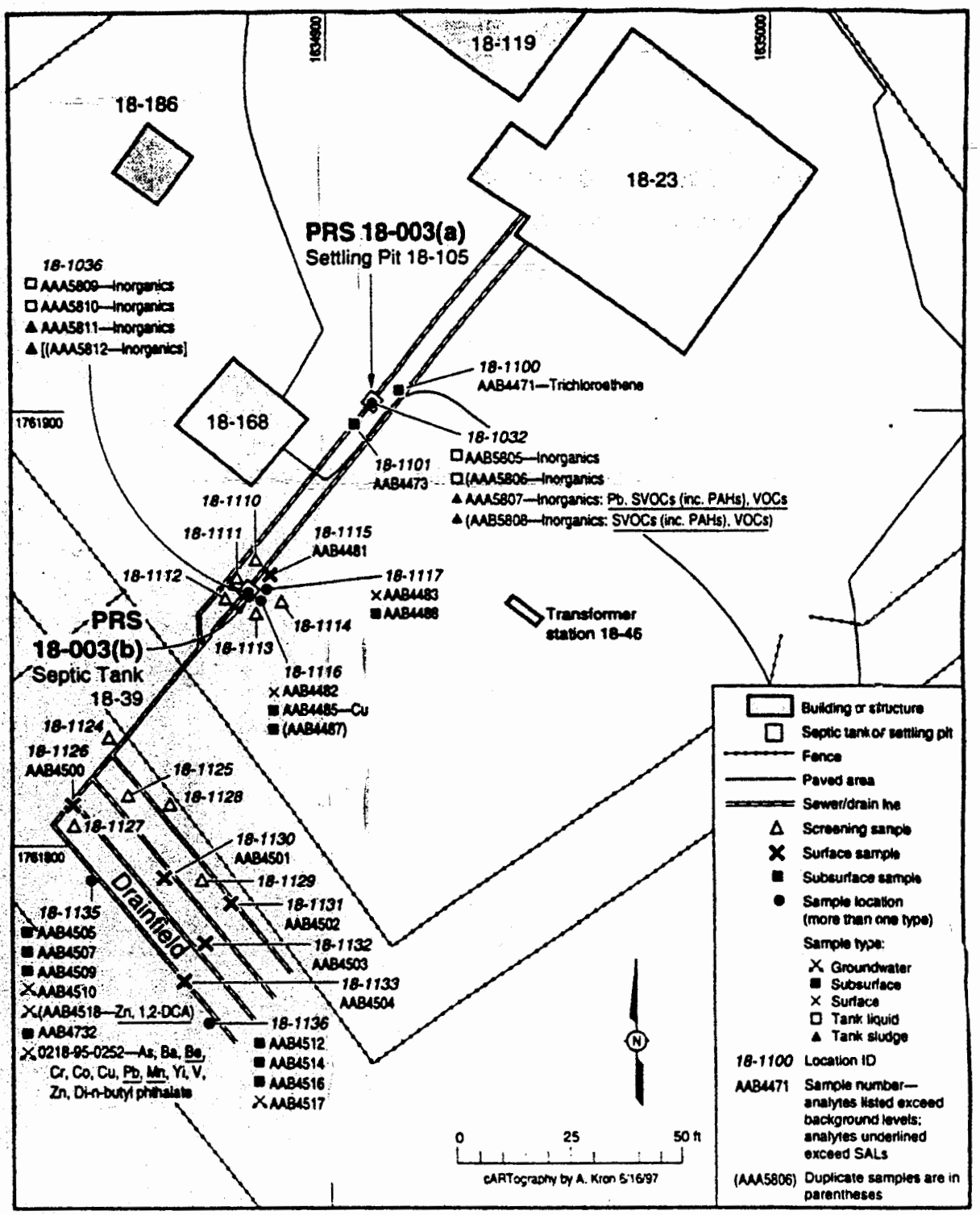


Figure 4-2. Sample locations and results of screening assessment for PRS 18-003(a and b).

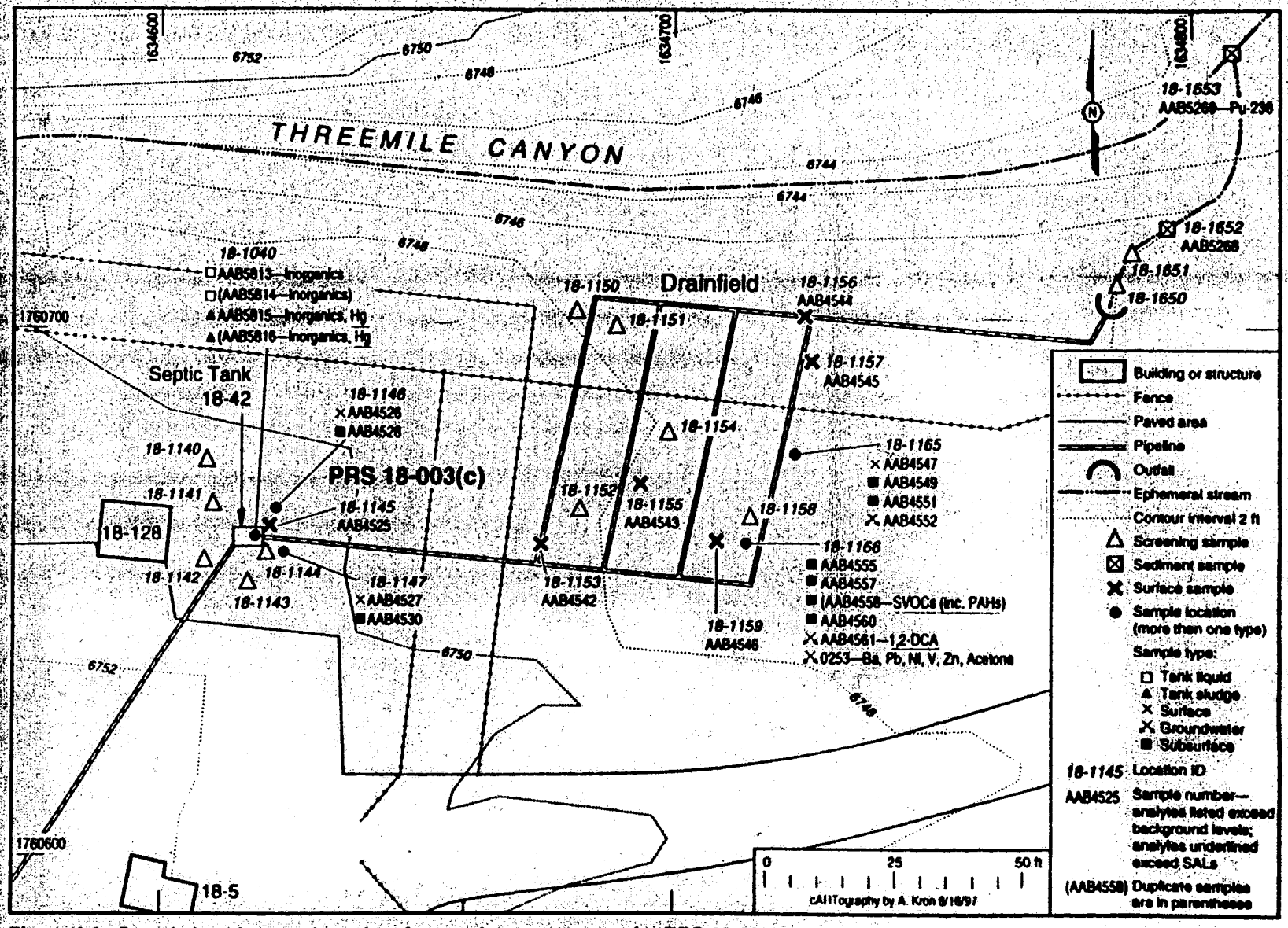


Figure 4-3. Sample locations and results of screening assessment for PRS 18-003(c).

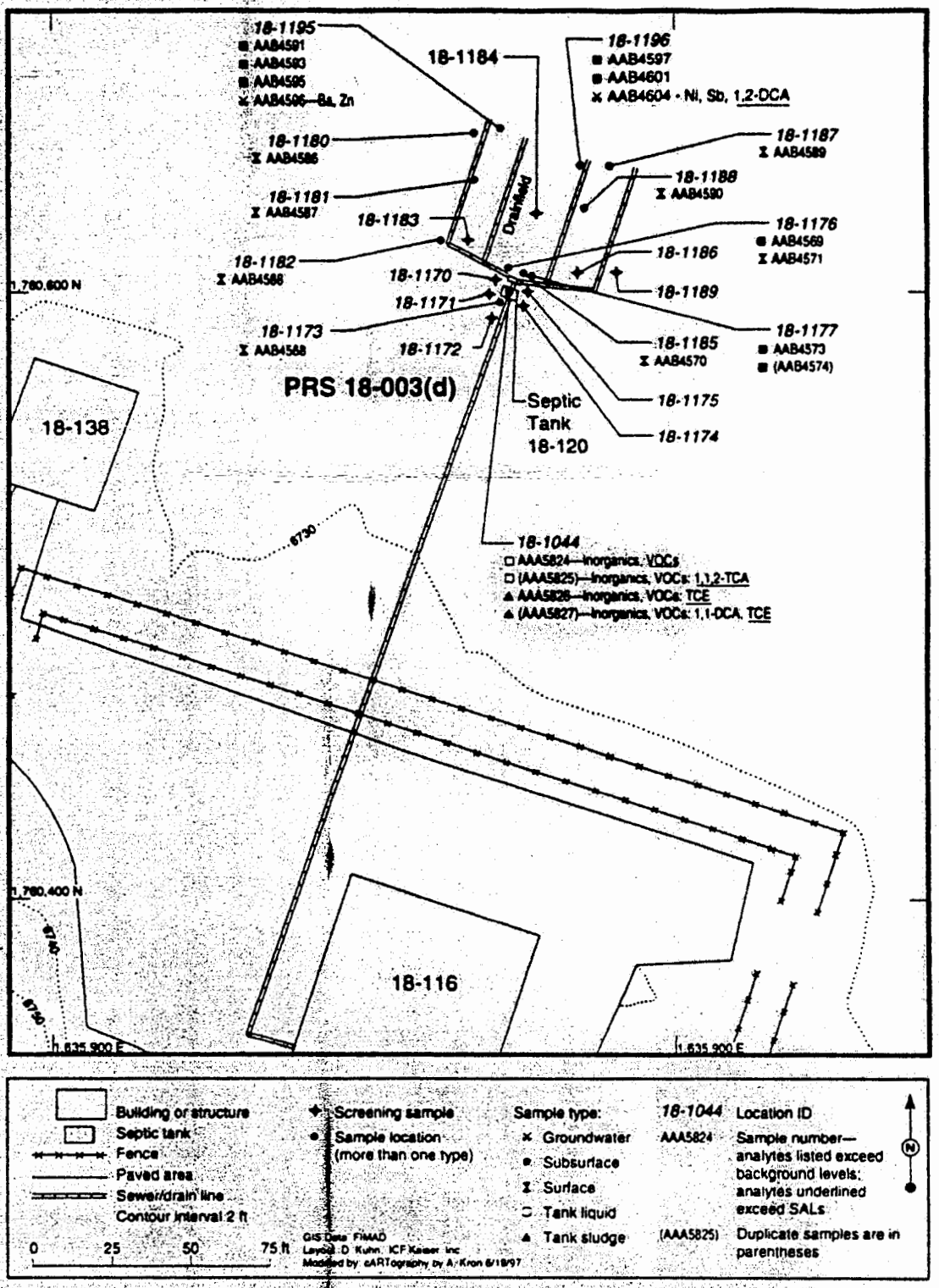


Figure 4-4. Sample locations and results of screening assessment at PRS 18-003(d).

