Voluntary Corrective Action Completion Report for

Potential Release Site 3-022 Dielectric Oil Containment Sump

HRMB

Field Unit 1

Environmental Restoration Program

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Revision 1

A Department of Energy Environmental Cleanup Program

Los Alamos
NATIONAL LABORATORY

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Certificate of Completion

I certify that all the work pertaining to the voluntary corrective action (VCA) conducted at PRS 3-022 has been completed in accordance with the Department of Energy approved VCA plan entitled VCA Plan for Solid Waste Management Unit 3-022, Dielectric Oil Containment Sump. Based on my personal involvement or inquiry of the person or persons who managed this cleanup, a review of all data gathered, and a visit to the site, to the best of my knowledge and belief, all criteria of the plan have been met or exceeded. I believe that the completion of this VCA is protective to both human health and the environment. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

GR Allen

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Field Unit One Project Leader
Environmental Restoration Project
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27 Sept 95
Date

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1.0 DESCRIPTION

Potential Release Site (PRS) 3-022 was a secondary containment for dielectric oil tanks located within TA-3, southwest of the Pajarito Road and Diamond Drive intersection, 200 ft south of building TA-3-316. This site is not included in the Hazardous and Solid Waste Amendments module to the Los Alamos National Laboratory Resource Conservation and Recovery Act Part B Permit, EPA I.D. NM0890010515.

The sump, or secondary containment, was part of an above ground mineral oil storage and pumping system that supported the operation of a Marx generator in Building TA-3-316. The secondary containment structure is made of reinforced concrete walls with a sand bottom and a Hypalon liner over the sand. A steel I beam structure within the sump supported two 500 gal. above ground steel storage tanks that were removed in early 1995. The electrical supply, pumps and above ground piping associated with the tanks were also removed. It was apparent from oil stains on the concrete walls above the liner that the electrical pump system had been leaking.

The mineral oil that was stored in the tanks was Shell Diala Oil AX, which is described as a mixture of refined hydrotreated middle distillates (30 - 40%) and severely hydrotreated light napthenic distillates (60 - 70%). This product does not contain detectable levels (<1 ppm) of polychlorinated biphenyl's (PCBs). The chemical of potential concern (CPOC) identified for this site was total petroleum hydrocarbons (TPH) and the cleanup level was calculated to be 2 600 ppm.

The site at which the dielectric fluid leaked is a LANL facility, and will likely remain as such in the future. Therefore, cleanup levels were based on the long-term worker exposure scenario, soil ingestion pathway, using input parameters described in the LANL 1993 Technical Assumptions Document.

The soil cleanup action level of 2600 ppm TPH is based on a middle distillate slope factor and a target cancer risk of 1E-06 is calculated in the attached risk assessment (Attachment A).

2.0 CORRECTIVE ACTION

The Voluntary Corrective Action (VCA) was implemented in accordance with the VCA Plan for Solid Waste Management Unit 3-022 with the following deviations:

- TPH contaminated soil is considered a "special waste" if it is over 1 000 ppm TPH, therefore only the asphalt and concrete was taken to the county landfill since they do not have a permit to accept special waste (New Mexico Solid Waste Management Regulations, Definition ZZZ, pages 15 - 16)

- One hundred eighty cubic yards of tuff were removed from the sump area in addition to the initial estimated quantity of thirty cubic yards of sand.

- Sampling was implemented for each of the five roll-off bins before being shipped offsite as described in the VCA plan. However, to expedite waste characterization the last eight truckloads of soil/tuff were profiled and manifested using a TPH concentration range from samples collected insitu as described below on August 31, 1995.

- The scheduled field activities were conducted during August and September 1995.

