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Project Engineer

PHASE II ENVIRONMENTAL SITE ASSESSMENT REPORT
UNM PNM Electrical Substation
University of New Mexico
Lot 6, Block C
Central Campus
1925 Las Lomas Rd., N.E.
Albuquerque, NM 87131

Prepared for
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EXECUTIVE SUMMARY

This report presents the results of the Phase II Environmental Site Assessment (Phase II ESA), performed by Dames & Moore, Inc. (Dames & Moore) for the University of New Mexico (UNM) at 1927 Las Lomas Road N.E. (the subject property) of Lot 6, Block C, Central UNM Campus, Albuquerque, New Mexico (see Figure 1). The subject property is currently utilized as an electrical transformer substation operated by the Public Service Company of New Mexico (PNM). The subject property Lot 6 is approximately 0.30 acres in size (13,068 ft^2) and is currently owned by the Regents of the University of New Mexico.

A Phase I ESA was conducted by Dames & Moore at the subject property, and was prepared under separate cover. Please refer to the Phase I ESA for additional site details and information regarding the surrounding property.

The project was performed in accordance with the Dames & Moore Phase II ESA proposal, submitted to UNM on May 13, 1999. The purpose of the Phase II ESA was to evaluate potential historical spills of dielectric fluids, solvents, hydrocarbons, or improper disposal of wastes. Additionally, the purpose of the Phase II ESA was to collect samples of the dielectric fluid in the transformers to evaluate polychlorinated biphenyl (PCB) concentrations in the fluid, if any. Additional objectives included collection and laboratory analysis of suspect Asbestos Containing Materials (ACMs) and Lead-Based Paint (LBP) samples.

In order to assess potential historical discharges of PCBs, hydrocarbons, or solvents, Dames & Moore advanced six (6) shallow soil borings adjacent to the transformers. Additionally, Dames & Moore advanced four (4) soil borings to a depth of thirty (30) feet using direct push drilling equipment. The purpose of the direct push borings was to collect soil samples from the surface and at the total depth of the boreholes. In order to screen for potential historical solvent discharges, soil vapor points were placed at the bottom of the direct push boreholes, with soil vapor samples collected and analyzed in the laboratory for volatile organic compounds (VOCs).

Results of the dielectric fluid sample analysis indicated that none of the four (4) samples were above the laboratory Method Detection Limit (MDL) of 10 parts per million (ppm). Results of the soil sample analysis for total petroleum hydrocarbons (TPH) indicated nine (9) of twenty-one (21) samples collected were above the 20 ppm MDL. Of these, only one (1) sample was above the New Mexico Environment Department – Groundwater Quality Bureau (NMED-GWQB) action level of 100 ppm. The soil sample

with a TPH concentration above the NMED-GWQB action level was collected from surface soils adjacent to the south transformer dielectric fluid reservoir drain valve.

In order to evaluate PCB concentrations in soils, samples with TPH concentrations above the MDL were analyzed for PCB using USEPA Method 8082. Results of the 8082 PCB soils analysis indicated that two (2) samples were detected above the MDL. However, the concentrations detected were below the EPA Human Health Media Specific Screening Levels for industrial and residential soils. The NMED is currently developing soil action levels for PCBs.

Results of the four (4) soil vapor samples laboratory analysis indicated trace levels of tetrachloroethene (PCE) and toluene in three (3) samples. However, these trace levels do not suggest that the transformer yard is a source region for historical discharges of solvents. A trace level plume of VOCs was identified in the UNM vicinity during the UNM Voluntary Abatement Plan (VAP) conducted by UNM under oversight by NMED-GWQB. The source region of the VOCs has not been identified. Based on the numerous historical dry cleaning and automotive repair establishments in the UNM vicinity, the potential for multiple sources is moderate.

Results of the two (2) lead-based paint samples indicated that the exterior paint on the transformers is lead-based. Both samples indicated lead concentrations above 2,500 ppm.

Dames & Moore presents the following conclusions based upon the results of the Phase II ESA performed at the subject property:

- The dielectric fluid samples collected from the main oil reservoir in each transformer were below the laboratory MDL for PCB. Additionally, the dielectric fluid samples collected from the load tap changer (LTC) reservoirs were also below the MDL for PCB.

- The small stain (2 ft^2) of apparent transformer dielectric fluid (oil) was noted on the surface of the concrete slab of the South Transformer, adjacent to the drain valve. This stain was probably created from a small leak in the valve, or historical minor spills during operation and maintenance of the transformer. Based on soil samples collected adjacent to the minor stain, minor discharges of dielectric fluid were introduced to site soils. However, based on the relatively minor concentrations of TPH and PCB, the affected soils are small in volume (< 1yd^3). The only soil sample with TPH concentrations above the NMED-GQWB action levels

was collected from surface soils. The soil sample collected at 30" below surface grade (bsg) in soil boring SB-7 located adjacent to the leaky valve exhibited a TPH concentration of 23 ppm, below the NMED-GWQB action level. Based on the density of site subgrade, the potential for additional soil TPH or PCB contamination above NMED-GWQB levels is low. PCB concentrations in soil were below the EPA action levels for industrial and residential areas. NMED is currently in the process of evaluating PCB action levels.

- Results of the confirmatory soil samples collected below the excavated soils above 100 ppm near the south transformer were below the NMED-GWQB action level at 20 ppm. Based on the results of the adjacent soil boring TPH results from 30" at 23 ppm suggest that TPH affected soils over 100 ppm were removed from the substation.

- A small stain of apparent transformer dielectric fluid (oil) was observed on the cooling fins located on the south side of the north transformer. The gravel beneath the stain was slightly discolored, indicating a potential former minor leak. One (1) of the two (2) TPH soil samples collected from soil boring SB-6 located beneath the stained cooling fin was above the TPH MDL at 83 ppm. However, this concentration is below the NMED-GQWB action level of 100 ppm. Additionally, the soil sample collected from the bottom of soil boring SB-6 at 6.0 feet bsg was non-detect for TPH. Results of PCB analysis indicated a soil PCB concentration of 0.016 ppm. This concentration is below the EPA screening level of 0.3 ppm for industrial sites, and below the 0.07 ppm residential screening level.

- Results of the soil vapor samples VOC laboratory analysis indicated only trace concentrations of PCE and toluene. Based on the relatively minor concentrations of VOCs, the transformer station does not appear to be a source area for historical discharges of solvents, or other VOCs.

- Results of the lead-based paint analysis indicate that the exterior paint of the transformers is lead-based.

- Visual observation of the exterior and interior of the transformer station did not indicate the presence of suspect ACMs.

Based upon the above-presented conclusions, Dames & Moore provides the following recommendations:

- Based on the results of the confirmatory soil samples, no additional excavation of site soils is warranted.

- Dames & Moore recommends that soils removed during the remedial activities conducted by PNM transported from the substation and transported to an approved waste disposal facility according to applicable regulations.

- Dames & Moore recommends that if operations and maintenance activities involve sanding, cutting, or using torches on the exterior of the transformers that appropriate precautions be undertaken to minimize potential exposure to lead dust. Dames & Moore recommends that maintenance personnel review the lead in construction OSHA standard prior to sanding, cutting, or disturbing the exterior paint of the transformers.

1.0 INTRODUCTION

This report presents the results of the Phase II Environmental Site Assessment (Phase II ESA), performed by Dames & Moore, Inc. (Dames & Moore) for the University of New Mexico (UNM) at 1927 Las Lomas Road N.E. (the subject property) of Lot 6, Block C, Central UNM Campus, Albuquerque, New Mexico (see Figure 1). The subject property is currently utilized as an electrical transformer substation operated by the Public Service Company of New Mexico (PNM). The subject property Lot 6 is approximately 0.30 acres in size (13,068 ft^2) and is currently owned by the Regents of the University of New Mexico.

The subject property is located near the south entrance to University Hospital close to the intersection of Las Lomas Road and Lomas Blvd. N.E., Albuquerque, New Mexico. Dames & Moore understands that UNM is considering purchasing the electric substation and associated equipment currently operated by the Public Service Company of New Mexico (PNM) on land leased to PNM for electric transmission operations.

The surrounding area is used primarily for educational and related purposes. A UNM water supply well (WS-7) is located approximately 1800 feet east of the subject property is also present in the surrounding area. The UNM Hospital and medical school are located approximately 500 feet northeast of the subject property. The UNM North Campus Chilled Water Plant is located approximately 200 feet north of the property. A subsurface utility tunnel is located on the western side of the subject property, and provides chilled water, electrical power, and telecommunications to the Central UNM campus. The east side of the subject property is landscaped with a modern sculpture and signage for the UNM campus. The western boundary of the subject property is occupied by a electrical switchgear building owned and operated by UNM.

The Phase I ESA was conducted in accordance with Dames & Moore's proposal dated May 13, 1999, and UNM's subsequent purchase order authorization dated June 30, 1999.

1.1 OBJECTIVES

The objective of the Phase II ESA performed by Dames & Moore was to evaluate potential historical spills of dielectric fluids, solvents, hydrocarbons, or improper disposal of wastes. Additionally, the purpose of the Phase II ESA was to collect samples of the dielectric fluid in the transformers to evaluate

polychlorinated biphenyl (PCB) concentrations in the fluid, if any. Additional objectives included collection and laboratory analysis of suspect Asbestos Containing Materials (ACMs) and Lead-Based Paint (LBP) samples.

1.2 SCOPE OF WORK

Dames & Moore's Scope of Work for the Phase II ESA consisted of installation of six (6) shallow soil borings adjacent to the transformers. Additionally, Dames & Moore advanced four (4) soil borings to a depth of thirty (30) feet using direct push drilling equipment. The purpose of the direct push borings was to collect soil samples from the surface and at the total depth of the boreholes. In order to screen for potential historical solvent discharges, soil vapor points were placed at the bottom of the direct push boreholes, with soil vapor samples collected and analyzed in the laboratory for volatile organic compounds (VOCs). Additional scope of work included collection of dielectric fluid samples, lead-based paint samples, Asbestos Containing Materials (ACMs) samples.

Dames & Moore was also authorized by PNM to provide third party observation and confirmatory sampling associated with the removal of hydrocarbon affected soils above NMED-GWQB action levels.

2.0 PHASE II INVESTIGATION

Mr. Wayne S. Jeffs, a Dames & Moore Project Engineer, conducted the Phase II ESA site investigation at the subject property, on June 15, June 23, June 24, June 29, and July 7, 1999. A Site Map indicating the location of the subject property is depicted in Figure 1. Details of the site and locations of sample locations are indicated on Figure 2. Photographs taken during the site activities are presented in Appendix A.

Mr. Vern Hershberger, an Environmental Safety Specialist with UNM Safety, Health and Environmental Affairs (SHEA), Mr. Richard Braziel, a PNM Capital Projects Manager, Mr. Ed Reyes, with PNM Real Estate department, and Ms. Claudette Bonham, PNM Environmental Scientist, and Mr. Jeff Lindsley accompanied Dames & Moore during the site Phase II ESA activities.

2.1 Transformer Dielectric Fluid Sample Collection And Analysis

On July 15, 1999, Dames & Moore collected dielectric fluid samples from the transformer main reservoirs and from the load tap changer (LTC) reservoirs. Dames & Moore did not sample dielectric fluids from the transformer radiators because these are common with the LTC fluid reservoirs. Dames & Moore collected the dielectric fluid samples with the assistance of Mr. Jeff Lindsley, with PNM. The samples were collected from a sample port fitted with a ¼ inch section of polyethylene tubing. The samples were collected in clean, laboratory supplied 40-ml glass vials. Following sample collection, the sample vials were placed in a 40-degree Fahrenheit cooler. The samples were subsequently transported to Hall Environmental Analysis Laboratory (HALL) for laboratory analysis using EPA Method 8082. The 8082 analysis included evaluation of seven (7) different analytes: Arochlor 1016, Arochlor 1221, Arochlor 1232, Arochlor1242, Arochlor 1248, Arochlor 1254, and Arochlor 1260. The table below provides a summary of the results of the dielectric fluid sample analysis. Refer to Appendix B for complete laboratory results.

PCB Sample Results – PNM UNM Substation

Sample Date	Sample Point	PCB Concentration	Arochlor Type
6/15/99	T. 6851370A – No. 1 Main	ND	NA
6/15/99	T. 6851370A – No. 1 LTC	ND	NA
6/15/99	T. 6851370B – No. 2 Main	ND	NA
6/15/99	T. 6851370B – No. 2 LTC	ND	NA

2.2 Substation Interior Soil Sample Collection and Analysis

Dames & Moore advanced six (6) 4-inch diameter soil borings in the interior of the substation adjacent to the transformers with a hand auger on June 23 and June 24, 1999 (Figure 2). Planned depth of the soil borings was10 feet below surface grade (bsg) or auger refusal. None of the soil borings installed in the substation interior were advanced beyond 6.0 feet bsg because of extremely dense subgrade and numerous rocks, bricks, and waste concrete that impeded the hand auger progress. Interior soils appeared to be primarily imported sandy fill with fragments of brick, concrete, and asphalt of various sizes. One (1) soil sample was collected near the surface, and one (1) soil sample was collected at the point of auger refusal from each borehole. Each soil sample was placed in a laboratory supplied 4-oz. glass jar, labeled with chain-of-custody, and placed in a 40-degree fahrenheit cooler. All soil samples collected were analyzed in the laboratory for total petroleum hydrocarbons (TPH) using EPA Method 418.1. Additional laboratory analysis for PCB using EPA Method 8082 was conducted on soil samples with TPH concentrations above the MDL. In addition, each soil sample was screened in the field for total ionizable volatile compounds (TIVC) using the field headspace method. A calibrated Thermoenvironmental Instruments 580B photo ionization detector was used to screen for TIVC. Following completion of daily site activities, Dames & Moore transported the samples to HALL for laboratory analysis, following chain-of-custody requirements.

The table below summarizes the results of the TPH analysis and field headspace measurements for the soil samples collected in the substation interior. Complete copies of laboratory analysis reports are attached in Appendix B.

Summary of TPH Concentrations and Field Headspace Measurements
Hand Auger Borings – Substation Interior – June 23-24, 1999

Soil Boring No.	Sample Depth (ft. bsg)	TPH (mg/kg)	TIVC (ppm.v)
SB-5	1.0 - 1.5	21	0.9
SB-5	6.0	ND	0.5
SB-6	1.0 – 1.5	83	0.7
SB-6	6.0	ND	0.1
SB-7	1.0 – 1.5	ND	0.9
SB-7	30"	23	0.5
SB-8	1.5 – 2.0	ND	0.3
SB-8	2.5 – 3.0	45	0.0
SB-9	1.5 – 2.0	20	0.1
SB-9	2.5 – 3.0	26	0.1
SB-10	1.5 – 2.0	29	1.3
SB-10	4.0	ND	18.5

Based on results of the TPH analysis, seven (7) samples with TPH concentrations above 20 mg/kg (MDL) were selected for laboratory analysis of PCB using EPA Method 8082. The samples selected for 8082 analysis were: SB-5 (1.0-1.5), SB-6 (1.0-1.5), SB-7(30"), SB-8(2.5-3.0), SB-9(1.5-2.0), SB-9(2.5-3.0), SB-10 (1.5-2.0). A summary of the results is presented below:

Summary of Soil PCB Concentrations – Substation Interior Hand Auger Borings
June 23-24, 1999

Soil Boring	Sample Depth (ft. bgs)	PCB (mg/kg)	Analyte
SB-5	1.0-1.5	ND	NA
SB-6	1.0-1.5	0.016	Arochlor 1260
SB-7	30"	0.027	Arochlor 1260
SB-8	2.5-3.0	ND	NA
SB-9	1.5-2.0	ND	NA
SB-9	2.5-3.0	ND	NA
SB-10	1.5-2.0	ND	NA

Based on the results of the laboratory analysis, minor amounts of site soils in the substation interior were impacted with TPH and PCB. Seven (7) TPH and two (2) PCB samples were above MDL. TPH affected soils were encountered at a maximum depth of 3.0 feet bsg. PCB affected soils were encountered at a maximum depth of 30-inches bsg. None of the TPH affected soil samples were above the NMED-GWQB action level of 100 mg/kg. Similarly, none of the PCB affected soil samples were above the EPA screening level concentrations of 0.3 ppm for industrial sites, or the 0.07 ppm residential screening level.

2.3 Substation Exterior Direct-Push Soil Investigation

Dames & Moore conducted a soil boring investigation at the exterior of the substation using direct-push drilling equipment. The direct-push drilling services were provide by SHIB, Inc. of Sandia Park, New Mexico. The direct-push drilling equipment hydraulically advances a 2-inch diameter drill rod equipped with 2-inch diameter split spoon into the subsurface. Four (4) direct-push soil borings were advanced to 30 feet bsg around the exterior walls of the substation (Figure 1). Soil boring SB-1 was located at the southwest corner, soil boring SB-2 the north center, soil boring SB-3 the northeast corner, and soil boring SB-4 the eastern center. Refer to Appendix C for soil boring logs.

Each soil boring was logged according to the Unified Soil Classification (USC) by Mr. Ron Weaver, a Dames & Moore Soil Scientist. Based on the results of the soil classifications, site soils consisted of silty sands near the surface with well graded silty sand encountered at the bottom of the boreholes. A complete lithologic description for the site was not conducted (5-foot sample intervals) in order to accelerate the drilling schedule. The primary task in this investigation is to assess potential environmental impacts from historical discharges of chemicals, hydrocarbons, or wastes.

One (1) soil sample was collected from the surface (~4 feet bsg), and one (1) soil sample was collected from the total depth of each borehole (30 feet bsg). Each soil sample was placed in a clean laboratory supplied 4-oz. glass jar, label with appropriate chain-of-custody seals, and placed in a 40-degree fahrenheit cooler. All samples collected were submitted for laboratory analysis of TPH using EPA Method 418.1 Additionally, samples were submitted for laboratory analysis for PCB using EPA Method 8082 if TPH concentrations were above the MDL.

