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TA-21
21-029

Date: December 13, 1999
Refer to: E/ER:99-355

Mr. John Kieling
NMED-HRMB
P.O. Box 26110
Santa Fe, NM 87502

SUBJECT: REQUEST FOR SUPPLEMENTAL INFORMATION (RSI) RESPONSE FOR TECHNICAL AREA (TA)-21, RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) FACILITY INVESTIGATION (RFI) WORK PLAN, VOLUME II, DP TANK FARM

Dear Mr. Kieling:

This letter and enclosure comprise the Los Alamos National Laboratory (LANL) Environmental Restoration (ER) Project's response to the RSI for the RFI Work Plan, Volume II, DP Tank Farm. The work plan addresses Potential Release Site (PRS) 21-029 also known as DP Tank Farm. The RSI was received by the ER Project Office on August 12, 1999, and a 90-day extension was approved by the New Mexico Environment Department Hazardous and Radioactive Materials Bureau (NMED-HRMB) on September 28, 1999.

Our response is organized by comment category with a total of seven categories. The RSI comments were clarified and comment categories discussed with John Kieling, John Young, and Vicki Maranville of your staff on October 4 and 20, 1999. LANL would like to thank Mr. Kieling, Mr. Young, and Ms. Maranville for taking the time for meeting with the ER Project staff several times to discuss the NMED-HRMB's comments and our response approach. We believe that because of these meetings, LANL is able to concisely provide the additional information NMED-HRMB seeks.

During the last two months, the ER Project conducted a thorough review of the operating history of the former tank farm and reviewed all available information regarding proximate PRSs. The results of this exhaustive review of historic operating information for DP Tank Farm confirmed that the site was used solely for the storage and distribution of petroleum products. This information was shared and discussed with Ms. Maranville on November 16, 1999 and discussed with John Young and Vicki Maranville on December 1, 1999. Additionally, LANL is proposing to focus initially on DP Tank Farm as the potential source of the hydrocarbon sheen observed in DP Canyon. All existing data point to the former tank farm as being the most likely source of the contamination. We believe that this understanding has been firmly established while working closely with NMED-HRMB through verbal discussions as well as the meetings described above.

LANL/ER/041106

10559

The enclosed RSI response amends the original work plan. As discussed in meetings with NMED-HRMB, the remaining RFI will be conducted in an iterative approach with input from NMED-HRMB staff regarding sample locations, discussion of real-time field screening results, and confirmation that the extent of contamination has been defined and the source of the sheen identified.

Once the extent of the hydrocarbon contamination is determined, all of the data will be evaluated and assessed (according to the Risk-Based Decision Tree) to determine an appropriate course of corrective action, if necessary. This approach was extensively discussed during the October 20, 1999 and December 1, 1999 meetings with your staff.

If you have any questions, please call Dave McInroy at (505) 667-0819 or Joe Mose at (505) 667-5808.

Sincerely,

James M. Ray
for

Julie A. Canepa, Program Manager
Los Alamos National Laboratory
Environmental Restoration

Sincerely,

T. J. Taylor

Theodore J. Taylor, Program Manager
Department of Energy
Los Alamos Area Office

JC/TT/PB/ev

Enclosure: 1) RSI Response, RFI Work Plan, Volume II, DP Tank Farm w/attachments
2) RSI Response, RFI Work Plan, Volume II, DP Tank Farm w/o attachments

Cy (w/encs.):
P. Bertino, E/ER, MS M992 (Enclosure 2)
M. Buksa, E/ET, MS M992 (Enclosure 2)
D. Daymon, EES-13, MS M992 (Enclosure 2)
J. Jones, E/ER, MS M992 (Enclosure 2)
D. McInroy, E/ER, MS M992 (Enclosure 2)
J. Mose, LAAO, MS A316 (Enclosure 2)
T. Taylor, LAAO, MS A316 (Enclosure 2)
L. Woodworth, DOE-AL, MS P366 (Enclosure 2)
J. Parker, NMED-AIP (Enclosure 1 & 2)
S. Yanicak, NMED-AIP, MS J993 (Enclosure 1 & 2)
RPF, (ER Catalog # 19990193), MS M707 (Enclosure 1 & 2)

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Cy (w/o enc.):
J. Canepa, E/ER, MS M992
T. George, E/ER, MS M992
T. Grieggs, ESH-19, MS M992
J. Bearzi, NMED-HRMB
E/ER File, MS M992

Response to
Request for Supplemental information
21-029 RFI WORK PLAN, VOLUME II
Los Alamos National Laboratory NM0890010515

To facilitate review of this response, the New Mexico Environment Department's (NMED's) comments are included verbatim. Los Alamos National Laboratory's (LANL's) responses follow each NMED comment. Pursuant to discussions with NMED Hazardous and Radioactive Materials Bureau (HRMB) on October 4 and 20, 1999, the Environmental Restoration (ER) Project has organized this response by category, with a total of seven categories. The first four categories represent the principal concerns of NMED HRMB in the request for supplemental information (RSI) comments. These categories include

- investigation of fracture flow,
- applicability of historical knowledge,
- use of a photoionization detector (PID) in sampling, and
- identification of analytical suites.

The three remaining categories are

- sampling design issues,
- request for additional detail, and
- format issues.

Headers within each category indicate which comments are included in that category; G denotes a general comment and S denotes a specific comment. Where applicable, one Laboratory response may address more than one NMED HRMB comment.

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Investigation of Fracture Flow: G1A/B, S19, S24

NMED G1A/B

1. *Information regarding fracture-flow at this potential release site (PRS) is unknown. Every attempt should be made to characterize nature and extent of subsurface contamination related to fractures, during this phase of investigation (if possible) to eliminate the need to re-mobilize and conduct additional field work which could have been conducted during this phase of investigation. Please submit a Sampling and Analysis Plan (SAP) to further investigate subsurface contamination related to fractures, the role in the transport of contaminants along fractures, and the impact of fracture flow on contaminant transport at this PRS.*

   The following sections in the RFI Work Plan Vol. II make assumptions regarding the composition of the fracture-filling material, the role in contaminant transport along fractures, and the impact of fracture flow on contaminant transport. Fracture-filling materials have not been studied or evaluated at this PRS, and therefore, assumptions regarding the influence of fracture-filling material on contaminant transport can not be made:

   A. § 2.2.1.1 Nonsampling, Fractures at TA-21, page 2-19

   " ...If this is correct, a contaminant plume migrating downward along fractures from the West Fill Station might be expected to intersect the upper DP Canyon drainage to the north of the DP Tank Farm. The study did not consider the possible influence of fracture-filling materials on contaminant migration in this area; however Davenport et al. (1995, 58847) note that the filling of surficial fractures in the tuff by swelling clays (smectites) tends to clog the fractures, reducing their ability to transport water (and fluids in general)."

   In addition, the above-referenced statement only refers to potential releases from the West Fill Station and does not take into account a release from other portions of this PRS.

   B. § 2.2.2.3 Media Characterization, page 2-72

   "It may be that fractures are observed to be contaminated, but on unfractured tuff material no contamination is visibly evident or measured with the PID. If this is the case, this sampling activity will be suspended and the alternatives considered based upon field observations."

NMED S24

24. § 2.2.1.2 VCA Confirmatory Sampling and Analysis Activities (1996), page 2-53

"Although analytical results indicated that the cleanup level for TPH had not been met for the samples, no further removal was conducted because the small volume of contaminated material remaining was associated with staining that was observed adjacent to and along fractures (that is, the samples were biased toward stained material not bulk tuff)."

Please indicate how the volume of contaminated soil left in place was determined. As stated earlier in the report, extent has not been clearly defined. Hence, the extent of contamination could not have been determined because the extent has not been determined. Also, the amount of contaminated material was stated to be "small"; please quantify what is meant by "small".

LANL Response to G1A/B and S24

The following information represents what is known about fracture flow for potential release site (PRS) 21-029. General observations from previous site visits and field investigations suggest that some type of contaminant transport is occurring along fractures. Several areas of possible contamination in fractures have been located. During the 1996 voluntary corrective action (VCA), soil contaminated with hydrocarbons was excavated from the area of the East Fill Station (Figure 1). Near the top of the excavation, contamination was present in both the bulk rock (tuff) and in fractures. Near the bottom of the excavation, contamination was observed in fractures but not in the bulk rock adjacent to the fractures. After contaminated material was excavated, the amount of hydrocarbons observed in DP Canyon appeared to decrease. This suggests that the hydraulic head for a potential source of the hydrocarbon sheen area may have been removed. Other observations suggest that upstream from the hydrocarbon sheen area there is flow in a fracture containing clay fill that exhibits a diesel odor. Another area, recently identified, is located approximately 45 ft upstream of the original hydrocarbon sheen area and on the south side of the stream bed. Diesel odors were noticeable in sediments at the interface between the overlying fill material and the tuff. It is assumed at this time that the presence of diesel at this location is fracture related; the objective of this work plan is to confirm the contaminant source of hydrocarbons in DP Canyon. Information gathered thus far suggests that the remaining contamination at this site is mostly present in fractures, as was observed near the bottom of the excavation at the East Fill Station.

A fracture characterization study (Attachment 1) was conducted by Ken Wohletz in 1995 at this PRS to understand possible fracture flow of petroleum hydrocarbons released during operations at DP Tank Farm. This study focused on the west side of DP Tank Farm and its relationship with the Guaje Mountain Fault Zone (GMFZ) (Figure 1) and the zone's influence on fracture spacing, orientation, and aperture. The GMFZ, located on the west side of DP Tank Farm, is a north-south-trending fault zone. The West Fill Station is located on the eastern edge of the fault zone. The GMFZ extends from approximately 250 to 600 ft east of the intersection of DP Road with Trinity Drive. In general, the fracture spacing averages ~5 ft for DP Tank Farm, however, over the GMFZ, average fracture spacing is about 2 ft. Northwest-trending fractures are about 50% more abundant than northeast-trending ones. The average trends of the northwest fractures will be N44W and the northeast fractures will be N40E (Figure 2). Figure 2 illustrates the fracture trends from the data collected by Wohletz (Attachment 1) for the areas at the West Fill Station and along a traverse to the west. The fracture trends are presented as rose diagrams that illustrate the frequency of measured strikes. The data show WNW and north strike modes. It is assumed that the strike modes for the East Fill Station are similar to those illustrated for the West Fill Station. The main difference between the East and West Fill Stations is the density of fractures, which is lower for the area east of GMFZ and the West Fill Station. Fracture dips are dominantly vertically oriented. Fractures near the West Fill Station average about 40° from vertical. The mean apertures are 0.5 cm and range between 0.4 and 0.7 cm.

An estimated volume of contamination remaining at this PRS was determined by using information obtained from a variety of resources. The main resources utilized were the 1995 fracture characterization study and personal communication with Ken Wohletz (Attachment 2).

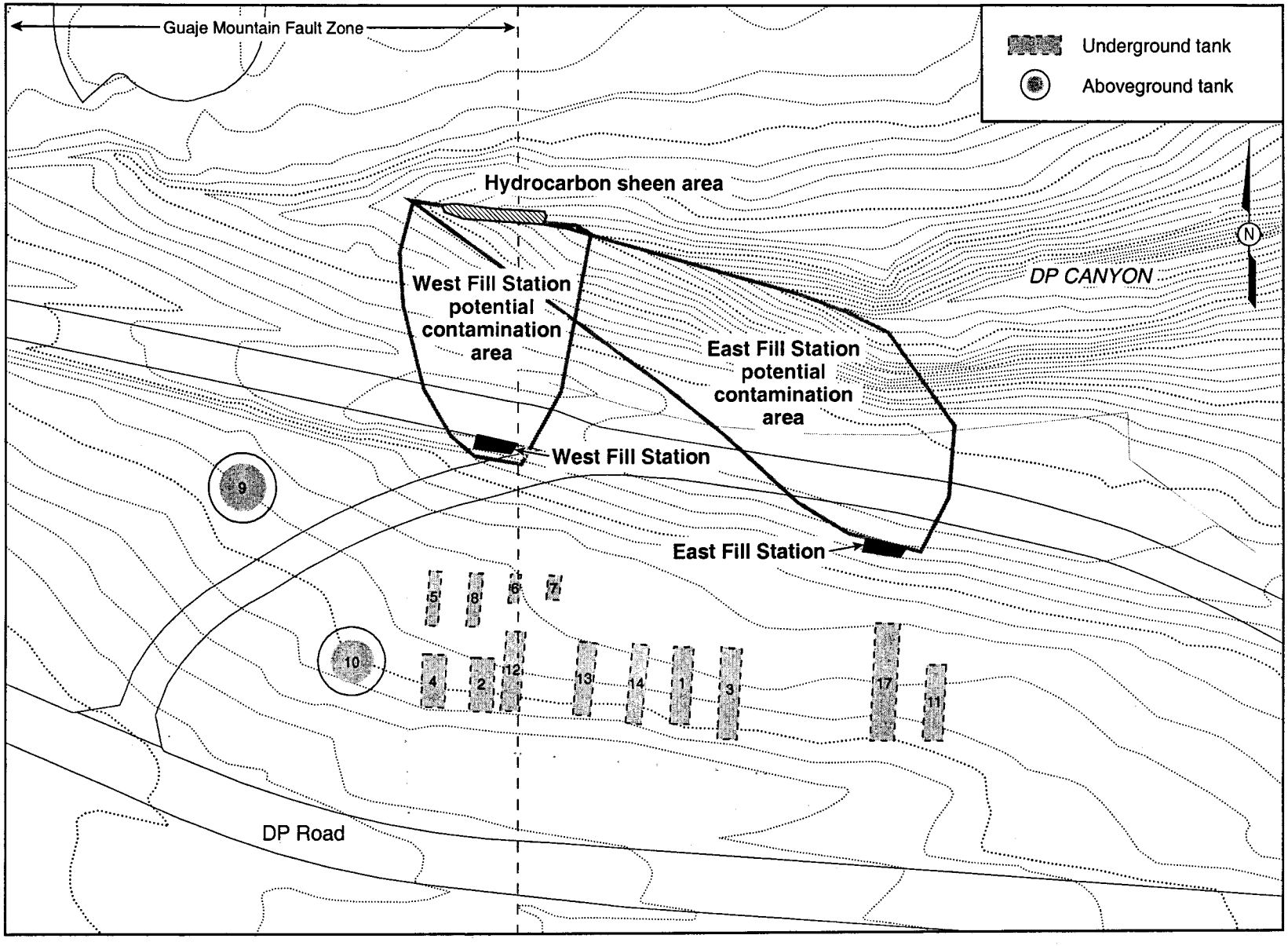

Figure 1. DP Tank Farm area and areas of potential contamination at the East and West Fill Stations

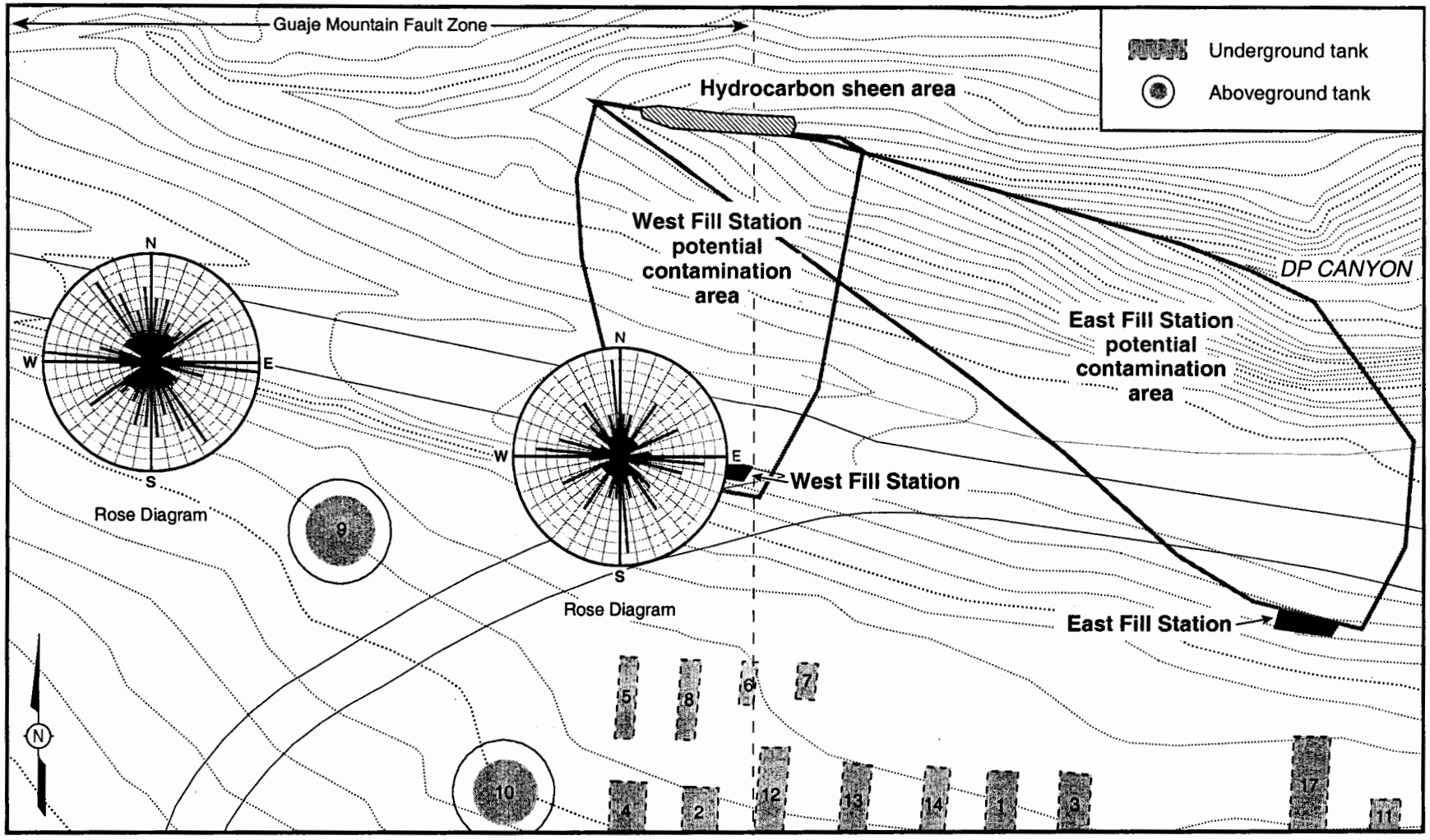

Figure 2. **Illustration of fracture trends presented as rose diagrams for fracture characterization study by Wohletz (Attachment 1), proposed area of potential contamination between East and West Fill Stations, and the hydrocarbon sheen area**

First, an estimate of the total subsurface volume that could have been contaminated from surface activities at DP Tank Farm was determined (Figure 1). Any fill material that exists over the tuff was not included in the volume estimate. If fractures within the tuff are the dominant transport pathway and represent the subsurface volume in which contamination is stored, then only the fracture volume of the total subsurface tuff volume is of interest. Fracture data collected by Wohletz (Attachments 1 and 2) were used to derive probability distributions for fracture density and fracture aperture. The GMFZ runs through DP Tank Farm resulting in different fracture densities for the East and West Fill Station areas, though aperture is apparently not significantly impacted (Attachment 1). Thus, different probability distributions were specified for fracture density for the East and West Fill Stations, but the same distribution for fracture aperture was used in the simulations for the two sites. The distribution for total fracture volume (ft^3) was then estimated (with appropriate unit conversion) as

total fracture volume (ft^3) = (fracture density)(fracture aperture)(total subsurface volume).