VCA activities began on August 16, 1995 with the removal of the steel support structure from the sump. The steel was loaded onto flatbed trucks and hauled to a staging yard to be recycled at a later date. The free standing water in the sump was pumped into a 55-gallon drum, the sediment located on top of the Hypalon liner was hand shoveled into approximately five 55-gallon drums, and the Hypalon liner was cut into pieces and containerized in eight 55-gallon polyethylene drums. The visibly-stained soil located beneath the former liner was hand shoveled into approximately seven 55-gallon drums. The waste drums from this phase were moved to a secure storage area, sampled, and analyzed for total petroleum hydrocarbons (TPH) and, in some cases, for benzene, toluene, ethylbenzene, and xylene (BTEX). Four excavation guidance samples were collected from each corner of the sump and sampled for TPH. Per the VCA Plan all samples, except for the quality assurance/quality control (QA/QC) samples, were analyzed at the on-site mobile chem van using modified EPA method SW-846 8015 for TPH, 8260 for BTEX and were validated by LANL personnel.

Excavation activities began on August 24, 1995. The sump was excavated down to the unconsolidated tuff/native material interface, or approximately one foot below ground surface (bgs), resulting in the removal of approximately sixty cubic yards of conta inated soil into five roll-off bins. During excavation, the concrete sidewalls of the sump and asphalt apron were broken up with a jackhammer and loaded into a dump truck. Five loads of concrete and asphalt were transported to the Los Alamos County landfill for disposal. When this part of the excavation was complete, six verification samples were collected (Figure 1) and analyzed for TPH. Also, the five roll-off bins containing the contaminated soil were sampled for waste characterization purposes. Analytical results (Table 1) indicated TPH concentrations ranging from 11 481 to 111 614 ppm; all greater than the cleanup level of 2 600 ppm.

On August 31, 1995, a test pit was dug in the center of the sump to a depth of four feet bgs and sampled at one-foot intervals. This test pit was used to determine the depth of excavation required to achieve cleanup levels. The analytical results (Table 1) showed TPH concentrations ranging from 1 255 to 28 362 ppm and indicated the sump required at least another foot of excavation. The remaining material was excavated, placed directly into two dump trucks, and transported offsite to the Waste Management Facility in Colorado Springs, Colorado. Two additional trenches were dug on the east and west sides of the sump, and the corners sampled at one-foot intervals (Figure 1). This action was performed to characterize the waste prior to disposal, as well as to determine the remaining amount of soil/tuff to be removed. The analytical results (Table 1) showed TPH concentrations ranging from 5 to 258 943 ppm.

On September 12, 1995, the sump was excavated to approximately 2 ft bgs at the east end and 2.5 ft bgs at the west end. Approximately 90 cu yds (6 dump trucks) of contaminated soil were excavated and transported for off-site disposal to the Colorado Springs facility. Six verification samples were collected (Figure 1) and analyzed for TPH. Analytical results (Table 1) showed the TPH concentrations ranged from non-detect to 3 570 ppm. One sample was greater than the cleanup level of 2 600 ppm.

On September 14, 1995, the center of the sump was excavated another 2 ft in depth, for a lateral extent of approximately 18 ft. Approximately 30 more cu yds (2 dump trucks) of contaminated soil were excavated and transported to the Colorado Springs facility. Two verification samples were collected from the excavated area (Figure 1) and analyzed for TPH. Analytical results obtained (Table 1) showed the TPH concentrations ranged from 257 to 862 ppm; the cleanup level of 2 600 ppm was met.

Site restoration activities began on September 15, 1995 and were completed on September 19, 1995. These activities included backfilling the area, regrading, contouring, and reseeding according to the Storm Water Pollution Prevention Plan and LANL Facilities Engineering Standards, 216, "Landscaping."

Verification sample locations are presented on a site map, Figure 1, and analytical results are presented in Table 2. Any characterization and/or screening data will be made available upon request. Cleanup verification was based on analytical results and visual inspection, as specified in the VCA Plan.

This report serves as the formal request for Department of Energy concurrence to approve no further action (NFA) for this PRS.