None of the samples collected from soil borings located at the exterior of the substation were above the MDL for TPH. Therefore, none of the samples were analyzed for PCB. Copies of laboratory reports are included in Appendix B. Results of field headspace analysis are included with the soil boring logs.

Following advancement of the soil borings to maximum depth (30 feet), soil vapor points were installed in each well. The soil vapor points consist of a 4.5 inch long, 5/8-inch diameter sintered stainless steel point, connected to a ¼ -inch teflon hose. Each soil vapor point was placed approximately 1-foot from the bottom of the borehole, and surrounded by three linear feet of 10-20 silica sand. The remainder of the borehole (0-27 feet bsg) was filled with activated bentonite chips.

2.4 Substation Interior Surface Soils Sample Collection

In addition to the soil samples collected from the hand auger and direct-push soil borings, Dames & Moore collected one (1) surficial soil sample on June 24, 1999 adjacent to the main dielectric drain valve on the north side of the south transformer (Figure 1). This soil sample was collected using the same field protocol as described in Sections 2.2 and 2.3. The sample was submitted for laboratory analysis of TPH, and PCB if TPH concentrations were above the MDL of 20 mg/kg.

Results of the laboratory analysis indicated that the TPH concentration was above the NMED-GWQB action level of 100 mg/kg, and that the PCB concentration was non-detect for all Arochlor analytes. Based on visual observation of discolored, reduced soils in the vicinity of the drain valve, Dames & Moore estimates that less than 1 yd^3 of TPH affected soils above the NMED-GQWB action level are present. Results of laboratory analysis are attached in Appendix B.

2.5 Substation Exterior Soil Vapor Sample Collection and Analysis

Dames & Moore collected four (4) soil vapor samples from the soil vapor points installed at the exterior of the substation on June 29, 1999. The soil samples were collected using a portable vacuum pump and vacuum chamber. Each soil vapor sample was collected in a laboratory supplied 1-liter tedlar™ sample bag after purging approximately three tubing volumes or greater. Each soil vapor sample was screened

for TIVC with a calibrated photionization detector. Following collection, the samples were transported to HALL for laboratory analysis of volatile organic compounds (VOCs) using EPA Method 8021.

A summary of the results of the laboratory analysis with analytes above the MDL and field headspace measurements are presented in the table below.

Summary of VOC and TIVC Concentrations at Substation Exterior Vapor Points
June 29, 1999

Sample No.	Depth (ft. bsg)	TIVC (ppm.v)	PCE (ppb)	Toluene (ppb)
SB-01	29	26	0.04	ND
SB-02	29	1.8	0.04	ND
SB-03	29	1.8	ND	ND
SB-04	29	36 (fogged)	ND	0.09

The results of the VOC analysis indicated that two (2) of thirty-six (36) analytes were detected above the MDL at trace concentrations. Based on the trace concentrations, the potential for the substation to be a historical source of VOCs is low. The ongoing VAP conducted by UNM has documented similar trace level VOC concentrations is soil gas in the vicinity of the substation at Computer Resources and Information Technologies (CIRT). The source region of the trace soil vapor VOCs has not been identified. Based on the numerous historical dry cleaning and automotive repair establishments in the UNM vicinity, the potential for multiple sources is moderate. Results of the laboratory analyses are attached in Appendix B.

2.6 Asbestos-Containing Material

At the time of the Phase I ESA site reconnaissance, Dames & Moore did not observe any suspect asbestos containing materials (ACMs). Dames & Moore did not visit the UNM electrical switchgear building or utility vaults. ACM samples were not collected during the investigation.

2.7 Lead-Based Paint Sample Collection

Dames & Moore observed peeling paint on the south side of both transformers. Historically, heavy equipment and mechanical systems are often coated with lead–based paint. Dames & Moore collected two (2) representative samples for laboratory analysis of total lead using EPA Method 7240 on June 24, 1999. Samples were collected by removing peeling paint from the south side of both transformers. Following sample collection, the samples were transported to HALL for analysis. The following table summarizes the results of the Method 7240 analysis.

Results of Lead-Based Paint Samples - Transformer Exterior – June 24, 1999

Sample Location	Total Lead (ppm)
South Transformer – South Side	2,560
North Transformer – North Side	2,960

Lead-based paint was and is still produced for heavy equipment and machinery use. If maintenance of the transformer equipment includes sanding or cutting with a torch, Dames & Moore recommends that paint chip samples be collected and submitted for laboratory analysis for lead content. The Occupational Safety and Health Administration (OSHA) has applicable regulations when conducting maintenance on equipment containing lead.

3.0 REMEDIAL ACTIVITIES

Following receipt of laboratory analysis, Dames & Moore forwarded results to UNM. Based on the results of the laboratory analysis, UNM requested that PNM remove all soils above the NMED-GQWB soil TPH action level of 100 mg/kg. Approximately 1 yd^3 of TPH affected soil over 100 ppm was identified at grade near the drain valve for the primary dielectric reservoir.

On July 8, 1999 Dames & Moore observed Mr. Jeff Lindsley, with PNM substation operations and maintenance, removed accumulated oil stains at the northeast corner of the south transformer, and the main dielectric fluid drain valve at the north side of the south transformer. Refer to Appendix A for photographs documenting remedial activities. Mr. Lindsley removed approximately 1 yd^3 of TPH affected soil located below the drain valve. Mr. Lindsley placed the removed soil in a sealed 55-gallon drum for future disposal. Following visual confirmation that discolored soils were removed, Dames & Moore collected two soil samples for fieldspace analysis of TIVC. The results of the TIVC screening indicated that both soil samples were within acceptable background moisture concentrations.

Dames & Moore collected two (2) soil samples in laboratory supplied 4-oz. glass jars with appropriate chain-of-custody. Dames & Moore then transported the samples to HALL for laboratory analysis of TPH using EPA Method 418.1. The results of the field TIVC screening and TPH analysis are presented below.

Result of Confirmatory Soil Samples– South Transformer – July 7, 1999

Sample No.	Depth (ft-bsg)	TPH (ppm)
South Transformer – S1	1.0	20
South Transformer – S2	1.0	20

4.0 CONCLUSIONS

Dames & Moore presents the following conclusions based upon the results of the Phase II ESA performed at 1927 Las Lomas Road N.E., Lot 6, Block C, UNM Faculty Housing Subdivision, Central UNM Campus, Albuquerque, New Mexico:

- The dielectric fluid samples collected from the main oil reservoir in each transformer were below the laboratory MDL for PCB. Additionally, the dielectric fluid samples collected from the load tap changer (LTC) reservoirs were also below the MDL for PCB.

- The small stain (2 ft^2) of apparent transformer dielectric fluid (oil) was noted on the surface of the concrete slab of the South Transformer, adjacent to the drain valve. This stain was probably created from a small leak in the valve, or historical minor spills during operation and maintenance of the transformer. Based on soil samples collected adjacent to the minor stain, minor discharges of dielectric fluid were introduced to site soils. However, based on the relatively minor concentrations of TPH and PCB, the affected soils are small in volume (< 1yd^3). The only soil sample with TPH concentrations above the NMED-GQWB action levels was collected from surface soils. The soil sample collected at 30" below surface grade (bsg) in soil boring SB-7 located adjacent to the leaky valve exhibited a TPH concentration of 23 ppm, below the NMED-GWQB action level. Based on the density of site subgrade, the potential for additional soil TPH or PCB contamination above NMED-GWQB levels is low. PCB concentrations in soil were below the EPA action levels for industrial and residential areas. NMED is currently in the process of evaluating PCB action levels.

- Results of the confirmatory soil samples collected below the excavated soils above 100 ppm near the south transformer were below the NMED-GWQB action level at 20 ppm. Based on the results of the adjacent soil boring TPH results from 30" at 23 ppm suggest that TPH affected soils over 100 ppm were removed from the substation.

- A small stain of apparent transformer dielectric fluid (oil) was observed on the cooling fins located on the south side of the north transformer. The gravel beneath the stain was slightly discolored, indicating a potential former minor leak. One (1) of the two (2) TPH soil samples collected from soil boring SB-6 located beneath the stained cooling fin was above the TPH MDL at 83 ppm. However, this concentration is below the NMED-GQWB action level of 100

ppm. Additionally, the soil sample collected from the bottom of soil boring SB-6 at 6.0 feet bsg was non-detect for TPH. Results of PCB analysis indicated a soil PCB concentration of 0.016 ppm. This concentration is below the EPA screening level of 0.3 ppm for industrial sites, and below the 0.07 ppm residential screening level.

- Results of the soil vapor samples VOC laboratory analysis indicated only trace concentrations of PCE and toluene. Based on the relatively minor concentrations of VOCs, the transformer station does not appear to be a source area for historical discharges of solvents, or other VOCs.

- Results of the lead-based paint analysis indicate that the exterior paint of the transformers is lead-based.

- Visual observation of the exterior and interior of the transformer station did not indicate the presence of suspect ACMs.

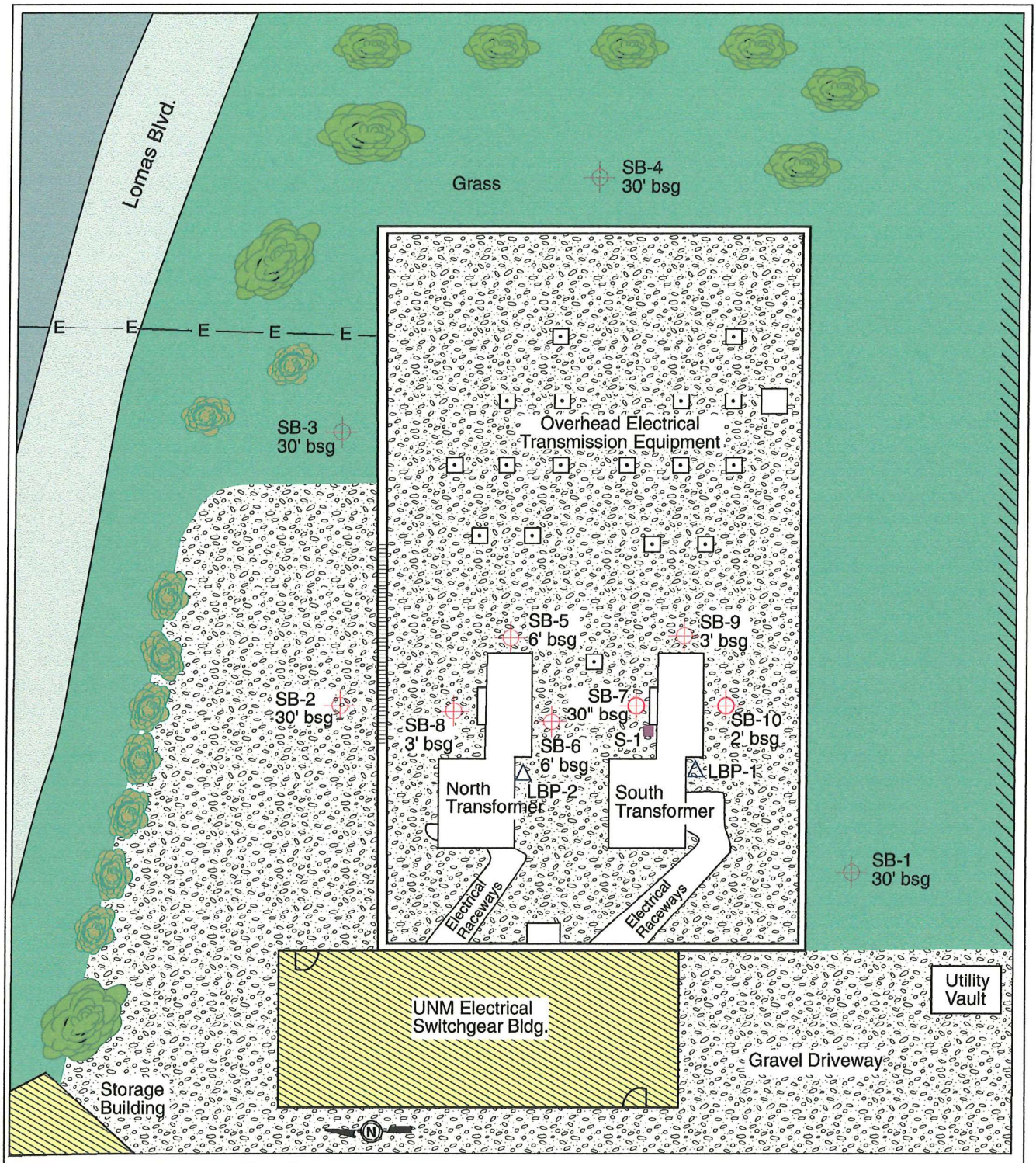
5.0 RECOMMENDATIONS

Based upon the above-presented conclusions, Dames & Moore provides the following recommendations:

- Based on the results of the confirmatory soil samples, no additional excavation of site soils is warranted.

- Dames & Moore recommends that soils removed during the remedial activities conducted by PNM to be transported from the substation to an approved waste disposal facility according to applicable regulations.

- Dames & Moore recommends that if operations and maintenance activities involve sanding, cutting, or using torches on the exterior of the transformers that appropriate precautions be undertaken to minimize potential exposure to lead dust. Dames & Moore recommends that maintenance personnel review the lead in construction OSHA standard prior to sanding, cutting, or disturbing the exterior paint of the transformers.



EXPLANATION:

- Soil Boring
- Lead Based Paint Sample
- Surficial Soil Sample
- bsg Below Surface Grade
- Screen
- –E– Overhead Electrical Service
- 0 10 20 Scale in Feet

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Figure 1. UNM Transformer Station
Location of Soil Boring and LBPP Samples.
University of New Mexico / PNM – Electrical Substation • Albuquerque, NM

Project No. 825890-340000	File Name: UNMPNMFig1		
Drawn by: WSJ	Drafted by: DRS	Checked by: WSJ	Date: 7-19-99

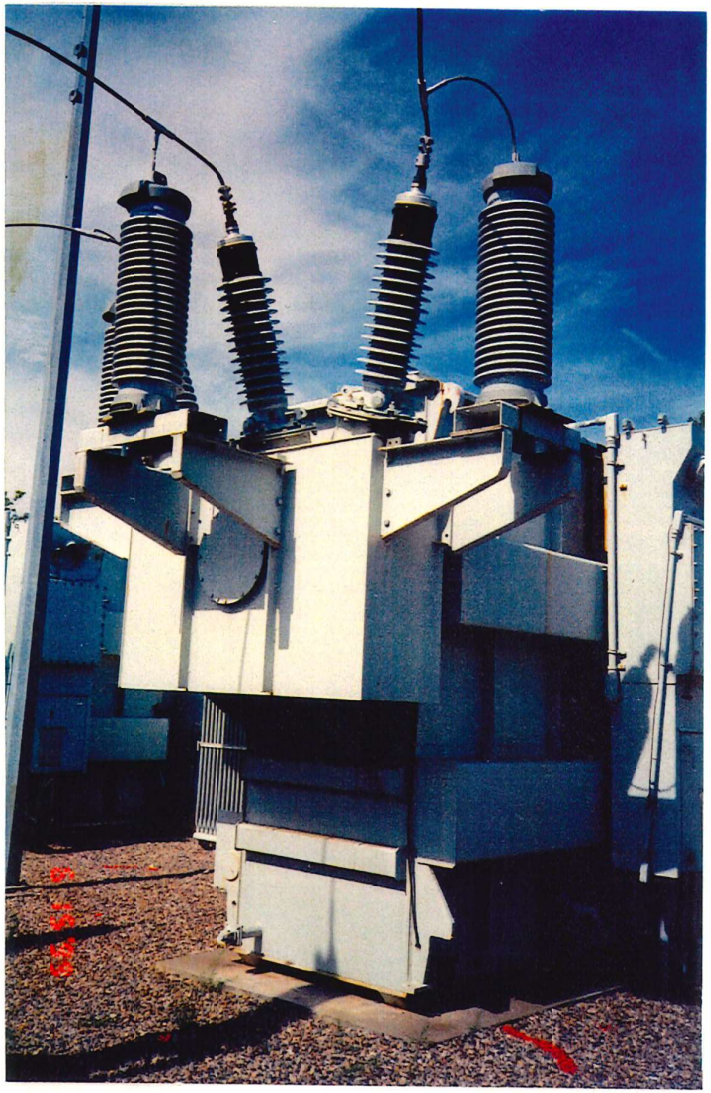


Photo 1.--View southwest of north transfomer .

Photo 2.--View looking south at SB-03(white painted grass).