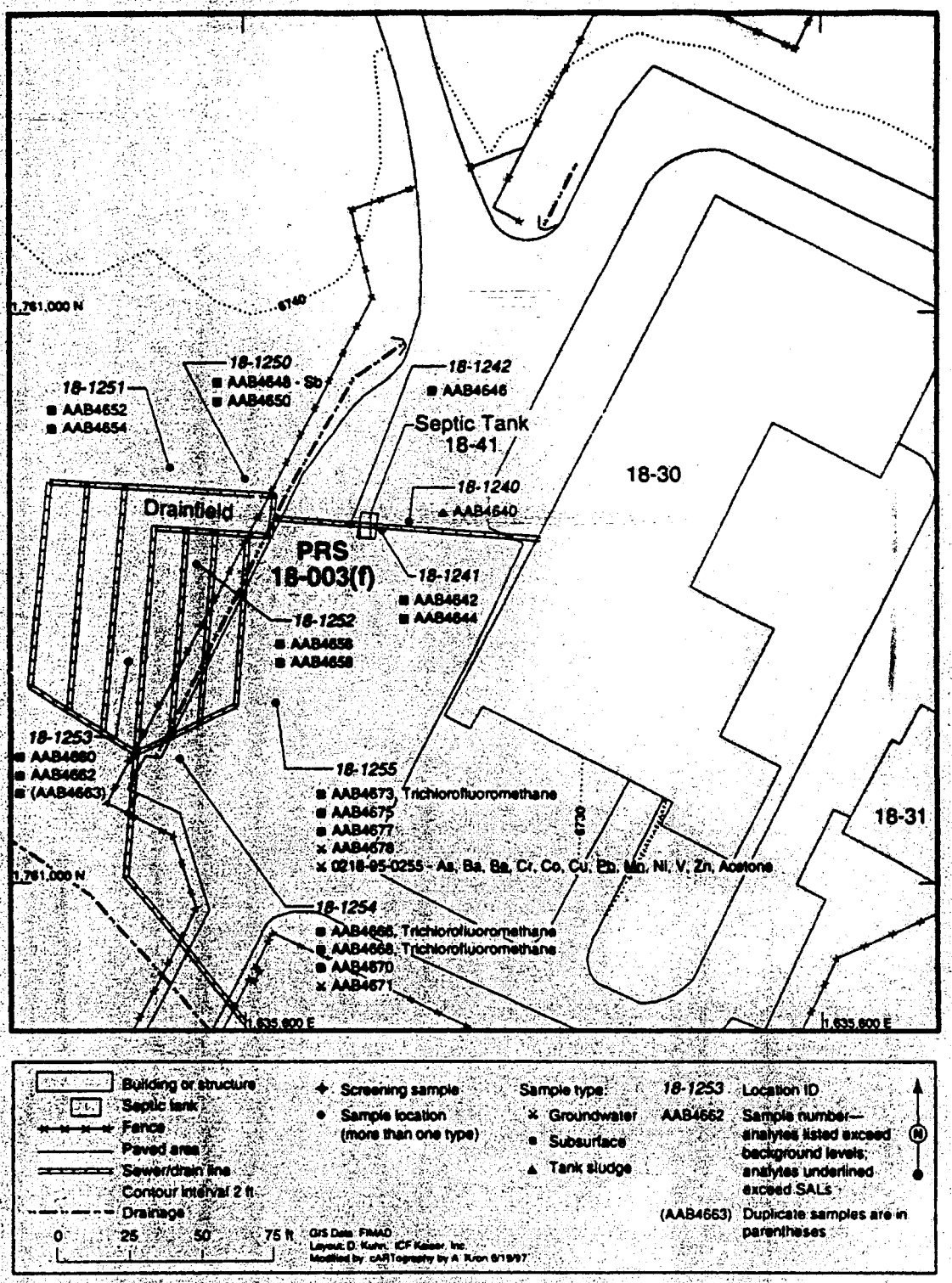
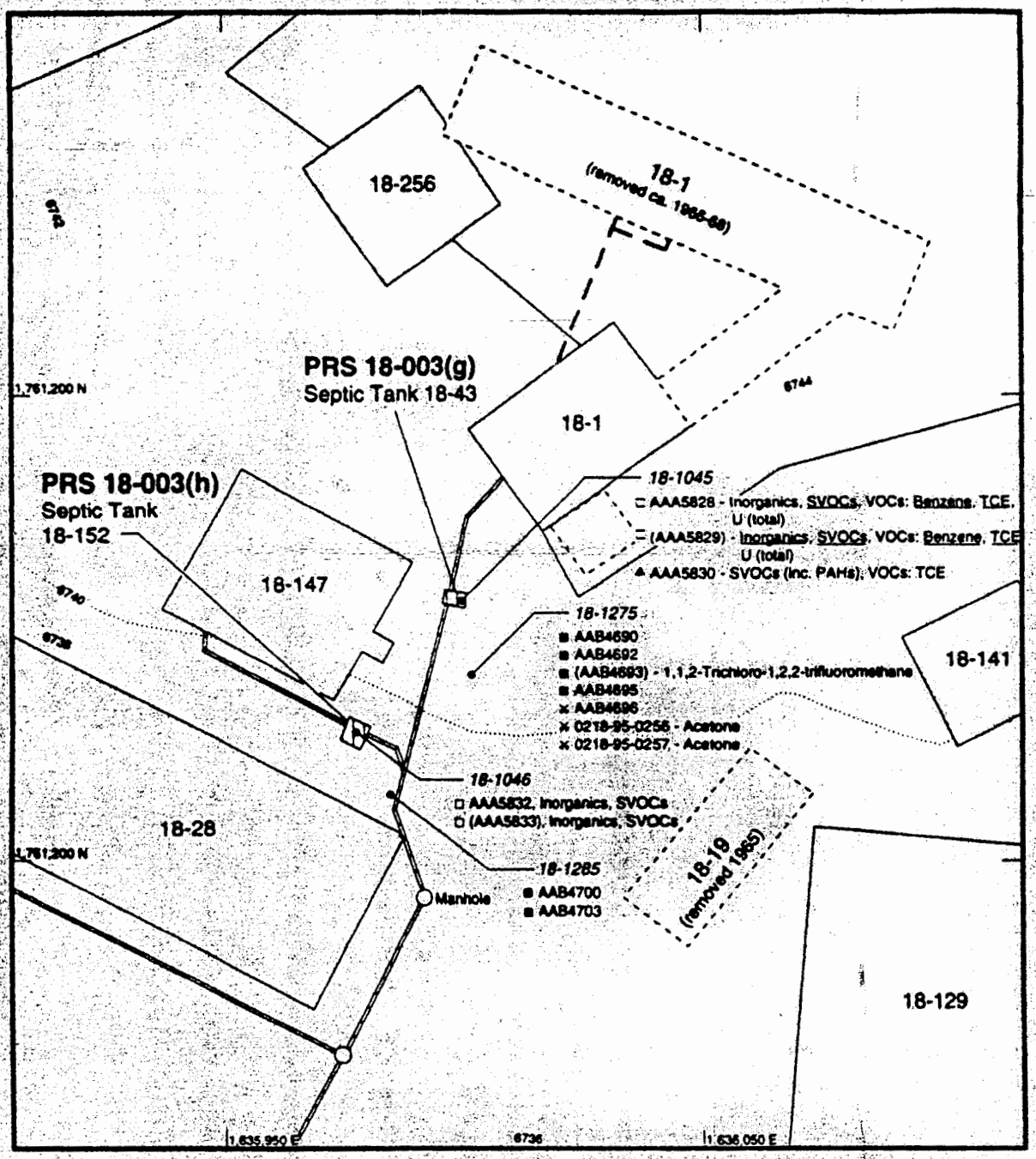


Figure 4-5. Sample locations and results of screening assessment at PRS 18-003(f).



Building (dashed where removed)
Concrete vault
Paved area
Sewer/drain line
Disconnected pipeline
Contour interval 2 ft
0 20 40 ft
GIS Data: FRMAD
Layout: D. Kuhn, ICF Kaiser, Inc
Modified by: cARTography by A. Kron 6/19/97

Sample location (more than one type)

Sample type:
- Groundwater
- Subsurface
- Surface
- Tank liquid
- Tank sludge

18-1046 Location ID
AAA5832 Sample number—analytes listed exceed background levels; analytes underlined exceed SALs
(AAA5833) Duplicate samples are in parentheses

Figure 4-6. Sample locations and results of screening assessment at PRS 18-003(g,h).

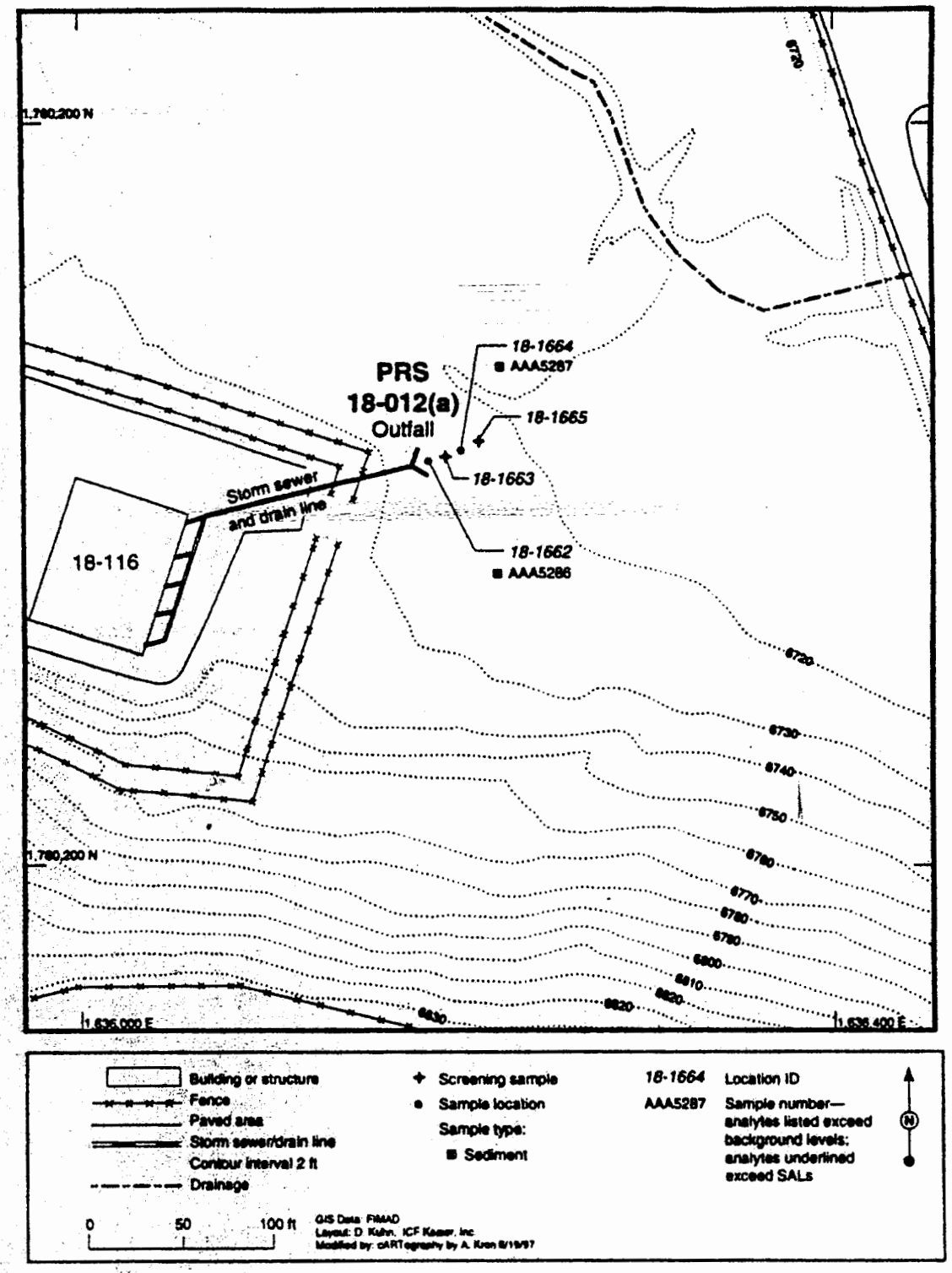


Figure 4-9. Sample locations and results of screening assessment at PRS 18-012(a).

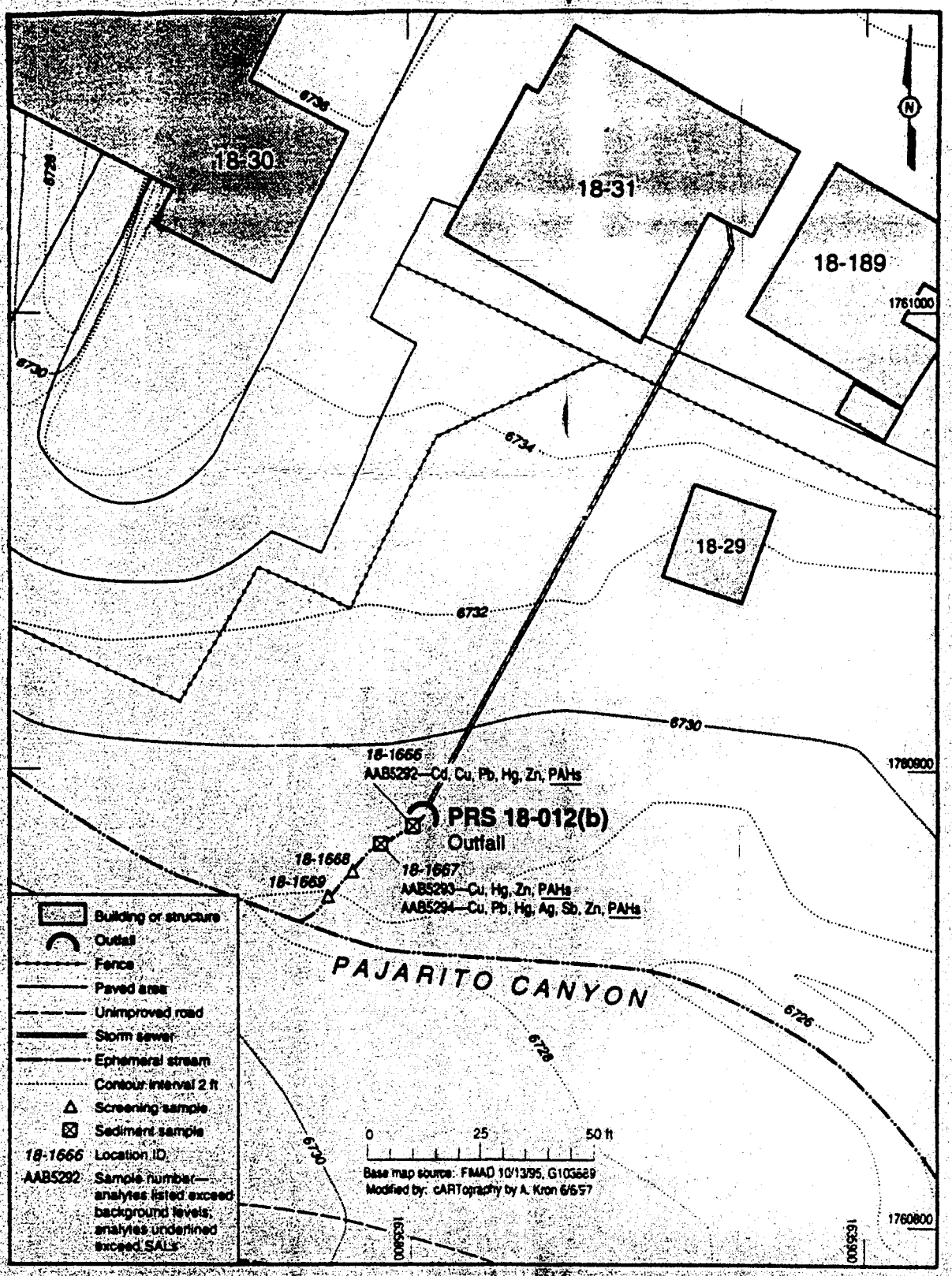


Figure 4-10. Sample locations and results of screening assessment for PRS 18-012(b).