3.0 COST SUMMARY

TABLE 1
VCA COSTS

ACTIVITIES	COST
Planning	$14,782
Cleanup	$75,173
Disposal	$32,594
Develop VCA report	$ 3,000
TOTAL COST	$125,550

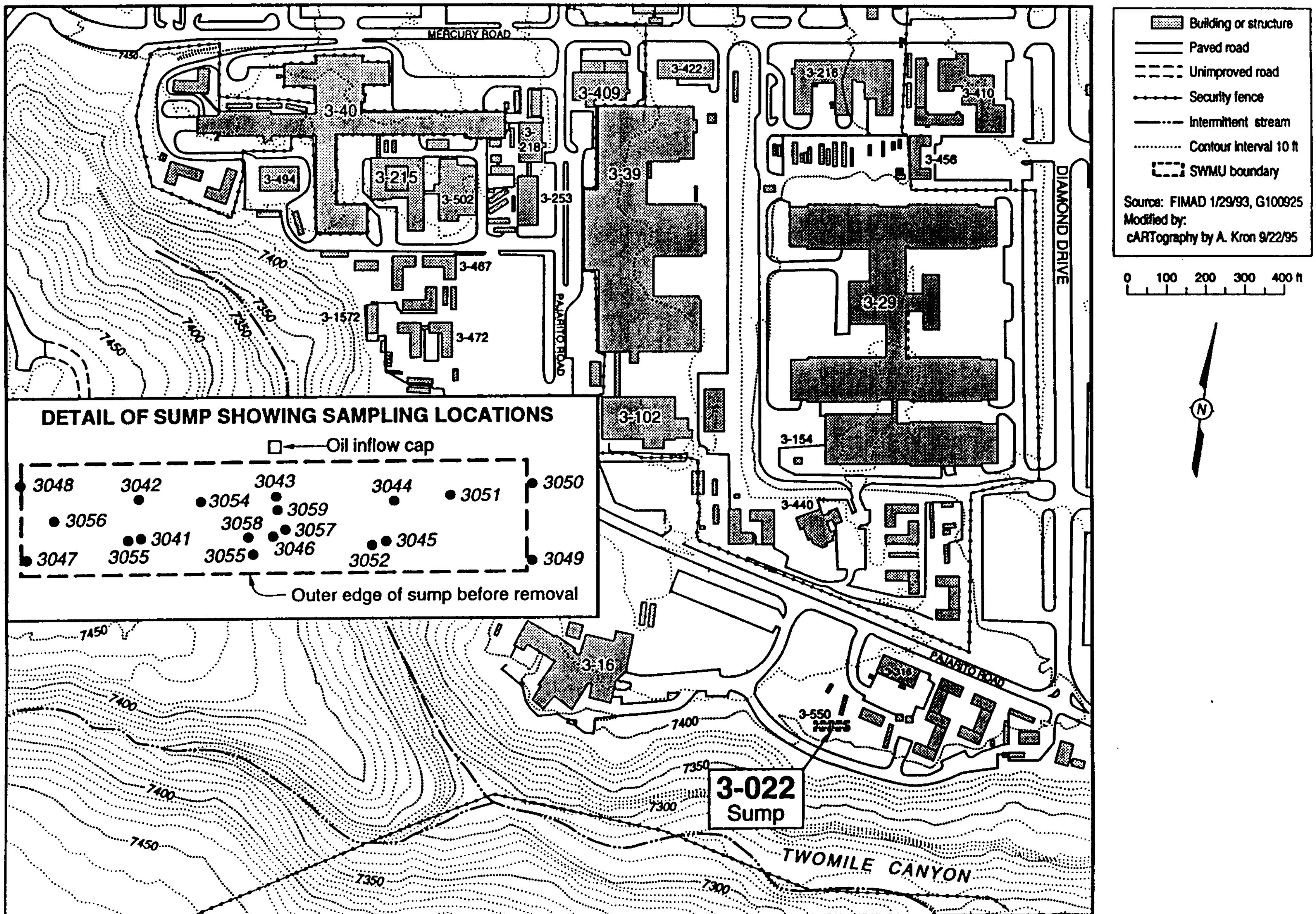

Figure 1. Sampling locations for VCA of SWMU 3-022 at TA-3.