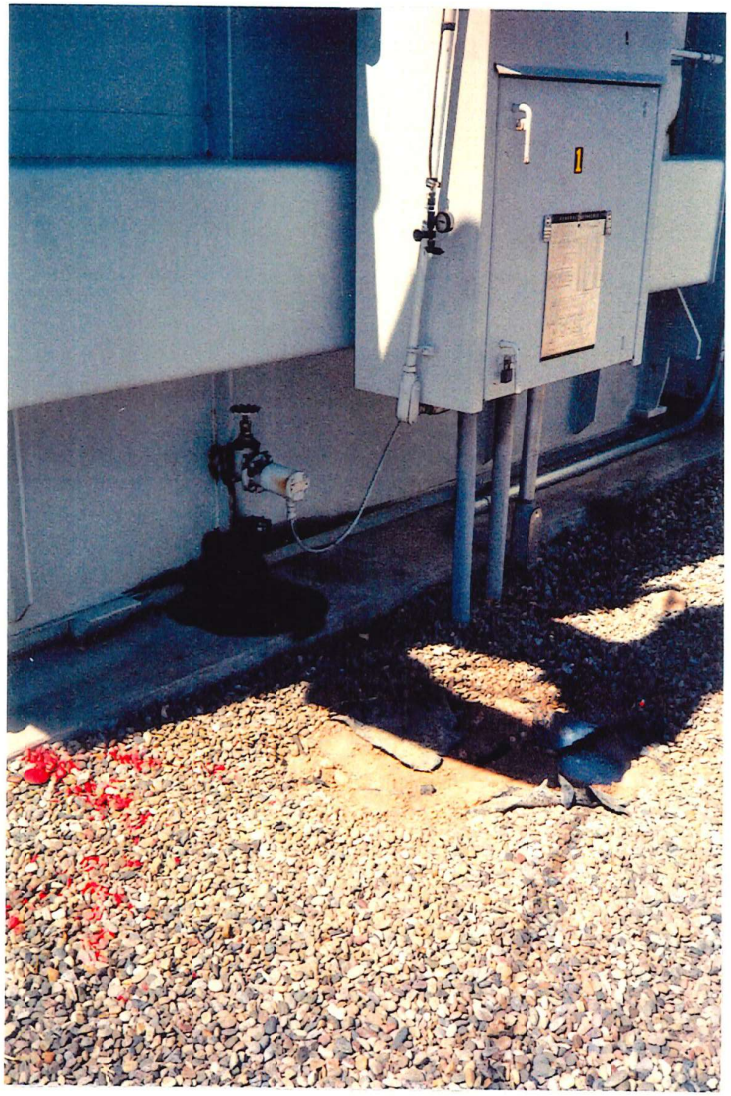


Photo 3.--View looking southwest at SouthTransformer.

Photo 4.--View looking east at Soil Boring SB-10.

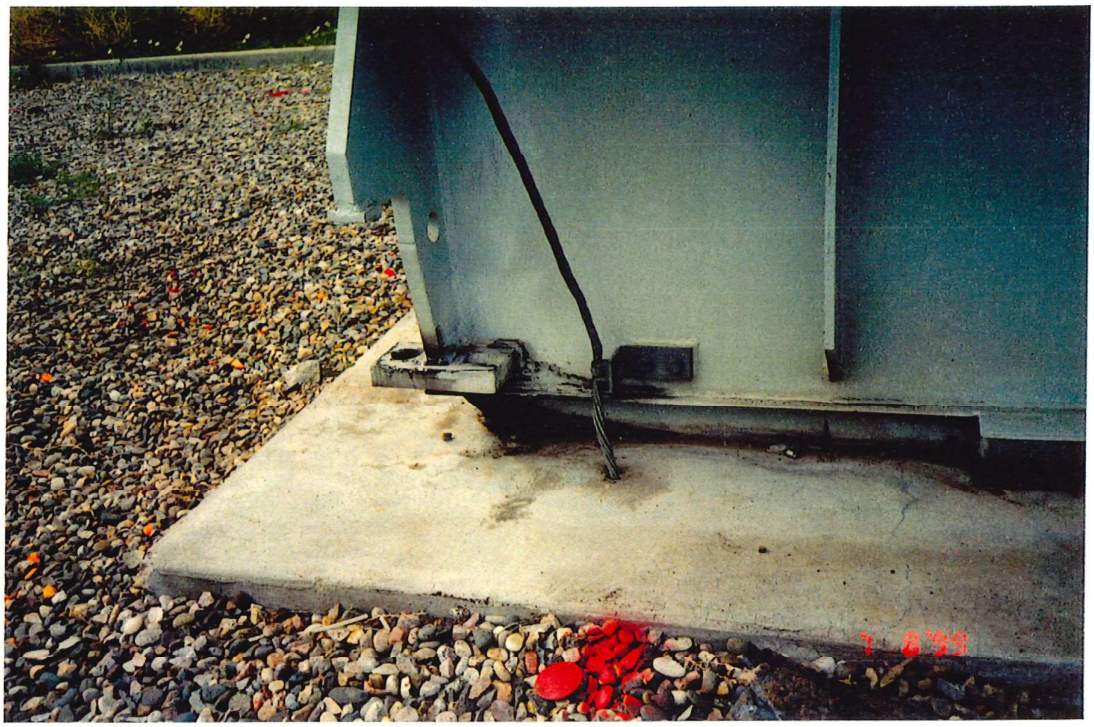


Photo 5.--View looking at northeast corner of south transformer after oil removal.

Photo 6.--View looking at soil removal area located at south transformer.

Photo 7.--View looking south at soil boring SB-4.

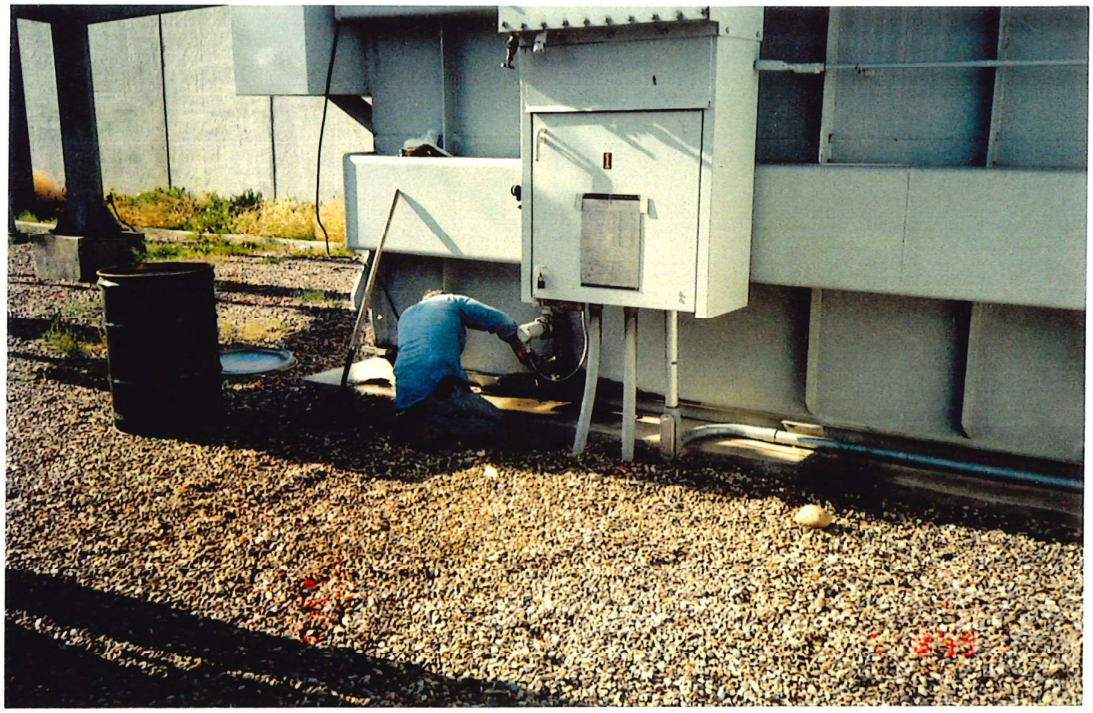


Photo 8.--View looking at PNM removing oil stains at south transformer..

Hall Environmental
Analysis Laboratory

June 17, 1999

Hall Environmental Analysis Laboratory
4901 Hawkins NE, Ste. A
Albuquerque, NM 87109

Dames & Moore
6565 Americas Pkwy., NE Ste. 610
Albuquerque, NM 87110

Dear Mr. Jeffs:

Enclosed are the results for the analyses that were requested. These were done according to EPA procedures or equivalent.

Detection limits are determined by EPA methodology. No determination of compounds below these (denoted by the ND or < sign) has been made.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

Andy Freeman
Assistant Laboratory Manager

Project: 9906058/UNM-PNM Substation

Hall Environmental Analysis Laboratory

Client:	Dames & Moore	**Date Collected:**	6/15/99
Project:	UNM-PNM Substation	**Date Received:**	6/15/99
Project Manager:	Wayne Jeffs	**Sample Matrix:**	Oil
Project Number:	31148-002-034	**Date Extracted:**	6/14/99

EPA Method - 8082

Units: PPM (mg/kg)

HEAL LAB ID	Sample ID	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	DCBP % Recovery	Dilution Factor	Date Analyzed
Ext. Blk.	-	ND	ND	ND	ND	ND	ND	ND	102	1	6/14/99
9906058-1	6851370B-No.2 LTC	ND	ND	ND	ND	ND	ND	ND	111	1	6/14/99
9906058-2	6851370B-No.2 Main	ND	ND	ND	ND	ND	ND	ND	99	1	6/14/99
9906058-3	6851370A-No.1 Main	ND	ND	ND	ND	ND	ND	ND	94	1	6/14/99
9906058-4	6851370A-No.1 LTC	ND	ND	ND	ND	ND	ND	ND	93	1	6/14/99

MDL	10	20	10	10	10	10	10

QC: BS/BSD 6/15

Analyte	MDL	Spike	Recovery	% Rec.	Duplicate	% Dup.	RPD
Arochlor 1260	<1.0 ug/L	5.0	4.8	96	4.7	94	2

CHAIN-OF-CUSTODY RECORD

HALL ENVIRONMENTAL ANALYSIS LABORATORY
4901 Hawkins NE, Suite A
Albuquerque, New Mexico 87109
505.345.3975
Fax 505.345.4107

Client: Dames & Moore	Project Name: UNM - PNM Substation
Address: 6565 Americas Pkwy Suite 610 ABQ, NM 87110	Project #: 31149-002-034
	Project Manager: Wayne Jeffs
Phone #: 884-2611	Sampler: Wayne Jeffs
Fax #: 888-1930	Samples Cold?: ☐ Yes ☐ No

ANALYSIS REQUEST

Date	Time	Matrix	Sample I.D. No.	Number/Volume	Preservative: $HgCl_2$	Preservative: HCl	Preservative: None	HEAL No.	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gasoline Only)	TPH Method 8015B MOD (Gas/Diesel)	TPH (Method 418.1)	Volatiles Full List (8021)	EDB (Method 504.1)	EDC (Method 8021)	8310 (PNA or PAH)	RCRA 8 Metals	Cations (Na, K, Ca, Mg)	Anions (F, Cl, NO_3, NO_2, PO_4, SO_4)	8081 Pesticides / PCB's (8082)	8260 (VOA)	8270 (Semi-VOA)	PCB - 8082		Air Bubbles or Headspace (Y or N)
5-15	9:28	oil	68513708 No. 2 LTC	2 - 40ml			X	9906058-1															X		
15	9:30	oil	68513708 No. 2 - Main	2 - 40ml			X	-2															X		
15	9:30	oil	68513704 No. 1 - Main	2 - 40ml			X	-3															X		
15	9:45	oil	68513704 No. 1 - LTC	2 - 40ml			X	-4															X		

Date	Time	Relinquished By: (Signature)	Received By: (Signature)
5-99	11:30	Wayne D. Jeffs	Lindy Freeman
Date:	Time:	Relinquished By: (Signature)	Received By: (Signature)

Remarks: Normal TAT
Keep extra 40 ml vial - contact Wayne Jeffs for disposal - Mark down transformer ID on sample report

Hall Environmental
Analysis Laboratory

July 9, 1999

Hall Environmental Analysis Laboratory
4901 Hawkins NE. Ste. A
Albuquerque, NM 87109

Dames & Moore
6565 Americas Pkwy. NE Ste. 610
Albuquerque, NM 87110

Dear Mr. Jeffs:

Enclosed are the results for the analyses that were requested. These were done according to EPA procedures or equivalent.

Detection limits are determined by EPA methodology. No determination of compounds below these (denoted by the ND or < sign) has been made.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

Andy Freeman
Assistant Laboratory Manager

Project: 9907039/UNM-PNM Transformer

Hall Environmental Analysis Laboratory

Client:	Dames & Moore	**Date Collected:**	7/8/99
Project:	UNM-PNM Transformer	**Date Received:**	7/8/99
Project Manager:	Wayne Jeffs	**Sample Matrix:**	Soil
Project Number:	38144-003-034(T)	**Extraction Date:**	7/8/99

EPA Method - 418.1

HEAL ID	Client ID	Dilution	TPH mg/kg	Analysis Date
9907039-1	S Transformer-S1	1	20	7/8/99
9907039-2	S Transformer-S2	1	20	7/8/99
Extraction Blank	-	1	ND	7/8/99

QA/QC		MRL	20	
Sample ID:	Sample Amount	Spike	Recovery	% Recovery
9907023-5 MS	<20	102	108	106
Sample ID:	Sample Amount	Duplicate	RPD	
9907023-5 MD	<20	<20	NA	

CHAIN-OF-CUSTODY RECORD

HALL ENVIRONMENTAL ANALYSIS LABORATORY
4901 Hawkins NE, Suite A
Albuquerque, New Mexico 87109
505.345.3975
Fax 505.345.4107

Client: Dames & Moore

Address: 6565 Americas Pkwy
Suite 610
ABQ, NM 87110

Phone #: 884-2611

Fax #: 888-1930

Project Name: UNM - PNM Transformer

Project #: 38144-003-034(T)

Project Manager: Wayne Jeffs

Sampler: Wayne Jeffs

Samples Cold?: ☐ Yes ☐ No

Date	Time	Matrix	Sample I.D. No.	Number/Volume	Preservative: $HgCl_2$	Preservative: HCl		HEAL No.
7-8-99	9:42	Soil	S. Transformer - S1	1 - 4oz.				9907039-1
7-8-99	9:45	Soil	S - Transformer - S2	1 - 4oz.				-2

ANALYSIS REQUEST

BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gasoline Only)	TPH Method 8015B MOD (Gas/Diesel)	TPH (Method 418.1)	Volatiles Full List (8021)	EDB (Method 504.1)	EDC (Method 8021)	8310 (PNA or PAH)	RCRA 8 Metals	Cations (Na, K, Ca, Mg)	Anions (F, Cl, NO_3, NO_2, PO_4, SO_4)	8081 Pesticides / PCB's (8082)	8260 (VOA)	8270 (Semi-VOA)	8082		Air Bubbles or Headspace (Y or N)
			X											X		
			X											X		

Date: 7-8-99 Time: 10:20 Relinquished By: (Signature) Wayne A. Jeffs

Received By: (Signature) @ 18:23

Date: Time: Relinquished By: (Signature)

Received By: (Signature)

Remarks: RUSH TAT - only analyze 8082 if 418.1 is greater than MDL
Please fax results by F. AM

By FAX

Hall Environmental
Analysis Laboratory

June 30, 1999

Hall Environmental Analysis Laboratory
4901 Hawkins NE, Ste. A
Albuquerque, NM 87109

Dames & Moore
6565 Americas Pkwy., NE Ste. 610
Albuquerque, NM 87110

Dear Mr. Jeffs:

Enclosed are the results for the analyses that were requested. These were done according to EPA procedures or equivalent.

Detection limits are determined by EPA methodology. No determination of compounds below these (denoted by the ND or < sign) has been made.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

6/30/99

Scott Hallenbeck
Laboratory Manager

Project: 9906126/UNM-PNM

Hall Environmental Analysis Laboratory

Client:	Dames & Moore	**Date Collected:**	6/29/99
Project:	UNM-PNM	**Date Received:**	6/29/99
Project Manager:	Wayne Jeffs	**Sample Matrix:**	Air
Project Number:	38144-002-034	**Extraction Date:**	NA

EPA Method - 8021

Units (ug/L)

	Client ID:	**SB-02**	**SB-03**	**SB-04**
	HEAL#:	9906126-1	9906126-2	9906126-3
	Analysis Date:	6/29/99	6/29/99	6/29/99
Compound	MDL	Result	Result	Result
Benzene	0.05	ND	ND	ND
Bromodichloromethane	0.02	ND	ND	ND
Bromoform	0.1	ND	ND	ND
Bromomethane	0.1	ND	ND	ND
Carbon Tetracholride	0.02	ND	ND	ND
Chlorobenzene	0.2	ND	ND	ND
Chloroethane	0.02	ND	ND	ND
Chloroform	0.02	ND	ND	ND
Chloromethane	0.02	ND	ND	ND
Dibromochloromethane	0.02	ND	ND	ND
1,2-Dichlorobenzene	0.02	ND	ND	ND
1,3-Dichlorobenzene	0.02	ND	ND	ND
1,4-Dichlorobenzene	0.02	ND	ND	ND
Dichlorodifluoromethane	0.02	ND	ND	ND
1,1-Dichloroethane	0.02	ND	ND	ND
1,2-Dichloroethane	0.02	ND	ND	ND
1,1-Dichloroethene	0.02	ND	ND	ND
1,2-Dichloroethene (Cis)	0.02	ND	ND	ND
1,2-Dichloroethene (Trans)	0.02	ND	ND	ND
1,2-Dichloropropane	0.02	ND	ND	ND
cis-1,3-Dichloropropene	0.02	ND	ND	ND
trans-1,3-Dichloropropene	0.02	ND	ND	ND
Ethylbenzene	0.05	ND	ND	ND
Dichloromethane	0.02	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.02	ND	ND	ND
Tetrachloroethene (PCE)	0.02	**0.04**	ND	ND
Toluene	0.05	ND	ND	**0.09**
1,1,1-Trichloroethane	0.02	ND	ND	ND
1,1,2-Trichloroethane	0.02	ND	ND	ND
Trichloroethene (TCE)	0.02	ND	ND	ND
1,2,4-Trimethylbenzene	0.05	ND	ND	ND
1,3,5-Trimethylbenzene	0.05	ND	ND	ND
Vinyl Chloride	0.02	ND	ND	ND
Total Xylenes	0.05	ND	ND	ND
Trichlorofluoromethane	0.02	ND	ND	ND
MTBE	0.25	ND	ND	ND
BFB (Surrogate) Recovery		107%	109%	94%
BCM (Surrogate) Recovery		83%	94%	99%
Dilution Factor		1	1	1