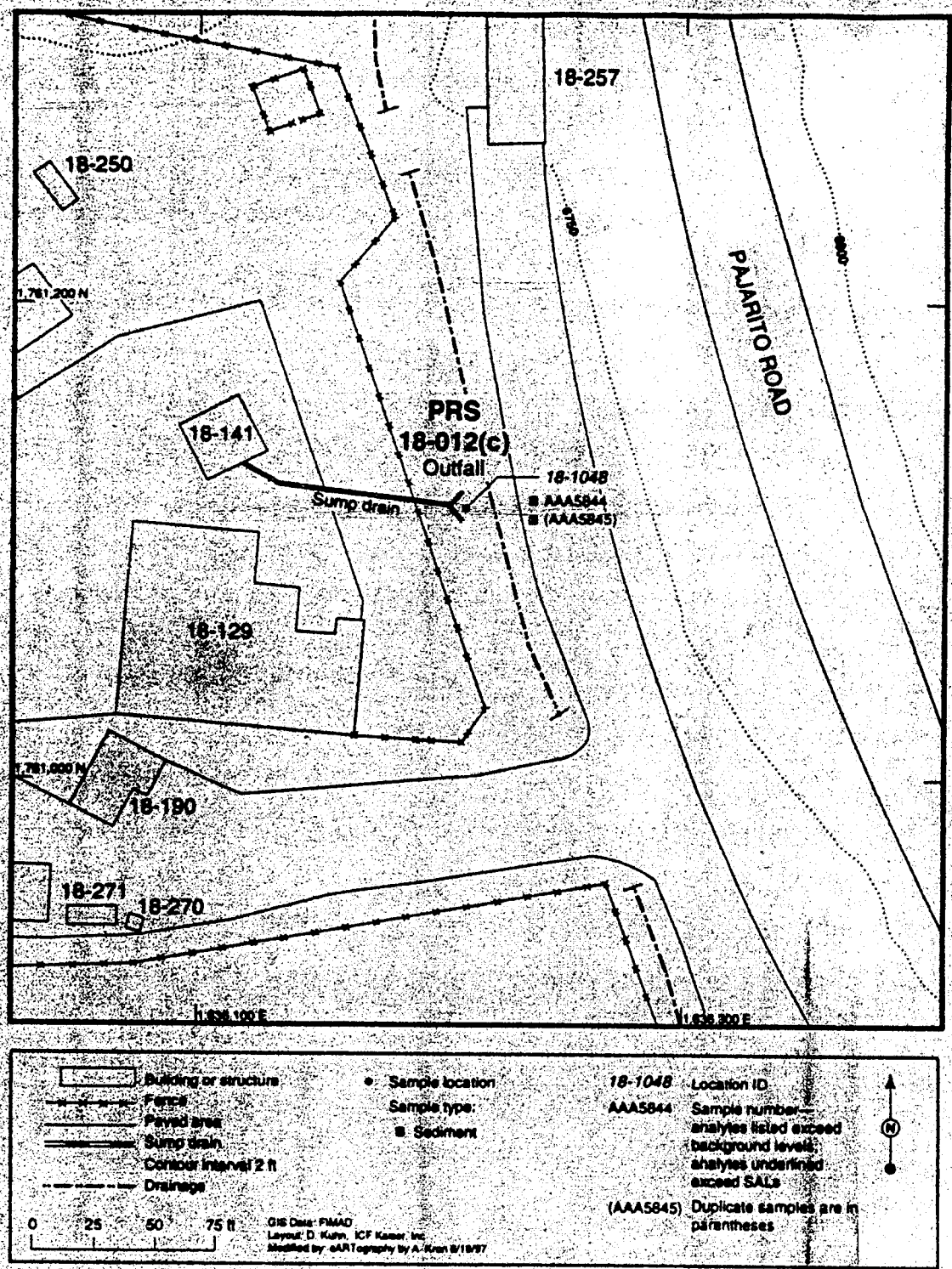


Figure 4-11. Sample locations and results of screening assessment at PRS 18-012(c).

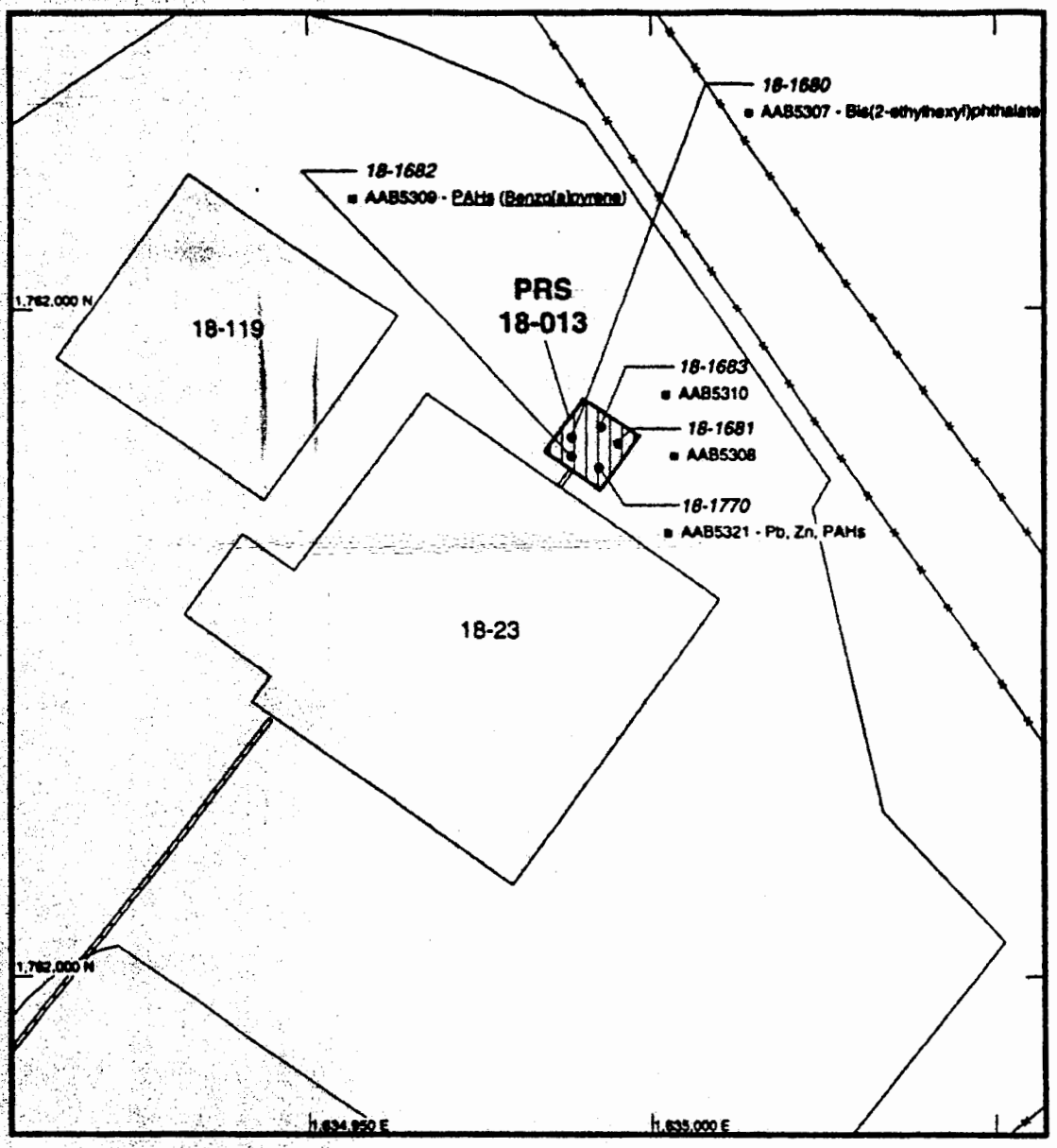


Figure 4-12. Sample locations and results of screening assessment at PRS 18-013.

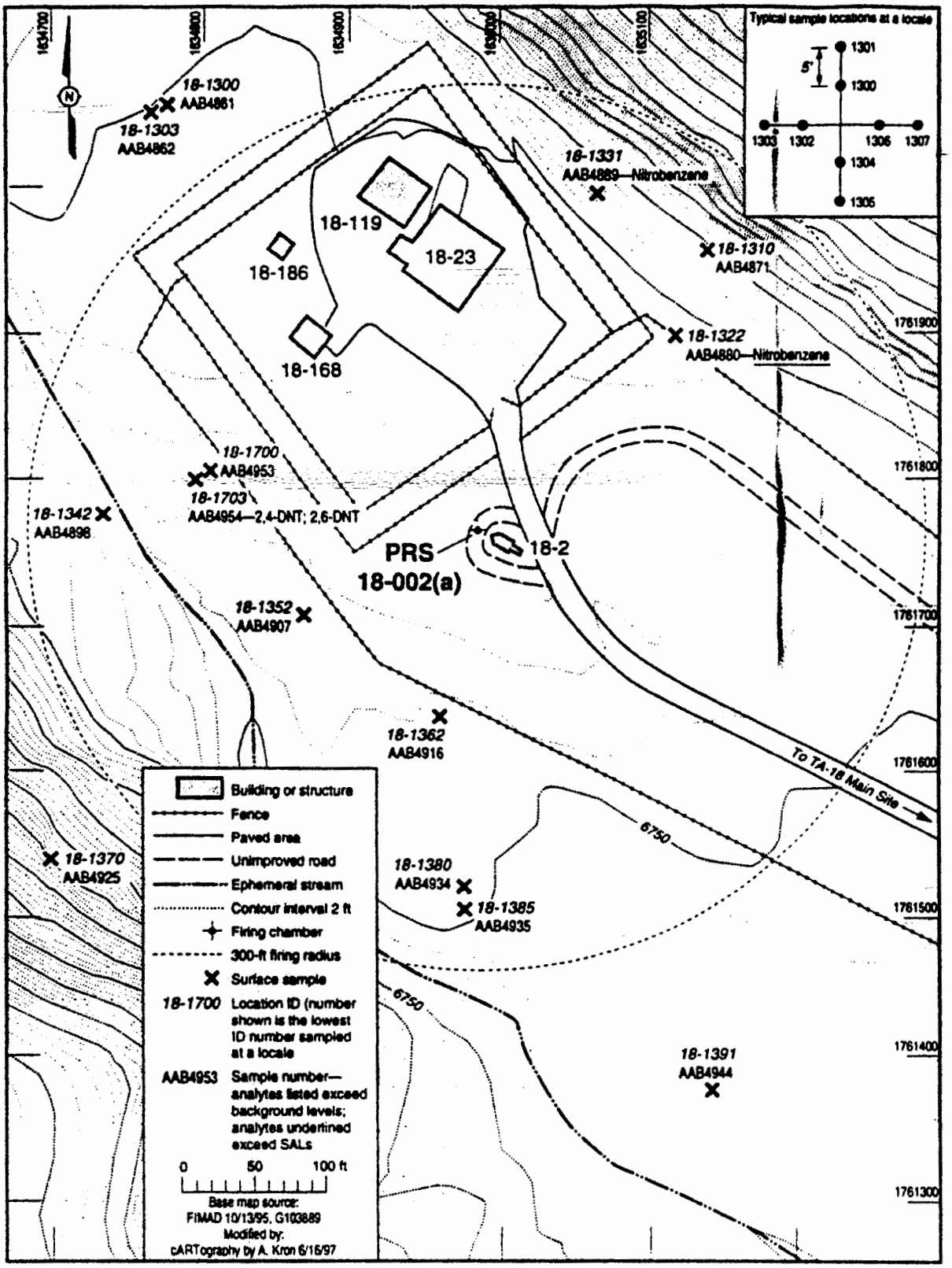


Figure 4-15. Sample locations and results of screening assessment for PRS 18-002(a).