Because the upper portions of fractures are typically filled (Attachments 1 and 2), the potentially contaminated volume of fractures is less than the total fracture volume. The effective porosity can be estimated by assuming the porosity of fracture fill is zero at the surface (because of fractures filling with fine grains and mineralization) and linearly increases with depth to 1 at 40 ft (i.e., the fractures may be completely open at 40 ft) (Attachment 2). Using this approach an average effective porosity for each of the fill station volumes was estimated. To simulate the uncertainty in effective porosity, these averages were used as parameters in normal distributions along with a standard deviation. The distributions for total fracture fill volume (ft^3) is then estimated as

total fracture fill volume (ft^3) = (total fracture volume) (fracture fill porosity).

Next, the proportion of fractures potentially contributing to the hydrocarbon sheen were estimated using strike data (Attachment 1) and the location of each fill station in relation to the hydrocarbon sheen. Approximately 59% of the fractures at DP Tank Farm trend to the northwest (Attachment 1). Because the East Fill Station lies to the east of the hydrocarbon sheen, it is unlikely that the northeast-trending fractures (41% of the fractures) would contribute to the sheen. There are some east-west-trending fractures that could provide connectivity between the northeast- and northwest-trending fractures. For the East Fill Station, a probability distribution was estimated to reflect the percentage of northwest-trending fractures (59%) coupled with the possibility of connecting east-west fractures. Because the West Fill Station lies due south of the hydrocarbon sheen, a probability distribution reflecting the likelihood that a larger proportion of the fractures under the West Fill Station are potentially contributing to the hydrocarbon sheen was chosen. The total fracture fill volume (for both east and west stations) potentially contributing to the hydrocarbon sheen is then estimated as

total fracture fill volume (ft^3) = (total fracture fill volume) (proportion of contributing fractures).

The best estimate from this analysis is given by the median (most likely) of the fracture fill volume distributions of 673 ft^3 for the East Fill Station and 357 ft^3 for the West Fill Station (Table 1). This is equivalent to approximately 5048 gal. of hydrocarbons for the West Fill Station and 2678 gal. of hydrocarbons for the East Fill Station.

Table 1
Bounds for Volume Potentially Contributing to the Hydrocarbon Sheen from the East and West Fill Stations

	Min (ft^3)	Most Likely (ft^3)	Max (ft^3)
West Fill Station	163	673	2002
East Fill Station	86	357	1541

Several issues should be taken into consideration when assessing the usefulness of these calculations.

- The total subsurface volume estimated is dependent on the surface area and contamination depth, both of which are uncertain at this time. This uncertainty is not included in the estimates.
- Field observations from the DP Tank Farm VCA suggest that migration of petroleum contamination into the tuff (bulk rock) is likely to be significant near the source areas. This analysis does not address this likelihood.
- The input probability distributions for density and aperture were based on visual inspection of graphs of fracture data. These distributions may be better characterized through analysis of fracture data. The distribution on fracture fill porosity could also be refined.

In summary, hydrocarbon contamination is present in the subsurface between the hydrocarbon sheen area and the probable hydrocarbon sources (East and West Fill Stations). The bulk of one probable source was removed during the VCA activities at the East Fill Station in 1996. It is assumed that the contamination present beneath the West Fill Station is mostly in bulk rock (tuff), as observed at the East Fill Station during the VCA. It is also assumed that as the distance away from the source increases, the main transport mechanism for hydrocarbons is through fractures, which is a path of least resistance. The fracture characterization study by Wohletz (Attachment 1) at DP Tank Farm supports the assumption that hydrocarbons are being transported along fractures to the north into DP Canyon. From a hypothetical model for DP Tank Farm, Wohletz concluded that the statistical variation favors the preferential direction of infiltration of hydrocarbons into tuff and expansion or movement along fractures in a north-south direction. In addition, the potential for intersection with DP Canyon to the north is likely.

The field investigation activities proposed in this RSI response include an investigation of the hydrocarbon sheen area and the length of stream bed that exhibits hydrocarbon contamination to determine the potential source(s) of the petroleum hydrocarbons. In addition, fingerprinting of the proposed samples collected in the hydrocarbon sheen area will confirm if the contamination is weathered diesel. This investigation will begin at the DP Canyon stream bed and focus towards the two most probable sources of petroleum hydrocarbons at the East and West Fill Stations to confirm whether or not DP Tank Farm may be the source of the hydrocarbons observed in DP Canyon. A detailed discussion to address sampling design comments is presented later in this RSI response.

A sampling and analysis plan was not prepared to investigate subsurface contamination related to fractures, the role in the transport of contaminants along fractures, and the impact of fracture flow on contaminant transport at the PRS because, during the discussions with NMED HRMB on October 4, October 20, and December 1, 1999, it was agreed that a fracture investigation would not be conducted. It was agreed that the field investigation would be focused on determining the source of hydrocarbons in DP Canyon.

Specific comment 24 requested a definition of the term *small* in the discussion of the amount of contamination left in place at the bottom of the excavation for the VCA at the East Fill Station. Small was used in a qualitative sense to emphasize that the volume of contamination present in fractures is much

less than the volume of contamination present in the bulk rock (tuff). Contaminated bulk rock was removed during the excavation, and at the bottom of the excavation, contamination was present only in fractures.

NMED S19

19. § 2.2.1.2 West Fill Station Location, page 2-43

"Figures 2.2-10 and 2.2-11 indicate that the vertical extent of contamination at the location of the former West Fill Station might not have been determined. The levels detected were all below the UST thresholds of interest, and the depths of the boreholes was great enough that extent was considered bounded according to the needs of the investigation. In particular, no large subsurface petroleum hydrocarbon accumulation was found."

Please clarify the above statement by explaining if the extent of the contamination at this PRS has been determined, what "bounded according to the needs of the investigation" means, and what were the objectives of the investigation. In addition, please clarify what is meant by "no large subsurface petroleum hydrocarbon accumulation."

LANL Response to S19

The extent of contamination adjacent to the West Fill Station has been bound vertically and horizontally for total petroleum hydrocarbons (TPH). For benzene, toluene, ethylbenzene, and xylene (BTEX), the extent of contamination has not been bounded vertically and has not been bounded horizontally to the west for a decreasing trend in concentrations. However, the concentrations of BTEX and benzene were <50 ppm and <10 ppm, respectively, for boreholes 21-3002 and 21-3005. The phrase "bounded according to the needs of the investigation" means that all concentrations were below the underground storage tank (UST) regulatory concentrations of 1000, 500, and 10 ppm for TPH, BTEX, and benzene, respectively, which were the bases for the 1996 VCA. The objectives of the investigation were to determine the nature and extent of contamination, if any. The phrase "no large subsurface petroleum hydrocarbon accumulation" means that an area containing petroleum hydrocarbon contamination above the UST regulatory concentrations was not found.

Applicability of Historical Knowledge: S9, S10, S17

NMED S9

9. § 2.1.2 Operational History, Potential Release Site 21-029, DP Tank Farm Site, page 2-10

"From these reports (Bend 1980, 3688; LANL 1985, 37841) of the sampling and analyses of the tank contents, it may be concluded that..."

The conclusions stated only discuss tank contents from 1980 to 1985 even though DP Tank Farm operated from 1946 to 1985. Please provide information on the contents of the tanks for the period of 1946 to 1980. If it is unclear or unknown what the actual contents of all tanks located on the site prior to 1980, please revise the statement to include such a lack of knowledge.

NMED S10

10. § 2.1.2 Operational History, Potential Release Site 21-029, DP Tank Farm Site, page 2-11 and § 2.1.3 Waste Characterization, page 2-17

"As discussed in Section 1.0 and Section 2.2.1.2 of the work plan, the results of the screening assessment for the 1994 RFI data indicated that all of the chemicals of potential concern (COPCs) present in the DP Tank Farm soils were associated with petroleum products. There was no evidence that hazardous wastes had been on the site."

All evidence from various maps, memorandums, and records of sampling and analysis at PRS 21-029, DP Tank Farm, and the results of all investigations conducted to date indicate that no solid wastes, and thus no hazardous wastes, were ever stored at the site. Records indicate that the 15 tanks contained only petroleum products including leaded and unleaded gasoline, diesel, kerosene, and No. 2 fuel oil.... And as noted in earlier sections, Francis (1993, 58986 and 58987) also recalls Stoddard solvent (mineral spirits or petroleum distillate) being distributed at the tank farm at times."

Please provide to HRMB the data and documentation or evidence (i.e. maps, memorandums, and records of sampling and analysis) used to support the above-referenced statements. Information regarding the exact contents of each of the tanks at the site for the period 1946 to 1980 is unknown. Please provide documentation to support hazardous wastes have not been stored on the site during the entire period of operation. The above-referenced statements contradict the statement in § 2.1.2 Operational History, page 2-10, which indicates that the contents of the tanks during the period of operation (1946-1985) cannot be determined.

LANL Response to S9 and S10

ER Project reports and plans including, but not limited to, the "Sampling and Analysis Plan for Subsurface Soil Sampling at DP Tank Farm" (LANL 1995, 59364); "RFI Report for Potential Release Site 21-029" (LANL 1996, 52270); "Voluntary Corrective Action Plan for Potential Release Site 21-029, DP Tank Farm Removal of Contaminated Soil" (LANL 1996, 55344); "Voluntary Corrective Action Report for Potential Release Site 21-029, DP Tank Farm" (LANL 1996, 55347); and the "RCRA Facility Investigation Work Plan, Volume II, DP Tank Farm" (LANL 1998, 59976.3) did not provide detailed information regarding the contents of the tanks at PRS 21-029. The following discussion and the corresponding documentation detail the operating history of the DP Tank Farm and the contents of the storage tanks.

William C. Francis and Gerald Huber were interviewed to clarify statements in the work plan regarding the contents of the tanks at the DP Tank Farm, PRS 21-029. Memorandums documenting the interviews are included in Attachment 3. Mr. Francis is a retired construction supervisor for the Zia Company and was involved with the construction and is knowledgeable of day-to-day operations at DP Tank Farm. Mr. Huber is a retired supervisor of the Zia Company's Warehouse Division and was responsible for all fuel and lubricant storage and delivery; Mr. Huber worked at DP Tank Farm from 1946 until he retired in 1987. According to Mr. Francis and Mr. Huber, in 1946, the Army Corps of Engineers installed five petroleum storage tanks at the DP Road Storage Area (PRS 00-027). Engineering drawings and aerial photographs confirm the presence of five aboveground storage tanks in the northern portion of the DP Road Storage Area in 1946 and 1947 (Attachment 4). All five of the original petroleum storage tanks were moved from the DP Road Storage Area in mid-1948 when the Zia Company took over the operation and relocated the fuel tank farm directly east of the storage area to DP Tank Farm. The tanks were in excellent condition.

The DP Tank Farm, known at the time as the *fuel yard* was located between the eastern boundary of the Knights of Columbus property line and the western boundary of the DP Road fire station. Gerald Huber confirmed that a total of 15 storage tanks were installed at the DP Tank Farm, including the 5 tanks from the DP Road Storage Area. The tanks had a total capacity of 281,364 gal. Thirteen of the tanks at the DP Tank Farm were installed below ground and two were installed aboveground. Mr. Huber also confirmed that the as-built configuration of the DP Tank Farm including tank number, capacity, and proposed contents, as depicted in Zia Company drawings Z-252, sheets 1 through 5 (LANL drawing number ENG-C49054) (Attachment 4), is accurate. The description of the tanks when they were installed and at the time of decommissioning of the DP Tank Farm is provided in Table 2.

Table 2
DP Tank Farm Tank Descriptions

Tank	Capacity (gal.)	Planned Contents Upon Installation – 1948	Contents Upon Decommissioning – 1983
1	28,500	Diesel Fuel #1	Diesel Fuel #2
2	14,494	Diesel Fuel #2	Diesel Fuel #2
3	23,967	Diesel Fuel #1	Diesel Fuel #2
4	14,994	Diesel Fuel #2	Diesel Fuel #2
5	5170	Kerosene	Diesel Fuel #2
6	2099	Kerosene	Residual gasoline/Stoddard solvent
7	2978	White gas	Residual gasoline/Stoddard solvent
8	5170	Kerosene	Diesel Fuel #2
9	21,644	Diesel Fuel #2	Diesel Fuel #2
10	21,644	Diesel Fuel #2	Diesel Fuel #2
11	23,967	H.E. diesel fuel	Residual ethanol/gasoline
12	20,266	Diesel Fuel #1	Residual kerosene
13	24,770	Bronze gas	Residual Diesel Fuel #2
14	20,266	Diesel Fuel #1	Diesel Fuel #2
17	51,015	P.P. diesel fuel	Residual gasoline

Tanks 1 through 8, 11 through 14, and 17 were buried, and tanks 9 and 10 (Figure 1) were installed aboveground with earthen dikes constructed on the downhill side of each tank. According to Mr. Huber

and Mr. Francis, tanks 15 and 16, shown as proposed on the engineering drawings, were never installed (Attachment 4). According to Mr. Francis and Mr. Huber, white gas was similar to Coleman fuel and was used in welder's torches, bronze gas was leaded gasoline for vehicles, distillate diesel fuel #1 and #2 were used primarily for heating, power plant (P.P.) diesel fuel was used in the power plant for power generation, heavy equipment (H.E.) diesel fuel was used to power heavy equipment, and kerosene was used for heating. Mr. Francis and Mr. Huber indicated that the tanks were designed to be drained to within a few gallons of their capacity. The contents of particular tanks were changed only in response to low usage of particular petroleum products and a corresponding high usage of other products, particularly diesel fuel #2, which had numerous uses and was routinely in high demand. Additionally, Mr. Huber does not recall any major spills during the operation of the tank farm; the product distribution procedure required the presence of two operators when the fuel was transferred from a storage tank to a tanker truck. One operator was at the tank, and the other was at the truck.

Mr. Huber stated that new Stoddard solvent was stored in one of the small buried tanks connected to the West Fill Station (tank 5 or 8) from mid-1948 until the late 1970s. According to Mr. Huber, the Stoddard solvent was transferred to a Zia Company tanker truck that would distribute the material to automotive and equipment maintenance shops throughout LANL. Mr. Huber confirmed that no spent Stoddard solvent was ever returned to the DP Tank Farm. Stoddard solvent is a mixture of numerous hydrocarbons derived from refining crude oil; the solvent is composed of approximately 85% nonane and 15% trimethyl benzene and is insoluble in water. It has a flash point between 100°F and 110°F and is considered to be a form of mineral spirits, naphtha, and white spirits. Stoddard solvent is used primarily as a paint thinner and as a general cleaner and degreaser. Stoddard solvent smells and tastes like kerosene and can be detected in the environment by the same analytical method TPH specified for Stoddard solvent (Attachment 5). It is, however, almost impossible to distinguish kerosene from diesel on a chromatograph once either product has been released to the environment.

Mr. Huber confirmed that only Stoddard solvent and the other petroleum products listed in Table 2 were stored at and distributed from the DP Tank Farm. No hydraulic oils, mineral oils, or motor oils were stored there. Hydraulic and motor oils were stored in drums at the DP Road Storage Area to the west, and mineral oils were stored at electrical yards maintained by the Zia Company utility crews. Mr. Huber and Mr. Francis also stated that the only tanks present at the DP Tank Farm were the 15 petroleum product storage tanks installed in 1948 and removed in 1988.

Mr. Francis and Mr. Huber stated that the DP Tank Farm was in full operation until the late 1970s, when some of the fuel storage and distribution operations were moved to Technical Area (TA) 3. According to Mr. Francis, Mr. Huber, and Dave McInroy, the large volumes of fuel stored at the DP Tank Farm from 1948 until the late 1970s were necessary to ensure that LANL and the community of Los Alamos would be self-sufficient if there was an emergency that resulted in a fuel shortage. By the late 1970s, this security concern was relaxed, and the large quantities of fuel stored at the DP Tank Farm were no longer required. At that time, petroleum products were distributed to various Laboratory facilities directly by suppliers.

In 1980, only one of the diesel tanks was still in operation; the remainder of the tanks still contained various quantities of fuel but were no longer being used. In 1980, a corrosion inspection was made to assess the condition of each tank by excavating a cross section of each of the six tanks at the fuel farm. The portions of the exposed tanks showed that the original corrosion coating on each tank was intact; the exteriors were determined to be in excellent condition. This was confirmed during the decommissioning of the tanks. Samples of the contents of each tank were collected in 1980 and sent to E.W. Saybolt & Company for analysis and comparison with the federal specification for diesel fuel oil VV-F-800B. The results indicated that the diesel fuel on hand met all the specification for use as motor fuel. Copies of

analytical results are not available; however, a the memorandum from Mr. LeRoy Warren, Chief of the Financial Management and Contracts Branch, Department of Energy (DOE) Los Alamos Area Office, summarizes the results (Attachment 6).

In October 1983, all fuel storage facilities at LANL were reviewed before implementation of the formal Spill Prevention, Control and Countermeasures Plan. The memorandum (Attachment 7) states that the earthen dike enclosing the 15 tanks was 397 ft long and 4 ft high with a containment capacity of 377,000 gal. The dike was in good condition at the time. Notes in the margin of the memorandum indicate that there was 142,289 gal. of diesel fuel #2 remaining on site. A site sketch and inventory (Attachment 7) to the October 1983 memorandum showed that the remaining diesel fuel was stored in tanks 1, 2, 3, 4, 5, 8, 9, 10, and 14. The remaining tanks contained residual amounts of the following fuels: gasoline in tanks 6, 7, and 17; ethanol in tank 11; kerosene in tank 12; and diesel fuel in tank 13. This site was identified for decommissioning in 1983. In November 1984, soil samples were collected from various locations around the DP Tank Farm, and in January 1985, soil control samples and liquid samples were collected from the tanks. The results are discussed below in the response to specific comment 17.

A memorandum dated May 17, 1985, provides recommendations for emptying and decommissioning the tanks at the DP Tank Farm (Attachment 8). A report was prepared by IT Corporation just before the decommissioning of the tank farm (Attachment 9). The report describes the status of each of the 13 USTs including approximate capacity and contents. According to the report, each tank had only a residual amount of fuel remaining (approximately 100 gal.).

The DP Tank Farm was decommissioned in 1988 as described in the DP Tank Farm work plan and in Dave McInroy's field notes (Attachment 10). According to Mr. McInroy, the concrete support saddles for each tank were removed, and each excavation was filled in with the soil that had covered the tanks. Clean fill was brought in to fill the depression caused by the removal of contaminated soil beneath tank 10. The soil berms were used to regrade the site. The soil from the dike was presumed to be clean because none of the tanks had ever ruptured. Additionally, Mr. McInroy confirmed that all known piping, fill stations, and valve boxes at the site were drained and removed as part of the decommissioning. The piping and concrete were disposed of at the Los Alamos County Landfill. Petroleum-contaminated soil excavated during decommissioning activities was brought to Area G at TA-54 (approximately 75 yd^3). The bulk of this soil was associated with the West Fill Station. As discussed in Mr. McInroy's field notes, the petroleum-contaminated soils were sampled and analyzed for benzene, toluene, total xylenes, and lead to ensure the soils met applicable waste acceptance criteria. Results showed the soil to be within acceptable levels (Attachment 11).

A copy of the Chemical Waste Disposal Request prepared by Dave McInroy confirms that 10 30-gal. drums and 40 55-gal. drums of residual fuel and sludge were generated during the decommissioning of the tank farm. Waste characterization results for these drums confirm that only petroleum products were stored in the tanks. Screening results for samples collected from each drum show no elevated radiation levels (Attachment 11), and the special waste analysis reports generated by Chemical Waste Management for waste approval confirm that no PCBs were present nor were any solvents or metals other than low levels of lead (Attachment 12). Additionally, the inside of each tank was monitored for radiation before shipment off site for salvage, and no radiation was found (Attachment 13).