Hall Environmental Analysis Laboratory

Client:	Dames & Moore	**Date Collected:**	6/29/99
Project:	UNM-PNM	**Date Received:**	6/29/99
Project Manager:	Wayne Jeffs	**Sample Matrix:**	Air
Project Number:	38144-002-034	**Extraction Date:**	NA

EPA Method - 8021

Units (ug/L)

	Client ID:	SB-01	-
	HEAL#:	9906126-4	Reagent Blank
	Analysis Date:	6/29/99	6/29/99
Compound	MDL	Result	Result
Benzene	0.05	ND	ND
Bromodichloromethane	0.02	ND	ND
Bromoform	0.1	ND	ND
Bromomethane	0.1	ND	ND
Carbon Tetracholride	0.02	ND	ND
Chlorobenzene	0.2	ND	ND
Chloroethane	0.02	ND	ND
Chloroform	0.02	ND	ND
Chloromethane	0.02	ND	ND
Dibromochloromethane	0.02	ND	ND
1,2-Dichlorobenzene	0.02	ND	ND
1,3-Dichlorobenzene	0.02	ND	ND
1,4-Dichlorobenzene	0.02	ND	ND
Dichlorodifluoromethane	0.02	ND	ND
1,1-Dichloroethane	0.02	ND	ND
1,2-Dichloroethane	0.02	ND	ND
1,1-Dichloroethene	0.02	ND	ND
1,2-Dichloroethene (Cis)	0.02	ND	ND
1,2-Dichloroethene (Trans)	0.02	ND	ND
1,2-Dichloropropane	0.02	ND	ND
cis-1,3-Dichloropropene	0.02	ND	ND
trans-1,3-Dichloropropene	0.02	ND	ND
Ethylbenzene	0.05	ND	ND
Dichloromethane	0.02	ND	ND
1,1,2,2-Tetrachloroethane	0.02	ND	ND
Tetrachloroethene (PCE)	0.02	0.04	ND
Toluene	0.05	ND	ND
1,1,1-Trichloroethane	0.02	ND	ND
1,1,2-Trichloroethane	0.02	ND	ND
Trichloroethene (TCE)	0.02	ND	ND
1,2,4-Trimethylbenzene	0.05	ND	ND
1,3,5-Trimethylbenzene	0.05	ND	ND
Vinyl Chloride	0.02	ND	ND
Total Xylenes	0.05	ND	ND
Trichlorofluoromethane	0.02	ND	ND
MTBE	0.25	ND	ND
Napthalene			
BFB (Surrogate) Recovery		109%	98%
BCM (Surrogate) Recovery		97%	93%
Dilution Factor		1	1

Hall Environmental
Analysis Laboratory

Client:	Dames & Moore	**Date Collected:**	NA
Project:	UNM-PNM	**Date Received:**	NA
Project Manager:	Wayne Jeffs	**Sample Matrix:**	Aqueous
Project Number:	38144-002-034	**Date Extracted:**	NA

8021 QC: BS/BSD 6/28

Compound	Sample Amount (ug/L)	Spike	Recovery	% Rec	Dup	% Dup	RPD
Benzene	<0.5	20.0	20.2	101	19.9	100	1
Toluene	<0.5	20.0	20.1	101	19.5	98	3
Ethylbenzene	<0.5	20.0	20.1	101	20.6	103	2
1,1 - DCE	<0.2	20.0	20.7	104	20.1	101	3
Trans-1,2-DCE	<0.2	20.0	20.7	104	20.2	101	2
1,2 - DCA	<0.2	20.0	20.9	105	20.3	102	3
Carbon Tet.	<0.2	20.0	20.5	103	20.5	103	0
TCE	<0.2	20.0	20.7	104	20.0	100	3
PCE	<0.2	20.0	20.7	104	21.1	106	2

CHAIN-OF-CUSTODY RECORD

Client: Dames & Moore

Address: 6565 Americas Parkway NE
Suite 610
ABQ, NM 87110

Phone #: (505) - 884-2611

Fax #: (505) - 889-1930

Project Name: UNM - PNM

Project #: 38144-002-034

Project Manager: Wayne Jeffs

Sampler: Wayne Jeffs

Samples Cold?: ☐ Yes ☐ No

Date	Time	Matrix	Sample I.D. No.	Number/Volume	Preservative $HgCl_2$	Preservative HCl	Preservative	HEAL No.
6-29-99	8:45	Air	SB-02	1-1l				9906126-1
"	9:00	Air	SB-03	1-1l				-2
"	9:15	Air	SB-04	1-1l				-3
"	9:30	Air	SB-01	1-1l				-4

Date	Time	Relinquished By: (Signature)	Received By: (Signature)
6-29-99	11:20	Wayne S. Jeffs	6/27/99 11:23
Date:	Time:	Relinquished By: (Signature)	Received By: (Signature)

HALL ENVIRONMENTAL ANALYSIS LABORATORY
4901 Hawkins NE, Suite A
Albuquerque, New Mexico 87109
505.345.3975
Fax 505.345.4107

ANALYSIS REQUEST

BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gasoline Only)	TPH Method 8015B MOD (Gas/Diesel)	TPH (Method 418.1)	Volatiles Full List (8021)	EDB (Method 504.1)	EDC (Method 8021)	8310 (PNA or PAH)	RCRA 8 Metals	Cations (Na, K, Ca, Mg)	Anions (F, Cl, NO_3, NO_2, PO_4, SO_4)	8081 Pesticides / PCB's (8082)	8260 (VOA)	8270 (Semi-VOA)			Air Bubbles or Headspace (Y or N)
				X												
				X												
				X												
				X												

Remarks: Rush TAT - 50%
+ Client supplied 3 of 4 Tedlar bags - deduct $30.00 from Invoice

Hall Environmental
Analysis Laboratory

June 30, 1999

Hall Environmental Analysis Laboratory
4901 Hawkins NE, Ste. A
Albuquerque, NM 87109

Dames & Moore
6565 Americas Pkwy., NE Ste. 610
Albuquerque, NM 87110

Dear Mr. Jeffs:

Enclosed are the results for the analyses that were requested. These were done according to EPA procedures or equivalent.

Detection limits are determined by EPA methodology. No determination of compounds below these (denoted by the ND or < sign) has been made.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

Andy Freeman
Assistant Laboratory Manager

Project: 9906097/UNM-PNM

4901 Hawkins NE, Suite A, Albuquerque, NM 87109
Ph (505) 345-3975, Fax (505) 345-4107

Hall Environmental Analysis Laboratory

Client:	Dames & Moore	**Date Collected:**	6/23/99
Project:	UNM/PNM	**Date Received:**	6/23/99
Project Manager:	Wayne Jeffs	**Sample Matrix:**	Soil
Project Number:	38144-002-034	**Extraction Date:**	6/23/99

EPA Method - 418.1

HEAL ID	Client ID	Dilution	TPH mg/kg	Analysis Date
9906097-1	SB05-1.0-1.5	1	21	6/24/99
9906097-2	SB05-6.0	1	ND	6/24/99
9906097-3	SB06-1.0-1.5	1	33	6/24/99
9906097-4	SB06-6	1	ND	6/24/99
9906097-5	SB07-1.0-1.5	1	ND	6/24/99
9906097-6	SB07-30"	1	23	6/24/99
9906097-7	SB08-1.5-2.0	1	ND	6/24/99
9906097-8	SB08-2.5-3.0	1	45	6/24/99
9906097-9	SB09-1.5-2.0	1	20	6/24/99
9906097-10	SB09-2.5-3.0	1	26	6/24/99
9906097-11	SB01-0.5-2.5	1	36	6/24/99
9906097-12	SB01-26-30	1	ND	6/24/99
9906097-13	SB02-0.5-4.0	1	ND	6/24/99
9906097-14	SB02-26-30	1	ND	6/24/99
9906097-15	SB03-0.5-4.0	1	ND	6/24/99
9906097-16	SB03-26-30	1	ND	6/24/99
9906097-17	SB04-0.5-4.0	1	ND	6/24/99
		MRL	20	

QA/QC

Sample ID:	Sample Amount	Spike	Recovery	% Recovery
9906097-14 MS	<20	102	95	93

Sample ID:	Sample Amount	Duplicate	RPD
9906097-14 MD	<20	<20	NA

Hall Environmental Analysis Laboratory

Client:	Dames & Moore	**Date Collected:**	6/23/99
Project:	UNM-PNM	**Date Received:**	6/23/99
Project Manager:	Wayne Jeffs	**Sample Matrix:**	Soil
Project Number:	38144-002-034	**Date Extracted:**	6/25,28/99

EPA Method - 8082

Units: PPM (mg/kg)

HEAL LAB ID	Sample ID	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	DCBP % Recovery	Dilution Factor	Date Analyzed
Ext. Blk	-	ND	ND	ND	ND	ND	ND	ND	93	1	6/28/99
Ext. Blk	-	ND	ND	ND	ND	ND	ND	ND	77	1	6/29/99
9906097-1	SB05-1.0-1.5	ND	ND	ND	ND	ND	ND	ND	**50	1	6/29/99
9906097-3	SB06-1.0-1.5	ND	ND	ND	ND	ND	ND	**0.016**	83	1	6/28/99
9906097-6	SB07-30"	ND	ND	ND	ND	ND	ND	**0.027**	83	1	6/28/99
9906097-8	SB08-2.5-3.0	ND	ND	ND	ND	ND	ND	ND	88	1	6/28/99
9906097-9	SB09-1.5-2.0	ND	ND	ND	ND	ND	ND	ND	**56	1	6/29/99
9906097-10	SB09-2.5-3.0	ND	ND	ND	ND	ND	ND	ND	84	1	6/28/99
9906097-11	SB01-0.5-2.5	ND	ND	ND	ND	ND	ND	ND	89	1	6/28/99

**Surrogate recovery low due to matrix interference

MDL		0.01	0.05	0.01	0.01	0.01	0.01	0.01

QC: BS/BSD 6/25

Analyte	MDL	Spike	Recovery	% Rec.	Duplicate	% Dup	RPD
Arochlor 1260	<0.01 ug/L	0.05	0.052	104	0.51	102	2

QC: BS/BSD 6/28

Analyte	MDL	Spike	Recovery	% Rec.	Duplicate	% Dup	RPD
Arochlor 1260	<0.01ug/L	0.05	0.042	84	0.042	84	0

CHAIN-OF-CUSTODY RECORD

HALL ENVIRONMENTAL ANALYSIS LABORATORY
4901 Hawkins NE, Suite A
Albuquerque, New Mexico 87109
505.345.3975
Fax 505.345.4107

Client: Dames + Moore

Address: 6565 Americas Pkwy Suite 610 Albq, NM 87110

Phone #: 884-2611

Fax #: 888-1930

Project Name: UNM/PNM

Project #: 38144-002-034

Project Manager: Wayne Jeffs

Sampler: WSJ/RKW

Samples Cold?: ☐ Yes ☐ No

Date	Time	Matrix	Sample I.D. No.	Number/Volume	Preservative: $HgCl_2$	Preservative: HCl		HEAL No.
6/21/99	9.14	soil	SB05-1.0-1.5	1/4 oz				9906097-1
	9:35		SB05-6.0	1/4 oz				-2
	10:00		SB06-1.0-1.5	1/4 oz				-3
	11:45		SB06-6	1/4 oz				-4
	11:15		SB07-1.0-1.5	1/4 oz				-5
	11:30		SB07-30"	1/4 oz				-6
	1:25		SB08-1.5-2.0	1/4 oz				-7
	1.55		SB08-2.5-3.0	1/4 oz.				-8
	2.40		SB09-1.5-2.0	1/4 oz.				-9
V	3.15	V	SB09-2.5-3.0	1/4 oz.				-10

ANALYSIS REQUEST

BTEX + MTBE + TMBs (8021)	BTEX + MTBE + TPH (Gasoline Only)	TPH Method 8015B MOD (Gas/Diesel)	TPH (Method 418.1)	Volatiles Full List (8021)	EDB (Method 504.1)	EDC (Method 8021)	8310 (PNA or PAH)	RCRA 8 Metals	Cations (Na, K, Ca, Mg)	Anions (F, Cl, NO_3, NO_2, PO_4, SO_4)	8081 Pesticides / PCBs (8082)	8260 (VOA)	8270 (Semi-VOA)	8082		Air Bubbles or Headspace (Y or N)
			X											X		
			X											X		
			X											X		
			X											X		
			X											X		
			X											X		
			X											X		
			X											X		
			X											X		
			X											X		

Date: 6/23/99 Time: 4:15 Relinquished By: (Signature) Wayne A. Jeffs

Received By: (Signature) 6/23

Date: Time: Relinquished By: (Signature)

Received By: (Signature)

Remarks: Rush TAT

Only run 8082 if 418.1 is above MDL (20 mg/kg)

CHAIN-OF-CUSTODY RECORD

HALL ENVIRONMENTAL ANALYSIS LABORATORY
4901 Hawkins NE, Suite A
Albuquerque, New Mexico 87109
505.345.3975
Fax 505.345.4107

Client: Dames + Moore

Address: 6565 Americas Pkwy Suite 610, Albq., NM 87110

Phone #: 884-2611

Fax #: 888-K130

Project Name: UNM / DNM

Project #: 38144-002-034

Project Manager: Wayne Jeffs

Sampler: WSJ/RRW

Samples Cold?: ☐ Yes ☐ No

Date	Time	Matrix	Sample I.D. No.	Number/Volume	Preservative $HgCl_2$	Preservative HCl	Preservative	HEAL No.
6/23/99	9:45	soil	SB01-0.5-~~4.0~~ 2.5	1/4 oz				9906097-11
	9:25		SB01-26-30	1/4oz				-12
	10:10		SB02-0.5-4.0	1/4oz				-13
	10:45		SB02-26-30	1/4oz				-14
	11:05		SB03-0.5-4.0	1/4 oz				-15
	11:30		SB03-26-30	1/4 oz				-16
	1:20		SB04-0.5-4.0	1/4 oz				-17
			~~SB05-4.0~~					
			~~SB04~~					

ANALYSIS REQUEST

BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gasoline Only)	TPH Method 8015B MOD (Gas/Diesel)	TPH (Method 418.1)	Volatiles Full List (8021)	EDB (Method 504.1)	EDC (Method 8021)	8310 (PNA or PAH)	RCRA 8 Metals	Cations (Na, K, Ca, Mg)	Anions (F, Cl, NO_3, NO_2, PO_4, SO_4)	8081 Pesticides / PCB's (8082)	8260 (VOA)	8270 (Semi-VOA)	8082		Air Bubbles or Headspace (Y or N)
			X											X		
			√											X		
			X											X		
			X											X		
			√											X		
			X											X		

Date:	Time:	Relinquished By: (Signature)	Received By: (Signature)	
2399	4:15	Wayne D. Jeffs		6/23
Date:	Time:	Relinquished By: (Signature)	Received By: (Signature)	

Remarks: Rush TAT

Only run 8082 if 418.1 is above MDL (20 mg/kg)

Hall Environmental
Analysis Laboratory

June 30, 1999

Hall Environmental Analysis Laboratory
4901 Hawkins NE, Ste. A
Albuquerque, NM 87109

Dames & Moore
6565 Americas Pkwy., NE Ste. 610
Albuquerque, NM 87110

Dear Mr. Jeffs:

Enclosed are the results for the analyses that were requested. These were done according to EPA procedures or equivalent.