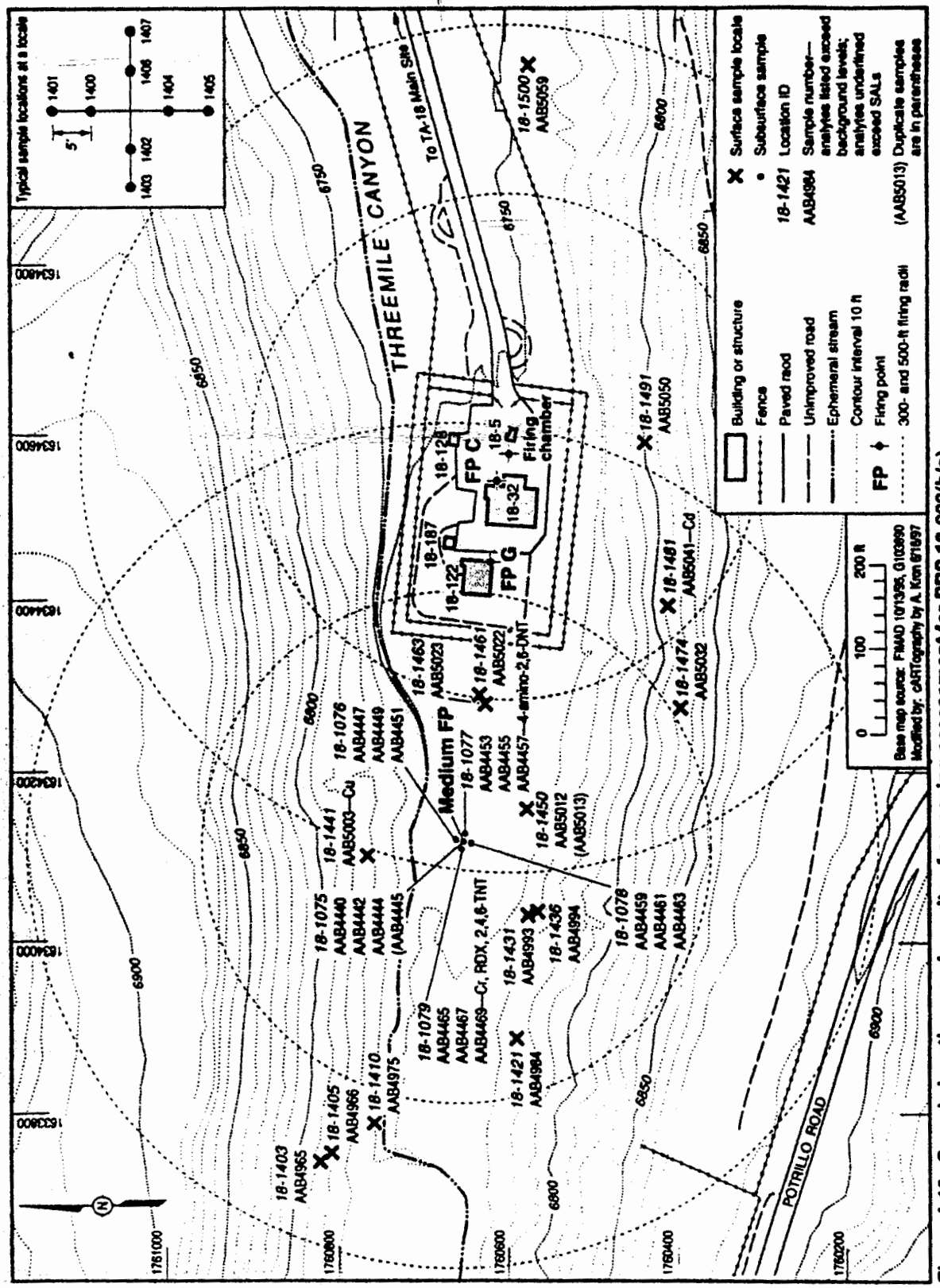


Figure 4-16. Sample locations and results of screening assessment for PRS 18-002(b/c).

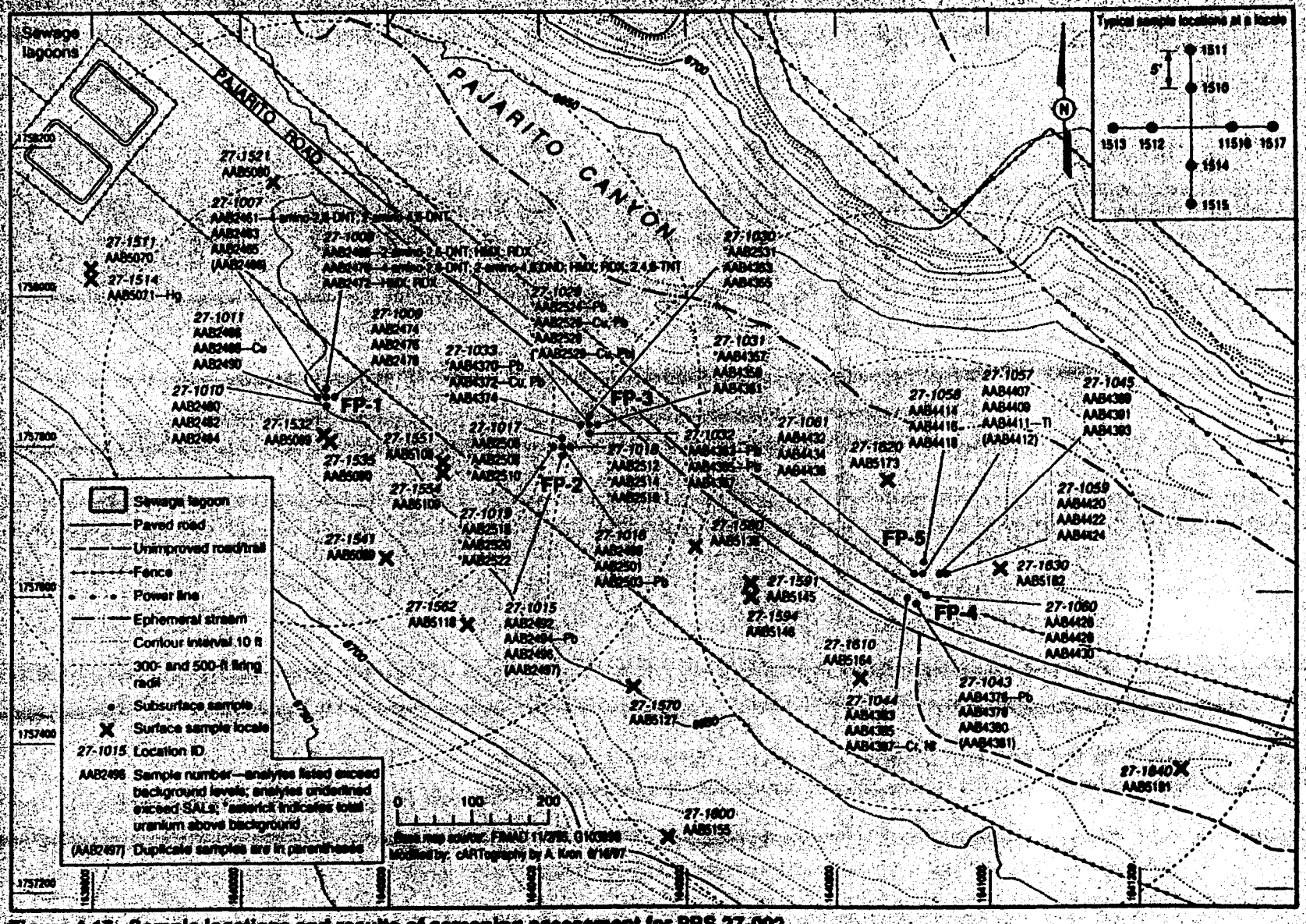
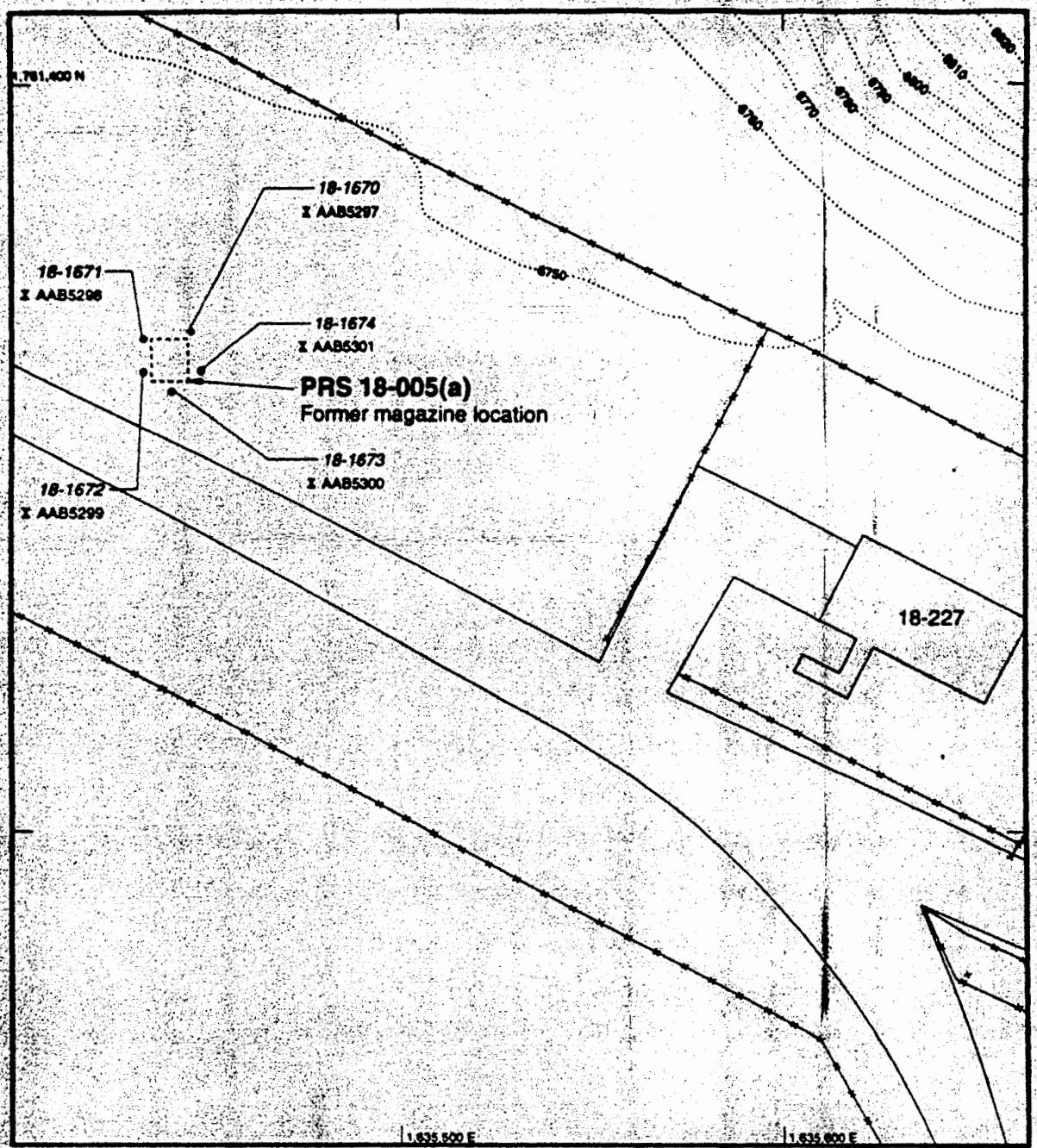


Figure 4-17. Sample locations and results of screening assessment for PRS 27-002.



Building or structure
Former magazine location
Fence
Paved area
Contour interval 2 ft
0 20 40 60 ft
Sample location
Sample type:
Surface
18-1670 Location ID
AAB5297 Sample number—analytes listed exceed background levels; analytes underlined exceed SALs
N

GIS Data: FIMAD
Layout: D. Kuhn, ICF Kaiser, Inc.
Modified by: cARTography by A. Kuon 6/1997

Figure 4-19. Sample locations and results of screening assessment at PRS 18-005(a).