Based on the information from investigations conducted to date, it can be concluded that no solid wastes, and thus no hazardous wastes, PCBs, or radionuclides were ever stored at the DP Tank Farm. The information provided would indicate that all structures documented and known to be present were removed in 1988. However, the geophysical survey proposed in Activity 1 of the DP Tank Farm work plan, page 3-1 will be conducted to ensure no piping, fuel ports, or other tank farm equipment remain.

NMED S17

17. § 2.2.1.2 Sampling, Predecommissioning Investigation Sampling and Analysis Activities (1984 and 1985), page 2-24

"Analytical results for EP toxicity lead and arsenic, and net total organics for the surface soil and control samples, location for which are indicated by the map, are summarized in a copy of the handwritten table submitted in 1985 (LANL 1985, 37841) (provided in Appendix A-1.0 of this work plan). The results show lead and arsenic concentrations in the EP toxicity leachate of samples at below detection (<0.1 mg/L) for lead (with the same result in the controls) and up to 0.0042 mg/L for arsenic (slightly greater than the highest value in the controls)..... A memorandum attached to LANL (1985, 37841) gives the exact date of the soil sample collection as November 27, 1984, followed by collection of soil sample controls and liquid samples from the tanks on January 17, 1985. Details of the analytical results for the liquid samples are not provided."

The analytical method used and the laboratory analytical results for the soil samples collected are not provided in the RFI Work Plan, Vol. II. Please provide laboratory data for review along with the analytical method used. In addition, please provide the exact locations of the samples, which were used as "control samples", as well as the land use history for the sampling location. It is unclear as to where the exact sampling location for the control samples is and if they were collected from an area that has not be previously disturbed. In addition, liquid samples were collected from the tanks on January 17, 1985. Based on the results of the liquid sampling, conclusions were made as to the contents of each of the tanks, however the analytical results are not provided. Please provide the analytical results for verification of the tank contents prior to the removal of the tanks.

LANL Response to S17

This site was identified for decommissioning in 1983. In November 1984, soil samples were collected from various locations around the DP Tank Farm, and in January 1985, soil control samples and liquid samples were collected from the tanks. The analytical results and a map of the sample locations were attached to a March 1, 1985, memorandum from Lynn Scholl Fritz to John Ahlquist (Attachment 14). Attached to the memorandum are hand-written analytical results for extraction procedure toxicity (EP Tox) lead, arsenic, and total extractable organics as well as a map of sample locations. An actual printout of these analytical results could not be located. The memorandum notes that a radiation survey was not completed because of the presence of snow on the ground. Dave McInroy stated that it was Laboratory policy to conduct a radiation survey before decommissioning any Laboratory buildings and equipment, regardless of their use. Liquid samples were collected from fuel ports, and results showed fuel range distillates with one sample containing ethanol. The two control soil samples were collected from an area to the south across DP Road. Aerial photographs from 1974 and 1986 show that the land was vacant at the time the control samples were collected. An aerial photograph from 1946 shows a large coal pile, and aerial photographs from 1958 and 1965 show residential trailers and associated parking areas (Attachment 15). Additional aerial photographs of the area were provided in Appendix F-1.0 of the DP Tank Farm work plan. In a recent interview, Mr. Francis and Mr. Huber confirmed that the two 1983 control samples were collected in the former location of the western end of a large coal pile, which was present in 1946 aerial photographs and was later the location of a residential trailer park.

The March 1, 1985, memorandum indicates that results for the soil samples showed no elevated lead, arsenic, or total organics in surface soils; however, actual analytical results are not available. A radiation survey using a Phoswich instrument was conducted at the DP Tank Farm on April 19, 1985. A memorandum dated April 22, 1985, from John Ahlquist to Wayne Hansen includes a copy of handwritten

survey maps and results documenting that no radioactivity above background was detected (Attachment 16). Mr. Francis and Mr. Huber also confirmed that no radioactive materials were ever brought on or used on site. The memorandum also stated that several core samples of fuel-soaked soil had been collected from around the two loading docks and analyzed for lead. However, these results were never located, and the areas were sampled again during the decommissioning in 1988.

Use of a PID in Sampling: G2, G3

NMED G2

2. *The use of photoionization detector (PID) readings to guide sample collection for laboratory analysis may not be appropriate for the following reasons: based on the information provided, the contamination at this PRS is largely related to "weathered or degraded" petroleum products, as a result the volatile portion of the hydrocarbons may not be present; heavier-end hydrocarbons are not as volatile as the gasoline-range organics and, are therefore less likely to be detected using a PID; and kerosene, which was indicated as a potential contaminant of concern, is not generally detected using a PID. Please include criteria for sample collection based on visual inspection and best professional judgement (i.e., presence of fractures, odor, staining, weathering and/or sheen). Please provide detailed information on the proposed screening instrument, more specifically, demonstrate the screening instrument is capable of detecting the presence of heavy end hydrocarbons (motor oil range), diesel range constituents, weathered petroleum hydrocarbons, and kerosene.*

NMED G3

3. *Vapor sampling methods using a PID are proposed in § 2.2.2.3 Media Characterization (page 2-74) to attempt to determine source and/or subsurface areas of contamination. The following comment is directly related to the proposed options for vapor sampling and Activity 5:*

   Collecting vapor samples using a PID may not yield favorable or representative results for the following reason: PID sampling of the vapors contained in the boreholes may not be the best method to detect the presence of heavy end hydrocarbons (motor oil range), diesel range constituents, weathered petroleum hydrocarbons, and kerosene. In addition, collecting samples using a vacuum method on the sealed borehole and then obtaining headspace may not yield favorable or representative results for the same reason stated above. The use of passive canisters would be more favorable than the above-described methods, assuming the auger holes are of a sufficient depth to encounter fractures (and organic vapors) and the samples collected are analyzed for the proper constituents. Based on the available information, HRMB is of the opinion that the most favorable method of collecting subsurface vapor samples to determine source(s) or areas of highest subsurface contamination is by using an adsorbent material (such as active, passive, and flux chamber soil vapor surveys using EPA endorsed methods) in a sealed hole which is allowed to equilibrate for specified period of time and then sent to a fixed laboratory for analyses of the targeted constituents.

LANL Response to G2 and G3

LANL agrees that use of a PID to guide sample collection for laboratory analysis is not appropriate when the contamination at this PRS is mainly weathered or degraded heavy-ended petroleum products. LANL proposes to use visual and olfactory senses and immunoassay kits in addition to the PID to field screen for the presence or absence of petroleum hydrocarbons (gasoline, kerosene, stoddard solvent, diesel fuel, diesel fuels #1 and #2). Immunoassay kits will be the primary screening tool for detecting heavier-ended petroleum hydrocarbons. Immunoassay kits for TPH will cover the range of petroleum hydrocarbons for kerosene, Stoddard solvent, diesel fuel, and diesel fuels #1 and #2 (Attachment 17). The analytical method for the immunoassay test kits is Environmental Protection Agency (EPA) Method 4030, "Soil Screening for Petroleum Hydrocarbons by Immunoassay," (Attachment 18). The detection limit for TPH for diesel is 15 ppm. The immunoassay kits give a qualitative rather than a quantitative screening result. Because gasoline may also be present at this site, a PID will be used to screen for the lighter-ended petroleum hydrocarbons.

Core samples will be screened every 5 ft or when vision and/or smell indicate the potential presence of contamination and/or a potential transport pathway (fracture) is observed. All core samples will be logged, and visual observations and odors will be noted on the core logs. PID readings and immunoassay screening results will also be recorded on the core logs. Twenty percent of the samples that screen positive by the immunoassay kits will be submitted to a fixed-laboratory for analysis, plus one from the bottom of each borehole for confirmation.

As agreed during the December 1, 1999, meeting with NMED HRMB, the vapor monitoring proposed in Activity 5 of the DP Tank Farm work plan will not be implemented because of the lack of organic vapors associated with diesel fuel. The immunoassay kits used in combination with a PID are more sensitive and more accurate than canisters and flux chambers when screening for heavy-end petroleum hydrocarbons.

Identification of Analytical Suites: G4 and G5

NMED G4

4. *Characterization and assessment of the site must be conducted in accordance with RCRA and not in accordance with the New Mexico Environment Department (NMED) Underground Storage Tank (UST) Regulations. Please note, analysis for total BTEX (as indicated in § 1.1 Objectives and Scope, page 1-7 of the RFI Work Plan, Vol. II) is not appropriate for RCRA characterization. Analyses for BTEX constituents should be conducted for the individual hazardous constituents using the appropriate VOC analysis. In addition, no further action (NFA) (under NFA Criterion 4: The site was characterized and/or remediated under a different authority) is not applicable for this site because the release of hazardous wastes or hazardous constituents is from a solid waste management unit (SWMU) listed on the facility's Hazardous and Solid Waste Act (HSWA) permit Module VIII.*

LANL Response to G4

From the time DP Tank Farm was decommissioned in 1988 until receipt of the RSI, LANL presumed that PRS 21-029 was to be characterized and remediated in accordance with NMED UST regulations. During our meetings with NMED staff from HRMB and the UST Bureau on October 4, 1999, and October 20, 1999, it was agreed that PRS 21-029 will be characterized and remediated in accordance with the Resource Conservation and Recovery Act and that the cleanup will meet NMED UST standards. When characterization and remediation is complete, the site will be proposed for no further action under Criterion 5, which states that the PRS has been characterized or remediated in accordance with current applicable state or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

LANL did not state nor intend for total BTEX to be an analyte. As indicated in Organic Analyses, page 3-11, of the DP Tank Farm work plan, LANL is proposing to use SW-846 Method 8260B and 8021B for analysis of BTEX. According to EPA's "SW-846 On-Line Test Methods for Evaluating Solid Waste, Physical and Chemical Methods," (www.epa.com) both methods are used to determine volatile organic compounds (VOCs) in a variety of solid waste matrices and are applicable to nearly all types of sample media regardless of water content, soils, and sediments. Each compound, benzene, toluene, ethylbenzene, and xylene, will be analyzed for and reported separately.

NMED G5

5. *Due to limited background information relating to past operational history, to the exact type of product stored at the tank farm during the period of operation, and since data from the site decommissioning was inconclusive with respect to the potential for contamination, full suite analyses including sampling and analysis for kerosene (using EPA Method 8015 for non-halogenated volatile organics or equivalent method), organics (volatile and semivolatile), radionuclides, polychlorinated biphenyls (PCBs) and metals should be conducted on samples collected during the investigation of this PRS. In addition, total petroleum hydrocarbons (TPH) for diesel range organics (DRO) is also recommended since analyses for TPH has been conducted during past investigations, and the results would be useful to compare and establish trends in TPH concentrations.*

   Analyses for kerosene is required due to the fact it was indicated as being stored at the tank farm during the period of operation. Organic analyses are required for the detection of volatile and semivolatile constituents associated with diesel, gasoline, and jet fuel stored at the tank farm, as well

as, possible solvents. PCBs analyses are required due to the fact that some heavy end oils (transformer oil) have historically contained PCBs.

Radionuclide analyses should be included for the following reason: Thirteen of the 31 samples collected from DP Tank Farm exhibited elevated concentrations of radionuclides (americium-241, cobalt-60, cesium-137, and uranium-235). The presence of radionuclides can not be ruled out based on historical knowledge since the exact contents of the tanks, during the entire period DP Tank Farm was operational, is unknown.

Metals analyses should be included because process knowledge has been shown to be unreliable and metals are associated with petroleum sites and, some elements are elevated depending on the background medium to which they were compared (page 2-29). Based on this information, sufficient evidence does not exist regarding medium identification and background values used to eliminate inorganic constituents from the investigation.

Sections in the RFI Work Plan Vol. II indicate the possibility of contamination at this PRS that is not petroleum-related, further illustrating the need for full suite analyses to characterize the site. The following sections of the RFI Work Plan, Vol. II indicate the potential for contamination at the site, which is not petroleum-related:

A. § 2.1.2 Operational History, Potential Release Site 21-029, DP Tank Farm, Page 2-10

"However, given the nature of historical operations, it is possible that low levels of metals, particularly lead, might be present at the site.... Francis (1993, 58986) also recalled cleaning solvent being distributed from the tank farm at times."

B. § 2.2.1.2 Sampling, Background Comparisons and Screening Assessment of Data Collected in the 1994 RFI, Inorganics, page 2-30

"The data presented do not indicate that inorganic constituents are present at levels greater than background at the DP Tank Farm site, with the possible exception of concentrations of lead in the subsurface that might be slightly greater than background."

C. § 2.2.1.2 Sampling, Background Comparisons and Screening Assessment of Data Collected in the 1994 RFI, Radionuclides, page 2-33

"Only americium-241, cobalt-60, cesium-137, and uranium-235 were detected. Background data only exists for three radionuclides from this suite (cesium, americium, and uranium), and the background data sets for americium and uranium are based on alpha spectroscopy analysis."

D. § 2.2.2.1 Nature and Extent of Contamination, page 2-62

"There are also the potential for the presence of low levels of lead contamination and a smaller possibility of the presence of other metals above background on the mesa top in the area of the tank farm."

E. § 2.2.2.1 Nature and Extent of Contamination, page 2-62

"3. Inorganic chemicals have been identified at concentrations possibly above background values in soils/tuff at DP Tank Farm."

The following sections of the RFI Work Plan, Vol. II propose sampling for specific constituents and not full suite analyses. LANL should amend the following sections to include full suite analyses:

A. § 2.2.3.2 Media Characterization, page 2-69

"Samples will be submitted for inorganic chemical, BTEX, SVOC, and TPH as diesel and motor oil range organic chemicals."

B. § 2.2.2.3 Media Characterization, page 2-71

"The samples collected will be analyzed for inorganic chemicals, BTEX, SVOCs, and both diesel range and motor oil range hydrocarbons."

LANL Response to G5

Responses to specific comments 9, 10, and 17, stated that DP Tank Farm only stored and distributed petroleum products including white gas (e.g., Coleman fuel), diesel fuels, leaded gasoline, ethanol, Stoddard solvent, and kerosene. As described in Section 3.3, Analytical Methods, pages 3-9 through 3-11, of the DP Tank Farm work plan, the inorganic and organic analyses specified will detect the analytes of concern from the petroleum products stored at the DP Tank Farm. Specifically, SW-846, Methods 3050B and 3051(3051A), will detect any possible lead contamination from the leaded gasoline stored on site. No other metals have been identified as chemicals of potential concern (COPCs). SW-846, Methods 8260B and 8021B, will determine the presence of individual BTEX components, trimethylbenzenes, naphthalene (Stoddard solvent), and numerous other VOCs. SW-846, Method 8270C, will determine the presence of target semivolatile organic compounds (SVOCs), including naphthalene (Stoddard solvent), and tentatively identified compounds including decane, heptadecane, eicosane, triacontane, and pristine. Lastly, SW-846, Method 8015, will determine the presence of gasoline range organics (GROs), diesel range organics (DROs), ethanol, and kerosene. LANL will specify each TPH range for each sample analysis type. Recent interviews with Mr. Gerald Huber, the former Zia Company supervisor responsible for all fuel and lubricant storage and delivery to the Zia Company, confirmed that jet fuel and motor oil were never stored at DP Tank Farm. It is important to note that the middle range of petroleum distillates includes a variety of diesel fuels, heating oils, kerosene, and turbine fuels. The specifications for these products often overlap allowing one product to be sold under several different names. For example, a product that meets the specifications for jet fuel may also meet the specifications for kerosene. Therefore, it may be impossible to distinguish between these middle range petroleum distillate products once they are released to the environment (Attachment 19). The work plan incorrectly stated that review of previous chromatographs from samples collected from the site could show the difference between these compounds. Additionally, these interviews confirmed that the only solvent stored at or distributed from the DP Tank Farm was Stoddard solvent.

PCBs

Recent interviews with Mr. Francis and Mr. Huber confirmed that electrical equipment and transformer oil (dielectric fluid) were managed at utility yards by Zia Company utility crews and that no electrical equipment or transformer oil was ever brought on site at the DP Tank Farm (Attachment 3). In addition to being used as coolants in the dielectric fluid of transformers, PCBs were used in the ballasts of old fluorescent lighting fixtures; hydraulic fluids, which are a light-ended lubricant; plasticizers; adhesives; surface coatings (e.g., paints); carbonless paper; dyes; and waxes. PCBs were not typically found in heavy-ended petroleum products or gasoline. As previously discussed, waste characterization results for the drums of residual diesel fuel and gasoline showed no detectable concentrations of PCBs. Lastly, analytical results presented in "Evaluation of Sediment and Alluvial Groundwater in DP Canyon"

(Environmental Restoration Project 1999, 63915) for sediment samples collected both upgradient and downgradient of the sheen in DP Canyon showed PCBs (specifically Aroclor-1260) at concentrations ranging between 0.038 ppm and 1.0 ppm in the six samples collected from Subreaches DP-1 West and DP-1 Central (two samples from one location each. These levels are consistent with those observed further downstream in Subreach DP-1 East and do not indicate a release of PCBs. Therefore, PCBs should not be considered a COPC for the DP Tank Farm.

Radionuclides

Recent interviews with Mr. Francis and Mr. Huber (Attachment 3) and review of historical information documenting the construction, operation, and decommissioning of the DP Tank Farm confirm that no radioactively contaminated materials were ever brought to the site. Results of the Phoswich radiation survey, conducted in 1985 before the decommissioning of the site, documented that no radioactivity above background was detected (Attachment 16) throughout the DP Tank Farm. Radiation screening results for samples collected from each drum of residual diesel fuel and gasoline showed no elevated radiation levels (Attachment 11). Additionally, in 1988, the inside of each of the tanks removed from the tank farm was monitored for radiation before shipment off site for salvage, and no radiation was found (Attachment 13).

The review of the 1994 DP Tank Farm radiochemical results on page 2-33 of the work plan concluded that "radionuclides are not expected to be contaminants at this site, and the gamma spectroscopy and tritium data strongly support this contention." The mesa top data set from the 1994 investigation consists of 28 gamma spectroscopy analyses and 12 tritium analyses. Detected tritium levels are consistent with Laboratory background levels. Conclusions regarding the gamma spectroscopy data require some clarification.

The radionuclide data presented in the appendixes of the DP Tank Farm work plan were re-evaluated. The results presented in the work plan were not qualified based on the total propagated uncertainty. According to ER Project guidelines, radionuclide results should be qualified as not detected (U) if the results are less than or equal to three times the 1-sigma total propagated uncertainty. This test was applied to the radionuclide data and the detected radionuclides at DP Tank Farm; results are presented in Table 3.

Soil samples at DP Tank Farm were analyzed for gamma-emitting radionuclides by gamma spectroscopy and tritium by liquid scintillation. No alpha spectroscopy analyses for uranium isotopes were performed. Tritium was detected in five samples (0.03-0.11 pCi/g). All tritium results were below LANL soil background value of 0.76 pCi/g. Cesium-137 was detected in one sample (0.606 pCi/g) below LANL soil background value of 1.65 pCi/g and below LANL sediment value of 0.9 pCi/g. Cesium-134 was detected in three samples (0.13-0.25 pCi/g), and cobalt-60 was detected in one sample (0.5 pCi/g). There are no Laboratory background values available for these analytes. Uranium-235, as measured by gamma spectroscopy, was detected in five samples (0.32-0.57 pCi/g). Measurements of uranium-235 by gamma spectroscopy are not as sensitive or reliable as measurement by alpha spectroscopy. The uranium-235 gamma spectrum is subject to interference from radium-226, a naturally occurring radionuclide. These five results exceed LANL sediment/soil background value of 0.2 pCi/g. In gamma spectroscopy, uranium-235 is measured by the energy peak at 185 KeV. Uranium-235 emits at an energy of 185 KeV 54% of the time during its decay. Radium-226 emits at an energy of 186.2 KeV 3.7% of the time during its decay. A typical gamma spectroscopy energy window is 3 to 5 KeV, so it is not possible to distinguish between the uranium-235 energy and the radium-226 energy.