Detection limits are determined by EPA methodology. No determination of compounds below these (denoted by the ND or < sign) has been made.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

Andy Freeman
Assistant Laboratory Manager

Project: 9906099/UNM-PNM Transformer

Hall Environmental Analysis Laboratory

Client:	Dames & Moore	**Date Collected:**	6/24/99
Project:	UNM-PNM Transformer	**Date Received:**	6/24/99
Project Manager:	Wayne Jeffs	**Sample Matrix:**	Soil
Project Number:	38144-002-034	**Extraction Date:**	6/24/99

EPA Method - 418.1

HEAL ID	Client ID	Dilution	TPH mg/kg	Analysis Date
9906099-1	SB-10 1 5-2.0	1	29	6/25/99
9906099-2	SB-10 4 0'	1	ND	6/25/99
9906099-3	SB-04-26-30	1	ND	6/25/99
9906099-4	Surface-S Transformer	1	130	6/25/99
Extraction Blank	-	1	ND	6/25/99

		MRL	20	
QA/QC				
Sample ID:	Sample Amount	Spike	Recovery	% Recovery
9906099-3 MS	<20	102	99	97
Sample ID:	Sample Amount	Duplicate	RPD	
9906099-3 MD	<20	<20	NA	

Hall Environmental Analysis Laboratory

Client:	Dames & Moore	**Date Collected:**	6/24/99
Project:	UNM-PNM Transformer	**Date Received:**	6/24/99
Project Manager:	Wayne Jeffs	**Sample Matrix:**	Soil
Project Number:	38144-002-034	**Date Extracted:**	6/25/99

EPA Method - 8082

Units: PPM (mg/kg)

HEAL LAB ID	Sample ID	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	DCBP % Recovery	Dilution Factor	Date Analyzed
Ext. Blk.	-	ND	ND	ND	ND	ND	ND	ND	93	1	6/28/99
9906099-1	SB-10 1.5-2.0	ND	ND	ND	ND	ND	ND	ND	84	1	6/28/99
9906099-4	Surface-S. Transformer	ND	ND	ND	ND	ND	ND	ND	67	1	6/28/99
MDL		0.01	0.05	0.01	0.01	0.01	0.01	0.01			

QC: BS/BSD 6/25

Analyte	MDL	Spike	Recovery	% Rec.	Duplicate	% Dup.	RPD
Arochlor 1260	<0.01 ug/L	0.05	0.052	104	0.51	102	2

Hall Environmental Analysis Laboratory

Client:	Dames & Moore	**Date Collected:**	6/24/99
Project:	UNM-PNM Transformer	**Date Received:**	6/24/99
Project Manager:	Wayne Jeffs	**Sample Matrix:**	Paint Chips
Project Number:	38144-002-034	**Digestion Date:**	6/29/99

EPA Method - 3050/7420

HEAL ID	Client ID	Dilution	Total Pb PPM mg/L	Analysis Date
9906099-5	S Transformer S Side	1	2.560	6/29/99
9906099-6	N Transformer S Side	1	2.960	6/29/99
Method Blank	-	1	ND	6/29/99

MRL	10

QA/QC:

Sample ID:	Sample Amt.	Spike	Rec.	%
9906365-7 MS	<10	100	121	121

Sample ID:	Sample Amt.	Duplicate	RPD
9906366-1 Dup	<10	<10	NA

CHAIN-OF-CUSTODY RECORD

HALL ENVIRONMENTAL ANALYSIS LABORATORY
4901 Hawkins NE, Suite A
Albuquerque, New Mexico 87109
505.345.3975
Fax 505.345.4107

Client: Ogden & Moore

Address: 6565 Americas Parkway
Suite 60
ABQ, NM 87110

Phone #: 884-2611

Fax #: 888-1930

Project Name: UNM - PNM Transformer

Project #: 38144-002-034

Project Manager: Wayne Jeffs

Sampler: Wayne Jeffs

Samples Cold?: ☐ Yes ☐ No

Date	Time	Matrix	Sample I.D. No.	Number/Volume	Preservative $HgCl_2$	Preservative HCl	Preservative	HEAL No.
6-24-99	9:00	Soil	SB-10 1.5 to 2.0	1-4oz				9906049-1
"	9:45	"	SB-10 4.0'	1-4oz				-2
"	8:55	"	SB-04-26-30	1-4oz				-3
"	10:30	"	Surface - S. Transformer *	"				-4
"	10:30	"	S. Transformer - S. side	Bag				-5
"	10:17	"	N. Transformer - S. side	Bag				-6

ANALYSIS REQUEST

BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gasoline Only)	TPH Method 8015B MOD (Gas/Diesel)	TPH (Method 418.1)	Volatiles Full List (8021)	EDB (Method 504.1)	EDC (Method 8021)	8310 (PNA or PAH)	RCRA 8 Metals	Cations Na, K, Ca, Mg	Anions (F, Cl, NO_3, NO_2, PO_4, SO_4)	8081 Pesticides / PCB's (8082)	8260 (VOA)	8270 (Semi-VOA)	8082	7240 - Hg Only	Air Bubbles or Headspace (Y or N)
			X											X		
			X											X		
			X											X		
			X											X		
			X											X		
															X	
															X	

Date: 6-24-99 Time: 11:40 Relinquished By: (Signature) Wayne Jeffs

Date: Time: Relinquished By: (Signature)

Received By: (Signature) 6/24/99 1130

Received By: (Signature)

Remarks: Rush TAT

* Run Both 418.1 and 8082 - S. Transformer - Surface

* Only Run 8082 if 418.1 is above MDL

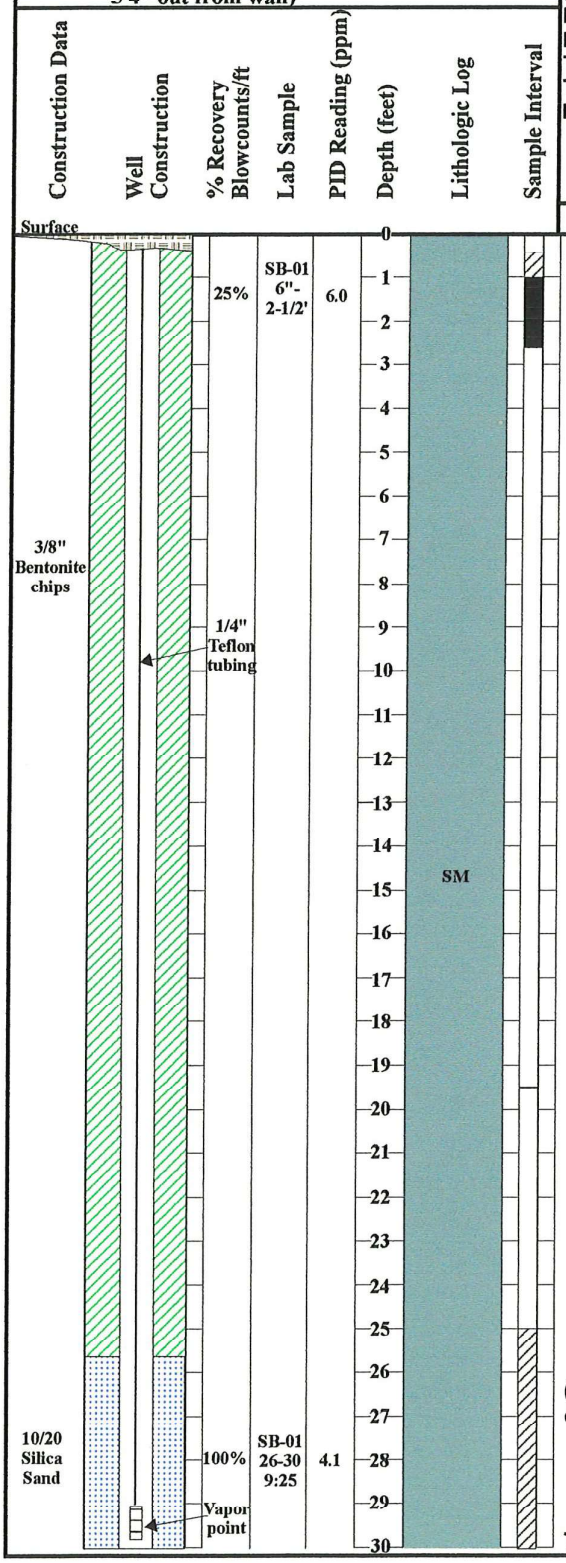
* Rush TAT on Above Samples

SITE: UNM/PNM Substation (SW corner of tranformer banks, 5'4" out from wall)

Soil Boring SB-01

Job No: 38144-002-034
Date of Drilling: 6/23/98
Driller: D. Roland
Top of Casing: N/A
Total Depth: 30 ft
Depth to water: N/A

Client: UNM
Drilling Co: SHIB
Sampling Method: 2'-2" Split spoon
Borehole Diameter: 2 inch
Type of Drilling: Direct push
Logged by: RRW



Lithological Description

Surface conditions: Landscaped lawn, grass sample collected at 6" to 2-1/2' bsg.

Only about 25% recovery (about 2oz.).

Moved rig over to collect additional surface sample, because of lack of sufficient recovery.

(0.5 - 2.5) SM silty sand, fine to medium-grained sand, red to brown, moist, no gravel; (25%/ 6") recovery with split spoon.

Drilling firm then loose about 15' bsg, then firm again about 20' bsg.

(26.0 - 30.0) 100% recovery SM, as above, more coarse grained sand, moist

TD = 30.0'

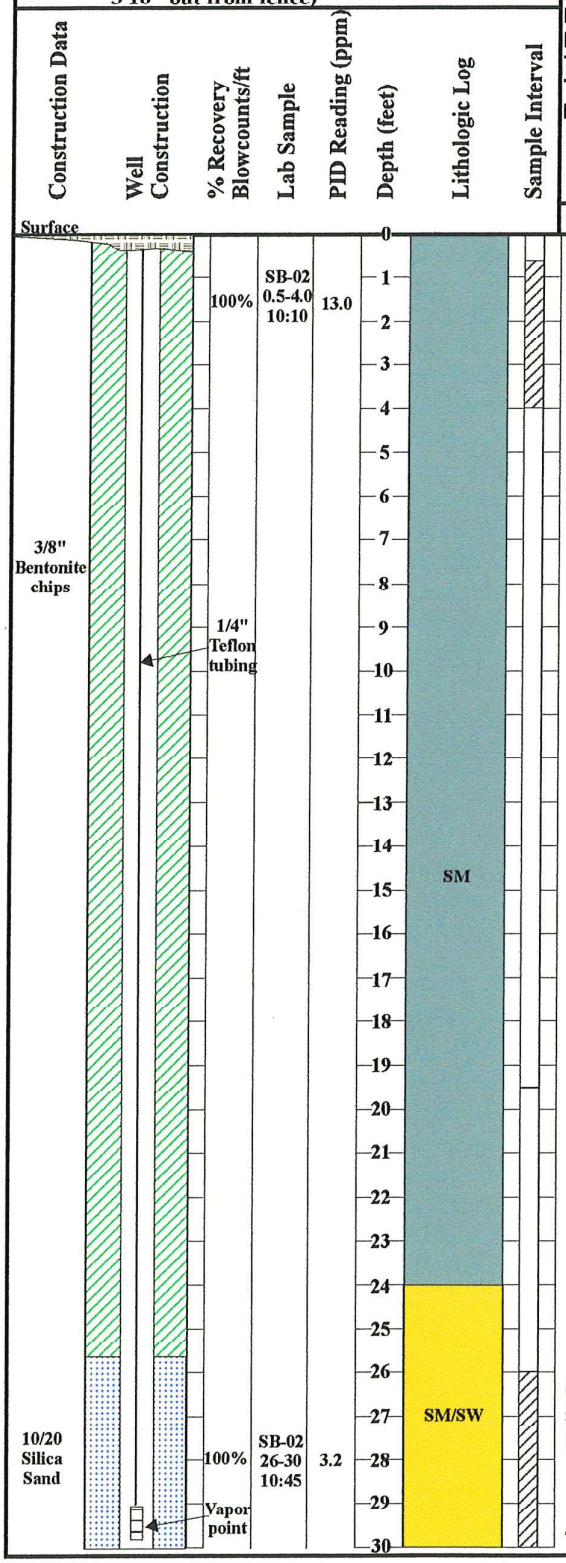
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SITE: UNM/PNM Substation (NW corner of tranformer site, 3'10" out from fence)

Soil Boring SB-02

Job No: 38144-002-034
Date of Drilling: 6/23/98
Driller: D. Roland
Top of Casing: N/A
Total Depth: 30 ft
Depth to water: N/A

Client: UNM
Drilling Co: SHIB
Sampling Method: 2'-2" Split spoon
Borehole Diameter: 2 inch
Type of Drilling: Direct push
Logged by: RRW



Lithological Description

Surface conditions: Landscaped gravel

(0.5 - 4.0) 100% recovery. SM silty sand, fine to medium-grained sand, with clay, red to brown, moist

(26.0 - 30.0) 100% recovery SM/SW, well graded silty sand, fine to coarse grained sand, slightly damp, red to brown.

TD = 30.0'

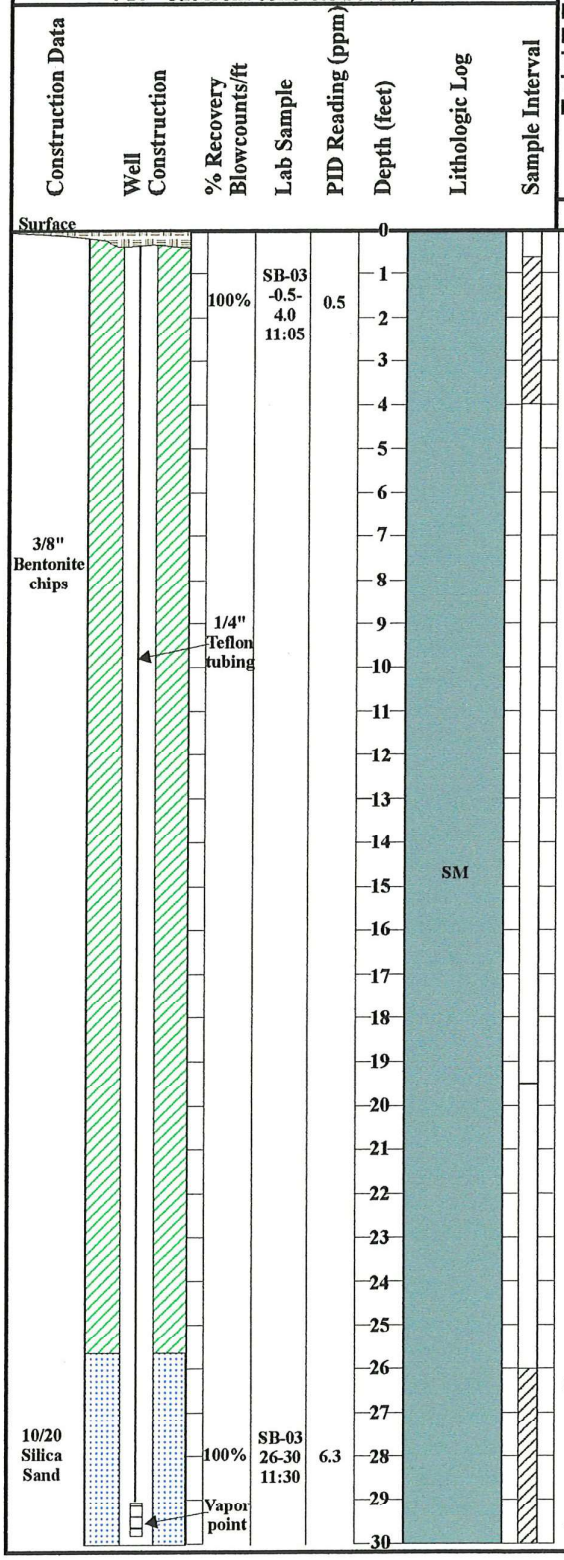
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SITE: UNM/PNM Substation (NE corner of tranformer site, 4'10" out from concrete border)

Soil Boring SB-03

Job No: 38144-002-034
Date of Drilling: 6/23/98
Driller: D. Roland
Top of Casing: N/A
Total Depth: 30 ft
Depth to water: N/A

Client: UNM
Drilling Co: SHIB
Sampling Method: 2'-2" Split spoon
Borehole Diameter: 2 inch
Type of Drilling: Direct push
Logged by: RRW



Lithological Description

Surface conditions: Landscaped grass

(0.5 - 4.0) 100% recovery. SM silty sand, fine grained sand, red to brown, moist.

(26.0 - 30.0) 100% recovery SM as above, moist

TD = 30.0'

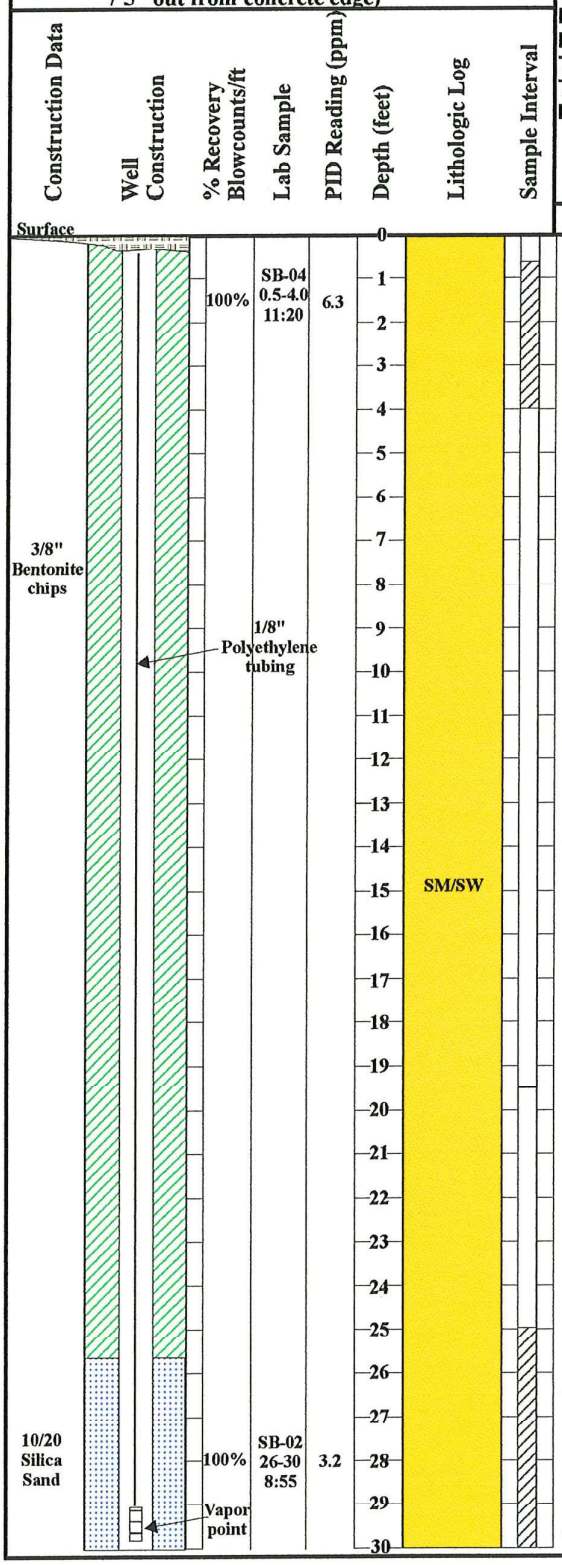
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SITE: UNM/PNM Substation (East side of tranformer area, 7'5" out from concrete edge)

Soil Boring SB-04

Job No: 38144-002-034
Date of Drilling: 6/23/98
Driller: D. Roland
Top of Casing: N/A
Total Depth: 30 ft
Depth to water: N/A

Client: UNM
Drilling Co: SHB
Sampling Method: 2'-2" Split spoon
Borehole Diameter: 2 inch
Type of Drilling: Direct push
Logged by: RRW



Lithological Description

Surface conditions: Landscaped grass

(0.5 - 4.0) 100% recovery. SM/SW well graded silty sand, fine to coarse grained sand.

*** Fuel pump on DPT rig broke, ended drilling at 2:30. Will continue 6/24/99 am.**

*** Resumed drilling at 8:25 am, 6/24/99. Resest DPT rig next to previous borehole.**

(26.0 - 30.0) 100% recovery SM/SW, as above, moist, red to brown.