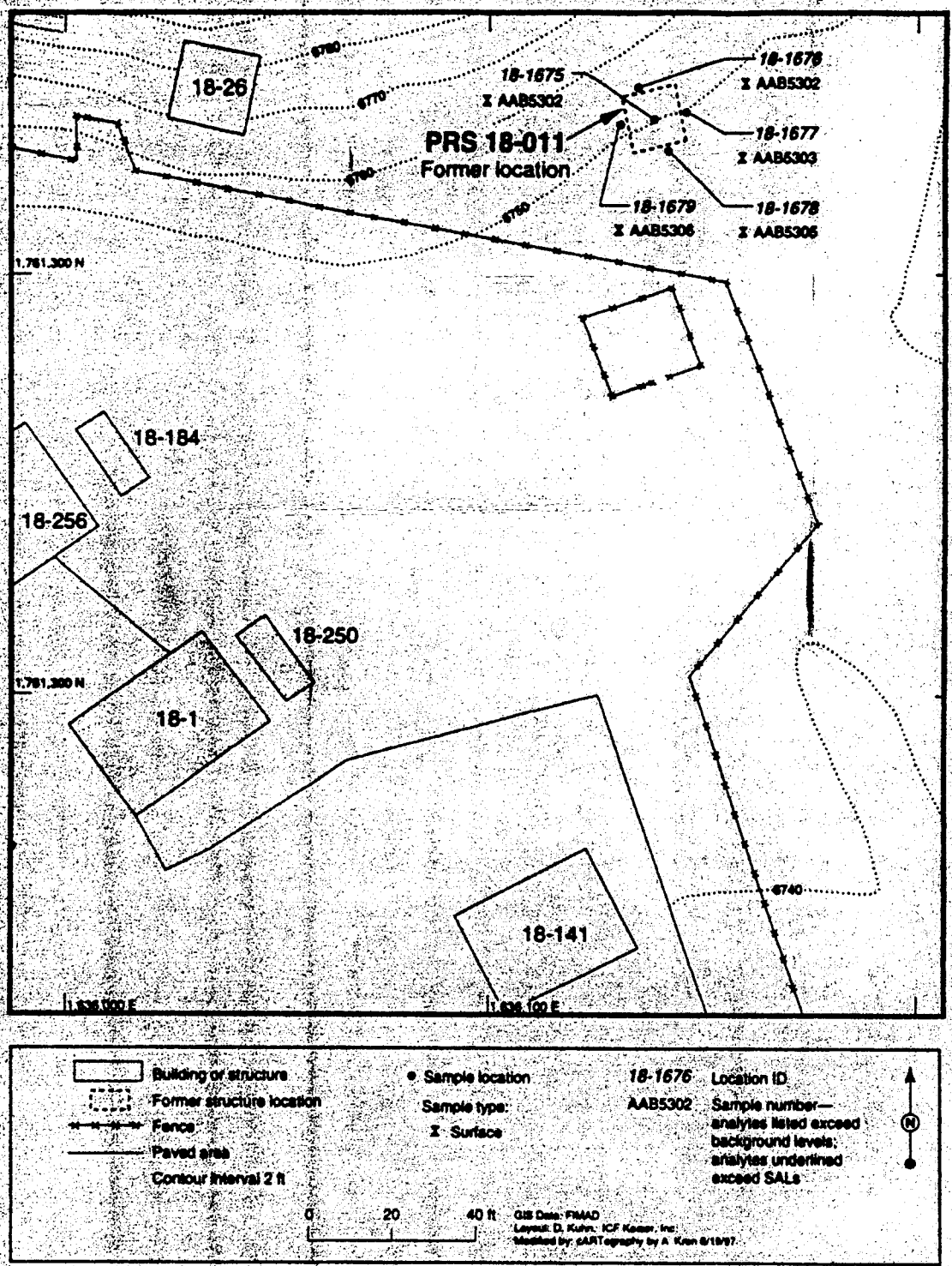


Figure 4-20. Sample locations and results of screening assessment at PRS 18-011.

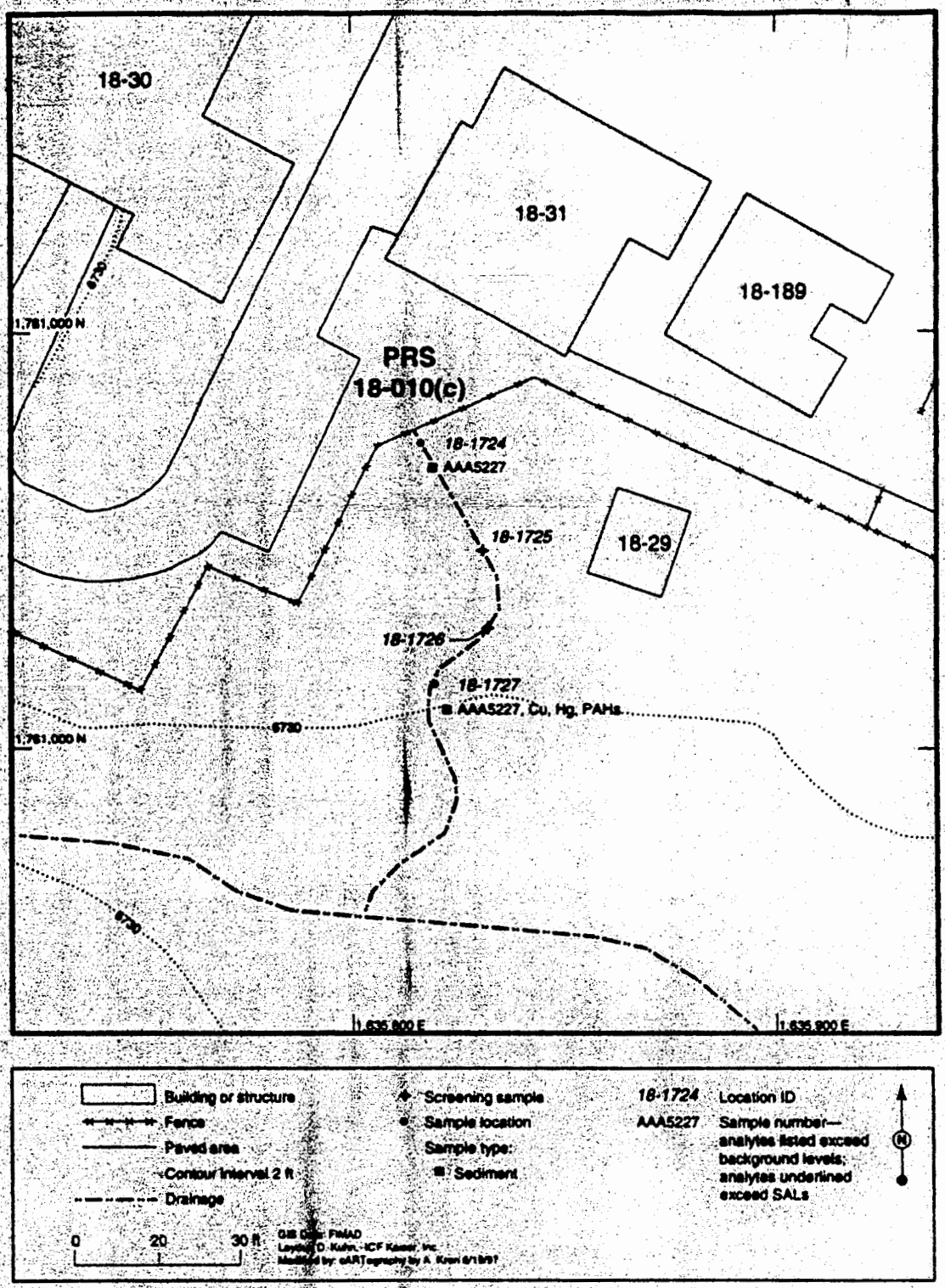


Figure 4-23. Sample locations and results of screening assessment at PRS 18-010(c).

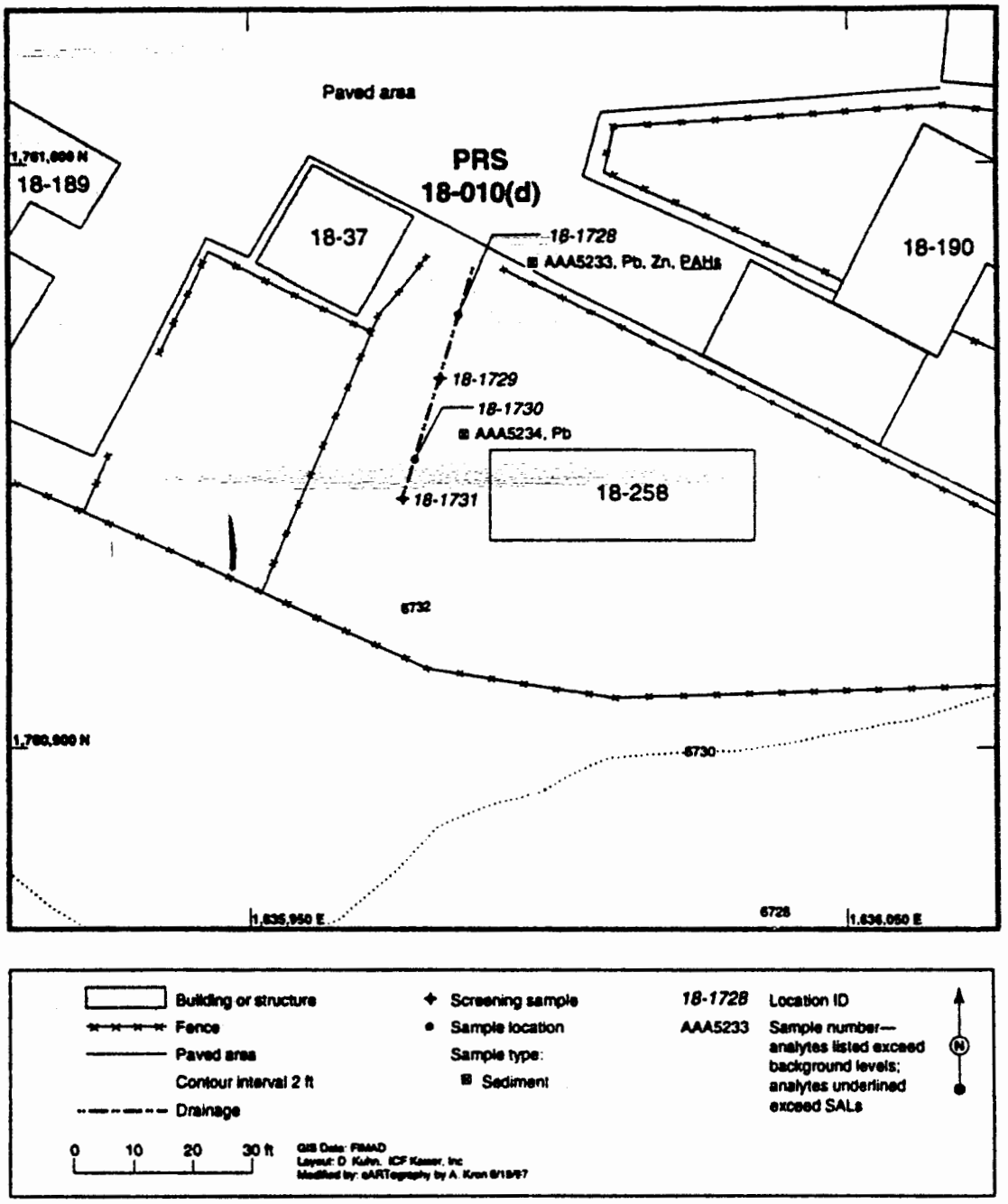


Figure 4-24. Sample locations and results of screening assessment at PRS 18-010(d).

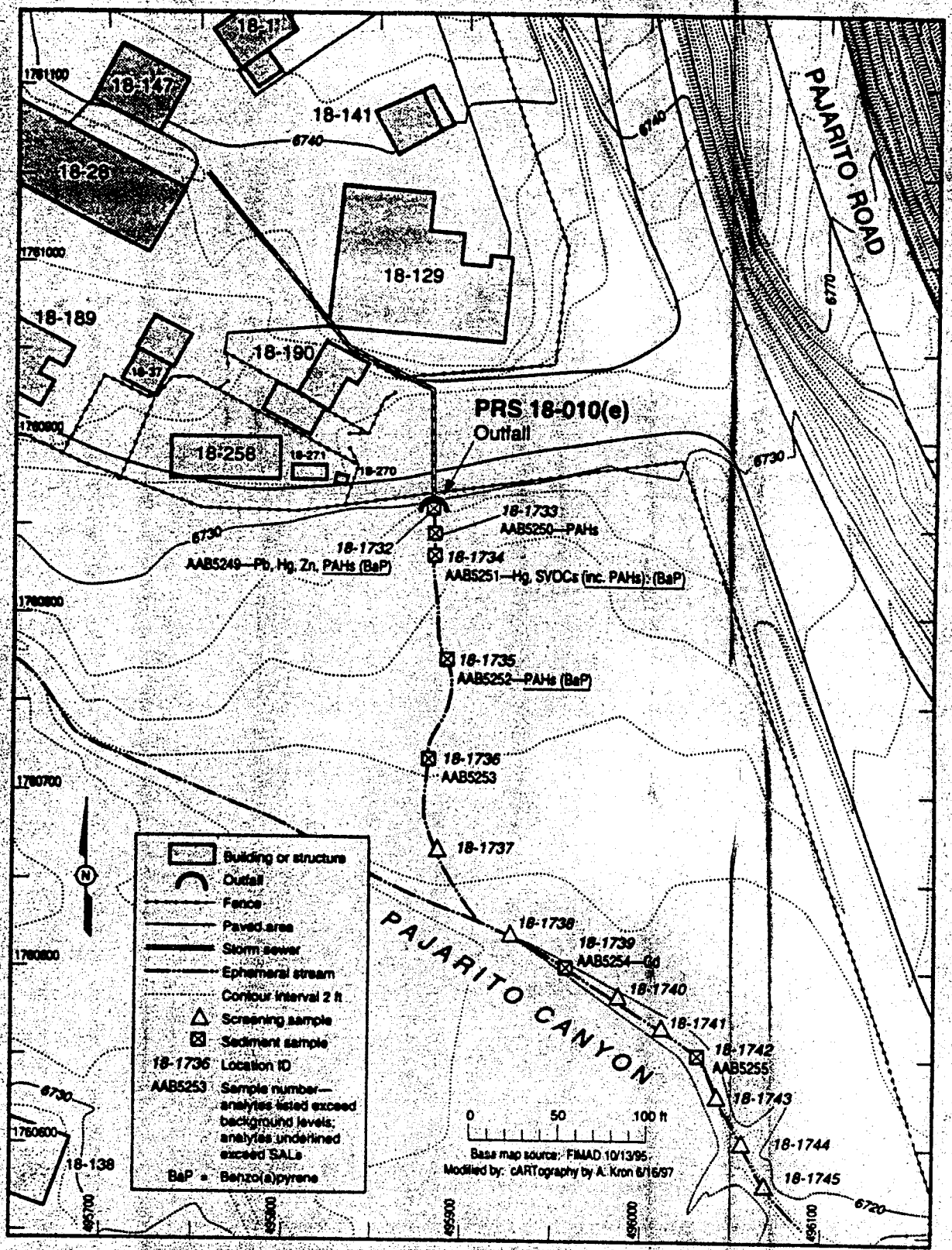


Figure 4-25. Sample locations and results of screening assessment for PRS 18-010(e).