VCA Completion Report

Table 2
PRS 3-022 VCA Sample Results

Sample Number	FIMAD ID	Date Collected	Max Sample Depth (feet)	Current Exc. Depth (feet)	TPH Conc. (ppm)	Comments
Excavation Guidance Samples						
0194	N/A	8/22/95	0.5	0	4,066.00	
0195	N/A	8/22/95	0.5	0	6,169.00	
0196	N/A	8/22/95	0.5	0	3,578.00	
0197	N/A	8/22/95	0.5	0	18,637.00	
Waste Characterization Samples						
0182	N/A	8/22/95	N/A	N/A	48,873.00	BTEX was Non-Detect, drum S-1
0183	N/A	8/22/95	N/A	N/A	48,219.00	BTEX was Non-Detect, drum S-2
0184	N/A	8/22/95	N/A	N/A	61,249.00	BTEX was Non-Detect, drum S-3
0185	N/A	8/22/95	N/A	N/A	26,505.00	BTEX was Non-Detect, drum S-4
0186	N/A	8/22/95	N/A	N/A	16,972.00	BTEX was Non-Detect, drum S-5
0187	N/A	8/22/95	N/A	N/A	46,302.00	BTEX was Non-Detect, drum S-6
0188	N/A	8/22/95	N/A	N/A	29,439.00	BTEX was Non-Detect, drum S-7
0189	N/A	8/22/95	N/A	N/A	16,252.00	BTEX was Non-Detect, drum S-8
0190	N/A	8/22/95	N/A	N/A	9,611.00	BTEX was Non-Detect, drum S-9
0191	N/A	8/22/95	N/A	N/A	12,207.00	Drum S-10
0192	N/A	8/22/95	N/A	N/A	15,534.00	Drum S-11
0193	N/A	8/22/95	N/A	N/A	6,114.00	Drum S-12
1st Set Verification Samples						
0201	03-03041	8/28/95	0.2	1.0	93,248.00	SW location, depth = 1.2 ft bgs
0202	03-03042	8/28/95	0.2	1.0	53,334.00	NW location, depth = 1.2 ft bgs
0203	03-03043	8/28/95	0.2	1.0	11,481.00	Center of N Wall, depth = 1.2 ft bgs
0204	03-03044	8/28/95	0.2	1.0	49,739.00	NE location, depth = 1.2 ft bgs
0205	03-03045	8/28/95	0.2	1.0	36,409.00	SE location, depth = 1.2 ft bgs
0206	03-03046	8/28/95	0.2	1.0	111,614.00	Center of S Wall, depth = 1.2 ft bgs
Roll-Off Bin Characterization Samples						
0209	N/A	8/30/95	N/A	1.0	37,218.00	Roll-off bin #1
0210	N/A	8/30/95	N/A	1.0	22,843.00	Roll-off bin #2
0211	N/A	8/30/95	N/A	1.0	1,811.00	Roll-off bin #3
0212	N/A	8/31/95	N/A	1.0	23,489.00	Roll-off bin #4
0213	N/A	8/31/95	N/A	1.0	10,875.00	Roll-off bin #5
Test Pit Samples						
0214	N/A	8/31/95	1.0	1.0	28,362.00	Depth = 2 ft bgs
0215	N/A	8/31/95	2.0	1.0	1,877.00	Depth = 3 ft bgs
0216	N/A	8/31/95	3.0	1.0	1,255.00	Depth = 4 ft bgs
East & West Trench Corner Samples						
0217	03-03047	9/8/95	1.2	1.0	30,658.00	SW corner, depth = 2.2 ft bgs
0218	03-03047	9/8/95	2.2	1.0	258,943.00	SW corner, depth = 3.2 ft bgs
0219	03-03047	9/8/95	3.2	1.0	82,658.00	SW corner, depth = 4.2 ft bgs
0220	03-03048	9/8/95	1.2	1.0	63,472.00	NW corner, depth = 2.2 ft bgs
0221	03-03048	9/8/95	2.2	1.0	85,456.00	NW corner, depth = 3.2 ft bgs
0222	03-03048	9/8/95	3.2	1.0	53,225.00	NW corner, depth = 4.2 ft bgs
0223	03-03049	9/8/95	1.2	1.0	12,439.00	SE corner, depth = 2.2 ft bgs
0224	03-03049	9/8/95	2.2	1.0	3,827.00	SE corner, depth = 3.2 ft bgs
0225	03-03049	9/8/95	3.2	1.0	2,408.00	SE corner, depth = 4.2 ft bgs
0226	03-03050	9/8/95	1.2	1.0	5.00	NE corner, depth = 2.2 ft bgs
0227	03-03050	9/8/95	2.2	1.0	105.00	NE corner, depth = 3.2 ft bgs