TD = 30.0'

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

Health & Safety

Sacramento

HSP Transmittal

To: Wayne Jeffs - ABQ
From: John Danby - SAC
Subject: **SITE SAFETY PLAN DOCUMENTATION**
Date: June 11, 1999
Reply By: ***Project Start Date***

Attached is the Health and Safety Plan (HSP) you requested for the UNM/PNM project. ***Please insert a Hospital Route Map in the Attachments.*** Have the Project Manager and Project Principal-in-Charge sign the approval page and return a copy of the signed page to Pam Baldridge (SAC) **PRIOR TO THE START** of field operations (fax is acceptable).

It is essential that the key Dames & Moore site operations personnel review this plan prior to the start of work. If there are any problems or questions regarding the HSP or its implementation, contact me immediately for prompt resolution of the issue.

The completed Safety Compliance Agreement Form (which incorporates the compliance agreement, briefing form, air monitoring log, and calibration check sheet) is to be retained in the project file. This file is subject to audit by the Health & Safety staff.

If this job is cancelled or delayed, please notify Pam Baldridge (SAC) so she won't harass you for the approval page.

Please contact me if you have any questions.

UNMPNM.232

HEALTH AND SAFETY PLAN
SITE ASSESSMENT
UNM/PNM TRANSFORMER STATION
ALBUQUERQUE, NEW MEXICO

		PHONE
Project Number:		
Project Manager:	Wayne Jeffs	505-884-2611
Plan Preparer:	John G. Danby, CIH	916-387-7554
Preparation Date:	June 11, 1999	
Expiration Date:	November 11, 1999	

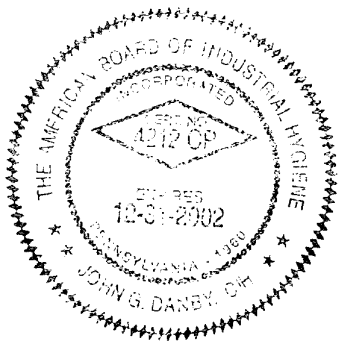
APPROVALS

Plan Preparer:

John G. Danby, CIH — 6/11/99 (DATE)

Division Health and Safety Manager:

John G. Danby, CIH — 6/11/99 (DATE)



Project Manager:

Wayne Jeffs — 6-16-99 (DATE)

Project Principal-in-Charge:

Abby Nagy — 6/16/99 (DATE)

THIS HSP IS TO BE USED FOR THE SPECIFIC PROJECT DESCRIBED HEREIN. IT IS NOT TO BE USED FOR ANY OTHER PROJECT, NOR IS IT TO BE USED FOR PROJECTS IN WHICH SIGNIFICANT CONTAMINANT REMOVAL IS REQUIRED.

SITE HEALTH AND SAFETY PLAN
GEOPROBE DRILLING ACTIVITIES

Activities covered under this HSP include the oversight of geoprobe drilling and hand auger drilling activities. This plan has been developed for Dames & Moore personnel; it is not intended for subcontractor or client use.

Dames & Moore personnel on this project must meet the training requirements of 29 CFR 1910.120(e) and be participating in a medical surveillance program as per 29 CFR 1910.120(f). Eating, drinking and smoking will only be allowed in designated areas of the support zone.

This plan is valid only for the specific project identified in the following project description. The Project Manager and Site Safety officer are responsible for implementation of this plan which includes the site safety briefing. Field activities are limited to providing general oversight in accordance with the workplan, and obtaining soil and/or groundwater samples for laboratory analysis.

PROJECT DESCRIPTION

Project Name UNM PNM Transformer Station Assessment Field Dates 6/15-7/15/99

Site Address UNM Central Campus, Las Lomas and Lomas Ave., Albuquerque

SITE HISTORY

Electrical substation contains two large transformers and associated switch gear. Transformers may contain PCB dielectric fluid.

SCOPE OF WORK

Under the guidance of a utility company representative, Dames & Moore will:

- Collect samples of dielectric fluid from the transformers and other equipment
- Collect surficial soil samples
- Use hand auger methods to collect subsurface soil samples
- Observe the direct-push drilling of soil borings outside the transformer security enclosure.

RESPONSIBLE PERSONNEL	Name	Phone
Project Manager	Wayne Jeffs	505-884-2611
Site Manager	Wayne Jeffs	505-884-2611
Site Safety Officer	Wayne Jeffs	505-884-2611

PLAN PREPARER John G. Danby, CIH Date June 11, 1999

REGIONAL HEALTH AND SAFETY MANAGER (RHSM) Susan Gulbrandsen

RHSM PHONE NUMBERS (805) 683-0213 (w) or (805) 381-0774 (h)

DUTY SAFETY OFFICER - 800-364-3765

EMERGENCY/CONTINGENCY INFORMATION

Hospital/Clinic University Hospital Phone No. 505-272-2111

Hospital Address Across street from the site

Paramedic 911 Fire Dept. 911 Police Dept. 911

Hospital Directions:
University Hospital is across the street from the site.

EMERGENCY/CONTINGENCY PLAN

Coordinate evacuation procedures with the utility company representative and remain a safe distance from the emergency. Perform First Aid/CPR as warranted by the situation. Do not move personnel with suspected neck or back injuries. Report all injuries to the supervisor (see Attachments). Note: the hospital route map is located in the Attachments.

CHEMICAL HAZARDS

Diesel Fuel (Fuel Oil) (similar to TPH/general petroleum hydrocarbons)

Diesel fuel is mildly toxic by ingestion. When inhaled, many of the constituents function as central nervous system depressants, with characteristic symptoms (headaches, nausea, dizziness, incoordination, and vomiting). Diesel fuel has been shown to be a strong skin irritant.

Few chronic inhalation or ingestion studies of the toxic effects of diesel vapors/fuels are available. Skin painting studies of experimental animals suggest the potential for weak tumor-producing activity.

Because diesel fuel is a complex mixture of varying proportions of hydrocarbons, a mean odor threshold or ionization potential has not been determined.

Polychlorinated Biphenyls (PCBs; chlorodiphenyl)

42% Chlorine	PEL/TLV = 1 mg/m^3	"skin"
54% Chlorine	PEL/TLV = 0.5 mg/m^3	"skin"
	REL = 0.001 mg/m^3	(both)

PCBs are in a mixture of compounds, and the commercial product is often described in terms of the relative proportion of chlorine. The greater the chlorine content, in general, the higher the toxicity.

Exposure to the vapor and fume of PCBs may result in acne (chloracne), irritation of respiratory passages and injury to the liver. Chronic exposures to levels below the PEL have induced chloracne in personnel at some industrial operations. Some PCBs are considered to be animal carcinogens. PCB vapor pressure is less than 0.001 mm Hg. Ionization potentials and odor thresholds have not been reported.

PHYSICAL HAZARDS

Physical hazards are inherently present during geoprobe sampling activities. Common physical hazards include mechanical hazards; noise exposure associated with the operation of sampling equipment; slip-trip-fall hazards associated with the field environment; hazards associated with weather conditions; musculoskeletal injury resulting from lifting tasks; and explosion hazards from underground pipes or overhead powerlines that may be encountered during the drilling process. The typical physical hazards anticipated to be present on the site and the methods for preventing injury due to these hazards are described below.

Sampling Equipment - Operation of Geoprobe sampling equipment during site activities presents potential physical hazards to personnel. During all site activities, personal protective equipment (PPE) such as steel-toed shoes, safety glasses or goggles, and hard hats should be worn whenever such equipment is present, and personnel should at all times be aware of the location and operation of sampling equipment, and take precautions to avoid getting in the way of its operation.

Noise - The primary noise hazard at this site is from the Geoprobe drilling equipment. Whenever feasible, noise levels, identified as exceeding 85 decibels, will be reduced by means of personal protective equipment. Ear plugs and/or muffs will be worn at all times when D&M personnel are within 25 feet of operating equipment. Hearing protection will also be worn in the vicinity of generators, concrete cutters, and any other high noise emitting equipment. See D&MG SMS 26 for additional information.

Slip-Trip-Fall Hazards - Slip-trip fall hazards are common at field sites due to open holes; muddy, slippery or unstable surfaces; and equipment on the ground. While it is difficult to eliminate all slip-

trip-fall hazards, risk of injury will be minimized by implementing safe work practices, utilizing proper footwear, and keeping the work area free of obstructions.

Lifting Hazards - Field operations often require the performance of laborious tasks. All employees must implement proper lifting procedures, such as keeping the load close to the body, and using leg muscles instead of back muscles to perform lifting tasks. Additionally, employees will not attempt to lift large, heavy, or awkwardly shaped objects without assistance. See D&MG SMS 45 for additional information.

Underground Utilities - All proximal underground utility locations must be located by the utility company representative prior to the commencement of hand augering or drilling activities. The deactivation of utilities should be certified by the proper utility company personnel. See D&MG SMS 34 for additional information.

Overhead Hazards - Overhead power lines pose a danger of shock or electrocution if the power line is contacted or severed during site operations. Prior to conducting work in areas where overhead lines could be impacted, the appropriate utility company will be notified and information will be obtained regarding the line voltage and the minimum separation distance required for work in this area. All work will be done under the direction of the utility company representative. See D&MG SMS 34 for additional information.

Hand Auger

- Keep the blades sharp and extension connections rust free.
- Get assistance with turning the auger when encountering rocky or hard soils.
- Use caution when pulling an auger out the hole so the handle does not get near energized equipment.
- Avoid cleaning out the auger bucket with your hands; use a tool such as a mason's trowel.
- Hand augers are not to be used near overhead lines where clearance is less than 10 feet at any point between the auger and the lines. When judging this distance, the length of the auger and its extensions when it is pulled out of the hole need to be taken into account.
- Use utility lineman's gloves when using the hand auger to provide protection in the event that the auger becomes energized.
- Hand augers are not to be used until utility clearances have been performed unless augering will be one foot or less.

MONITORING EQUIPMENT

The following monitoring equipment will be used during drilling activities:

___ Organic Vapor Analyzer
___ HNu w/lamp __ eV
___ Explosimeter
___ Microtip w/lamp __ eV
✓ Organic Vapor Monitor w/lamp 10.3 eV
___ MiniRAE PID w/lamp ___ eV.

(✓) The monitoring equipment must be calibrated in accordance with the manufacturer's instructions. In addition, the results of daily instrument calibrations shall be logged in the field log book, or on the Daily Instrument Calibration Check Sheet found in the Attachments.

ACTION LEVELS

Action levels and response criteria are presented below. Initial monitoring is conducted on a regular basis (every 10 minutes) in the work area. All readings are to be recorded in the field log book.

Analyzer Reading*	Location	Duration	Action	Personal Protective Equipment
< 15 ppm	Point of Operations/ Release Source point	_____	Continue periodic monitoring.	Minimum Site Ensemble (Hardhat, Steel-toed boots, eye protection, hearing protection)
> 15 ppm	Point of Operations/ Release Source point	>1 minute	Monitor OBZ; don protective clothing; establish work zones	Minimum Site Ensemble, PLUS: Tyvek coveralls‡, Nitrile Outer Gloves, and Nitrile Inner (surgical) Gloves
< 15 ppm	OBZ	-----	No respirators required.	Same as above
> 15 ppm	OBZ	>1 minute	Provide respiratory protection; establish decon area	Add Half-face Respirators with organic vapor cartridges
> 75 ppm	OBZ	>1 minute	Increase respiratory protection.	Replace ½-face respirators with Full-face respirators with organic vapor cartridges.
> 150 ppm OR > 300 ppm	OBZ OBZ	>1 minute instanta-neous	Stop work; move upwind while vapors dissipate. If elevated levels remain, cover boring and cuttings, evacuate upwind and notify DSO or PM.	As specified by DSO

(OBZ - Operator's Breathing Zone)

SITE CONTROL

Work area barricades will be used to prevent access by unauthorized persons. Yellow caution tape and/or sawhorse-type barricades can be used for this purpose. Formal work zones will be implemented if the analyzer reading exceeds 15 ppm in the work area.

DECONTAMINATION PROCEDURES

Wash hands thoroughly before eating; clean-up and wash hands and face when work activities are completed. Formal decontamination procedures are required if the analyzer reading exceeds 15 ppm in the OBZ (see Attachments).

HEALTH AND SAFETY EQUIPMENT

R = Required A = As Needed

R Hard Hat	R Eye Protection (Type) Safety Glasses
R Hearing Protection	R Gloves (Type) Nitrile gloves when handling contam. mtls.
R Steel-toed Boots	A Chemical-resistant steel-toed Boots
A Orange Safety Vest	A Respirator (Type) Half-face APR
A Tyvek Coveralls	A Cartridges (Type) Organic Vapor
A Poly-coated Tyvek	R Fire Extinguisher
R First Aid Kit	R Other Utility Lineman's Gloves

The HSP Preparer has conducted a Hazard Assessment for this project based upon information provided by the Project Manager, in accordance with 29 CFR 1910.132 (d).

HAZARD COMMUNICATION (MSDSs)

✓ TSP/Alconox	✓ Methanol	✓ Portland Cement
✓ Isobutylene	✓ Diesel fuel	✓ Bentonite

(✓) See the information sheet found in the Attachments.

See D&MG SMS 2 for additional information.

ATTACHMENTS

SAFETY PLAN COMPLIANCE AGREEMENT, BRIEFING FORM, AIR MONITORING LOG AND CALIBRATION CHECK SHEET
HOSPITAL ROUTE MAP
ACCIDENT REPORT FORM
PERSONNEL DECONTAMINATION STATION LAYOUT
MATERIAL SAFETY DATA SHEETS
INJURY AND ILLNESS PREVENTION PROGRAM

SAFETY MANAGEMENT STANDARDS

The Project Manager is to append the following D&MG Safety Management Standards to this HSP:

SMS 26 - Noise and Hearing Conservation
SMS 45 - Back Injury Prevention
SMS 14 - Fire Prevention
SMS 34 - Utility Clearances
SMS 2 - Worker Right to Know
SMS 12 - Electrical Safety
These SMSs are available on the D&MG Safety Intranet, at safety.dames.com (internal access only). Go to Safety Management Standards, and click on the "Print this SMS" link for each SMS.

SAFETY COMPLIANCE AGREEMENT, BRIEFING FORM,
AIR MONITORING LOG, AND CALIBRATION CHECK SHEET
FOR UNM/PNM TRANSFORMER ASSESSMENT

I have read the Health and Safety Plan for the project and I understand it, and agree to comply with all of its provisions. I understand that I could be prohibited from working on the project for violating any of the health and safety requirements specified in the Plan.

	Name	Signature
D&M Site Manager		
D&M Site Safety Officer		
D&M Site Personnel		
D&M Site Personnel		

SAFETY ISSUES

	DISCUSSED Yes	No
Protective Clothing/Equipment	—	—
Chemical and Physical Hazards	—	—
Control Methods	—	—
Air Monitoring Action Levels and Requirements	—	—
Nearest Phone	—	—
Hospital Name/Address/Directions	—	—

Meeting conducted by: _____ Date: _____

Attendees' Names (print) **Signatures**

_____

_____

_____

_____

_____

DAILY INSTRUMENT CALIBRATION CHECK SHEET

DATE	INSTRUMENT	BATTERY CHECK OK?	ZERO ADJUST OK?	CALIBRATION GAS(PPM)	READING (PPM)	CALIBRATED BY

FIELD MONITORING ACTIVITY LOG

DATE	ACTIVITY MONITORED	TIME	LOCATION	READING	ACTION	READING BY

ACCIDENT REPORT FORM

Employee Name _____ Date of birth _____

Home Address _____ Phone _____

Sex: ☐Male ☐ Female Job Title _____ Social Security No _____

Office No. _____ Office Location _____ Date of Hire _____

Hours Usually worked: Hours per day _____ Hours per week _____ Total hours weekly _____

Where did accident or exposure occur? (Include address) _____

_____

County _____ On employer's premises? ☐Yes ☐ No

What was employee doing when injured (Be specific) _____

_____

How did the accident or exposure occur? (Describe fully) _____

_____

_____

_____

What steps could be taken to prevent such an occurrence? _____

_____

_____

Object or substance that directly injured employee _____

_____

Describe the injury or illness _____ Part of body affected _____

Name and address of physician _____

If hospitalized, name and address of hospital _____

Date of injury/illness _____ Time of day _____ Loss of one or more day of work? ☐ yes ☐ no