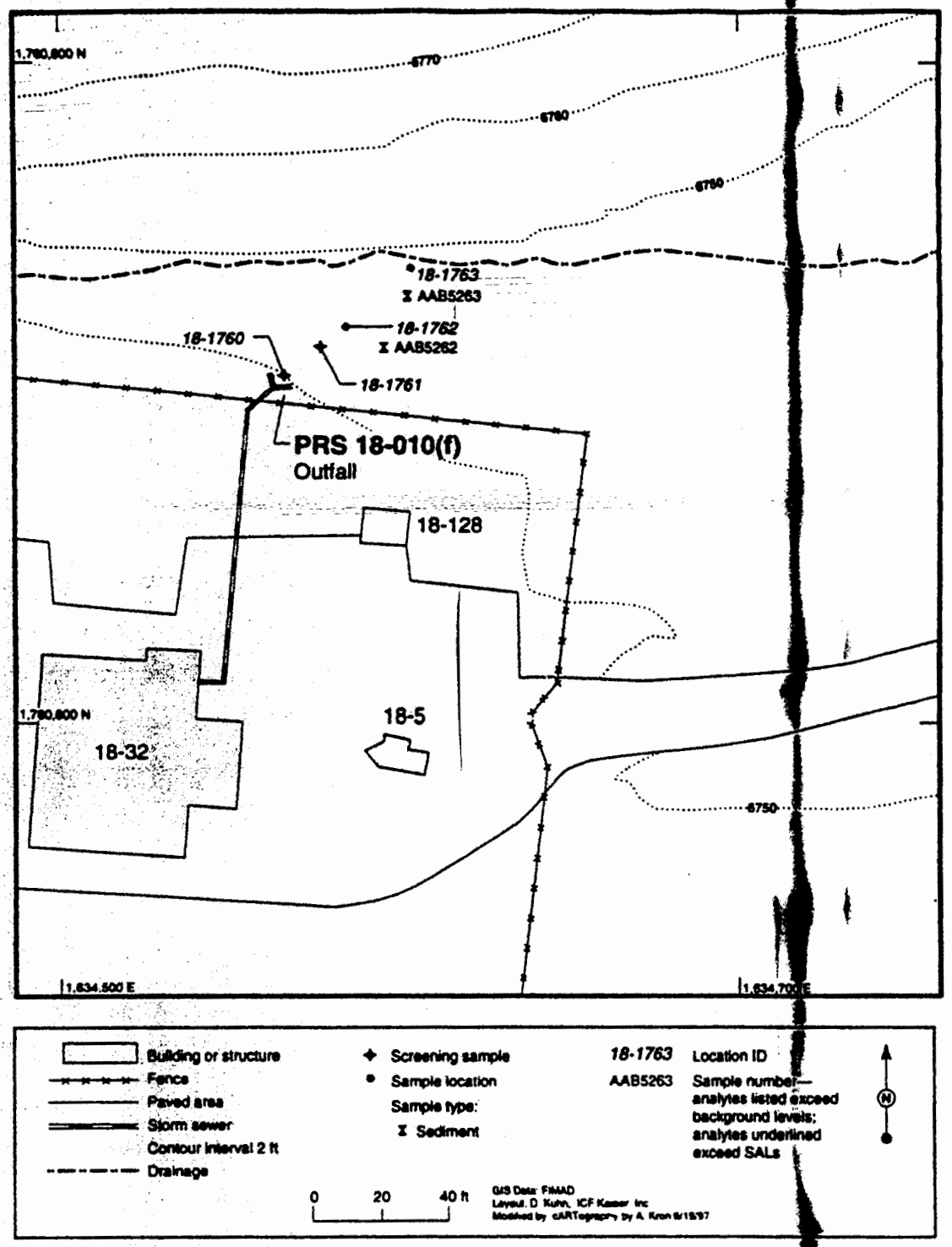


Figure 4-26. Sample locations and results of screening assessment at PRS 18-010(f).

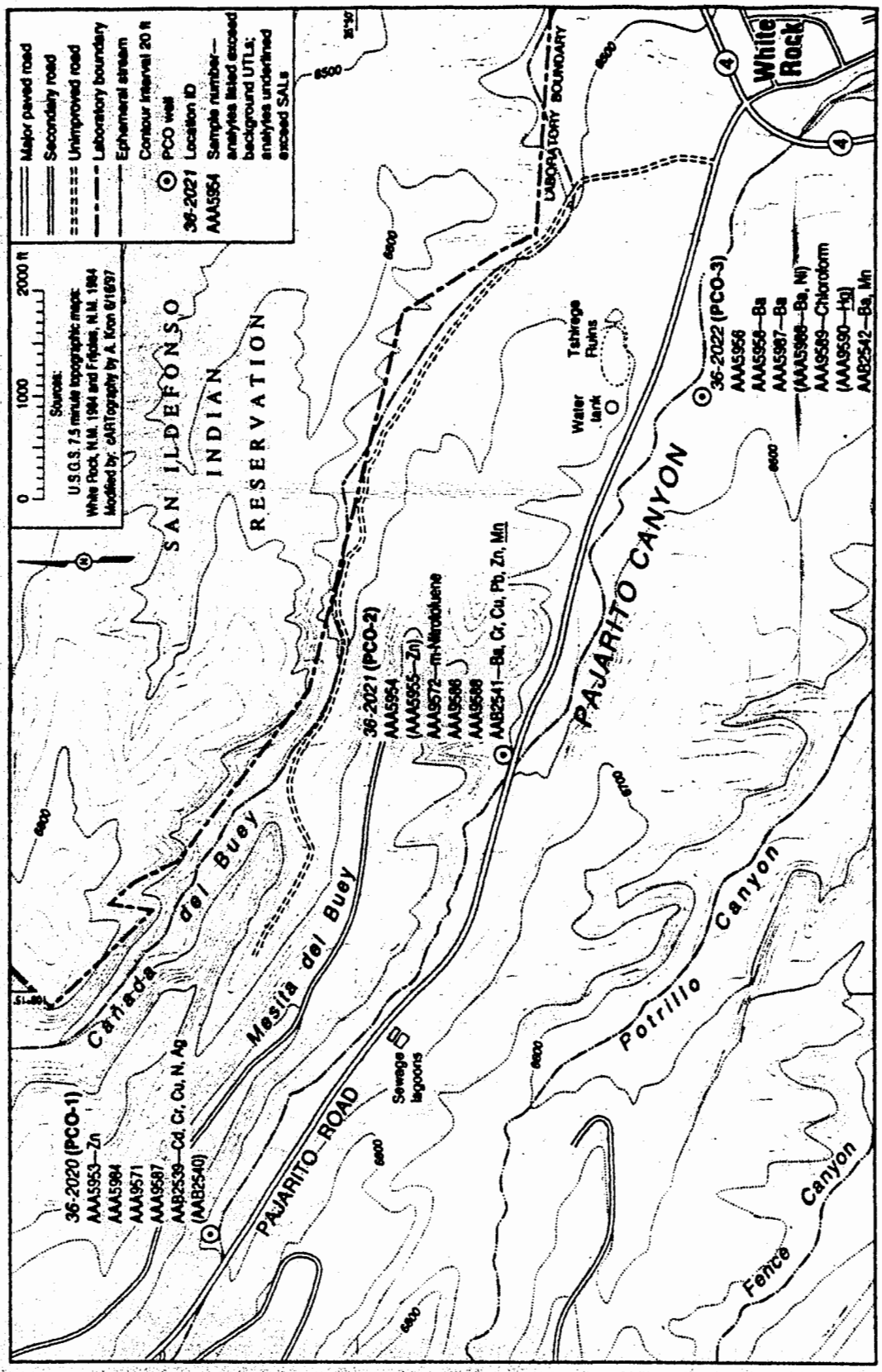


Figure 4-28. Sample locations and results of screening assessment for PCO wells.

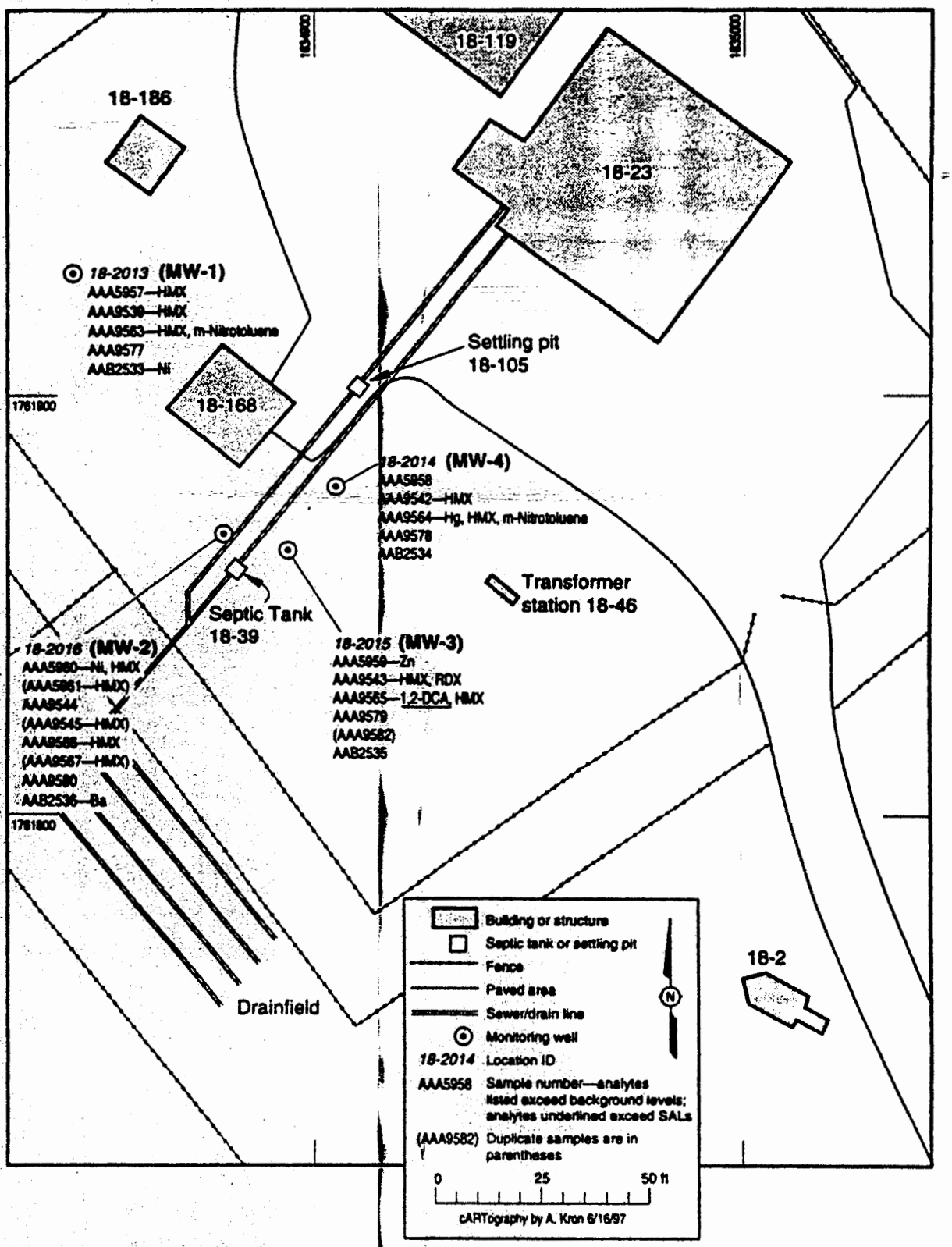


Figure 4-29. Sample locations and results of screening assessment for LACEF monitoring wells.