Table 3
Detected Radionuclide Data from DP Tank Farm

Request	Location	Sample ID	Sample Location	Analyte	Begin Depth (in.)	End Depth (in.)	Analytical Suite	Result (pCi/g)	TPU[a] (pCi/g)	TA-21 Background Value (pCi/g) (soil/sed.)	Laboratory Background Value (pCi/g) (soil/sed.)
19090	21-2558	AAB9721	East Fill Station	Cesium-134	0	30	Gamma spectroscopy	0.18	0.055	N.A.[b]	N.A.
19090	21-2558	AAB9723	East Fill Station	Cesium-134	60	90	Gamma spectroscopy	0.13	0.04	N.A.	N.A.
19090	21-2559	AAB9726	East Fill Station	Cesium-134	30	60	Gamma spectroscopy	0.25	0.065	N.A.	N.A.
19929	21-2615	AAB9820 Field duplicate	DP Canyon East	Cesium-137	0	6	Gamma spectroscopy	0.606	0.13	N.A.	1.65/0.9
19090	21-2559	AAB9728	East Fill Station	Cobalt-60	90	120	Gamma spectroscopy	0.5	0.085	N.A.	N.A.
19090	21-2559	AAB9726	East Fill Station	Tritium	30	60	Liquid scintillation	0.11	0.01	9.92	0.76/0.093
19090	21-2559	AAB9728	East Fill Station	Tritium	90	120	Liquid scintillation	0.09	0.01	9.92	0.76/0.093
19090	21-2558	AAB9886	East Fill Station	Tritium	1110	1128	Liquid scintillation	0.03	0.006	9.92	0.76/0.093
19929	21-2560	AAB9732	Southwest of West Fill Station	Tritium	90	120	Liquid scintillation	0.06	0.02	9.92	0.76/0.093
19929	21-2560	AAB9742 Field Duplicate	Southwest of West Fill Station	Tritium	90	120	Liquid scintillation	0.05	0.02	9.92	0.76/0.093
19090	21-2558	AAB9724	East Fill Station	Uranium-235	90	120	Gamma spectroscopy	0.47	0.105	0.05/.443[c]	0.203/0.203
19090	21-2559	AAB9725	East Fill Station	Uranium-235	0	30	Gamma spectroscopy	0.57	0.16	0.05/.443[c]	0.203/0.203
19090	21-2559	AAB9728	East Fill Station	Uranium-235	90	120	Gamma spectroscopy	0.34	0.1	0.05/.443[c]	0.203/0.203
19091	21-2556	AAB9714	Northwest corner of West Fill Station	Uranium-235	30	60	Gamma spectroscopy	0.54	0.145	0.05/.443[c]	0.203/0.203
19091	21-2556	AAB9716	Northwest corner of West Fill Station	Uranium-235	90	120	Gamma spectroscopy	0.32	0.1	0.05/.443[c]	0.203/0.203

[a] TPU = total propagated uncertainty.
[b] N.A. = not available.
[c] The upper tolerance limit was not calculated. The numbers reported are the minimum and maximum.

To determine if the uranium-235 reported in the DP Tank Farm samples is uranium-235 or radium-226 two factors can be evaluated:

- What radionuclides are possibly expected based on the historic use of the area? (There is no reason to expect radionuclide contamination at DP Tank Farm based on its use as a petroleum product storage area).
- What are the gamma spectroscopy results for radium-226 and other gamma-emitting radionuclides in the decay series below radium-226? (Although qualified as not detected, because the results were less than three times the 1-sigma uncertainty, the radium-226 results for the five samples with detected uranium-235 ranged between 1.47 and 1.71 pCi/g. Lead-214 is a decay product below radium-226. The lead-214 results (again based on the 1-sigma uncertainty, these were qualified as not detected) ranged between 0.56 and 1.79 pCi/g. These results indicate that the low levels of uranium-235 reported for the five DP Tank Farm samples are a byproduct of the interference from radium-226.) The radium-226 results are also below the soil/sediment Laboratory background level of 2.59 pCi/g, further indicating no radionuclide contamination at DP Tank Farm. The five uranium-235 results shown in Table 3 should be regarded as not detected (U) because of the spectral interference with radium-226.

As agreed to during the December 1, 1999, meeting with NMED HRMB staff, LANL will analyze the samples collected at depth from the borehole proposed at the West Fill Station for americium-241, cobalt-60, cesium-134, cesium-137, uranium-235 and tritium.

Soil samples collected for laboratory analysis during the implementation of the DP Tank Farm work plan, will undergo analysis for volatile BTEX; SVOCs; metals (specifically lead); and TPH segmented into diesel, gasoline, ethanol, and kerosene ranges in accordance with the analytical methods listed in Table 4 below. All laboratory analyses will be performed at an ER Project-approved fixed-site laboratory.

Table 4
Analytical Requirements

Analyte Suite	Preparation Method Options	Determinative Method Options
Metals Target Analyte List*	3050B 3051(3051A)	6010B
		6020(6020)A 7000 Series
BTEX	5035 3500 series (solvent extraction)	8260B 8021B
SVOCs	3540C/3550B	8270C
TPH	8015 (options)	DRO, GRO, kerosene, ethanol, Stoddard solvent

* TAL = target analyte list.

Sampling Design Issues: G6, S39–S45

NMED G6

6. *The proposed auger and borehole sampling of the surface and near surface soils at DP Tank Farm, and in DP Canyon, and the hydrocarbon sheen area may not define soil contamination at depth associated with the former tank farm activities conducted at this PRS. Numerous shallow auger samples are proposed which correspond with former drain lines, fill ports, valve boxes, former berm, and inlet and locations below the outfall of each drainpipe.*

   The auger samples proposed are shallow and may not be deep enough to define the vertical extent of soil contamination at this PRS, specifically in the vicinity of the former East and West Fill Stations. At the former West Fill Station, results of the 1995 UST investigation indicate that the vertical extent of soil contamination had not been defined. At the former East Fill Station, results of the 1996 voluntary corrective action (VCA) indicate soil samples containing total petroleum hydrocarbon (TPH) were found approximately 15 to 32 feet below the ground surface. TPH concentrations at the former East Fill Station ranged from 1,300 parts per million (ppm) at an approximate depth of 15 feet below the ground surface (Sample 0121-96-0027 collected from the bottom of the southern portion of the excavation) to 6,100 ppm TPH (Sample 0121-96-0042 collected from the bottom of the northern portion of the excavation) at an approximate depth of 32 feet below the ground surface.

   HRMB provides the following comments to the proposed auger and boring installation plan in an attempt to define vertical extent of contamination:

   A. *Sampling frequency located along the former berm should be reduced because the berm has been removed and used as backfill material. Because the berm was not believed to be constructed to contain a catastrophic release, and therefore, significant soil contamination is not expected to be related to this structure, therefore soil sampling along the berm could be reduced to a minimum of four auger holes (as opposed to the nine which are proposed); and*

   B. *Nine shallow auger fill port samples are proposed along the fence adjacent to DP Road. The proposed fill port samples are located extremely close together. For example, sample locations 5 and 8 appear to be located within five feet of one another, and locations 17 and 11 are also within five to seven feet of one another. Because these locations are in close proximity to one another, HRMB believes they could be combined without detracting from the objectives of the work plan.*

      In addition, sample location 3 (which is located approximately 12 feet west of sample location 17) and sample location "?" (which is located 15 feet east of sample location 8) could also be combined. HRMB recommends reducing the number of samples along the former fill ports from nine to five.

LANL Response to G6

To ensure that the vertical extent of soil contamination is defined, LANL will advance the boreholes proposed for sampling of the near-surface and subsurface soils at DP Tank Farm along accessible sides of DP Canyon and in the hydrocarbon sheen area until field measurements indicate that contamination is no longer present. Field measurements will be based on methodologies proposed above in our response regarding the use of the PID and other field methodologies.

Mesa Top Samples

Berm. LANL agrees with HRMB's recommendation to reduce the sample numbers and frequency of sample collection along the former location of the berm to the four auger hole locations shown in

Figure 3 (revised Figure 2.2-15). Historic information and interviews with site-operating and decommissioning personnel confirmed that there was no documentation or evidence of a release or contamination of the berm. There is no evidence of the berm because soil from the berm was used as fill material for regrading the site following the tank farm decommissioning in 1988.

Fill Ports. LANL agrees with HRMB's recommendation to combine shallow auger fill port sample locations 5 and 8 and locations 17 and 11, as shown in Figure 3. Additionally, LANL is proposing to eliminate the two sample locations originally identified with question marks along the southern boundary of the tank farm, unless contamination is detected in the other auger holes, because contamination is not expected to be present on the south side of the tank farm.

Mesa Top, North of Fence. LANL is proposing to advance a minimum of five boreholes north of the former berm location along the southern edge of DP Canyon. Exact sample locations will be selected during the site reconnaissance and with NMED HRMB's input, if requested. It should be noted that the area directly north of the East Fill Station is inaccessible because of extremely steep canyon walls. Also, as shown on Figure **3**, the area including and around the former East Fill station was excavated during the 1996 VCA, and results from samples collected from the borehole north of the excavation (sample ID 21-3003) show no detectable BTEX, benzene, or TPH.

West Fill Station. LANL is also proposing to advance one borehole north of but in close proximity to the former location of the West Fill Station to confirm that extent of contamination had been determined in this area of the tank farm. As agreed to during the December 1, 1999, meeting with NMED HRMB staff, one sample from depth in this borehole will be analyzed for the analytical suite described in Table 5 (revised Table 2.2-2), which includes the specific radiological isotopes identified in the RFI report (LANL 1996, 52270). Historical information regarding the DP Tank Farm indicates that radionuclides are not considered COPCs for the DP Tank Farm.

Tanks and Valve Boxes. As agreed to at the October 20, 1999, meeting with NMED HRMB staff, LANL is proposing not to collect samples from the former locations of tanks 1, 2, 3, 4, 5, 7, 8, 11, 12, 14, and 17 and because, when the tanks were removed, they were in good condition with no evidence of having leaked. This is documented in Dave McInroy's field notes (Attachment 10) and in photographs taken during decommissioning of each tank. These photographs were provided in Appendix F-2.0 of the DP Tank Farm work plan. Releases from piping joints and fill stations were the most likely source of contamination previously detected and/or removed from the site. A reduction in the number of boreholes at the former location of tanks 6 and 10 was also discussed at the October 20, 1999, meeting. LANL proposes advancing only one borehole at the former location of these tanks, where TPH was not included in previous analytical suites. These two former tank locations were investigated during previous RFIs. According to Dave McInroy's field notes (Attachment 10), both tanks appeared to be in good condition when they were decommissioned in 1988. Approximately 4 yd^3 of soil were removed from the vicinity of tank 10; however, the source of the petroleum was stated as a failed fuel line gasket. Additionally, because of its size, diesel contents, and location with respect to the sheen, LANL is proposing to advance one borehole at the former location of tank 9. LANL also proposes to advance one borehole at the former valve box location just south of the West Fill Station because this area was not previously characterized. The area surrounding the former valve box south of the East Fill Station was excavated during the 1996 VCA. One borehole will be advanced at each of these locations (former locations of tanks 6, 10, and the valve box for the West Fill Station) to an initial depth of 15 ft, and intervals of core will be screened in accordance with the field methodologies described below. The boreholes will be advanced until field screening indicates that contamination is no longer present. If it is determined that contamination from a release remains, the extent of contamination will be determined.

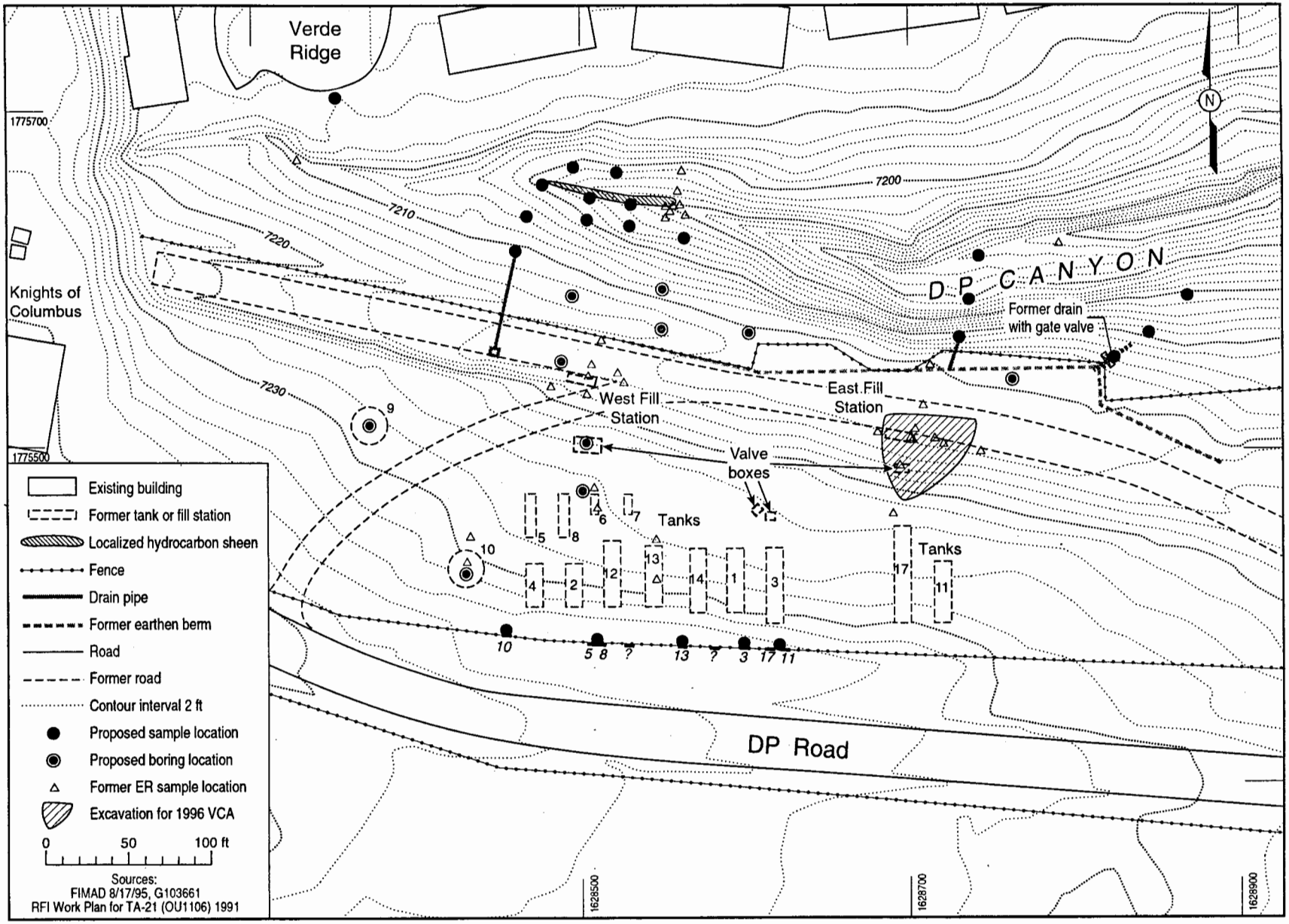

Figure 3. Locations of proposed auger holes and boreholes, DP Tank Farm, PRS 21-029

F2.2-15 / DP Tank Farm SAP / 100398

Table 5
Summary of Samples and Fixed Laboratory Analyses

Method/Media	Numbers		Analyses					
	Sample Locations	Samples[a]	BTEX and TMB[b]	SVOCs	TPH[c]	Inorganics	Radionuclides	PCBs
Berm	4	8	✓	✓	✓	✓	—[d]	—
Fill ports	5	10	✓	✓	✓	✓	—	—
Mesa top north of fence	5	10	✓	✓	✓	✓	—	—
Storm drains	3–9	6–18	✓	✓	✓	✓	—	—
Valve boxes	1	2	✓	✓	✓	✓	—	—
DP Canyon stream	9	18	✓	✓	✓	✓	—	—
Tanks	3	6	✓	✓	✓	✓	✓	—
Sediments[e]	6	6–12	✓	✓	✓	✓	✓	✓
Upgradient sample, south of paved parking area	1	1	✓	✓	✓	✓	—	—
West Fill Station	1	2	✓	✓	✓	✓	✓[f]	—

[a] Based on use of immunoassay test kits, 20% of the samples will be sent to fixed laboratory analysis.

[b] TMB = trimethylbenzene (1,3,5- and 1,3,4- isomers).

[c] Sample submitted for TPH laboratory analysis will be designated for the specific ranges of stoddard solvent, diesel range organics, and kerosene.

[d] A dash in the table means no analysis will be performed.

[e] Sediment samples will be analyzed for the same analytical suite as those collected for the DP Canyon reach report (Environmental Restoration Project 1999, 63915)

[f] Radionuclide analysis only on one sample collected at depth from the West Fill Station.

Every 5-ft interval of core will be screened in the field visually and with olfactory senses by the investigating field team, with a PID (or equivalent organic vapor instrument), and with an immunoassay test kit. Because real-time qualitative results will be obtained in the field with the immunoassay test kits, 20% of the samples will be sent to a fixed laboratory for analysis. LANL is proposing that a minimum of one sample from each borehole and one confirmatory sample from the bottom of each borehole will be sent to an off-site fixed laboratory to verify immunoassay field screening results and confirm that no contamination is present at the bottom of the borehole. The fixed laboratory will also fingerprint any TPH contamination detected to help confirm the source of the hydrocarbon sheen. If fractures are observed, a sample will be collected and field screened. Samples with positive screening results will be submitted for laboratory analysis and fingerprinting. If fractures are observed during any of the sampling activities, a sample will be collected and field screened. Samples with positive screening results will be submitted for laboratory analysis and fingerprinting.

Canyon Side Samples

Storm Drains. Pursuant to discussions with NMED HRMB on October 20, 1999, LANL proposes collecting one to three sediment sample(s) from obvious sediment catchments below each of the three storm drainpipes. These samples will be field screened and sent off site for analysis. LANL is not proposing to

collect samples from the inlets to the three storm drains because they have all been removed, covered, and/or cannot be located with any certainty. Additionally, there were no reported releases or evidence of releases to any of these storm drains.

It is important to note that only the easternmost storm drainpipe (previously sampled by Dave McInroy) was associated with the tank farm. The other two pipes appear to channel stormwater runoff away from perimeter roadways. According to Mr. Francis and as shown on engineering drawing C 49054, sheet 2 of 5 (Attachment 4), the 24-in. corrugated metal drainpipe previously located north of the West Fill Station was constructed to channel stormwater from the perimeter road on the north side of the tank farm to DP Canyon. The 18-in. drainline located north of the East Fill Station was designed to channel stormwater away from the north side of DP Road and appears to have been installed before the existence of the DP Tank Farm. It is believed to have been the drainpipe encountered and removed during the VCA. Field notes from the VCA indicate only that the culvert was removed from a depth of approximately 30 ft and was disposed of off site along with the petroleum-contaminated soils.