Table 2
PRS 3-022 VCA Sample Results

Sample Number	FIMAD ID	Date Collected	Max Sample Depth (feet)	Current Exc. Depth (feet)	TPH Conc. (ppm)	Comments
0228	03-03050	9/8/95	3.2	1.0	4,385.00	NE corner, depth = 4.2 ft bgs
2nd Set Verification Samples						
0229	03-03051	9/12/95	0.2	2.0	82.00	Depth = 2.2 ft bgs
0230	03-03052	9/12/95	0.3	2.0	1,307.00	Depth = 2.3 ft bgs
0501	03-03053	9/12/95	0.4	2.0	3,570.00	Depth = 2.4 ft bgs
0502	03-03054	9/12/95	0.5	2.0	ND	Depth = 2.5 ft bgs
0503	03-03055	9/12/95	0.6	2.0	1.00	Depth = 2.6 ft bgs
0504	03-03056	9/12/95	0.6	2.0	675.00	Depth = 2.6 ft bgs
Final Verification Samples						
0505	03-03057	9/14/95	0.7	4.0	257.00	Depth = 4.7 ft bgs
0506	03-03057	9/14/95	0.7	4.0	862.00	Depth = 4.7 ft bgs
QA/QC Samples						
0207	N/A	8/28/95	0.2	1.0	0.413[a]	Duplicate of 0202, location 03-03042
0208	N/A	8/28/95	0.2	1.0	0.587[a]	Duplicate of 0206, location 03-03046

[a] Preliminary Data, unvalidated
ppm = part per million
bgs = below ground surface
BTEX = benzene, toluene, ethylbenzene, xylene

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ATTACHMENT A
RISK ASSESSMENT TO CALCULATE CLEANUP LEVEL

1.0 CLEANUP LEVEL FOR SHELL DIELECTRIC FLUID IN SOIL

A material safety data sheet was available on the Shell Dielectric fluid and was used to identify chemical components for the purpose of calculating a cleanup level in soil. The dielectric fluid is composed of 30-40% solvent refined hydrotreated light naphthenic distillate petroleum (CAS Number 6472-46-7), and 60-70% severely hydrotreated light naphthenic distillate (CAS Number 64742-53-6). Less than 0.2% of the product is butylated hydroxy toluene (CAS Number 128-37-0), which is present at such low concentrations that it will not be considered in setting the cleanup level.

The cleanup level for this product in soil was developed based on the toxicology of middle distillate petroleum and light catalytically cracked naptha. The toxicity criteria for each of these petroleum products is based on different toxic endpoints: middle distillate petroleum is a suspected carcinogen, and its toxicity criteria is based on its carcinogenic effects, while light catalytically cracked naptha is not a suspected carcinogen, and its toxicity criteria is based on noncarcinogenic effects. To establish a cleanup level for the dielectric fluid, which contains both of these petroleum products, cleanup levels will be calculated for both individual products, and the lower cleanup level will be adopted for the dielectric fluid.

The site at which the dielectric fluid was spilled is a LANL facility, and will likely remain as such in the future. Therefore, cleanup levels were based on the long-term worker exposure scenario, soil ingestion pathway, using input parameters described in the LANL 1993 Technical Assumptions Document.

1.1 DEVELOPMENT OF A SOIL CLEANUP LEVEL BASED ON THE TOXICOLOGY OF MIDDLE DISTILLATE PETROLEUM

Millner et al. (1992) conducted a comprehensive study of tumor development data from studies in mice exposed to 13 refinery streams, including middle distillate petroleum. The carcinogen assessment guidelines developed by EPA (1986) for calculating cancer slope factors was used to develop a range of slope factors for middle distillate petroleum. Millner calculated the geometric mean of the resulting slope factors and reported it as the cancer slope factor for the middle distillate. The reported cancer slope factor is 1.09E-03 kg-day/mg.