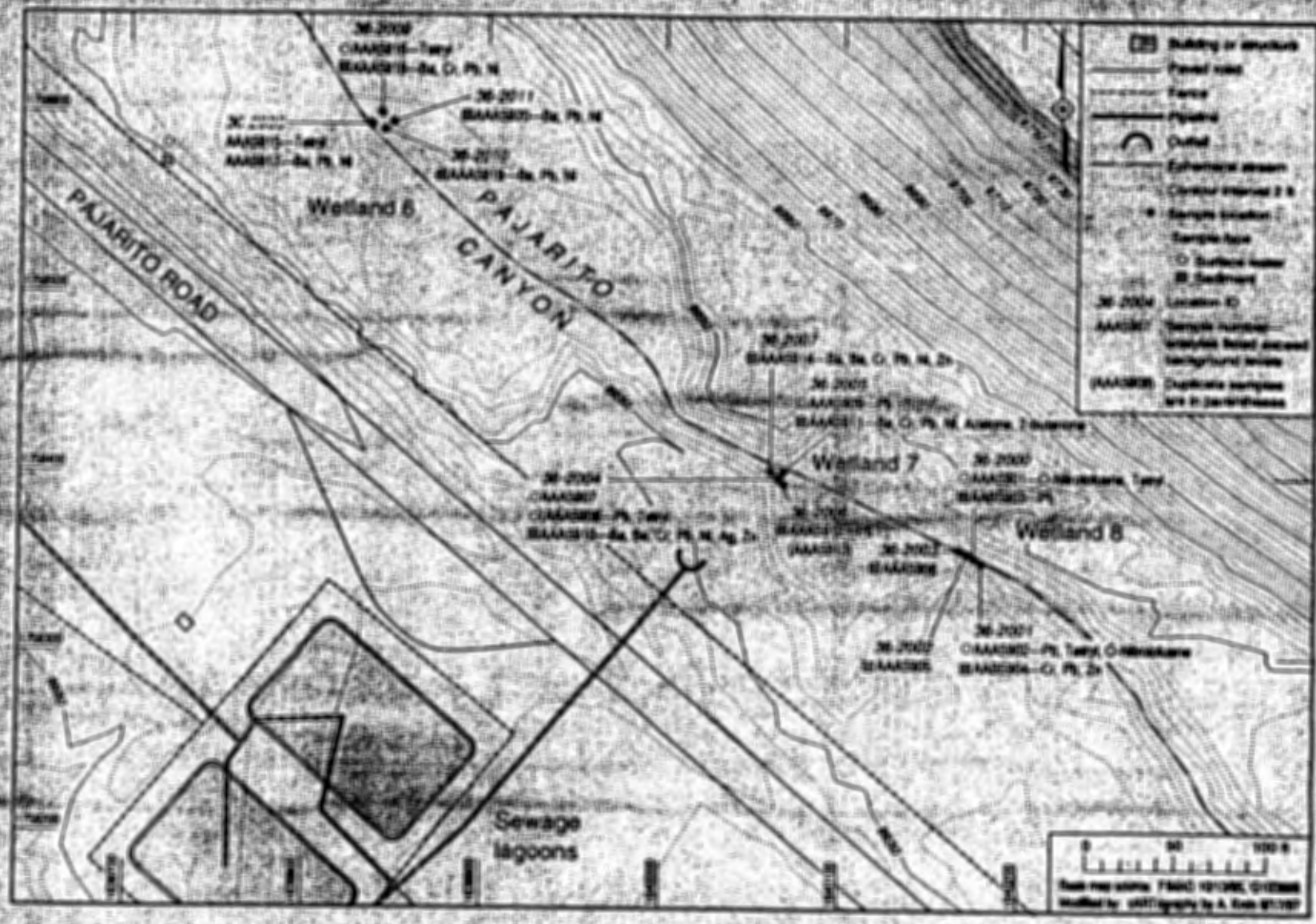


Figure 4-33. Sample locations and results of screening assessment for WL-6, WL-7, and WL-8.

ATTACHMENT E

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	AAB4965	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

Location ID	Sample ID	Depth (Inches)	Media	Total Metals	VOC
[illegible]	[illegible]	[illegible]	soil	X	XX
[illegible]	[illegible]	[illegible]	soil	X	XX
[illegible]	[illegible]	[illegible]	soil	X	XX
[illegible]	[illegible]	[illegible]	soil	X	XX
[illegible]	[illegible]	[illegible]	soil	X	XX

[illegible] from SAP Plan Table in SP, Work Plan (Table 3-10, p. 3-47)

There were no variances.

SUMMARY OF SAMPLES TAKEN
PRS 27-002 Firing Site
1994

Location ID	Sample ID	Depth (inches)	Media	HE	Total Metals
TA-27-1008	AAB2470	25-35	subsurface soil	X	X
TA-27-1008	AAB2472	48-60	subsurface soil	X	X
TA-27-1009	AAB2476	38-42	subsurface soil	X	X
TA-27-1009	AAB2478	48-60	subsurface soil	X	X
TA-27-1010	AAB2482	24-35	subsurface soil	X	X
TA-27-1010	AAB2484	48-60	subsurface soil	X	X
TA-27-1011	AAB2488	25-35	subsurface soil	X	X
TA-27-1011	AAB2490	48-54	subsurface soil	X	X
TA-27-1015	AAB2494	25-36	subsurface soil	X	X
TA-27-1015	AAB2496	50-60	subsurface soil	X	X
TA-27-1015	AAB2497	50-60	subsurface soil	X	X
TA-27-1016	AAB2501	25-36	subsurface soil	X	X
TA-27-1016	AAB2503	50-60	subsurface soil	X	X
TA-27-1017	AAB2508	25-38	subsurface soil	X	
TA-27-1017	AAB2510	48-60	subsurface soil	X	
TA-27-1018	AAB2513	25-35	subsurface soil	X	
TA-27-1018	AAB2515	48-60	subsurface soil	X	
TA-27-1019	AAB2521	25-35	subsurface soil	X	
TA-27-1019	AAB2522	48-54	subsurface soil	X	
TA-27-1029	AAB2526	30-42	subsurface soil	X	X
TA-27-1029	AAB2528	48-60	subsurface soil	X	X
TA-27-1029	AAB2529	48-60	subsurface soil	X	X
TA-27-1030	AAB4353	30-42	subsurface soil	X	
TA-27-1030	AAB4355	48-60	subsurface soil	X	
TA-27-1031	AAB4359	30-42	subsurface soil	X	
TA-27-1031	AAB4361	48-60	subsurface soil	X	
TA-27-1032	AAB4365	30-42	subsurface soil	X	X
TA-27-1032	AAB4367	48-60	subsurface soil	X	X
TA-27-1033	AAB4372	30-42	subsurface soil	X	X
TA-27-1033	AAB4374	42-54	subsurface soil	X	X
TA-27-1043	AAB4378	24-36	subsurface soil	X	X
TA-27-1043	AAB4380	48-66	subsurface soil	X	X
TA-27-1043	AAB4381	48-66	subsurface soil	X	X
TA-27-1044	AAB4383	12-24	subsurface soil	X	X
TA-27-1044	AAB4385	30-42	subsurface soil	X	X
TA-27-1044	AAB4387	48-60	subsurface soil	X	X
TA-27-1045	AAB4391	30-42	subsurface soil	X	X
TA-27-1045	AAB4393	48-60	subsurface soil	X	X
TA-27-1057	AAB4409	32-42	subsurface soil	X	X
TA-27-1057	AAB4411	48-60	subsurface soil	X	X
TA-27-1057	AAB4412	48-60	subsurface soil	X	X
TA-27-1058	AAB4416	30-42	subsurface soil	X	X
TA-27-1058	AAB4418	48-60	subsurface soil	X	X
TA-27-1059	AAB4422	30-42	subsurface soil	X	X
TA-27-1059	AAB4424	46-54	subsurface soil	X	X
TA-27-1060	AAB4428	24-36	subsurface soil	X	X
TA-27-1060	AAB4430	48-66	subsurface soil	X	X
TA-27-1061	AAB4434	30-42	subsurface soil	X	X
TA-27-1061	AAB4436	48-60	subsurface soil	X	X
TA-27-1007	AAB2461	0-12	surface soil	X	X

SUMMARY OF SAMPLES TAKEN
PRS 27-002 Firing Site
1994

Location ID	Sample ID	Depth (inches)	Media	HE	Total Metals
TA-27-1008	AAB2468	0-12	surface soil	X	X
TA-27-1009	AAB2474	0-12	surface soil	X	X
TA-27-1010	AAB2480	0-12	surface soil	X	X
TA-27-1011	AAB2486	0-12	surface soil	X	X
TA-27-1015	AAB2492	0-16	surface soil	X	X
TA-27-1016	AAB2499	0-12	surface soil	X	X
TA-27-1017	AAB2506	0-12	surface soil	X	X
TA-27-1018	AAB2516	0-12	surface soil	X	
TA-27-1019	AAB2519	0-12	surface soil	X	
TA-27-1029	AAB2524	0-12	surface soil	X	X
TA-27-1030	AAB2531	0-12	surface soil	X	
TA-27-1031	AAB4357	0-12	surface soil	X	
TA-27-1032	AAB4363	0-12	surface soil	X	X
TA-27-1033	AAB4370	0-12	surface soil	X	X
TA-27-1043	AAB4376	0-12	surface soil	X	X
TA-27-1045	AAB4389	0-12	surface soil	X	X
TA-27-1057	AAB4407	0-12	surface soil	X	X
TA-27-1058	AAB4414	0-12	surface soil	X	X
TA-27-1059	AAB4420	0-12	surface soil	X	X
TA-27-1060	AAB4426	0-12	surface soil	X	X
TA-27-1061	AAB4432	0-12	surface soil	X	X
TA-27-1511	AAB5070	0-12	surface soil	X	X
TA-27-1512	AAB5070	0-12	surface soil	X	X
TA-27-1514	AAB5071	0-12	surface soil	X	X
TA-27-1516	AAB5071	0-12	surface soil	X	X
TA-27-1521	AAB5080	0-12	surface soil	X	X
TA-27-1523	AAB5080	0-12	surface soil	X	X
TA-27-1525	AAB5080	0-12	surface soil	X	X
TA-27-1527	AAB5080	0-12	surface soil	X	X
TA-27-1532	AAB5089	0-12	surface soil	X	X
TA-27-1533	AAB5089	0-12	surface soil	X	X
TA-27-1535	AAB5089	0-12	surface soil	X	X
TA-27-1536	AAB5089	0-12	surface soil	X	X
TA-27-1541	AAB5099	0-12	surface soil	X	X
TA-27-1543	AAB5099	0-12	surface soil	X	X
TA-27-1546	AAB5099	0-12	surface soil	X	X
TA-27-1547	AAB5099	0-12	surface soil	X	X
TA-27-1551	AAB5108	0-12	surface soil	X	X
TA-27-1553	AAB5108	0-12	surface soil	X	X
TA-27-1554	AAB5109	0-12	surface soil	X	X
TA-27-1556	AAB5109	0-12	surface soil	X	X
TA-27-1562	AAB5118	0-12	surface soil	X	X
TA-27-1564	AAB5118	0-12	surface soil	X	X
TA-27-1565	AAB5118	0-12	surface soil	X	X
TA-27-1566	AAB5118	0-12	surface soil	X	X
TA-27-1570	AAB5127	0-12	surface soil	X	X
TA-27-1572	AAB5127	0-12	surface soil	X	X
TA-27-1573	AAB5127	0-12	surface soil	X	X
TA-27-1576	AAB5127	0-12	surface soil	X	X
TA-27-1580	AAB5136	0-12	surface soil	X	X

SUMMARY OF SAMPLES TAKEN
PRS 27-002 Firing Site
1994

Location ID	Sample ID	Depth (inches)	Media	HE	Total Metals
TA-27-1581	AAB5136	0-12	surface soil	X	X
TA-27-1583	AAB5136	0-12	surface soil	X	X
TA-27-1584	AAB5136	0-12	surface soil	X	X
TA-27-1591	AAB5145	0-12	surface soil	X	X
TA-27-1593	AAB5145	0-12	surface soil	X	X
TA-27-1594	AAB5146	0-12	surface soil	X	X
TA-27-1595	AAB5146	0-12	surface soil	X	X
TA-27-1600	AAB5155	0-12	surface soil	X	X
TA-27-1602	AAB5155	0-12	surface soil	X	X
TA-27-1603	AAB5155	0-12	surface soil	X	X
TA-27-1606	AAB5155	0-12	surface soil	X	X
TA-27-1610	AAB5164	0-12	surface soil	X	X
TA-27-1611	AAB5164	0-12	surface soil	X	X
TA-27-1613	AAB5164	0-12	surface soil	X	X
TA-27-1616	AAB5164	0-12	surface soil	X	X
TA-27-1620	AAB5173	0-12	surface soil	X	X
TA-27-1621	AAB5173	0-12	surface soil	X	X
TA-27-1624	AAB5173	0-12	surface soil	X	X
TA-27-1626	AAB5173	0-12	surface soil	X	X
TA-27-1630	AAB5182	0-12	surface soil	X	X
TA-27-1634	AAB5182	0-12	surface soil	X	X
TA-27-1635	AAB5182	0-12	surface soil	X	X
TA-27-1640	AAB5191	0-12	surface soil	X	X
TA-27-1641	AAB5191	0-12	surface soil	X	X
TA-27-1642	AAB5191	0-12	surface soil	X	X
TA-27-1643	AAB5191	0-12	surface soil	X	X
TA-27-1637	AAB5182	0-12	surface soil	X	X
TA-27-1532	AAB5090	0-12	surface soil (field duplicate)	X	X
TA-27-1533	AAB5090	0-12	surface soil (field duplicate)	X	X
TA-27-1535	AAB5090	0-12	surface soil (field duplicate)	X	X
TA-27-1536	AAB5090	0-12	surface soil (field duplicate)	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	
18-1126	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	AAB4516	20-25 ft	subsurface soil	X	X	X	X		
18-1136	AAB4516	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
PRS 18-003(c)