If yes, date last worked _____

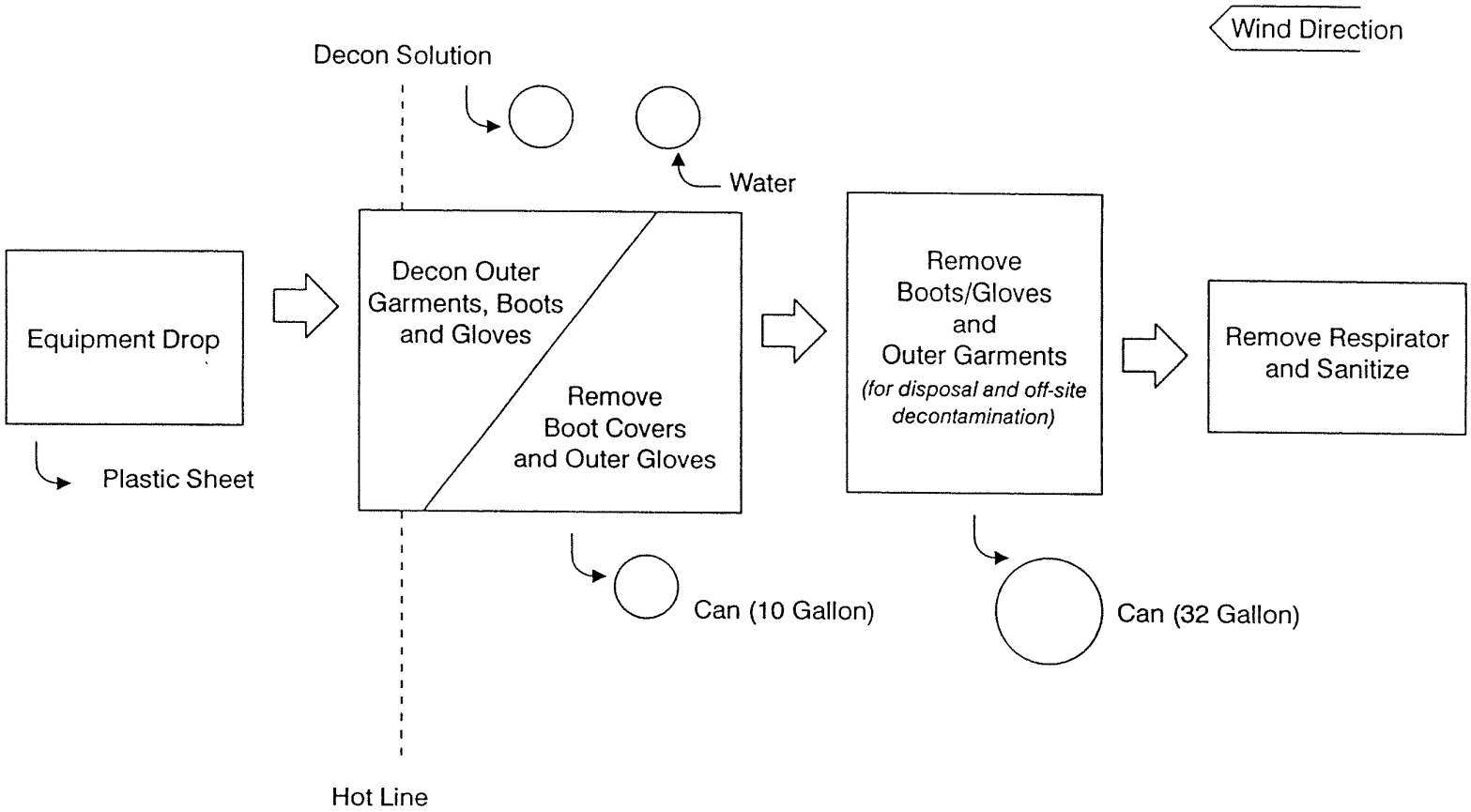
Has employee returned to work? _____ If yes, date returned _____ Did employee die? ☐ yes ☐ no

If yes, date of death _____

Completed by (Print name) _____ Signature _____

Title _____ Date _____

An Accident/exposure report must be completed by the supervisor or site safety officer immediately upon learning of the incident. The completed report must be immediately transmitted to the office administrative manager and the Division Health and Safety Manager.



Minimum Layout of Personnel Decontamination Station

Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8854

Sheet No. 43
Trisodium Phosphate

Issued: 11/78 Revision: 11/89

Section 1. Material Identification 30

Trisodium Phosphate Description: Trisodium phosphate crystallizes from water as trisodium phosphate dodecahydrate ($Na_3PO_4 \cdot 12H_2O$) and can exist as several hydrate forms, and as anhydrous salt, depending on processing. Prepared by combining proper proportions of phosphoric acid and soda ash to form disodium phosphate, then adding caustic soda. Used in softening water, tanning leather, manufacturing paper, clarifying sugar; in detergent mixtures, photographic developers, food additives, buffers, emulsifiers, dietary supplements, boiler water compounds, and industrial cleaners.
Other Designations: TSP; trisodium orthophosphate; sodium phosphate, tribasic; tertiary sodium phosphate; trisodium phosphate dodecahydrate ($Na_3PO_4 \cdot 12H_2O$), CAS No. 10101-89-0; Na_3PO_4; CAS No. 7601-54-9.
Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide* (Genium ref. 73)

R 1
I 2
S 2
K 1

Genium

HMIS
H 1
F 0
R 2
PPG*
* Sec. 8

Section 2. Ingredients and Occupational Exposure Limits

Trisodium phosphate, ca 100%

OSHA PEL	ACGIH TLV, 1989-90	NIOSH REL, 1987	Toxicity Data†
8-hr TWA: 5 mg/kg of respirable dust*	None established	None established	Rabbit, intravenous, LD_{Lo}: 1580 mg/kg

* Under OSHA inert dust limits, assume that airborne particulates not otherwise controlled are limited to a maximum of 5 mg/kg of respirable dust; however, this level may be inadequate to prevent irritation with this material.
† See NIOSH, *RTECS* (TC9490000) for additional data with references to mutagenic effects.

Section 3. Physical Data

Boiling Point: -11 H_2O at 212 F (100 C) (decomposes)
Melting Point: 163.9 to 170.1 F (73.3 to 76.7 C)
Molecular Weight: 163.94 g/mol
Specific Gravity (H_2O = 1 at 39 F (4 C)): 1.62 at 68 F (20 C)

Water Solubility: (F/ C)	(g/100 g)
32/0	1.5
59/15	28.3
158/70	157.0

Appearance and Odor: White or colorless crystalline solid (also as powder flake, granules); no odor.

Section 4. Fire and Explosion Data

Flash Point: Noncombustible	Autoignition Temperature: Noncombustible	LEL: None reported	UEL: None reported

Extinguishing Media: Use what is appropriate to the surrounding fire since this material is noncombustible.
Unusual Fire or Explosion Hazards: In a fire situation at high temperature, phosphates can emit highly toxic phosphorus oxides (PO_x) fumes.
Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

Section 5. Reactivity Data

Stability/Polymerization: Trisodium phosphate is stable at room temperature in closed containers. Hazardous polymerization cannot occur.
Chemical Incompatibilities: This strong caustic material reacts violently with water and strong acids to generate heat.
Conditions to Avoid: Never heat to decomposition.
Hazardous Products of Decomposition: Thermal oxidative decomposition of trisodium phosphate can produce highly toxic fumes of phosphorus oxides (PO_x) and sodium oxide (Na_2O).

Section 6. Health Hazard Data

Carcinogenicity: Neither the NTP, IARC, nor OSHA lists trisodium phosphate as a carcinogen.
Summary of Risks: Inhaling this alkaline material's dust or mist irritates the respiratory tract. Aqueous, highly alkaline solutions may also produce caustic burns.
Medical Conditions Aggravated by Long-Term Exposure: Permanent tissue damage to the skin and eyes.
Target Organs: Skin, digestive tract.
Primary Entry: Inhalation and ingestion. Its alkaline nature irritates and may injure the digestive tract. To use as a food additive requires reducing its alkalinity.
Acute Effects: Tissue irritation upon contact with skin and eyes.
Chronic Effects: Prolonged or repeated eye and skin contact causes irritation. Injury to the esophagus from scarring may occur. Alkali exposures may necessitate irrigation for extended duration.
FIRST AID
Eyes: Flush immediately, including under the eyelids, gently but thoroughly with flooding amounts of running water for at least 15 min.
Skin: After rinsing affected area with flooding amounts of water, wash it with soap and water.
Inhalation: Remove exposed person to fresh air and support breathing as needed.
Ingestion: Never give anything by mouth to an unconscious or convulsing person. If ingested, have that conscious person drink 1 to 2 glasses of water or milk to dilute; then give fruit juice or diluted vinegar to drink. *Never induce vomiting* unless instructed by a physician to do so.
After first aid, get appropriate in-plant, paramedic, or community medical attention and support.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Cleanup personnel should wear the necessary personal protective equipment to prevent skin or eye contact and dust inhalation. For liquid (solution) spills, cover the material with an inert solid absorbent (vermiculite or dry sand) and scoop into an appropriate container (with secure lid) for disposal in accordance with existing regulations. Dike with inert absorbent material, as needed, to contain and limit spill area. Sweep, vacuum, or scoop the spilled solid, avoiding dust generation, into a suitable disposal container (with secure lid). Flush residues to drain with plenty of water.
Disposal: Scrap material can be used for neutralizing acid wastes or buried in an approved landfill. If regulations permit, you may flush *small* amounts to drain with large excess of water. Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.
OSHA Designations
Air Contaminant (29 CFR 1910.1000, Subpart Z): Not listed
EPA Designations
RCRA Hazardous Waste (40 CFR 261.33): Not listed
Listed as CERCLA Hazardous Substance* (40 CFR 302.4), Reportable Quantity (RQ): 5000 lb (2270 kg) [* per Clean Water Act, Sec. 311(b)(4)]
SARA Extremely Hazardous Substance (40 CFR 355): Not listed
SARA Toxic Chemical (40 CFR 372.65): Not listed

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Chemical safety glasses with side shields are recommended for handling this material.
Respirator: Wear a NIOSH-approved respirator if necessary. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA.
Warning: Air-purifying respirators do *not* protect workers in oxygen-deficient atmospheres.
Other: Wear impervious gloves, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact.
Ventilation: Provide general and local explosion-proof ventilation systems to maintain airborne concentrations below the OSHA PEL standard (Sec. 2). If dusty conditions occur, local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by eliminating it at its source (Genium ref. 103).
Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.
Contaminated Equipment: Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Launder contaminated clothing before wearing again. Remove this material from your shoes and equipment.
Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store this material in tightly sealed containers away from acidic materials in a clean, dry, ventilated area. Prevent physical damage to containers.
Engineering Controls: Avoid dust inhalation, body contact, contact with acidic materials, and heating to decomposition. Note that anhydrous trisodium phosphate and lower hydrates are more alkaline than $Na_3PO_4 \cdot 12H_2O$ *on a weight basis.*

Transportation Data (49 CFR 172.101, .102): Not listed

MSDS Collection **References:** 1, 2, 4-7, 12, 15, 80, 81, 82, 109
Prepared by: MJ Allison, BS; **Industrial Hygiene Review:** DJ Wilson, CIH; **Medical Review:** Warren Silverman, MD M6

Material Safety Data Sheet

from Genium's Reference Collection
Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
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GENIUM PUBLISHING CORP.

No. 674

ISOBUTYLENE

Issued: November 1988

SECTION 1. MATERIAL IDENTIFICATION 27

Material Name: ISOBUTYLENE

Description (Origin/Uses): Obtained from refinery steams by absorption on 65% sulfuric acid (H_2SO_4) at 59°F (15°C). Used primarily to produce diisobutylene, trimers, butyl rubber, and other polymers; also used to produce antioxidants for foods, plastics, and packaging food supplements.

NFPA

Other Designations: Isobutene; 2-Methylpropene; *gamma*-Butylene; $CH_2=C(CH_3)_2$; CAS No. 0115-11-7

Manufacturer: Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyers' Guide* (Genium ref. 73) for a list of suppliers.

HMIS	
H 1	R 1
F 4	I 1
R 0	S 1
PPG*	K 4
*See sect. 8	

SECTION 2. INGREDIENTS AND HAZARDS

%	EXPOSURE LIMITS
Ca 100	OSHA PEL None Established ACGIH TLV, 1988-89 None Established NIOSH REL None Established Toxicity Data* Rat, Inhalation, LC_{50}: 620 g/m³ (4 Hrs) Mouse, Inhalation, LC_{50}: 415 g/m³ (2 Hrs)

Isobutylene, CAS No. 0115-11-57

*Monitor NIOSH, *RTECS* (UD0890000), for additional data.

SECTION 3. PHYSICAL DATA

Boiling Point: -19.6°F (-6.9°C)
Melting Point: -220°F (-140°C)
Vapor Density (Air = 1): 1.9
Specific Gravity (H_2O = 1): Ca 0.6
Molecular Weight: 56 Grams/Mole
Solubility in Water (%): Insoluble*
% Volatile by Volume: 100

Appearance and Odor: A colorless, extremely flammable gas; odor not listed.

*Isobutylene is very soluble in alcohol, ether, and sulfuric acid.

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point*	Autoignition Temperature: 869°F (465°C)	LEL: 1.8% v/v	UEL: 9.6% v/v

Extinguishing Media: Isobutylene gas is an extremely flammable gas that has a substantial explosive air-gas range. For isobutylene fires, the recommended fire-fighting technique is to stop the flow of gas instead of extinguishing the fire. If the flames are extinguished and the isobutylene gas continues to escape or leak, an explosive air-gas mixture can form quickly and ignite without warning. A resulting explosion could cause greater damage than that which would be caused by allowing the fire to burn itself out. If the fire must be extinguished to allow safe access to shutoff valves, recommended extinguishing agents include CO_2 and dry chemical. **Unusual Fire or Explosion Hazards:** In many cases, the preferred strategy is to allow the flames to continue to burn and to cool the surroundings with water spray to prevent ignition of nearby combustibles. Isobutylene gas is heavier than air and can collect in low-lying, confined spaces. Potentially explosive air-gas mixtures are especially likely to build up in such an area, so enter it with extreme caution whether or not it is presently involved in a fire. Possible sources of ignition must not be brought into any area suspected of containing substantial concentrations of isobutylene gas. Special **Fire-fighting Procedures:** Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

* Sax (Genium ref. 6) reports a flash point of -105°F (-76°C) for isobutylene.

SECTION 5. REACTIVITY DATA

Stability/Polymerization: Isobutylene is stable in closed, pressurized containers during routine operations at room temperature. Hazardous polymerization cannot occur. **Chemical Incompatibilities:** Isobutylene can react dangerously with strong oxidizing materials. **Conditions to Avoid:** Prevent exposing isobutylene to any source of ignition such as an open flame, sparks, lighted tobacco products, or steam lines. **Hazardous Products of Decomposition:** Isobutylene fires can produce toxic gases such as carbon monoxide (CO) or lower-molecular-weight hydrocarbons. **Comments:** The extreme flammability of isobutylene means that any reactions involving this material, including nonhazardous ones, must be performed carefully in order to prevent fires and/or explosions.

SECTION 6. HEALTH HAZARD INFORMATION

Carcinogenicity: Isobutylene is not listed as a carcinogen by the NTP, IARC, or OSHA.
Summary of Risks: Isobutylene is a simple asphyxiant. As such it will not cause significant physiological responses, but it can displace the minimum required atmospheric oxygen level. Significant displacement by isobutylene results in an oxygen-deficient atmosphere with no adequate warning properties. Asphyxiation fatalities can occur especially in confined, low-lying, poorly ventilated spaces because isobuty-

SECTION 6. HEALTH HAZARD INFORMATION, cont.

lene gas is almost twice as dense as air itself (see sect. 3). **Medical Conditions Aggravated by Long-Term Exposure:** None reported. **Target Organs:** None reported. **Primary Entry:** Inhalation. **Acute Effects:** Initial symptoms of the effects of simple asphyxiant gases are rapid respiration and air hunger, diminished mental alertness, and impaired muscular coordination. Continuing lack of oxygen causes faulty judgment, depression of all sensations, rapid fatigue, and emotional instability. As the asphyxia continues, nausea; vomiting; prostration; loss of consciousness; and, finally, convulsions; deep coma; and death can occur. **Chronic Effects:** None reported. **FIRST AID: Inhalation.** Would-be rescuers need to be concerned about their own safety when entering confined, poorly ventilated, oxygen-deficient areas. Self-contained breathing equipment must be readily available for rescuers. Station standby workers outside the immediate area so that they can summon additional help if it is needed. Remove the exposed person to fresh air; restore and/or support his or her breathing as needed. Have qualified medical personnel administer oxygen as required. **Comments:** The extreme flammability of isobutylene gas warrants special attention even during rescue operations. Rescue personnel must not smoke. All emergency lamps and floodlights that must be lowered into enclosed areas for rescue operations must be explosion proof. Obtain this equipment before any emergency occurs and make it accessible to emergency-response personnel. **Get medical help (in plant, paramedic, community) for all exposures.** Seek prompt medical assistance for further treatment, observation, and support after first aid.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill/Leak: *Treat any isobutylene gas leak as an emergency.* If the leaking gas has not yet ignited, use water spray to direct flammable gas-air mixtures away from sources of ignition. Extinguish all sources of ignition as quickly as possible; however, if the leaking gas is burning, do not attempt to extinguish the flames until the source of the isobutylene gas is located and sealed. Otherwise, flammable isobutylene gas-air mixtures can explode without warning and cause widespread damage that might not have occurred if the original fire had been allowed to burn itself out. If it is necessary to extinguish isobutylene flames in order to gain access to a shutoff valve, use dry chemical or carbon dioxide as extinguishing agents. **Waste Disposal:** Contact your supplier or a licensed contractor for detailed recommendations. Follow Federal, state, and local regulations.

OSHA Designations
Air Contaminant (29 CFR 1910.1000 Subpart Z): Not Listed
EPA Designations (40 CFR 302.4): Not Listed

SECTION 8. SPECIAL PROTECTION INFORMATION

Respirator: Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine operations (leaks or cleaning reactor vessels and storage tanks), wear an SCBA. **Warning:** Air-purifying respirators will *not* protect workers in oxygen-deficient atmospheres, which lack warning properties; to work in them safely requires that an SCBA be worn. **Ventilation:** Install and operate general and local maximum, explosion-proof ventilation systems powerful enough to maintain airborne levels of this material below the lower explosive limit cited in section 4. Local exhaust ventilation is preferred because it prevents dispersion of the contaminant into the general work area by eliminating it at its source. Consult the latest edition of Genium reference 103 for detailed recommendations. **Safety Stations:** Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work areas. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants, and all lenses concentrate them. Do *not* wear contact lenses in any work area. **Comments:** Practice good personal hygiene; always wash thoroughly after using this material and before eating, drinking, smoking, using the toilet, or applying cosmetics. Keep it off your clothing and equipment. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do *not* eat, drink, or smoke in any work area. Do not inhale isobutylene vapor.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Storage/Segregation: Store isobutylene in closed, pressurized containers in a cool, dry, well-ventilated area away from sources of ignition, combustible materials, and strong oxidizers. Protect containers from physical damage. **Engineering Controls:** Make sure all engineering systems (production, transportation) are of maximum explosion-proof design. Electrically ground and bond all containers, pipelines, etc., used in shipping, transferring, reacting, production, and sampling operations to prevent static sparks. **Comments:** Isobutylene is an extremely explosive and flammable gas. It must not be exposed to any possible source of ignition in work or storage areas.