DP Canyon Stream. LANL is proposing to advance auger holes in approximately four locations at the fill/tuff interface above the stream bed directly south of the hydrocarbon sheen area and a minimum of two auger holes in the fill directly north of the sheen area. Exact sample locations will be determined during field reconnaissance. Auger holes will be advanced to the depth of the stream channel or until field measurements indicate that contamination is no longer present. A minimum of three locations will be sampled in the stream bed between the original sheen area and about 45 ft west where hydrocarbon contamination has been most prevalent during recent months. The sample locations will be along the south side of the stream channel in the fill. If contamination is not encountered, one confirmation sample will be collected for the bottom of the auger hole. If contamination is encountered, a sample will be collected from the contaminated area and the bottom of the auger hole.

LANL is also proposing to collect one sample from sediment directly below the paved parking area (Verde Ridge) that abuts the north edge of DP Canyon. This sample will be field screened and sent off site for analysis to determine what effect, if any, runoff from this area may be having on DP Canyon sediments.

As agreed to during the December 1, 1999, meeting with NMED HRMB staff, Activity 5, page 2-72 of the DP Tank Farm work plan, which proposed the collection of organic vapor measurements and samples around the hydrocarbon sheen area, will not be implemented. This is because of the lack of VOCs associated with the weathered diesel contamination observed in DP Canyon.

Every 5-ft interval of core will be screened in the field visually and with olfactory senses by the investigating field team, with a PID (or equivalent organic vapor instrument), and with an immunoassay test kit. Because real-time qualitative results will be obtained in the field with the immunoassay test kits, 20% of the samples will be sent to a fixed laboratory for analysis. LANL is proposing that a minimum of one sample from each borehole and one confirmatory sample from the bottom of each borehole will be sent to an off-site fixed laboratory to verify immunoassay field screening results and confirm that no contamination is present at the bottom of the borehole. The fixed laboratory will also fingerprint any TPH contamination detected to help confirm the source of the hydrocarbon sheen. If fractures are observed, a sample will be collected and field screened. Samples with positive screening results will be submitted for laboratory analysis and fingerprinting. If fractures are observed during any of the sampling activities, a sample will be collected and field screened. Samples with positive screening results will be submitted for laboratory analysis and fingerprinting.

DP Canyon Sediment Samples

The DP Canyon reach report (Environmental Restoration Project 1999, 63915) divided DP canyon into four reaches DP-1 through DP-4. The portion of DP Canyon applicable to the DP Tank Farm investigation is referred to as Reach DP-1 consisting of Subreaches DP-1 West, DP-1 Central, and DP-1 East. Subreach DP-1 West begins at a culvert just north of the Knights of Columbus Hall on DP Road and ends at the approximate location of the hydrocarbon sheen (Figure 4). Sample location 21-10934 (Figure 4) is the easternmost sample location in Subreach DP-1 West and is located just upstream of the hydrocarbon sheen area. Subreach DP-1 Central is contiguous with Subreach DP-1 West and continues down canyon for 100 m. Subreach DP-1 East is located in a portion of DP Canyon just east of the section of commercial businesses along DP Road. Subreaches DP-1 West and DP-1 Central are the most applicable to the DP Tank Farm investigation; Subreach DP-1 East is not applicable. Eleven sediment samples were collected from Subreaches DP-1 West and DP-1 Central during November 1998 (Figure 4). All eleven samples were analyzed for SVOCs and TPH, and all but one of the samples were analyzed for TAL metals including lead. Six of the samples were analyzed for PCBs (two samples from one location), and three of the samples were analyzed for radionuclides. Results showed total lead at levels ranging between 16.2 and 205 ppm, PCBs (specifically Aroclor-1260) at concentrations ranging between 0.038 ppm and 1.0 ppm, naphthalene at levels ranging between 0.34 and 4.1 ppm, and organics (diesel range) at levels ranging between 59 and 680 ppm. Reported levels of PCBs and naphthalene are consistent with those observed further downstream in Subreach DP-1 East and Reaches DP-2 and DP-3. Reported levels of radionuclides in Reach DP-1 are generally less than or equal to levels reported downgradient to the east in Reaches DP-2, DP-3, and DP-4. Reported levels of total lead are higher by a factor of two in Subreaches DP-1 West and DP-1 Central sample locations than observed further to the east, and reported levels of DROs are higher by a factor of three in some locations in Subreaches DP-1 West and DP-1 Central than observed further to the east and downgradient of the hydrocarbon sheen.

LANL is therefore proposing to collect a minimum of six additional sediment samples from locations in Subreaches DP-1 West and DP-1 Central to fill in data gaps remaining from the DP Canyon Reach report (Environmental Restoration Project 1999, 63915). Estimated sample locations are shown on Figure 4. Exact sample locations will be determined in the field with input from ER Project Canyons Focus Area staff involved in the preparation of the DP Canyon Reach report and, if requested, from NMED HRMB staff. These sediment samples will be analyzed for the same suite of analyses applied to samples collected from the former DP Tank Farm described above in Table 5. Additionally, to fill the data gaps in the DP Canyon Reach report, LANL proposes analyzing these sediment samples for PCBs by EPA Method 8082. LANL maintains that PCBs are not a COPC for the DP Tank Farm. LANL also proposes analyzing the sediment samples for only those isotopes retained as COPCs in the DP Canyon Reach report, which include americium-241, cesium-137, plutonium-238, plutonium-239/-240, uranium-234, strontium-90, and tritium, and maintains that radionuclides are not considered COPCs for the DP Tank Farm.

NMED S39

39. § 2.2.2.3 Media Characterization, page 2-70

"The following information should be recorded from each observation event:...."

Please include the volume of water in the channel at the time of inspection, and a description of how relative intensity will be determined.

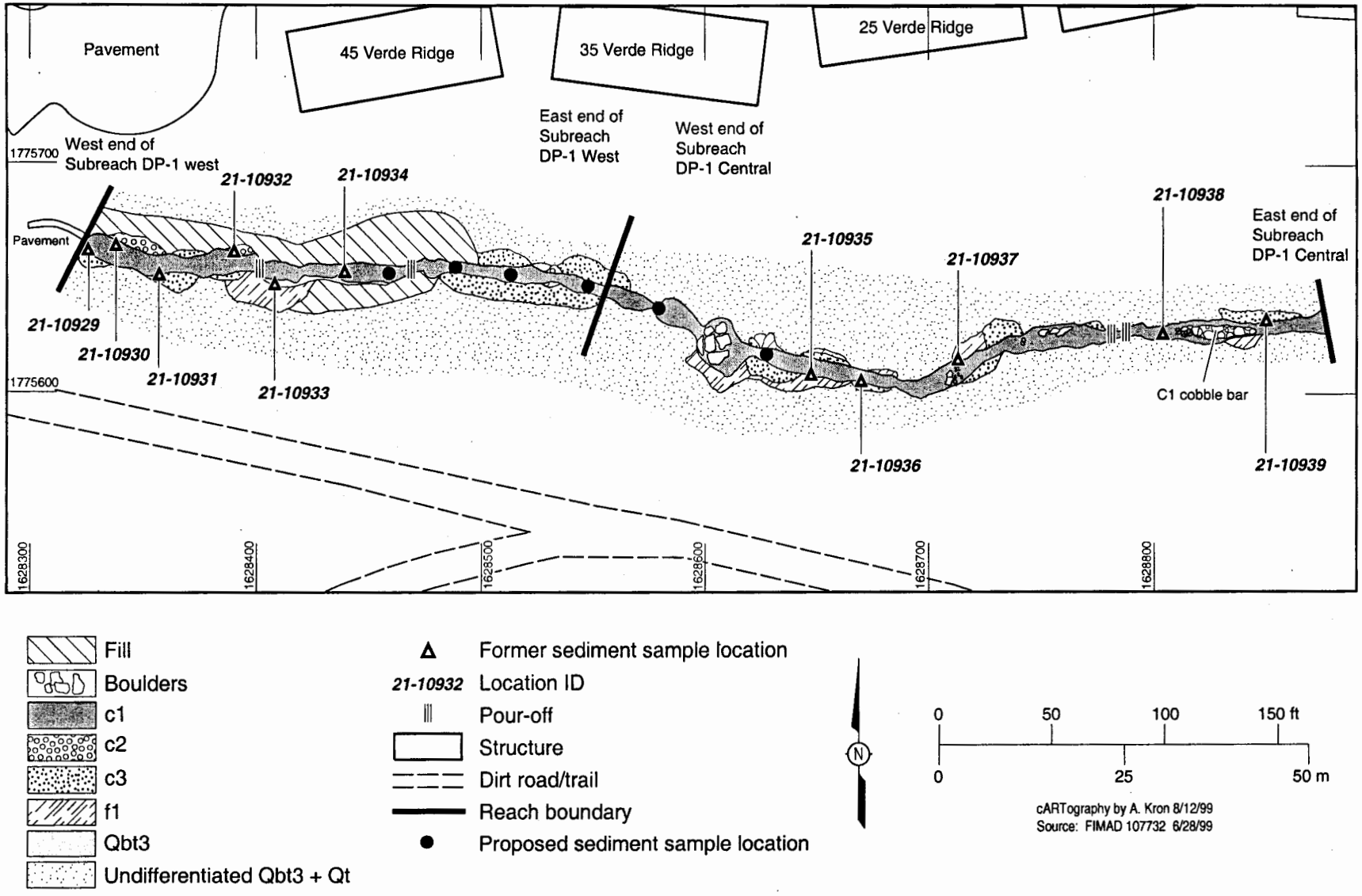

Figure 4. Subreach DP-1 West and Central geomorphology and sediment sample locations (information on geologic material can be found in the DP Canyon reach report [Environmental Restoration Project 1999, 63915])

LANL Response to S39

Data gathered from each monthly inspection will be used to develop a descriptive model of site variability and are intended to be qualitative rather than quantitative in nature. LANL will describe the volume of water in the channel at the time of each inspection (i.e., presence of standing or running water because water in DP Canyon tends to flow only after a storm event) and include a description of the relative intensity of any odor or sheen (e.g., faint odor, strong odor, barely visible sheen) observed during site visits to DP Canyon.

NMED S40

40. § 2.2.2.3 Media Characterization, page 2-70

> "Precipitation information for correlation with recorded observations will be obtained from the Laboratory meteorological records."
>
> *Please clarify if each storm event and the amount of precipitation received during each storm event will be included in the meteorological information. In addition, clarify if the duration and intensity of the storm event will be provided.*

LANL Response

Data gathered during the monthly inspections will be used to develop a descriptive model of site variability and are intended to be qualitative rather than quantitative in nature. LANL will report total precipitation received each month.

NMED S41

41. § 2.2.2.3 Media Characterization, page 2-71

> "The sediment sampling should be performed when the canyon is dry, as is generally the case in April through June, both to facilitate sample collection and because observations to date suggest that petroleum hydrocarbons are most evident in the channel during dry periods."
>
> *Please provide a detailed standard operation procedure (SOP) for sampling the canyon bottom if it is not dry as anticipated to be during the period of April through June.*

LANL Response to S41

LANL ER Standard Operating Procedure (SOP) 06.14, Rev. 0, "Sediment Material Collection," provides detailed instructions for sampling the canyon bottom whether it is dry or filled with water. The SOP is attached (Attachment 20) along with a copy of the letter sent to NMED HRMB on May 18, 1999, (EM/ER:99-129) describing how to access the ER Project SOPs online (http://erproject.lanl.gov).

NMED S42

42. § 2.2.2.3 Media Characterization, page 2-72

> "After a period of time, the headspace in the container will be analyzed with a PID for organic vapors. Samples with positive readings will be submitted for off-site analysis of BTEX, SVOCs, and diesel and motor oil range petroleum hydrocarbons."

Please define the term "positive readings." Indicate the concentration that will be used to determine if a sample will be sent to a fixed laboratory for analyses. Also, please include field screening for radionuclides and concentrations at which samples will be sent to a fixed laboratory for analyses.

LANL Response to S42

As discussed above in our response to comments regarding use of the PID, all samples will be screened visually and with olfactory senses by the investigating field team, with a PID (or equivalent organic vapor instrument), and with an immunoassay test kit. Because real-time qualitative results will be obtained in the field with the immunoassay test kits, 20% of the samples will be sent to a fixed laboratory for analysis. To clarify, a *positive reading* is defined as 10 ppm.

Field screening for radionuclides (gross alpha/beta/gamma) will be conducted for transportation purposes only because radionuclides are not considered COPCs at the DP Tank Farm. If field screening results suggest the presence of radionuclides, the sample in question will be submitted for radiochemistry analysis.

NMED S43

43. § 2.2.2.3 Media Characterization, page 2-76

"Auger holes will be advanced to depths of approximately 5 ft below the soil/tuff interface, or to 5 ft if tuff is absent, at these locations."

Please provide a detailed plan to define vertical extent of subsurface soil contamination if there is indication during the field activities (visual, olfactory, or other evidence) that subsurface contamination exists in an auger hole at a greater depth than 5 ft below the soil/tuff interface or 5 ft below the ground surface if tuff is absent. Also, borehole depth should be at a minimum, equal to the depth of the canyon bottom, or hydrocarbon sheen area.

LANL Response to S43

As discussed above in our response to comments regarding use of the PID, all samples will be screened visually and with olfactory senses by the investigating field team, with a PID (or equivalent organic vapor instrument), and with an immunoassay test kit. To ensure that the vertical extent of soil contamination is defined, LANL will advance the boreholes until field screening results indicate that contamination is no longer present. Field measurements will be based on methodologies proposed in our response regarding the use of the PID and other field methodologies above. Boreholes and/or auger holes advanced along the southern edge and side of DP Canyon will be advanced to a depth equal to the depth of the canyon bottom/hydrocarbon sheen area or until field screening indicates no contamination is present.

NMED S44

44. § 2.2.2.3 Media Characterization, page 2-77

Activity 7 paragraphs two, three and six on page 2-77 discuss headspace sampling and laboratory analysis of tuff, soil and backfill samples collected during the field investigation, and proposed sampling depth. HRMB has the following comments:

Soil or backfill samples should be collected from sufficient depth to determine vertical extent (it may be necessary to go deeper than proposed in the RFI Work Plan). For example, the proposed boreholes at the former locations of tanks TA-21-ATF-6 and -10 may need to be advanced deeper than proposed to define vertical extent if observations in the field indicate soil contamination at a depth greater than 15 feet below the ground surface. Boreholes should be advanced at least as deep as the canyon bottom or hydrocarbon sheen area.

LANL Response to S44

As previously stated, Laboratory samples will be screened visually and with olfactory senses by the investigating field team, with a PID (or equivalent organic vapor instrument), and with an immunoassay test kit. To ensure that the vertical extent of soil contamination is defined, LANL will advance the boreholes until field measurements indicate that contamination is no longer present. Field measurements will be based on methodologies proposed in our response regarding the use of the PID and other field methodologies above.

NMED S45

45. § 3.1 Activity-Specific Data Quality Objectives, Activity 5: Measure Organic Vapor Concentrations on the Walls of DP Canyon, page 3-6

"Contingencies: Because the actual PID values are not significant in this sampling event, no contingencies for elevated values are proposed."

Although it is assumed that elevated PID readings will not be encountered, the possibility does exist. Please provide a detailed contingency plan to address measures to be taken in the event elevated PID readings are encountered during this phase of investigation. In addition, please provide a limit (or value) to determine what readings are considered to be "elevated."

LANL Response to S45

During the December 1, 1999, meeting with NMED HRMB staff, it was agreed that Activity 5, page 2-72 of the DP Tank Farm work plan, which proposed the collection of organic vapor measurements and samples around the hydrocarbon sheen area, would not be implemented. This is because of the lack of VOCs associated with the weathered diesel contamination observed in DP Canyon.

Request for Additional Detail: S2, S6, S7, S11, S12, S14–S16, S18, S20–S22, S27–S32, S34–S38

NMED S2

2. § 1.1 Objectives and Scope, page 1-6

"Finally, recently available background data for geologic media at the Laboratory were used in this review as the basis for background comparisons, the results of which suggest some potential for low levels of lead contamination at the site."

Please provide the appropriate citation for the background data used in the review of this data.

LANL Response to S2

The background data are presented in two ER Project documents. The first document is entitled "Application of LANL Background Data to ER project Decision-Making Part I: Inorganics," (Ryti et al. 1996, 53953). The second document is entitled "Technical Position Paper on Use of TA-21 Process Area Baseline Data for RFI Reports," (Ryti 1997, 58239).

NMED S6

6. § 1.0 Introduction, page 1-5

"Because of the remediation activities at the location of the former East Fill Station, which had changed the conditions at the site, a monitoring program was established that required two years of quarterly monitoring involving visual inspections of the sheen area. The inspections over the course of the last two years has shown that the sheen area is highly variable depending on seasonal fluctuations in the weather patterns."

Please provide to HRMB the quarterly monitoring data collected during the visual inspection of the sheen area.

LANL Response to S6

The inspections made over the course of the last years were only performed in a sporadic fashion, primarily as part of ER Project and NMED HRMB staff tours and during the development of the DP Canyon Reach report and the DP Tank Farm work plan. These site visits and corresponding observations were not consistently documented. As discussed on page 2-60 of the work plan, even though the inspections have not been routine, it was noted that the visibility and extent of the localized hydrocarbon sheen area in DP Canyon varied depending on site conditions. Additional information is provided on page 2-60 regarding observations of the sheen area during site visits made in June and August 1998.

The ER Project conducted visual inspections of the sheen area twice each month during July and August 1999 (rainy season) and monthly since then (Attachment 21). These inspections suggest that the extent and intensity of the hydrocarbon sheen is variable. Hydrocarbon odors, soil staining, and sheens were not as prevalent during warm summer months when more runoff passed through DP Canyon. Soil staining, odors, and a slight sheen have been more pronounced in recent months at a location approximately 15 yd upstream from the original hydrocarbon sheen area. Recent months have been extremely dry with almost no precipitation. LANL will continue to conduct monthly inspections of the hydrocarbon sheen area

during dry months and twice each month during rainy summer months and provide NMED HRMB with quarterly reports for the period of a year to allow for discussion and field interpretation.

NMED S7

7. § 2.1.2 Operational History, Potential Release Site 21-029, DP Tank Farm Site, page 2-9

"At the time of decommissioning in 1988 the berm soils were considered to be clean and were used as backfill probably in the area of the East and West Fill Stations and the access road."

Please submit to HRMB information (i.e., analytical or other data) used to make the determination that the berm soils were not contaminated and suitable to be used as backfill material in the vicinity of the East and West Fill Stations and the former access road.

LANL Response to S7

As presented above in LANL's response to Historical Knowledge comments, there was no documented or reported release from any of the tanks. According to Dave McInroy's field notes (Attachment 10), on June 21, 1988, he determined that, based on historical knowledge and visual inspection, the soil composing the berm was clean and instructed that it be used as backfill for regrading the site.

NMED S11

11. § 2.2.1 Existing Data, page 2-18

"Section 2.2.1.2, Sampling discusses data collected at DP Tank Farm Site and surrounding areas."

The use of the term "surrounding areas" implies off-site investigation and sampling. Please clarify the "surrounding areas" to be investigated. (If the term applies to DP Canyon and the hydrocarbon sheen area, these are not considered by HRMB to be "surrounding areas", but part of 21-029.)

LANL Response to S11

Surrounding areas refers to other PRSs that may be investigated if the DP Tank Farm is determined not to be the source of the hydrocarbon sheen in DP Canyon.

NMED S12

12. § 2.2.1.1 Nonsampling, Fractures at TA-21, page 2-18

"An extensive field survey of fractures in the Bandelier Tuff at TA-21 was conducted in 1992. Wohletz (1995, 54404) measured strike, dip, and aperture for a total of 1662 fractures in Unit 2 of the Tshirege Member of the Bandelier Tuff (Qbt2) exposed on cliff below TA-21 in Los Alamos Canyon."