The soil cleanup level based on the middle distillate slope factor and a target risk of 1E-06 can be calculated as follows, using the soil ingestion pathway for the long term worker exposure scenario (LANL, 1993):

SCL (mg/kg) = (TR x BW x AT)/(SF x EF x ED x IR x CF)

where:

SCL	=	soil cleanup level
TR	=	target risk level
BW	=	adult body weight (70 kg)
AT	=	averaging time (25550 days)
SF	=	slope factor (1.09E-03 kg-day/mg)
EF	=	exposure frequency (250 days/year)
ED	=	exposure duration (25 years)
IR	=	soil ingestion rate (100 mg/day)
CF	=	conversion factor (1E-06 kg/mg)

For the middle distillate, the calculated soil cleanup level is 2600 mg/kg.

1.2 DEVELOPMENT OF A SOIL CLEANUP LEVEL BASED ON THE TOXICOLOGY OF LIGHT CATALYTICALLY CRACKED NAPTHA

Toxicity information on light catalytically cracked naptha was obtained from a comprehensive study of the toxicity of thirteen refinery streams, conducted by the Mobile Environmental and Health Sciences Laboratory (Feuston et al. 1994). An oral reference dose (RfD) can be developed based on the Feuston et al data following EPA methodology. The No Observable Adverse Effects Level (NOAEL) for light catalytically cracked naptha was reported to be 300 mg/kg/day. This NOAEL is then divided by a series of modifying and safety factors, which account for uncertainty in the data, to arrive at an oral RfD. The oral RfD is calculated using the following equation:

Oral RfD (mg/kg/day) = NOAEL/(UF-1) x (UF-2) x (MF)

where:

NOAEL = the No Observable Adverse Effect Level reported in the Feuston et al data

UF-1	=	uncertainty factor #1, which accounts for variation in the general population (10)
UF-2	=	uncertainty factor #2, which accounts for extrapolation from animal data to human effects (10)
MF	=	a modifying factor to account for other uncertainties not specifically accounted for (10)

The resulting oral RfD for light catalytically cracked naptha is 0.3 mg/kg/day. The soil cleanup level for this product can then be calculated using the following equation:

SCL (mg/kg) = (THI x BW x AT)/[(IR x EF x ED x CF)/(RfD)]

where:

SCL	=	soil cleanup level (mg/kg)
THI	=	target hazard index (1)
BW	=	body weight (70 kg)
AT	=	averaging time (10950 days)
IR	=	soil ingestion rate (100 mg/day)
EF	=	exposure frequency (250 days/year)
ED	=	exposure duration (25 years)
CF	=	conversion factor (1E-06 kg/mg)
RfD	=	oral reference dose (0.3 mg/kg/day)

The soil cleanup level calculated for light catalytically cracked naptha using this equation is 365,000 mg/kg.

1.3 SUMMARY AND CONCLUSIONS

Two cleanup levels were calculated in this analysis, one for middle distillate petroleum and one for light catalytically cracked naptha. Each of the cleanup levels calculated assumes that 100% of the petroleum product present is the product for which the cleanup level was derived. In reality, the dielectric fluid is 60-70% light naptha and 30-40% middle distillate. However, since the toxic end point of these petroleum products is different, the cleanup level for the dielectric fluid must be based on the most toxic petroleum product present. Therefore, the cleanup level for the dielectric fluid is 2600 mg/kg, based on the toxicity of the middle distillate petroleum product.

References

1. EPA, 1986. Guidelines for Carcinogen Risk Assessment. U.S. Environmental Protection Agency, Washington, D.C. 51 FR 33992.

2. LANL, 1993. Technical Assumptions Document.

3. Millner, GC, James, RC, and NYE, AC, 1992. Human Health-based Soil Cleanup Level Guidelines for Diesel Fuel no. 2. Journal of Soil Contamination, 1(2):103-157.

4. Feuston, MH, Low, LK, Hamilton, CE, and Mackerer, C, 1994. Correlation of Systemic and Developmental Toxicities with Chemical Component Classes of Refinery Streams. Fundamental and Applied Toxicology, 22:622-630.