Loc ID	Sample ID	Depth	Media	Chloride	Nitrate	Total Metals	SVOCs	VOCs	General Minerals (Chemical Oxygen Demand)
18-1145	AAB4525	0-4 in	surface soil			X	X		
18-1146	AAB4526	0-1 ft	surface soil			X	X		
18-1146	AAB4528	0-5 ft	subsurface soil	X	X	X	X	X	
18-1147	AAB4527	0-1 ft	surface soil			X	X		
18-1147	AAB4530	0-5 ft	subsurface soil	X	X	X	X	X	
18-1153	AAB4542	0-4 in	surface soil			X	X		
18-1155	AAB4543	0-4 in	surface soil			X	X		
18-1156	AAB4544	0-4 in	surface soil			X	X		
18-1157	AAB4545	0-4 in	surface soil			X	X		
18-1159	AAB4546	0-4 in	surface soil			X	X		
18-1165	AAB4547	2.5-5 ft	subsurface soil	X	X	X	X	X	
18-1165	AAB4549	7.5-10 ft	subsurface soil	X	X	X	X	X	
18-1165	AAB4551	7-15 ft	subsurface soil	X	X	X	X		
18-1165	AAB4552	0-15 ft	groundwater	X	X	X	X	X	X
18-1166	AAB4555	0-5 ft	subsurface soil	X	X	X	X	X	
18-1166	AAB4557	5-10 ft	subsurface soil (field duplicate)	X	X	X	X	X	
18-1166	AAB4558	5-10 ft	subsurface soil (field duplicate)	X	X	X	X	X	
18-1166	AAB4561	0-40 ft	groundwater	X	X	X	X	X	
18-1652	AAB5268	0-12 in	sediment soil			X	X		
18-1653	AAB5269	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 anlayzed 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 anlayzed for VOCs, while no VOC anlayses 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 perfomed 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 15-003(c) SEPTIC SYSTEM
[illegible]

Lab ID	Sample ID	Depth	Media	Total Metals	VOCs	SVOCs	Chloride and Nitrate	General Minerals
[illegible]	[illegible]	[illegible]	septic tank liquid	X	[illegible]	X	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	septic tank liquid field duplicate	X	X	X	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	sludge	X	X	X	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	soil	X	[illegible]	X	X	[illegible]
[illegible]	[illegible]	[illegible]	soil	X	[illegible]	X	X	[illegible]
[illegible]	[illegible]	[illegible]	soil field duplicate	X	X	X	X	[illegible]
[illegible]	[illegible]	[illegible]	soil	X	[illegible]	X	X	[illegible]
[illegible]	[illegible]	[illegible]	groundwater	X	X	X	X	X
[illegible]	[illegible]	[illegible]	groundwater	[illegible]	X	[illegible]	[illegible]	?
[illegible]	[illegible]	[illegible]	groundwater	[illegible]	X	[illegible]	[illegible]	?

Variances from S&A Plan Table in RI Work Plan (Table 3-6, p. 3-31)

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 waste releases to soils.
3. Groundwater: Three groundwater samples were collected and analyzed instead of the one proposed sample. This provided additional data.
4. Groundwater: The groundwater samples (AA3AR30) were analyzed for chloride and nitrate, which were not proposed in the plan. This provided data on possible effects of waste disposal on groundwater.

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	
27-1285	AAB4700	2-4 ft	soil	X	X	X	X
27-1285	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. Groundwater: No groundwater 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 18-010(b) STORM DRAIN OUTFALL
1994

Loc ID	Sample ID	Depth	Media	Total Metals	SVOCs
18-1297	AAB4712	0-6 in	soil	X	X
18-1298	AAB4713	0-6 in	soil	X	X
18-1714	AAB5205	0-6 in	sediments (Chem Van screening sample)		X
18-1715	AAB5206	0-6 in	sediments (Chem Van screening sample)		X
18-1716	AAB5207	0-6 in	sediments (Chem Van screening sample)		X
18-1717	AAB5208	0-6 in	sediments (Chem Van screening sample)		X
18-1718	AAB5209	0-6 in	sediments (Chem Van screening sample)		X
18-1719	AAB5210	0-6 in	sediments (Chem Van screening sample)		X
18-1720	AAB5211	0-6 in	sediments (Chem Van screening sample)		X
18-1746	AAB5217	0-6 in	sediments	X	X
18-1746	AAB5218	0-6 in	sediments (field duplicate)	X	X
18-1747	AAB5219	0-6 in	sediments	X	X
18-1749	AAB5220	0-6 in	sediments	X	X
18-1750	AAB5221	0-6 in	sediments	X	X
18-1754	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 18-0100 | STORM DRAIN OUTFALL
1994

Loc ID	Sample ID	Depth	Media	Total Metals	SVOCs
18-1724	AA85227	0-12 in	sediments	X	X
18-1727	AA85229	0-12 in	sediments	X	X

Variances from S&A Plan Table in RFI Work Plan (5-12, p. 5-68)

There were no variances.

SUMMARY OF SAMPLES TAKEN
PRS 28-[illegible] STORM DRAINAGE
1994

Loc ID	Sample ID	Depth	Media	Total Metals	SVOCs
18-1726	AA[illegible]33	0-6 in.	sediments	X	X
18-1730	AA[illegible]34	0-6 in.	sediments	X	X

Variances from S&A Plan Table in RI Work Plan (Table 5-12, p. 5-68)

There were no variances.

SUMMARY OF SAMPLES TAKEN
PRS 18-010(e) 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
18-1736	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 18-01/02 STORM SEWER OUTFALL
1994

Loc ID	Sample ID	Depth	Media	Total Metals	SVOCs
18-1702	AA8T0W2	0-12 in.	soil	X	X
18-1703	AA8T0W3	0-12 in.	soil	X	X

Variances from S&A Plan Table in the RFI Work Plan (Table 5-12 p. 5-44).

There were no variances.

SUMMARY OF SAMPLES TAKEN
FPS 18-01 SOIL CONTAMINATION SITE
1994

Loc ID	Sample ID	Depth	Media	Mercury
18-1675	AA[illegible]	[illegible]	soil	X
18-1676	AA[illegible]	[illegible]	soil	X
18-1677	AA[illegible]	[illegible]	soil	X
18-1678	AA[illegible]	[illegible]	soil	X
18-1679	AA[illegible]	[illegible]	soil	X

Variances from S&A Plan Table in RI Work Plan (Table 5-10, p. 5-57)

There were no variances.

SUMMARY OF SAMPLES TAKEN
PRS 13-01 [illegible] OUTFALL
1994

Loc ID	Sample ID	Depth	Matrix	Total Metals	SVOCs
13-[illegible]-1994	AA[illegible]-[illegible]	0-12 in	sediments	X	X
13-[illegible]-1994	AA[illegible]-[illegible]	0-12 in	sediments	X	X

(Variances from D&A Plan Table in RI) Work Plan (Table 3-6, p. 3-44)

1 - The sediments were analyzed for SVOCs which was not originally proposed. This provided additional data.

SUMMARY OF SAMPLES TAKEN
PIRS 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 SAMPLE TAKEN
FOR [illegible] OU/17 ALL
[illegible]

Loc ID	Sample ID	Depth	Media	Total Metals	SVOCs
[illegible]	AAA0044	[illegible]	sediment	X	X
[illegible]	AAA0045	[illegible]	sediment (field duplicate)	X	X

Variances from the SAA Plan Table in RI 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 [illegible] SAMPLES
[illegible]-01) WASTE TANK
1994

Loc ID	Sample ID	Depth	Media	Total Metals	VOCs	SVOCs
[illegible]	[illegible]	[illegible]	[illegible]	X	X	X
[illegible]	[illegible]	[illegible]	[illegible]	X	X	X
[illegible]	[illegible]	[illegible]	[illegible]	X	X	X
[illegible]	[illegible]	[illegible]	[illegible]	X	X	X
[illegible]	[illegible]	[illegible]	[illegible]	X	X	X

Variances from S&A Plan Table in RFI Work Plan (Table 3-8, p. 3-44)

1. Residue with 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 in lieu of four. Four backfill samples and one gravel sample were collected in lieu 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
LACEF WELLS
1994

Monitor Well 1

Loc ID	Sample ID	Depth	Media	Total Metals	HE	VOCs	SVOCs	Chloride	Nitrate	General Minerals
18-2013	AAA5957		water	X	X	X	X			
18-2013	AAA9539		water	X	X	X	X	X		X
18-2013	AAA9563		water	X	X	X	X	X	X	X
18-2013	AAA9577		water	X		X	X		X	X
18-2013	AAB2533		water	X	X					

Monitor Well 2

Loc ID	Sample ID	Depth	Media	Total Metals	HE	VOCs	SVOCs	Chloride	Nitrate	General Minerals
18-2014	AAA5958		water	X	X	X	X			X[1]
18-2014	AAA9542		water	X	X	X	X	X		X
18-2014	AAA9564		water	X	X	X	X	X	X	X
18-2014	AAA9578		water	X		X	X		X	X[1]
18-2014	AAB2534		water	X	X					

Monitor Well 3

Loc ID	Sample ID	Depth	Media	Total Metals	HE	VOCs	SVOCs	Chloride	Nitrate	General Minerals
18-2015	AAA5959		water	X	X	X	X			X[1]
18-2015	AAA9543		water	X	X	X	X	X		X
18-2015	AAA9565		water	X	X	X	X	X	X	X
18-2015	AAA9579		water	X		X	X		X	X[1]
18-2015	AAA9582		water (field duplicate)	X		X	X		X	X[1]
18-2015	AAB2535		water	X	X					

Monitor Well 4

Loc ID	Sample ID	Depth	Media	Total Metals	HE	VOCs	SVOCs	Chloride	Nitrate	General Minerals
18-2016	AAA5960		water	X	X	X	X			X[1]
18-2016	AAA5961		water (field duplicate)	X	X	X	X			X[1]
18-2016	AAA9544		water	X	X	X	X	X		X
18-2016	AAA9545		water (field duplicate)	X	X	X	X			
18-2016	AAA9566		water	X	X	X	X	X	X	X
18-2016	AAA9567		water (field duplicate)	X	X	X	X	X	X	X
18-2016	AAA9580		water	X		X	X		X	X[1]
18-2016	AAB2536		water	X	X					

[1] The only general mineral analyzed for was hardness

Variances from S&A Plan Table in the RFI Work Plan (Table 5-14, p. 5-84)

1 Additional samples were collected and analyzed that were not originally proposed
These additional samples were analyzed for nitrate and chloride to provide additional information regarding groundwater contamination

SUMMARY OF SAMPLES TAKEN
PCO WELLS
1994

Monitor Well 1

Loc ID	Sample ID	Depth	Media	Total Metals	HE	VOCs	SVOCs	Chloride	Nitrate	General Minerals
36-2020	AAA5953		water	X	X	X	X	X		X
36-2020	AAA5984		water	X	X	X	X	X		X
36-2020	AAA9571		water	X	X	X	X			X
36-2020	AAA9587		water	X		X			X	X
36-2020	AAB2539		water	X	X	X	X			
36-2020	AAB2540		water (field duplicate)	X	X	X	X			

Monitor Well 2

Loc ID	Sample ID	Depth	Media	Total Metals	HE	VOCs	SVOCs	Chloride	Nitrate	General Minerals
36-2021	AAA5954		water	X	X	X	X	X		X
36-2021	AAA5955		water (field duplicate)	X	X	X	X	X		X
36-2021	AAA9572		water	X	X	X	X			
36-2021	AAA9588		water	X		X	X	X		X
36-2021	AAB2541		water	X	X	X	X			

Monitor Well 3

Loc ID	Sample ID	Depth	Media	Total Metals	HE	VOCs	SVOCs	Chloride	Nitrate	General Minerals
36-2022	AAA5956		water	X	X	X	X	X		X
36-2022	AAA5987		water	X	X	X	X	X		X
36-2022	AAA5988		water (field duplicate)	X	X	X	X	X		X
36-2022	AAA9589		water	X		X	X	X		X
36-2022	AAA9590		water	X		X	X	X		X
36-2022	AAB2542		water	X	X	X	X			

Variances from the S&A Plan Table in the RFI Work Plan (Table 5-14, p. 5-84)

1. The RFI Work Plan indicated quarterly sampling at each well with four samples each being analyzed for VOCs, SVOCs, metals, HE, and general minerals. For the 1994 reporting period the following variations in sampling are as follows.

PCO-1. The following analyses were performed: six for VOCs and metals, five for SVOCs and HE, and four for general minerals. In addition two samples were analyzed for chloride and one was analyzed for nitrate.

PCO-2. The following analyses were performed: five for VOCs, SVOCs, and metals; four for HE, and three for general minerals. In addition three samples were analyzed for chloride.

PCO-3. The following analyses were performed: six for VOCs, SVOCs, and metals; four for HE and five for general minerals. Five samples were analyzed for chloride.

One extra sample taken at each well is a field duplicate. For those analyses where six instead of four samples were analyzed, the reason is because additional data provided more information.

In cases where less than four samples were analyzed, the reason is because some samples were misplaced or containers were broken at the analytical laboratory.