Please provide a detailed map that illustrates the relationship and distance between the field survey study area and this investigation. The locations of faults in the area and the fracture study conducted at DP Tank Farm (Wohletz 1995, 58845) should be provided graphically.

LANL Response to S12

The 1992 study of fractures for TA-21 was south and east of DP Tank Farm. Figure 1 from the report for fracture studies at TA-21 (Attachment 1) was modified to illustrate the relationship between the TA-21

study and DP Tank Farm (Figure 5). A map for the 1995 fracture study of DP Tank Farm is presented in Attachment 1.

NMED S14

14. § 2.2.1.1 Nonsampling, Other Site Information, page 2-20

"A second drain about 18 inches in diameter was observed about 200 ft downstream from the 24-in. drain. This drain also is oriented approximately north-south, but no records were found to identify it. Photographs of the 1996 VCA show several sections of partially removed drainpipe from the location of the former East Fill Station area. This is thought to be the same drain pipe."

Please clarify the use of the 18-inch pipe. In addition, please provide information (analytical results) regarding soil sampling activities conducted beneath the outlet, adjacent, and in the projected drainage way of the 18-inch pipe.

LANL Response to S14

Dave McInroy's field notes (Attachment 10) from the 1988 decommissioning of the tank farm describe a 14-in. drainpipe that drained the eastern portion of the tank farm. The drainpipe was equipped with a gate valve and appeared to have discharged stormwater to DP Canyon. Mr. McInroy noted that there was no evidence of a release of petroleum to the drain (e.g., no staining). This drainpipe was the easternmost drainpipe shown on Figure 3. The 24-in. drainpipe described in the work plan is clearly shown on the 1948 engineering drawings C-49054, (Attachment 4) as being located in close proximity to the aboveground tanks at the western end of the tank farm. There are no engineering drawings documenting the presence of an 18-in. drainpipe approximately 200 ft west of the 24-in. drainpipe within the vicinity of the tank farm. However, Mr. Francis and Mr. McInroy believe the drainpipe previously channeled stormwater runoff from DP Road, under the tank farm, and into DP Canyon through the corrugated metal pipe still in place on the south side of DP Canyon. It is believed to have been the drainpipe encountered and removed during the VCA. Field notes from the VCA indicate only that the culvert was removed from a depth of approximately 30 ft and was disposed of off site along with the petroleum-contaminated soils. The interior of the pipe has been traced back approximately seven feet to the south where it stops. As described in the work plan, attempts will be made to find records documenting the presence and placement of the drainpipe and trace it to its origin. Sediment samples will be collected from sediment catch basins below where the pipe discharged to DP Canyon.

NMED S15

15. § 2.2.1.1 Nonsampling, Surrounding Sites, Mari Mac Shopping Center, page 2-21

"Potential contamination associated with the Mari Mac Shopping Center has not been documented, and no PRSs have been identified at this site (LANL 1992, 7667). However, the shopping center and surrounding commercial and light industrial areas drain into the head of DP Canyon are potential sources of low levels of contamination in DP Canyon of some metals (e.g. lead, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and other organic compounds that could be associated with town site runoff."

The above statement is speculative; please provide documentation to support it or remove the statement. In addition, it is stated that no contamination or PRS is associated with the Mari Mac Shopping Center. If there is no suspected contamination, how please indicate how the Shopping Center could be a possible source for contamination at DP Tank Farm and in DP Canyon, more specifically of lead, PAHs, PCBs and other organics.

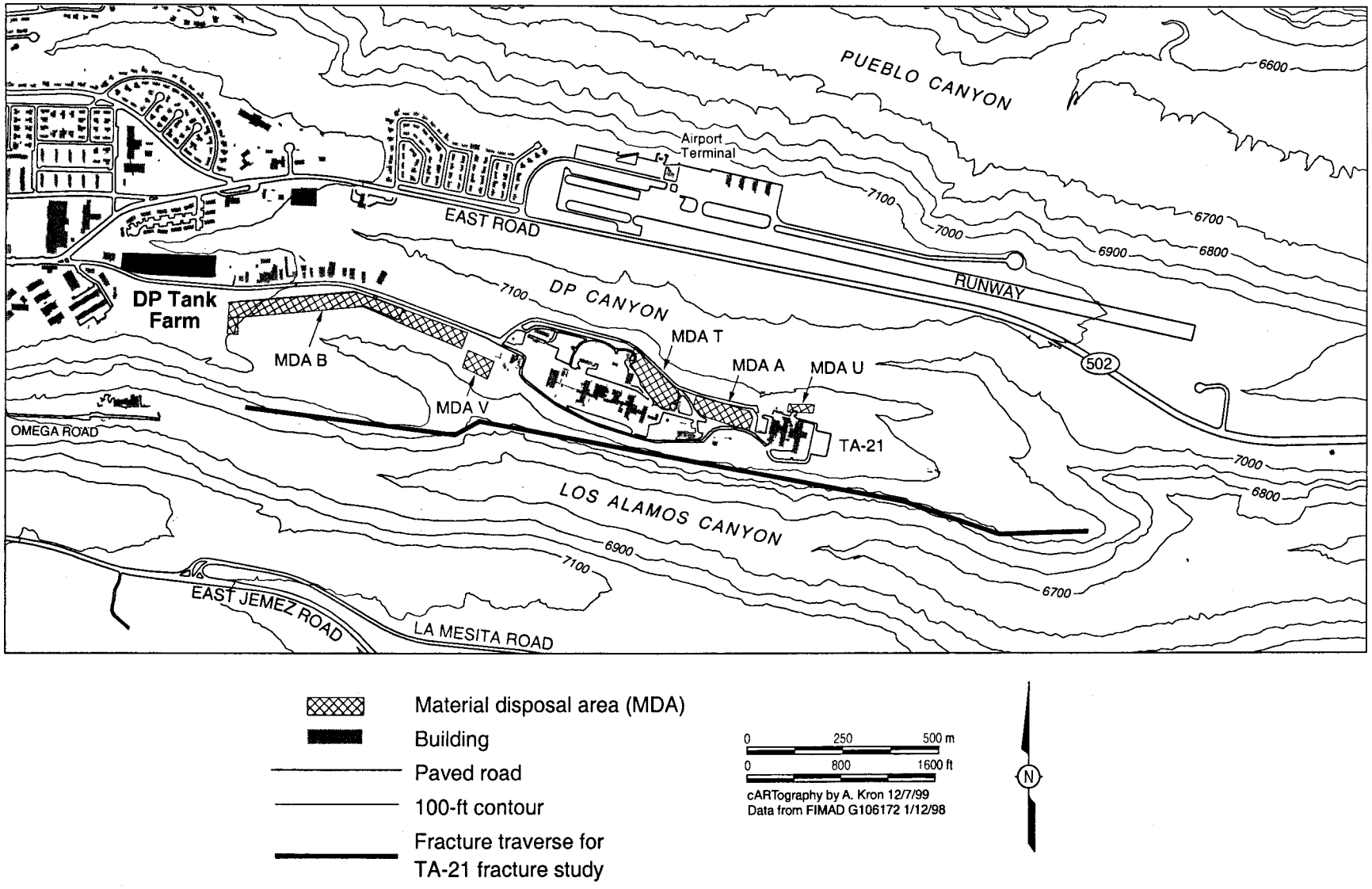

Figure 5. Location of fracture traverse in relation to DP Tank Farm

LANL Response to S15

The Mari Mac Shopping Center is not considered a potential source of contamination at the DP Tank Farm or the source of the hydrocarbon sheen observed in DP Canyon. However, as concluded in the DP Canyon reach report (Environmental Restoration Project 1999, 63915), runoff from the Los Alamos townsite, which includes parking lots and roadways around the Mari Mac Shopping Center, is the most likely source of the residual organics and to a lesser extent, inorganics in sediments that are dispersed throughout the entire length of DP Canyon.

NMED S16

16. § 2.2.1.1 Nonsampling, Surrounding Sites, PRS 00-027, page 2-22

"This site was first used as a fuel tank farm beginning in 1946 and was converted to a drum storage area in mid-1948. Potential contamination at PRS 00-027 is attributable to petroleum products leaking from storage tanks, drums, and drainlines. The potential contaminants associated with PRS 00-027 are primarily fuel products, including BTEX, as well as volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), TPH, target analyte list (TAL) metals, and pesticides/PCBs."

PRS 00-027 could be a possible source of contamination for DP Tank Farm and/or the hydrocarbon sheen area. Possible subsurface contaminants, primarily fuel products, associated with 00-027, could have migrated via fracture flow onto DP Tank Farm and/or the hydrocarbon sheen area. In order to determine if 00-027 is a possible source of contamination at DP Tank Farm and/or the hydrocarbon sheen area, an understanding of fracture flow and contaminant transport via fractures in the vicinity of 00-027, 21-029, and the hydrocarbon sheen area is necessary (i.e., characterization of PRS 00-027 should be conducted).

LANL Response to S16

PRS 00-027, the former DP Drum Storage Area, is not considered a likely source of the hydrocarbon contamination present at the DP Tank Farm or in DP Canyon for several reasons.

- The five aboveground diesel fuel storage tanks originally installed at this location in 1946 were moved to the DP Tank Farm to the west in 1948 and reused. There were no reported releases from the tanks during the short period of time they were in use at PRS 00-027.
- According to Mr. Francis and Mr. Huber, PRS 00-027 was converted to a drum storage area in 1948. Petroleum-related products (primarily lubricants and solvents) were stored in 55-gal. drums before distribution to various Laboratory equipment maintenance and vehicle service shops. Fuels were not stored at this location.
- Surface and subsurface samples were analyzed for BTEX, VOCs, SVOCs, TAL metals, TPH, and pesticides/PCBs. Boreholes were advanced until there was no evidence of contamination, based on field screening, and a confirmatory sample was subsequently collected from the bottom of each borehole. Analytical results from the RFI of PRS 00-027 (not yet reported to NMED HRMB) indicate that the nature and extent of contamination has been defined in an area northwest of the Knights of Columbus building. TPH matching spectra for lubricating oils and not diesel fuel were detected to a maximum depth of 40 ft in that area. The 11 chemicals retained as COPCs include antimony, benzene, butylbenzene, sec-butylbenzene, isopropyl benzene, 4-isopropyltoluene, propylbenzene, TPH, 1,2,4-trimethybenzene, 1,3,5-trimethylbenzene, and n-toluene. PCB levels

were all well below 1 ppm. With the exception of the TPH, these chemicals were detected at low levels at maximum depths of 20 to 30 ft below ground surface.

- In general, the fracture spacing for PRS 00-027 is about 2 ft because it is located near the western edge of the GMFZ. As mentioned earlier, the average northwest-trending fractures are about 50% more abundant than the northeast-trending ones. The average trends are N44W and N40E for the northwest and northeast fractures, respectively. Fracture dips are dominantly vertically oriented, and the near apertures are 0.5 cm. The fracture characteristics for this PRS suggest that a release from this site, if transported along fractures, would be more towards the NNW and away from the hydrocarbon sheen area in DP Canyon.

NMED S18

18. § 2.2.1.2 Sampling, Predecommissioning Investigation Sampling and Analysis Activities (1984 and 1985), page 2-26

"Field notebook entries on May 17, 1988 and May 25, 1988 (McInroy 1988, 1641), indicate that vapor measurements were taken during the excavation activities. No details regarding these measurements were available at the time this work plan was prepared."

Please provide the vapor measurements collected during the excavation activities. If these measurements can not be located, please indicate that they were collected but can not be verified.

LANL Response to S18

Detailed vapor measurements were not logged during the 1988 decommissioning of the DP Tank Farm. Dave McInroy's field notes (Attachment 10) indicate that a contract safety officer was on site during the entire decommissioning operation to monitor for organic vapors with an explosive gas meter to ensure worker health and safety. According to Dave McInroy, as each tank was uncovered, the area was monitored, as was the inside of each tank. The only problems noted in the field notes were elevated vapors inside several of the tanks (especially the gasoline tanks) that required workers cleaning the tanks to wear respirators. Dave McInroy stated that no elevated levels of organic vapors were observed in soils around the tanks.

NMED S20

20. 2.2.1.2 Summary, page 2-43

"The presence of petroleum hydrocarbons in the subsurface at the locations of the former East and West Fill Stations was confirmed during the 1995 UST investigation. In addition, the vertical and horizontal extent of contamination at these locations appeared to be reasonably defined."

Please clarify if the vertical and lateral extent of contamination at this PRS has been defined; the above statement is ambiguous as it is and indicates that contamination has been "reasonably defined."

LANL Response to S20

This statement was taken from the 1996 RFI report for PRS 21-029 (LANL 1996, 52270) and was presented as part of the historic information in the work plan. The investigation was implemented in accordance with UST regulations and relative to UST contaminant thresholds, and it appeared that the

nature and extent of contamination had been defined to 100 ppm TPH, 50 ppm BTEX, and 10 ppm benzene. The VCA report (LANL 1996, 55347) also stated that the extent of contamination had been defined during the 1994 and 1995 RFIs. Implementation of the DP Tank Farm work plan and proposed activities in this response to the RSI will verify that nature and extent of contamination at the site has been determined. A detailed discussion of the estimated volume of contamination that may be in the subsurface between the East and West Fill Stations and the hydrocarbon sheen area are presented in the response to general comment 1A/B and specific comment 24.

NMED S21

21. § 2.2.1.2 Hydrocarbon Sheen and DP Canyon Sampling and Analysis (1994-present), page 2-47

"The results of the 1994 RFI indicated the only contaminant source at DP Tank Farm was petroleum related products."

This statement implies full suite analysis was conducted during the 1994 RFI at DP Tank Farm. Please verify which analytical suite methods were employed.

LANL Response to S21

The analytical suite for samples collected during the 1994 RFI included VOCs, SVOCs, TAL metals, TPH, and ethanol. Surface samples were also submitted for gamma spectroscopy. All of the 1994 RFI samples were also screened in the field for VOCs and subsequently analyzed for gross alpha, beta, and gamma before transport to an off-site fixed analytical laboratory. This analytical suite was based on historical knowledge of the site, which indicated that COPCs consisted of petroleum-product-related constituents.

NMED S22

22. § 2.2.1.2 Hydrocarbon Sheen and DP Canyon Sampling and Analysis (1994-present), page 2-47

"Because the qualitative analysis indicated a potential relationship between the localized hydrocarbon sheen area and the former West Fill Station, the DP Canyon channel was investigated in 1995 to determine if the petroleum-related products in the sheen area are associated with the petroleum-related products contamination at the location of the former West Fill Station."

Although a relationship may exist between the West Fill Station and the hydrocarbon sheen area, the West Fill Station may not be the only source of petroleum-related product contamination. Other sources of subsurface contamination, which exist at DP Tank Farm, may contribute to the contamination at the hydrocarbon sheen area. Other potential sources of contamination have not been investigated or linked to the hydrocarbon sheen area. Subsurface soil samples from the hydrocarbon sheen area were collected in April 1995 and compared to subsurface soil samples from the vicinity of the former West Fill Station. Soil samples from the former West Fill Station had been drummed for approximately one year prior to analysis, and most likely had degraded and volatilized during that period. The approach used to determine a source for the hydrocarbon sheen area implies that the West Fill Station is the only source of subsurface contamination at DP Tank Farm. Investigation of other potential sources should be included in the SAP to be submitted in response to these comments.

LANL Response to S22

LANL agrees that the West Fill Station may not be the only contaminant source of the hydrocarbon sheen in DP Canyon, and the purpose of the DP Tank Farm work plan is to determine the source or sources of the contamination. The soils from the West Fill Station referred to in specific comment 22 were soil cuttings awaiting waste characterization results. The samples collected from these drums were used for fingerprinting purposes only. The comparison of chromatographic peak patterns between the samples indicated that contaminants were diesel range petroleum hydrocarbons, while the contamination at the sheen area was weathered diesel fuel. This section of the work plan was only intended to present the history of previous investigations.

NMED S27

27. § 2.2.1.2 Other Sampling and Analysis Data Evaluation, Previous Investigations at PRS 00-031(a), page 2-54

"A GPR geophysical survey and magnetic survey were performed at the site March 20, 1993, to locate any UST or underground pipelines. The results of the survey showed that no USTs were present at the site. However, a "rubble pit" was located in the parking area northeast of the hotel lobby area (LANL 1993, 15022; LANL 1993, 15023)."

Please indicate if the "rubble pit" identified at 00-031(a) (Hilltop House Gasoline Station) has been investigated or is planned to be investigated and when. If 00-031(a) is to be considered as a source of potential contamination, documentation of actual contamination at the site and a graphical illustration of the subsurface plume associated with the contamination at the site must be obtained.

LANL Response to S27

PRS 00-031(a) is not considered a source of potential contamination at the DP Tank Farm or in DP Canyon. According to Mr. Francis, the Zia Company leased the government service station previously located at 4th Street and Trinity Drive to Bennie A. Moore. Mr. Moore continued to operate the property as a Mobile gasoline station and vehicle service station called Moore's Motors. On November 1, 1968, the US Government sold this property to Mr. and Mrs. Philip Giber. The property was subsequently transferred to the Aries Company, which was owned by Mr. Giber. Mr. Moore leased the site back from the Aries Company and continued to operate Moore's Motors. On May 1, 1974, the Aries Company sold the property to Waterchris, Inc. (Robert Waterman). Mr. Waterman continued to operate the property as a gasoline filling station. In 1988 and 1989, Mr. Waterman moved the filling station from its original location on the east side of what is now the Hilltop House Hotel to the north side of the building bordering Central Avenue. When this move was made, three new fiberglass USTs were installed at the northwest corner of the building and two underground gasoline storage tanks were removed. These two tanks were located in the parking area north of the original government-installed pump islands and south of Central Avenue. This area is immediately north of what is now the main entrance and lobby of the Hilltop House Hotel and is the approximate location of the original government tanks (Attachment 22).

Before Los Alamos County initiated a landscaping project east of the Hilltop House Hotel in 1993, ER Project contractors surveyed the parking lot north of the main entrance and lobby of the Hilltop House Hotel and the area between the eastern boundary of the hotel and the west curb of 4th Street to determine if any USTs remained on the property. Ground penetrating radar and a magnetometer were used to survey the areas with results being negative for the presence of any USTs. Survey results did indicate the presence of a *rubble pit*, which is basically an excavated area filled with rubble. Voids in the rubble cause

strong radar reflections, which begin immediately below the asphalt surface (see Figures 2 and 3, Attachment 22). Such features are typical of areas where USTs have been excavated and the excavation backfilled. No additional investigation is planned for this site.

NMED S28

28. § 2.2.1.2 Other Sampling and Analysis Data Evaluation, Previous Investigations at PRS 00-030(a), page 2-55

"The method selected consisted of crushing the septic tank in place when the sample analyses and assessment confirmed that no human health risk was presented associated with COPCs at the site."

Please provide the method by which COPCs were identified at this PRS. If historical records of inventory stored at this PRS where used to make the determination of potential contaminants, please provide this information to HRMB. Indicate how the "no human health risk" determination was calculated.

LANL Response to S28

PRS 00-030(a) is not considered a source of contamination at DP Tank Farm or the sheen in DP Canyon. The septic system was originally installed to serve the fuel dispatch office, which operated at PRS 00-027 from 1946 to 1948. The office remained in place when the site was converted to a drum storage area, which operated until the late 1950s. The drum storage area was decommissioned at that time, and the septic system was left in place. During the VCA implemented in 1996, the tank and associated piping were found intact and at the location indicated on engineering drawings. Two soil samples were collected outside the tank, one underneath the inlet pipe and one underneath the outlet pipe. A single sample was collected from within the septic tank, although there was only a small amount of material remaining inside the tank. The samples were analyzed for VOCs, SVOCs, TPH, TAL metals, TCLP metals (for waste characterization), pesticides/PCBs, and radionuclides. Results showed similar COPCs as those found during the RFI of PRS 00-027 (response to specific comment 16) at low levels and primarily in the dried septic tank sludge. Human health assessments showed an acceptable level of risk if the small volume of dried sludge were to remain in place. When septic tanks are to be closed in place, the New Mexico Uniform Plumbing Code allows the tanks to be either filled with an inert material or crushed. The New Mexico State Drinking Water Bureau (responsible for enforcing the Uniform Plumbing Code) concurred that the tank could be crushed and abandoned in place. This alternative was also selected in part because of the vast amount of concrete debris previously used as fill material at this site and around the tank. Two boreholes were advanced in the vicinity of the septic tank during the RFI of PRS 00-027. Results showed low levels of VOCs (well below screening action levels) in one of the boreholes. No further action will be requested for PRS 00-030(a), and the VCA report will be included in a future request for permit modification. Results will be reported as part of a future report or plan for PRS 00-027.

NMED S29

29. § 2.2.1.2 Other Sampling and Analysis Data Evaluation, Environmental Surveillance Program Data Relevant to DP Canyon, page 2-56

"Samples for organic analysis relevant to this work plan have been taken at DPS-1, DPS-4, LAO-2, LAO-3, LAO-3A, LAO-4 and LAO-4.5C."

Please clarify the distance the samples were collected from DP Tank Farm and how the samples are relevant to the DP Tank Farm investigation. Based on the information provided in Figure 2.2-14, page 2-57, the sample locations identified (DPS-1, DPS-4, LAO-2, LAO-3, LAO-3A, LAO-4 and LAO-4.5C) appear to located over 2,000 feet from DP Tank Farm and some are not located in DP Canyon. Also indicate how the samples were collected, bailer, bladder pump, impeller pump. (Include flow rates, field parameters used to determine stabilization, etc.)

LANL Response to S29

These data were initially considered to be relevant because they don't indicate organic contamination in sediments or alluvial groundwater at the listed locations. The references for the sampling were provided in Appendix E-2.0. The sample locations and approximate distances from the petroleum sheen in DP Canyon were presented on Figure 2.2-14 of the work plan. NMED HRMB is correct that the sample locations identified (DPS-1, DPS-4, LAO-2, LAO-3, LAO-3A, LAO-4 and LAO-4.5C) are located over 2000 ft from DP Tank Farm, and several of the sample locations are not located in DP Canyon. These data were not used in sample design or approach presented in the work plan.

NMED S30

30. § 2.2.1.2 Other Sampling and Analysis Data Evaluation, Canyons Investigations, page 2-59

"The main finding from the canyons investigations and the ESH-18 environmental surveillance data that are pertinent to the DP Tank Farm investigation are that petroleum hydrocarbons are not found downstream from the localized hydrocarbon sheen area at DP Tank Farm..... This indicated that the petroleum-related products that are in the sheen area, if they are migrating down-channel at all, are not migrating in measurable quantities."

Please indicate the distance surface water samples were collected downstream from DP Tank Farm and the hydrocarbon sheen area. Petroleum-related products may be migrating downstream, but dilution may be occurring downstream of the hydrocarbon sheen area.

LANL Response to S30

Figure 2.2-14 in the DP Tank Farm work plan shows the location of surface water samples collected during the Canyons study of DP Canyon. Surface Water Station 1 (SW Station 1) is located at the head of DP Canyon and SW Station 2 is located immediately east of the DP Tank Farm, approximately 800 ft downstream of the hydrocarbon sheen. Alluvial groundwater wells LAUZ-1 and LAUZ-2 that were sampled as part of the DP Canyon study are located approximately one mile downstream of the hydrocarbon sheen. The DP Spring is located another 3000 ft downstream of the alluvial groundwater wells. The results of surface and alluvial groundwater sampling are presented in detail in the DP Canyon Reach Report (Environmental Restoration Project 1999, 63915). Petroleum-product-related contaminants were detected downstream of the hydrocarbon sheen in DP Canyon; however, except for one sample, all the sediment samples collected in 1988 and analyzed for TPH DRO had chromatograms that were indicative of motor oil that is attributed to runoff from the townsite. As discussed above in our response to sample design category comments, LANL is proposing to collect a minimum of six additional sediment samples from locations in Subreaches DP-1 West and DP-1 Central to fill data gaps remaining from the DP Canyon reach report. Analytical results from these samples will help clarify whether or not petroleum-product-related contaminants are migrating downstream.

NMED S31

31. § 2.2.2.1 Nature and Extent of Contamination, page 2-60

"The stream in DP Canyon is ephemeral, flowing significantly only after heavy rains and periods of spring snowmelt."

Please verify if this stream is an ephemeral stream. NMED personnel have visited the canyon on several occasions and water has been observed flowing in the canyon bottom, even when there has been no precipitation, indicating that the stream in the bottom of DP Canyon may, in fact, be perennial, flowing throughout the year.

LANL Response to S31

As presented in the DP Canyon Reach Report (Environmental Restoration Project 1999, 63915), stream flow in DP Canyon is largely controlled by ephemeral runoff from rainstorms and snowmelt. Runoff from the Los Alamos townsite activities, such as lawn watering, also contributes minor input into the canyon. Some surface runoff flows overland directly into the canyon along the entire length of DP Canyon, but most of this flow appears to enter the canyon by way of the storm drain system that discharges into the head of the canyon. There may be sections downstream that flow perennially from DP Spring; however, the portion of the streambed near DP Tank Farm consists primarily of urban drainage that flows only during storm events.

NMED S32

32. § 2.2.2.1 Nature and Extent of Contamination, page 2-61

"The chromatograms indicate that the hydrocarbons in these samples can be classified as motor or lubricating oil; concentrations cannot be quantified but they are known to be low."

This statement is vague and requires supporting documentation. Please provide the values and analytical data to support this statement.

LANL Response to S32

LANL agrees that this statement is vague and speculative in nature. Historical knowledge of the DP Tank Farm confirms that neither motor oil or jet fuel was ever stored at the site. The following is a discussion of TPH fingerprinting for samples collected for DP Tank Farm and in DP Canyon (Environmental Restoration Project 1999, 63915).

To distinguish between petroleum products released into the environment, it is first necessary to understand the chemical characteristics of various fuel products. Petroleum and the products made from it are highly complex, even though they are mainly composed of only two elements: hydrogen and carbon. Petroleum products can be analyzed using SW-846, EPA Method 8015, gas chromatographic (GC) separation, followed by detection on a flame ionization detector (FID). The FID is an ideal detector because it will detect any compound that will burn, and its response is relatively constant for a wide variety of petroleum products and a wide range of concentrations. It is, however, a temperamental instrument when used in the field.

The petroleum-refining process begins with the purchase of crude oil. All crude oils have low-boiling (gasoline), medium-boiling (diesel, jet fuel, and heating oil) and high-boiling (asphalt and Bunker C)

portions. The gasoline-like compounds elute from a GC in the first third of the GC trace, the middle distillates elute in the middle third, and the heavy residuals begin to elute in the latter third. Because many of the compounds that make up the heavy residues do not easily vaporize, they cannot be seen using a GC. For a variety of reasons, EPA Method 8015 has been separated into two methods: one for the analysis of gasoline-like products and a second for the analysis of higher boiling point products. The purge and trap, GC, and FID are used for the samples to be analyzed for gasoline-like products. Samples suspected of containing higher boiling petroleum hydrocarbons are usually extracted using EPA Methods 3510, 3540, or 3550, followed by direct injection into the GC.

Petroleum Product GC Characteristics

Gasoline can be characterized in environmental samples by looking for BTEX. These analytes are characteristic of gasoline of recent manufacture. A gasoline GC/FID pattern will have a peak at approximately two minutes associated with benzene. Next isooctane and toluene will elute from the GC. The next three peaks form an easy to recognize pattern. These three peaks are ethylbenzene and the three xylenes. These four analytes show up as three GC peaks because the meta and para xylene isomers do not separate on the GC. Isopropyl benzene, naphthalene, 1,2,3-trimethyl benzene, and n-decane follow the xylenes. There are also other higher boiling point compounds present in a gasoline chromatogram, but in general, the major peaks in a gasoline chromatogram occur within the first 15 minutes.

The middle petroleum distillates include a variety of diesel fuels, heating oils, kerosene, and turbine fuels. The specifications for these products often overlap, so one product may be sold under several different names. For example, a product that meets the specifications for jet fuel may also meet the specifications for kerosene. This means that it may be impossible to distinguish between these middle petroleum distillate products once they are released into the environment. The GC pattern for the middle petroleum distillates is generally a hydrocarbon hump with a number of alkane peaks on top of this hydrocarbon hump. The grouping of peaks will vary from one product to another. For example, kerosene does not show many peaks past about 16 minutes, while diesel #2 does. Diesel fuels show a dominance in the n-alkanes (these contribute to high cetane ratings), while a fuel oil may show more of a hump of peaks.

There are also many petroleum products that have higher boiling points than the medium distillate fuels. Some of these are made from the residuum that comes from the bottom of the distillation towers while others are highly refined materials. The highly refined products in the high distillate range, such as motor oil and hydraulic fluid, have GC traces that show a broad hydrocarbon hump without other hydrocarbon peaks on top of the hump starting at approximately 20 minutes.

Environmental Breakdown of Petroleum Products

When petroleum products are released into the environment they tend to weather by three processes: evaporation, water solubilization, and oxidation (chemical and biological). To an experienced analyst, the changes in pattern of peaks seen in a GC analysis can be used to provide an insight into what has occurred to the product following its release.

Evaporative weathering is the loss of hydrocarbons by evaporation. The more volatile, lower boiling point compounds will be lost fastest, and higher boiling point compounds will be lost more slowly. Evaporative weathering tends to shift the peaks seen in the GC trace to longer retention times. The loss of the low boiling point compounds makes the higher boiling point compounds more pronounced. As gasoline (C_4-C_{12}) weathers, it will begin to look like Stoddard solvent (C_7-C_{12}). It will never look like a diesel (C_{10}-C_{24}) because the gasoline never contained compounds beyond C_{12}.

Weathering by water solubilization most affects gasolines. These products generally contain hydrocarbons that have significant water solubility. BTEX is soluble in water. As the carbon number increases the solubility decreases. Benzene is more water soluble than toluene. Toluene is more water soluble than the C_2-benzenes, which are more water soluble than the C_3-benzenes. Extractable petroleum hydrocarbons were analyzed using solvent extraction followed by direct injection GC FID, EPA Method 8015, for samples collected at DP Tank Farm and in DP Canyon.

DP Canyon Reach Report Sediment Sample Results for TPH

All sediment samples reported in the DP Canyon reach report (Environmental Restoration Project 1999, 63915) were analyzed for TPH DROs. Of particular importance in relating the TPH contamination in DP Canyon with DP Tank Farm are the samples collected from Subreaches DP-1 West and DP-1 Central. The samples in these two DP Canyon subreaches are important because they can be used to characterize and differentiate between the hydrocarbon contamination from townsite runoff and DP Tank Farm. Table 6 presents the DP Canyon sample results for the samples collected in 1998.

Table 6
TPH DRO Results for 1998 DP Canyon Sediment Samples

Request	Location ID	Sample ID	TPH DRO Result	TPH Profile
DP Canyon Reach 1 West				
4960	21-10929	CA21-98-0051	310 mg/kg	Motor Oil C_{14}-C_{34}
4960	21-10930	CA21-98-0052	320 mg/kg	Motor Oil C_{14}-C_{34}
4960	21-10931	CA21-98-0053	370 mg/kg	Motor Oil C_{14}-C_{34}
4960	21-10932	CA21-98-0054	680 mg/kg	Motor Oil C_{14}-C_{34}
4960	21-10933	CA21-98-0055	240 mg/kg	Motor Oil C_{14}-C_{34}
4960	21-10934	CA21-98-0056	260 mg/kg	Motor Oil C_{14}-C_{34}
DP Canyon Reach 1 Central				
4960	21-10935	CA21-98-0057	87 mg/kg	Motor Oil C_{10}-C_{34}
4960	21-10936	CA21-98-0058 CA21-98-0059	530 mg/kg 490 mg/kg	Motor Oil C_{14}-C_{34} Motor Oil C_{12}-C_{34}
4960	21-10937	CA21-98-0060	59 mg/kg	Weathered Diesel C_{10}-C_{34}
4960	21-10938	CA21-98-0061	320 mg/kg	Motor Oil C_{14}-C_{34}
4960	21-10939	CA21-98-0062	270 mg/kg	Motor Oil C_{14}-C_{34}

The 1998 sediment sampling completed for the preparation of the DP Canyon reach report was the first time in which all sediment samples collected from DP Canyon were analyzed for TPH DRO. As seen in Table 6, the petroleum contamination in Subreaches DP-1 West and DP-1 Central is primarily motor oil. The two samples that represent the present-day channel material (CA21-98-0061 and CA21-98-0062) have chromatographic traces that clearly represent motor oil. Only one sample, CA21-98-0060, had a chromatograph that showed a weathered diesel profile (59 mg/kg). The motor oil TPH signature is seen at similar concentrations (240–680 mg/kg) in all the samples starting at the two 4-ft-diameter culverts at the Knights of Columbus parking lot, continuing through Subreach DP-1 West, through the hydrocarbon sheen area, and downstream into Subreach DP-1 Central.

The samples from DP Tank Farm during the 1994 RFI primarily contained gasoline and diesel. After further review of the data by several Laboratory chemists, the petroleum hydrocarbons identified in

samples from boreholes near the former locations of tanks 6 and 10 were incorrectly identified as motor oils. These samples were analyzed for SVOCs, and the resulting petroleum products detected in the chromatograms were indistinguishable from each other. Additionally, historic knowledge of the tank farm confirmed no motor oil was ever stored at the site. Tank 6 stored lighter-end products including kerosene, gasoline, and Stoddard solvent, while tank 10 stored diesel fuel #2. One of the data gaps listed in the DP Tank Farm work plan is to determine the extent of subsurface contamination in tuff in the area of former tanks at the DP Tank Farm site, particularly the former locations of Tanks TA21-ATF-6 and TA-21-ATF-10. These samples as well as the others collected during the implementation of this work plan will be fingerprinted to help determine the source of contamination in DP Canyon.

Motor oil would be expected as a typical contaminant in townsite runoff into DP Canyon. Because the detailed historic review of the DP Tank Farm confirmed that motor oil was never stored at the tank farm, the motor oil contamination in DP Canyon is currently assumed to be from townsite runoff.

DP Canyon Hydrocarbon Sheen Sample Results for TPH

The sample chromatograms from the 1995 UST investigation of the localized hydrocarbon sheen in DP Canyon clearly showed a weathered diesel fuel pattern. The motor oil chromatograms from the DP Canyon sediment investigation had a starting time of approximately 20 minutes and a large hydrocarbon hump without a prominent alkane peak pattern above the hydrocarbon hump. This pattern is indicative of highly refined petroleum products like motor oil and hydraulic fluid. The samples collected from the hydrocarbon sheen in the 1995 UST investigation, for the purpose of identifying the sheen contaminant, did not show a motor oil pattern. Rather, the hydrocarbon sheen chromatograms were representative of weathered diesel, with a hydrocarbon hump starting at 10 minutes and ending around 25 minutes. The chromatograms also had a clear alkane pattern on the hydrocarbon hump. Further, the lighter alkanes on the hydrocarbon hump (these lighter alkanes would be present in fresh diesel) were missing, indicating weathered diesel fuel. Table 7 presents the samples collected from DP Canyon in 1995 to characterize the hydrocarbon sheen.

Table 7
TPH DRO Results for 1995 DP Canyon Hydrocarbon Sheen Samples

Request	Location ID	Sample ID	TPH DRO Result	TPH Profile
DP Canyon Reach 1 West				
NA	Hydrocarbon Sheen	0121-95-0004	Not quantitated*	Weathered Diesel
NA	Hydrocarbon Sheen	0121-95-0006	Not quantitated	Weathered Diesel

* These samples were analyzed qualitatively using a modified EPA Method 8270. The purpose of these samples was to "fingerprint" the type of petroleum product.

To date, the hydrocarbon sheen has been clearly characterized as weathered diesel. Because the latest DP Canyon sediment investigations show primarily motor oil contamination in DP Canyon for the samples collected and analyzed for TPH DRO, it is suspected that the localized hydrocarbon sheen in DP Canyon is most likely attributed to an earlier release of diesel and will continue to degrade by weathering and microbial processes.

NMED S34

34. § 2.2.2.1 Nature and Extent of Contamination, page 2-62

"Evaluation of the chromatograms from samples taken from the DP Road Storage Area (PRS 00-027) also are classified as motor oils as well as diesel and, possibly, jet fuel (Loescher 1998, 58988)."

This statement implies DP Road Storage Area is a source of contamination in DP Canyon. Please provide documentation (analytical data, fracture flow mechanisms, or other transport data) to support this statement.

LANL Response to S34

PRS 00-027, the former DP Drum Storage Area, is not considered a likely source of the hydrocarbon contamination present at the DP Tank Farm or in DP Canyon. Preliminary RFI data indicate that the contaminant plume at PRS 00-027 has been defined and consists of lighter-end TPH (e.g., lubricating oils) and different VOCs, SVOC, and inorganics than those detected at DP Tank Farm and at the hydrocarbon sheen area in DP Canyon. The TPH spectra for the samples do not indicate the presence of diesel fuel at this PRS. Additional information for this PRS is provided in the response to specific comment 16. A future VCA of PRS 00-027 is planned as part of DOE's land transfer initiative. Documentation will be provided to NMED HRMB in the RFI and subsequent VCA Reports.

NMED S35

35. § 2.2.2.1 Nature and Extent of Contamination, page 2-62

"3. Inorganic chemicals have been identified at concentrations possibly above background values in soils/tuff at DP Tank Farm."

The above statement contradicts statements made on page 2-30 of the RFI which state inorganics (with the possible exception of lead) are not present above background at this PRS. Please amend the statements on page 2-30 to indicate that the possibility for inorganic contamination does exist at this PRS.

LANL Response to S35

As previously stated, the possibility for inorganic contamination, in the form of lead from leaded gasoline, does exits at PRS 21-029. Specifically, samples will be analyzed by EPA SW-846, Methods 3050B and 3051(3051A), to detect any possible lead contamination from the leaded gasoline previously stored on site, even though analytical results from past investigations at the DP Tank Farm do not indicate a release of leaded gasoline. No other metals have been identified as COPCs.

NMED S36

36. § 2.2.2.2 Fate and Transport, From the DP Canyon Watershed To The Canyon Bottom, page 2-65

"Another storm drain daylighted in DP Canyon near the location of the former East Fill Station. The location of the inlet to this drain is not known."

Please clarify if the inlet to this storm drain will be located during this phase of investigation. As stated earlier in this RFI, a geophysical survey will be conducted to locate any remaining piping, but the survey will not determine the possible inlet if the piping has been removed. Please include in the SAP a plan for determining the origin of the drain if piping has been removed, and for sampling the surrounding area.

LANL Response to S36

As stated in our response to specific comment 14, there are no engineering drawings documenting the presence of an 18-in. drainpipe approximately 200 ft west of the 24-in. drainpipe. However, Mr. Francis and Mr. McInroy believe the drainpipe previously channeled stormwater runoff from DP Road, under the tank farm, and into DP Canyon through the corrugated metal pipe still in place on the south side of DP Canyon. It is believed to have been the drainpipe encountered and portions of it removed during the VCA. Field notes from the VCA indicate only that the culvert was removed from a depth of approximately 30 ft and was disposed of off site along with the petroleum-contaminated soils. The interior of the pipe has been traced back approximately 7 ft to the south where it stops. As described in the work plan, attempts will be made to find the drainpipe and trace it to its origin as part of the geophysical survey. If the pipe has been removed from the site, it may be difficult to locate the origin of the storm drain (if it ever existed).

NMED S37

37. § 2.2.2.3 Data Gaps, page 2-68

"Inorganic chemical data at the tank farm and, in particular, in the drainages leading from the tank farm into DP Canyon may be useful in determining whether past tank farm activities could be a source for inorganic chemicals observed in DP Canyon sediments."

Please clarify if the drainages referenced above are included in Activity 5: Auger hole sampling. If the drainage pathways are not included, please include in the SAP to be submitted a detailed plan for sampling of the drainage pathways. Please provide a detailed map of all drainage pathways (natural and man-made) leading from the DP Tank Farm on the mesa-top to the canyon below. In addition, please identify the approximate locations where soil samples for full suite analysis will be collected and at what depths these samples will be collected. Please note, the Canyons Approach, using geomorphic mapping of the canyon to determine sampling locations is preferred as the method by HRMB.

LANL Response to S37

The sampling of drainages from DP Tank Farm is discussed under Sampling Activity 6, page 2-74 of the DP Tank Farm work plan. As previously discussed, sediment sampling is currently proposed for sediment catch basins where the three storm drains discharged to DP Canyon. If additional drain pipes or evidence of releases to the canyon are identified during the reconnaissance described in Sampling Activity 2, page 2-69 of the DP Tank Farm work plan, samples will also be collected from these areas. LANL is proposing a combination of the Canyons Approach, using geomorphic mapping to determine sampling locations, and inviting NMED HRMB as an observer during the site reconnaissance to help identify sample locations on the slope below DP Tank Farm. Specific details about these proposed sampling activities are presented in response to general comment 6.

NMED S38

38. § 2.2.3.1 Contaminant Source, page 2-68 and 2-69

"Because the original sources of contamination at PRS 21-029 DP Tank Farm, namely the fuel tanks, and all other sources potentially associated with the DP Canyon localized hydrocarbon sheen area have been removed, no contaminant source sampling and analysis is possible."

The above statement contradicts statements made previously in the RFI Work Plan, Vol. II (page 2-11). These statements indicate that the tanks and structures at the site are believed to have been removed in May 1988. However, the above statement implies that they are known to have been removed. The purpose of the proposed geophysical survey is to locate any remaining subsurface structures (fill ports, pipes, tanks or other subsurface structures). Please replace the statement "have been removed" with the statement "believed to have been removed", as stated previously in the RFI.

LANL Response to S38

As discussed in our response to the Historical Knowledge category of comments, LANL stated that all known tanks and related structures have been removed from the DP Tank Farm. The proposed geophysical survey will confirm that all subsurface structures have been removed. If any subsurface structures are identified during the survey, they will be identified, removed, and the location field screened and sampled to determine if any contamination is present. If contamination is detected, samples will be collected for off-site analysis.

Format Issues: S1, S3-S5, S8, S13, S23, S25, S26, S33

NMED S1

1. § 1.0 Introduction, page 1-1

"Structures at DP Tank Farm site consisted of fuel tanks, fill ports, valve boxes, the East and West Fill Stations, access roads, a large berm on the north side of the site extending from just east of the West Fill Station to the east end of the site, and pipes that drained into outfalls on the north-facing slope of DP Canyon. The site was decommissioned in 1988, resulting in removal of all major structures at the site (LANL 1991, 7529)..... Remnants of the drain pipe and one fill port remain at the site."

It is unclear if the piping to the outfalls were removed and the outfalls remediated during the 1988 site decommissioning. Please clarify if the piping to the outfalls were removed and the outfalls remediated, or if they still remain. Please submit a detailed SAP for the investigation and sampling of the outfalls and the associated drainage channel. No Further Action (NFA) cannot be granted until the outfalls and drainage channels are fully characterized.

LANL Response to S1

As previously discussed, only the easternmost storm drainage channel was sampled in 1988 as part of the decommissioning effort. Dave McInroy's field notes (Attachment 23) describe the collection of six soil samples from the drainage channel below the easternmost drainpipe. The samples were only analyzed for EP Tox lead, and results showed no elevated lead levels. Sampling of the discharge points from storm drain outfalls and drainage channels is described in Activity 6 of the DP Tank Farm work plan, beginning on page 2-74. Potential sample locations are presented in Figure 3. Sediment sampling is currently proposed from sediment catch basins where the three storm drains discharged to DP Canyon. If additional drain pipes or evidence of releases to the canyon are identified during the site reconnaissance taking place under Sampling Activity 2 of the DP Tank Farm work plan, page 2-69, samples will also be collected from these areas. LANL is proposing a combination of the Canyons Approach, using geomorphic mapping to determine sampling locations, and inviting NMED HRMB as an observer during the site reconnaissance to help identify sample location on the slope below DP Tank Farm. Specific details for the proposed sampling activities are presented in the response to general comment 6. These storm drains, located on the north side of the tank farm, are still in place except for the easternmost drain pipe, which was removed in 1988.

NMED S3

3. § 1.1 Objectives and Scope, page 1-7

"As outlined in Section 1.1, the principle objective of these activities is to determine the extent, possible origin, and migration mechanism related to the determination of the nature and extent of petroleum hydrocarbon and inorganic chemical contamination on the mesa top."

In order to determine the migration mechanism, migration pathways, including fracture-flow mechanisms, must be fully evaluated. Please outline the approach or plan to be implemented to address fracture-flow and other contaminant transport mechanisms at this PRS.

LANL Response to S3

As mentioned earlier in a detailed discussion of fractures for general comment 1A/B and specific comment 24, the field investigation activities will begin at the DP Canyon stream bed and focus towards the two most probable sources of petroleum hydrocarbon at the east and west fill stations to confirm whether or not DP Tank Farm is the source of hydrocarbons observed in DP Canyon.

NMED S4

4. § 1.1 Objectives and Scope, page 1-7

"Activity 2 includes an initial detailed reconnaissance of DP Canyon (before sampling activities) followed by monthly to biweekly inspections of the canyon."

Please include what actions and activities are to be conducted during the initial detailed site reconnaissance. Please clarify the frequency of the monthly to bimonthly inspection of the canyon bottom and list the criterion for establishing inspection frequency. A detailed schedule outlining the intended plan of action and determining factors must be submitted to HRMB for review and approval prior to the implementation of this phase of work.

LANL Response to S4

LANL started inspections of the hydrocarbon sheen area in July 1999 (Attachment 21). Activity 2 of the DP Tank Farm work plan, page 2-69, describes the details that will be recorded during each inspection. Monthly inspections will be conducted at the hydrocarbon sheen area during dry periods and every two weeks during the summer rainy season. HRMB's copies of ongoing inspections are attached for review and approval.

NMED S5

5. § 1.1 Objectives and Scope, page 1-8

"Activity 3 is collection and analysis of sediment samples from the channel within, upstream, and downstream of the localized hydrocarbon sheen area."

Please clarify the location of the sediment samples to be collected or how the locations will be selected. It is unclear if only surface sediment samples are to be collected. In order to properly characterize sediments in the canyon bottom, both surface and subsurface sediment samples if available are required. Please submit details or site the proper standard operating procedure (SOP) regarding the proposed sample collection depth and sample collection procedures for the canyon bottom sediment sampling activities.

LANL Response to S5

LANL is proposing to collect a minimum of six sediment samples from locations in Subreaches DP-1 West and DP-1 Central to fill in data gaps remaining from the DP Canyon reach report (Environmental Restoration Project 1999, 63915). Estimated sample locations are shown on Figure 4. Exact sediment sample locations will be determined in the field with input from ER Project Canyon Focus Area staff involved in the preparation of the DP Canyon reach report, and if requested, NMED HRMB staff as well. These sediment samples will be analyzed for the same suite of analyses applied to samples collected

from the former DP Tank Farm described above in the response to the analytical data category of comments. These sediment samples will be analyzed for PCBs by EPA Method 8082 and only those isotopes retained as COPCs in the DP Canyon reach report, which are americium-241, cesium-137, plutonium-238, plutonium-239/-240, uranium-234, strontium-90, and tritium. LANL maintains that PCBs and radionuclides are not COPCs for the DP Tank Farm.

The LANL ER SOP 06.14, Rev. 0, "Sediment Material Collection," provides detailed procedures for sampling the canyon bottom. The SOP is included in Attachment 20.

NMED S8

8. § 2.1.2 Operational History, Potential Release Site 21-029, DP Tank Farm Site, page 2-9

"The field logs of the decommissioning (McInroy 1988, 1641) mention there was not visual evidence that fuels had ever been released through the gate valve (or even that the gate valve had ever been opened)."

Please verify if soil samples were collected in the vicinity of the former gate valve to confirm the presence or absence of soil contamination immediately down gradient from the gate valve. If soil samples were not collected in these areas, please include in the detailed SAP outlining sampling to be conducted immediately down gradient of the gate valve.

LANL Response to S8

Sampling of the discharge points from storm drain outfalls and drainage channels is described in Activity 6 of the DP Tank Far work plan, page 2-74, and potential sample locations are presented in Figure 3. Only the easternmost storm drainage channel was sampled in 1988 as part of the decommissioning effort. Dave McInroy's field notes (Attachment 10) describe the collection of six soil samples from the drainage channel below the easternmost drainpipe (equipped with the gate valve) beginning immediately downgradient from the gate valve. The samples were analyzed for EP Tox lead only, and results showed no elevated lead levels. Sediment sampling is currently proposed from sediment catch basins where the three storm drains discharged to DP Canyon. It is important to note that the western two drains were not located within the tank farm and were used to channel stormwater away from roadways. LANL is proposing a combination of the Canyons Approach, using geomorphic mapping to determine sampling locations, and inviting NMED HRMB as an observer during the site reconnaissance to help identify sample location on the slope below DP Tank Farm.

NMED S13

13. § 2.2.1.1 Nonsampling, Other Site Information, page 2-19

"A preliminary ecological screening assessment for OU 1106 conducted in 1994 found that PRS 21-029, DP Tank Farm, is a mesa top site surrounded by disturbed areas. The area provides limited habitat for biota, does not contain sensitive habitats, and threatened or endangered species are not present there. Therefore, there is no immediate ecological risk at this site."

The 1994 "preliminary ecological screening assessment" conducted for OU 1106 is not provided, although an Ecological Scoping Checklist and Ecological Pathways Conceptual Exposure Model dated July 8, 1998 is provided. Please provide the 1994 assessment for review. (The "preliminary ecological screening assessment" is also referenced in § 2.2.1.2 Summary (page 2-43) as

unpublished). In addition, please reference the 1998 assessment if information contained in the assessment was used to demonstrate "no immediate ecological risk" at this PRS and in DP Canyon.

Based on information contained in the 1998 Ecological Scoping Checklist and Ecological Pathways Conceptual Exposure Model, DP Canyon, more specifically, the hydrocarbon sheen area, has not been fully evaluated. A full evaluation, including erosion potential evaluation for the residual hydrocarbon contamination in the bottom of DP Canyon must be conducted prior to assuming that "no immediate ecological risk" exists at this PRS, the hydrocarbon sheen area, and DP Canyon reach. In addition, please define what is meant by the term "no immediate ecological risk".

The 1998 assessment report also states that no threatened and endangered species are present in the vicinity of the tank farm or DP Canyon itself, but does not provide the documentation (specifically Bennett 1996, LA-UR-93-107) to support this statement. Please provide any site surveys used to determine that the site does not pose an ecological risk to DP Canyon.

LANL Response to S13

Because the DP Tank Farm work plan presents the sampling and analysis approach to complete the characterization of the DP Tank Farm and hydrocarbon sheen area in DP Canyon, it is too soon to make conclusions regarding the presence or absence of risk. LANL is therefore proposing to delete the second to the last paragraph on page 2-19 of the work plan. An ecological screening assessment will be completed during implementation of the work plan and results will be presented in a future RFI report.

NMED S23

23. § 2.2.1.2 VCA Confirmatory Sampling and Analysis Activities (1996), page 2-50

"Samples were submitted to a fixed laboratory for analysis of BTEX by Environmental Protection Agency (EPA) SW-846 Method 8020 and TPH in the form of diesel by modified EPA SW-846 Method 8015. Sample locations are shown in Figures 2.2-12 and 2.2-13. Some of the sample analytical results were estimated data. However, the analytical results were significantly below action levels. For these reasons, the data qualifications did not affect the usability of the data."

Please submit to HRMB the reason analytical results for some of the samples that were reported as estimated values and provide verification, including supporting documentation that the data collected is usable and of sound quality. The data tables should indicate relative bias of qualified data.

LANL Response to S23

Analytical data for the 1996 VCA are presented in Appendix D of the work plan. Section D-4.0 presents a summary of quality control issues for these data.

NMED S25

25. § 2.2.1.2 Evaluation of VCA Confirmatory Sampling and Analysis Data, page 2-53

"The residual contamination is largely in the subsurface, and there is no direct pathway to receptors other than upward movement of the more volatile hydrocarbons to the surface."

Please substantiate or remove this statement.

LANL Response to S25

This statement pertains only to the former location of the East Fill Station following the completion of the VCA in 1996. LANL is therefore proposing to delete the statement in question and will complete an ecological and human health screening assessment during implementation of the work plan with results to be presented in a future RFI report.

NMED S26

26. § 2.2.1.2 Evaluation of VCA Confirmatory Sampling and Analysis Data, page 2-53

> "As indicated in Section 2.1.1 (discussion of fractures), it is possible that fracture flow to the north could transport petroleum-related products to DP Canyon. However, the actual paths of the fractures is uncertain, and there are other potential sources for the localized hydrocarbon sheen area in DP Canyon. Because of the difficulty of pursuing contamination through fractured media, the objective of the next phase of investigation at DP Tank Farm is to better understand the sheen area, its extent, and the direction of its origin."
>
> *Sufficient evidence supporting an off-site source of contamination has not been presented. If LANL should obtain supporting documentation and analytical results indicating an off-site source of contamination HRMB will review and consider the new information. In addition, fracture flow must be investigated for this PRS and the area hydrocarbon sheen area in DP Canyon.*

LANL Response to S26

LANL agrees that sufficient evidence supporting an off-site source of contamination observed in the hydrocarbon sheen area has not been presented. The investigation of the origin of the hydrocarbon sheen in DP Canyon is described in Section 2.2.3 of the DP Tank Farm work plan. As agreed during the October 4, October 20, and December 1, 1999, meetings, fracture flow will not be investigated. The investigation proposed in the DP Tank Farm work plan and the fracture flow category of this response will focus towards determining the source(s) of the hydrocarbon contamination in DP Canyon.

NMED S33

33. § 2.2.2.1 Nature and Extent of Contamination, page 2-61

> "The 1995 UST investigation appeared to reasonably determine the extent of the contamination at the locations of both the former fill stations; however, the VCA performed in 1996 at the location of the former East Fill Station clearly demonstrated that fractures were an important factor that limited the potential for completely determining extent."
>
> *Please clarify what is meant by the term "reasonably determined". Based on the information provided, extent has not been defined. Please omit "reasonably determined" and indicate that extent has not been defined and fully characterized.*

LANL Response to S33

This statement was taken from the 1996 RFI report for PRS 21-029 (LANL 1996, 52270) and was presented as part of the historic information in the work plan. The investigation was implemented in accordance with UST regulations and relative to UST contaminant thresholds and it appeared that the

nature and extent of contamination had been defined. The VCA report (LANL 1996, 55347) also stated that the extent of contamination had been defined during the 1994 and 1995 RFIs. Implementation of the DP Tank Farm work plan, as amended by this RSI response, will verify that nature and extent of contamination at the DP Tank Farm has been determined. As mentioned in a detailed discussion of fractures for general comment 1A/B and specific comment 24, the field investigation activities will begin at the DP Canyon stream bed and focus towards the two most probable sources of petroleum hydrocarbon at the East and West Fill Stations to confirm whether or not DP Tank Farm is the source of the hydrocarbons observed in DP Canyon.

NMED Miscellaneous Comments (No Response Required)

1. ***Figure 1-3. Location of DP Tank Farm, PRS 21-029, at TA-21., page 1-4***

   Please label DP Canyon on Figure 1-3.

2. ***Figure 2.2-1. Locations of samples collected during the 1994 investigations of DP Tank Farm., PRS 21-029, page 2-27***

   The eastern fence line of DP Tank Farm is not shown on the map (or identified on any Figure pertaining to DP Tank Farm in this Work Plan).

3. ***Figure 2.2-14. Surveillance and canyons investigations sampling locations in DP Canyon., page 2-57***

   The location of DP Tank Farm is not labeled or identified on the map and should be in order for the reader to better determine the location and distance of the monitoring locations in relation to DP Tank Farm.

4. ***§ 2.2.2.3 Media Characterization, page 2-74, third paragraph***

   The acronym SUMMA is used, but it is not defined in the text or in the acronyms and abbreviations (located on pages vii-viii).

5. ***Table 2.2-2 Summary of Samples and Analyses, page 2-78***

   The heading of Table 2.2-2 should read Summary of Proposed Samples and Analyses since the sampling plan and analyses have not been approved by HRMB.

REFERENCES

Environmental Restoration Project, August 1999. "Evaluation of Sediment and Alluvial Groundwater in DP Canyon, Reaches DP-1, DP-2, DP-3, and DP-4," Los Alamos National Laboratory report LA-UR-99-4238, Los Alamos, New Mexico. (Environmental Restoration Project 1999, 63915)

LANL (Los Alamos National Laboratory), May 1995. "Sampling and Analysis Plan for Subsurface Soil Sampling at DP Tank Farm (21-029)," Los Alamos National Laboratory report, Los Alamos, New Mexico. (LANL 1995, 59364)

LANL (Los Alamos National Laboratory), January 1996. "RFI Report for Potential Release Site 21-029," Los Alamos National Laboratory report LA-UR-95-3693, Los Alamos, New Mexico (LANL 1996, 52270)

LANL (Los Alamos National Laboratory), April 1996. "Voluntary Corrective Action Plan for Potential Release Site 21-029, DP Tank Farms Removal of Contaminated Soil," Los Alamos National Laboratory report LA-UR-96-1263, Los Alamos, New Mexico (LANL 1996, 55344)

LANL (Los Alamos National Laboratory), July 1996. "Voluntary Corrective Action Report for Potential Release Site 21-029, DP Tank Farm," Los Alamos National Laboratory report LA-UR-96-2408, Los Alamos, New Mexico. (LANL 1996, 55347)

LANL (Los Alamos National Laboratory), October 1998. "RCRA Facility Investigation Work Plan, Volume II, DP Tank Farm (TA-21)," Los Alamos National Laboratory LA-UR-98-4169, Los Alamos, New Mexico. (LANL 1998, 59976)

Ryti, R., P. Longmire, and E. McDonald, March 29, 1996. "Application of LANL Background Data to ER Project Decision-Making, Part I: Inorganics in Soils, Sediments, and Tuff Los Alamos National Laboratory Report LA-UR-96-1534, Los Alamos, New Mexico. (Ryti et al. 1996, 53953)

Ryti, R., August 19, 1997. "Technical Position Paper on Use of TA-21 Process Area Baseline Data for RFI Reports," Los Alamos National Laboratory report LA-UR-97-3393, Los Alamos, New Mexico. (Ryti 1997, 58239)