Transportation Data (49 CFR 172.101-2)

DOT Shipping Name: Liquefied Petroleum Gas
DOT Hazard Class: Flammable Gas
ID No. UN1055
DOT Label: Flammable Gas
DOT Packaging Requirements: 49 CFR 173.304, .314, .315
DOT Packaging Exceptions: 49 CFR 173.306

IMO Shipping Name: Isobutylene
IMO Hazard Class: 2.1
IMO Label: Flammable Gas

References: 1, 6, 84-94, 116, 117, 120, 122.

Prepared by PJ Igoe, BS
Industrial Hygiene Review: DJ Wilson, CIH
Medical Review: W Silverman, MD

MATERIAL SAFETY DATA SHEET

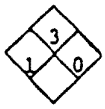
GENIUM PUBLISHING CORPORATION
1145 CATALYN ST., SCHENECTADY, NY 12303 USA (518) 377-8854

MSDS # 354
METHYL ALCOHOL
Revision C
Issued:
Revised: September, 1985

From Genium's MSDS Collection, to be used as a reference.

SECTION 1. MATERIAL IDENTIFICATION

MATERIAL NAME: METHYL ALCOHOL
OTHER DESIGNATIONS: Methanol, Wood Alcohol, Carbinol, Wood Naphtha, Methyl Hydroxide, Monohydroxy Methane, CH_3OH, CAS #67-56-1
MANUFACTURER/SUPPLIER: Available from several suppliers, including; E.I. DuPont DeNemours & Co. (302- 774-2290
Chemicals & Pigments Dept (800) 441-9442
1007 Market St. Wilmington, DE 19898



SECTION 2. INGREDIENTS AND HAZARDS

	%	HAZARD DATA
METHYL ALCOHOL CH_3-OH	ca 100	8 hr TWA: 200 ppm, or 260 mg/m^3* (Skin) STEL: 250 ppm, or 310 mg/m^3 HUMAN Eye: 5 ppm, primary irritation dose Oral: LDLo: 340 mg/kg Inhalation: TCLo: 86,000 mg/m^3 - Toxic irritant effects (systemic)

* Current OSHA Standard; ACGIH (1985-86) TLV adds (skin) notation.

NIOSH has recommended a TWA standard of 200 ppm with a fifteen minute ceiling of 800 ppm. This ceiling is well above the TLV STEL of 250 ppm.

SECTION 3. PHYSICAL DATA

Boiling Point, 1 atm ..... 148.5°F (64.7°C)
Vapor density (Air=1) 1.11
Vapor pressure @ 21°C, mmHg ... 100
@ 50°C, mmHg ... 400
Water Solubility ..... Totally Miscible

Viscosity @ 20°C, cps 0.59
Specific gravity, 20°/4°C ... 0.791
Melting point ..... -144°F (-97.8°C)
Volatiles, % ..... ca 100
Evaporation rate (BuAc=1) ... 5.9
Molecular weight 32.04

APPEARANCE & ODOR: Clear, colorless, highly polar liquid with a characteristic alcohol odor. The odor recognition threshold (100% of test panel) is 53.3 ppm

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits in Air	Lower	Upper
60.8°F (12°C) Closed Cup	725°F (385°C)	% by Volume	6	36.5

EXTINGUISHING MEDIA: Use carbon dioxide, dry chemical, or alcohol type foam. Do not use a solid stream of water since the stream will scatter and spread the fire. Use water spray to cool fire-exposed tanks/containers. Fires involving Methyl Alcohol are Class IB; use a blanketing effect to smother fire. Methyl Alcohol is a moderate explosion hazard and a dangerous fire hazard when exposed to heat, sparks, flame or oxidizers. Its vapors are heavier than air and may travel a considerable distance to an ignition source and flashback. Firefighters should wear self-contained breathing apparatus and full protective clothing when fighting fires involving Methyl Alcohol.

SECTION 5. REACTIVITY DATA

Methyl Alcohol is stable in closed containers at room temperature under normal storage and handling conditions. It does not undergo hazardous polymerization. This material may react violently with chromic anhydride; iodine plus ethyl alcohol, and mercuric oxide; lead perchlorate; perchloric acid plus ethyl alcohol; dimethyl formamide plus phosphorous; potassium hydroxide plus chlorloform; sodium hydroxide plus chloroform. It may also react with metallic aluminum at high temperatures.
Methyl Alcohol is incompatible with strong oxidizing agents (eg., nitrates, perchlorate or sulfuric acid), active metals, acetaldehyde, ethylene oxide, isocyanates, beryllium dihydride, chloroform, and potassium tert-butoxide. It may attack some forms of plastics and rubber. Thermal decomposition or burning will produce carbon monoxide, carbon dioxide and possible toxic formaldehyde and unburned methanol.

Revised: 9/85

MSDS # 0514 Issued _____ METHYL ALCOHOL (Rev. C)

SECTION 6. HEALTH HAZARD INFORMATION

TLV 200 ppm (skin) or 260 mg/m^3

Methanol is a poisonous, narcotic chemical that may exert its effects through inhalation, skin absorption, or ingestion. Elimination of Methanol from the body is slow, and the toxic effects can be compounded by repeated excessive exposures over several days. Toxic effects are exerted upon the CNS, especially the optic nerve and possibly the retinae. Symptoms of overexposure include dizziness, visual impairment, nausea, respiratory failure, muscular incoordination and narcosis. Visual disturbances may clear temporarily then re-occur and progress to blindness. Prolonged or repeated contact with the skin may cause dermatitis, erythema, and scaling. Vapors of Methanol are mildly irritating to the eyes, while direct contact with the liquid may cause irritation, pain and transient corneal opacity. Ingestion of Methanol can cause blindness and death. The fatal dose is 100-250 ml, although death from ingestion of less than 33 ml has been reported.
FIRST AID: EYE CONTACT: Immediately flush eyes, including under eyelids, with plenty of running water for at least 15 minutes. Get medical attention if irritation persists. SKIN CONTACT: Flush exposed area with water while removing contaminated clothing. Wash with soap and water. Get medical attention if irritation persists. INHALATION: Remove victim to fresh air. Restore and/or support breathing as needed. Get medical help (Inplant Paramedic, community). INGESTION: Give victim 3-4 glasses of water or milk and induce vomiting by sticking finger to back of throat. Contact a Poison Control Center or physician. Transport victim to a medical facility immediately. Do not induce vomiting or give anything to drink if victim is unconscious or having convulsions. Get medical attention (Inplant, paramedic, community).

SECTION 7. SPILL, LEAK AND DISPOSAL PROCEDURES

Notify safety personnel of large spills or leaks. Remove all sources of heat and ignition. Provide maximum explosion-proof ventilation. Evacuate all personnel from the area except for those involved in clean-up. Remove leaking container to safe place if feasible. Clean-up personnel should wear protective clothing, gloves, boots, and a self-contained breathing apparatus. Absorb small quantities on paper towel, vermiculite, or other absorbent and place in closed container for disposal. Dike large spills and collect for reclamation or disposal. Water spray may be used to knock down vapor and to dilute and flush spill away from sensitive areas. Do not flush to sewer. Keep out of watersheds and waterways.
DISPOSAL: Place in suitable container for disposal by a licensed contractor or burn in an approved incinerator. Waste solvent may be reclaimed via filtration and distillation procedures. Methyl Alcohol has been designated as a hazardous waste by the EPA (RCRA CFR 261.33). The EPA Hazardous Waste No. is U154. Aquatic Toxicity Rating: TLm96: Over 1000 ppm.

SECTION 8. SPECIAL PROTECTION INFORMATION

Provide general and local exhaust ventilation (explosion-proof) to meet TLV requirements. For emergency or non-routine exposures where the TLV may be exceeded, wear an appropriate NIOSH-approved respirator. All electrical service in use or storage areas should have an explosion-proof design.
Prevent skin and eye contact by wearing rubber gloves and splash goggles or safety glasses. Use protective aprons, boots and face shield as necessary when splashing may occur.
Eyewash stations and safety showers should be available in areas of use and handling. Provide suitable training to those working with Methanol. Monitor the workplace and keep accurate records.

Contact lenses pose a special hazard; soft lenses may absorb and all lenses concentrate irritants.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Store in tightly closed containers in a dry, well-ventilated area away from strong oxidizing agents, heat, sparks and open flame. Protect container from physical damage. When transferring or pouring Methyl Alcohol, ground and bond containers and equipment to prevent static sparks. Use non-sparking tools.
Do not smoke in areas of use or storage. Use with adequate ventilation. Do not breathe vapors. Avoid contact with eyes and skin. This material is poisonous when introduced into the body metabolism. DO NOT INGEST!!!
Provide preplacement medical exams and periodic medical surveillance for industrially exposed workers with emphasis on neurological and visual functions, liver, and kidney systems.
DOT CLASSIFICATION: Flammable liquid, UN1230 DOT LABEL: Flammable liquid.

DATA SOURCE(S) CODE (See Glossary) 1, 2, 4-12, 16, 19, 20, 23-26, 31, 34, 37-39, 43, 47, 63, 79, R.

APPROVALS [signature], 11/85

INDUST. HYGIENE/SAFETY [signature] 11-85

MEDICAL REVIEW: [signature] Dec 85

GENIUM PUBLISHING

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Material Safety Data Sheets Collection:

Sheet No. 470
Diesel Fuel Oil No. 2-D

Issued: 10/81 Revision: A, 11/90

Section 1. Material Identification

Diesel Fuel Oil No. 2-D Description: Diesel fuel is obtained from the middle distillate in petroleum separation; a distillate oil of low sulfur content. It is composed chiefly of unbranched paraffins. Diesel fuel is available in various grades, one of which is synonymous with fuel oil No. 2-D. This diesel fuel oil requires a minimum Cetane No. (efficiency rating for diesel fuel comparable to octane number ratings for gasoline) of 40 (ASTM D613). Used as a fuel for trucks, ships, and other automotive engines; as mosquito control (coating on breeding waters); and for drilling muds.

Other Designations: CAS No. 68334-30-5, diesel fuel.

Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*(77) for a suppliers list.

Cautions: Diesel fuel oil No. 2-D is a skin irritant and central nervous depressant with high mist concentrations. It is an environmental hazard and moderate fire risk.

R	1
I	-
S	2
K	2

NFPA

HMIS
H 0
F 2
R 0
PPG*
* Sec. 8

Section 2. Ingredients and Occupational Exposure Limits

Diesel fuel oil No. 2-D*

1989 OSHA PEL	1990-91 ACGIH TLV	1988 NIOSH REL	1985-86 Toxicity Data‡
None established	Mineral Oil Mist TWA: 5 mg/m³† STEL: 10 mg/m³	None established	Rat, oral, LD_{50}: 9 g/kg produces gastrointestinal (hypermotility, diarrhea) effects

* Diesel fuel No. 2-D tends to be low in aromatics and high in paraffinics. This fuel oil is complex mixture of: 1) >95% paraffinic, olefinic, naphthenic, and aromatic hydrocarbons, 2) sulfur (<0.5%), and 3) benzene (<100 ppm). [A low benzene level reduces carcinogenic risk. Fuel oils can be exempted under the benzene standard (29 CFR 1910.1028)]. Although low in the fuel itself, benzene concentrations are likely to be much higher in processing areas.
† As sampled by nonvapor-collecting method.
‡ Monitor NIOSH, *RTECS* (HZ1800000), for future toxicity data.

Section 3. Physical Data

Boiling Point Range: 340 to 675 °F (171 to 358 °C)
Viscosity: 1.9 to 4.1 centistoke at 104 °F (40 °C)
Specific Gravity: <0.86
Water Solubility: Insoluble

Appearance and Odor: Brown, slightly viscous liquid.

Section 4. Fire and Explosion Data

Flash Point: 125 °F (52 °C) min.	Autoignition Temperature: >500 °F (932 °C)	LEL: 0.6% v/v	UEL: 7.5% v/v

Extinguishing Media: Use dry chemical, carbon dioxide, or foam to fight fire. Use a water spray to cool fire exposed containers. Do not use a forced water spray directly on burning oil since this will scatter the fire. Use a smothering technique for extinguishing fire.

Unusual Fire or Explosion Hazards: Diesel fuel oil No. 2-D is a OSHA Class II combustible liquid. Its volatility is similar to that of gas oil. Vapors may travel to a source of ignition and flash back.

Special Fire-fighting Procedures: Isolate hazard area and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode and full protective clothing. If feasible, remove containers from fire. Be aware of runoff from fire control methods. Do not release to sewers or waterways due to pollution and fire or explosion hazard.

Section 5. Reactivity Data

Stability/Polymerization: Diesel fuel oil No. 2-D is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.

Chemical Incompatibilities: It is incompatible with strong oxidizing agents; heating greatly increases the fire hazard.

Conditions to Avoid: Avoid heat and ignition sources.

Hazardous Products of Decomposition: Thermal oxidative decomposition of diesel fuel oil No. 2-D can produce various hydrocarbons and hydrocarbon derivatives, and other partial oxidation products such as carbon dioxide, carbon monoxide, and sulfur dioxide.

Section 6. Health Hazard Data

Carcinogenicity: Although the IARC has not assigned an overall evaluation to diesel fuels as a group, it has evaluated occupational exposures in petroleum refining as an IARC probable human carcinogen (Group 2A). It has evaluated distillate (light) diesel oils as not classifiable as human carcinogens (Group 3).

Summary of Risks: Although diesel fuel's toxicologic effects should resemble kerosine's, they are somewhat more pronounced due to additives such as sulfurized esters. Excessive inhalation of aerosol or mist can cause respiratory tract irritation, headache, dizziness, nausea, vomiting, and loss of coordination, depending on concentration and exposure time. When removed from exposure area, affected persons usually recover completely. If vomiting occurs after ingestion and if oil is aspirated into the lungs, hemorrhaging and pulmonary edema, progressing to renal involvement and chemical pneumonitis, may result. A comparative ratio of oral to aspirated lethal doses may be 1 pt vs. 5 ml. Aspiration may also result in transient CNS depression or excitement. Secondary effects may include hypoxia (insufficient oxygen in body cells), infection, pneumatocele formation, and chronic lung dysfunction. Inhalation may result in euphoria, cardiac dysrhythmias, respiratory arrest, and CNS toxicity. Prolonged or repeated skin contact may irritate hair follicles and block sebaceous glands, producing a rash of acne pimples and spots, usually on arms and legs.

Medical Conditions Aggravated by Long-Term Exposure: None reported.

Target Organs: Central nervous system, skin, and mucous membranes.

Primary Entry Routes: Inhalation, ingestion.

Acute Effects: Systemic effects from ingestion include gastrointestinal irritation, vomiting, diarrhea, and in severe cases central nervous system depression, progressing to coma or death. Inhalation of aerosols or mists may result in increased rate of respiration, tachycardia (excessively rapid heart beat), and cyanosis (dark purplish discoloration of the skin and mucous membranes caused by deficient blood oxygenation).

Chronic Effects: Repeated contact with the skin causes dermatitis.

FIRST AID

Eyes: Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.

Skin: *Quickly* remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. If large areas of the body have been exposed or if irritation persists, get medical help immediately. Wash affected area with soap and water.

Inhalation: Remove exposed person to fresh air and support breathing as needed.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. If ingested, *do not induce vomiting* due to aspiration hazard. Contact a physician immediately. Position to avoid aspiration.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: Gastric lavage is contraindicated due to aspiration hazard. Preferred antidotes are charcoal and milk. In cases of severe aspiration pneumonitis, consider monitoring arterial blood gases to ensure adequate ventilation. Observe the patient for 6 hr. If vital signs become abnormal or symptoms develop, obtain a chest x-ray.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel, evacuate area for large spills, remove all heat and ignition sources, and provide maximum explosion-proof ventilation. Cleanup personnel should protect against vapor inhalation and liquid contact. Clean up spills promptly to reduce fire or vapor hazards. Use a noncombustible absorbent material to pick up small spills or residues. For large spills, dike far ahead to contain. Pick up liquid for reclamation or disposal. Do not release to sewers or waterways due to health and fire and/or explosion hazard. Follow applicable OSHA regulations (29 CFR 1910.120). Diesel fuel oil No. 2-D spills may be environmental hazards. Report large spills.

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations

RCRA Hazardous Waste (40 CFR 261.21): Ignitable waste

CERCLA Hazardous Substance (40 CFR 302.4): Not listed

SARA Extremely Hazardous Substance (40 CFR 355): Not listed

SARA Toxic Chemical (40 CFR 372.65): Not listed

OSHA Designations

Air Contaminant (29 CFR 1910.1000, Subpart Z): Not listed

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133).

Respirator: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, use a NIOSH-approved respirator with a mist filter and organic vapor cartridge. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA.*Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.*

Other: Wear impervious gloves, boots, aprons, and gauntlets to prevent skin contact.

Ventilation: Provide general and local explosion-proof ventilation systems to maintain airborne concentrations that promote worker safety and productivity. Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.[103]

Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.

Contaminated Equipment: Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Remove this material from your shoes and equipment. Launder contaminated clothing before wearing.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Use and storage conditions should be suitable for a OSHA Class II combustible liquid. Store in closed containers in a well-ventilated area away from heat and ignition sources and strong oxidizing agents. Protect containers from physical damage. To prevent static sparks, electrically ground and bond all containers and equipment used in shipping, receiving, or transferring operations. Use nonsparking tools and explosion-proof electrical equipment. No smoking in storage or use areas.

Engineering Controls: Avoid vapor or mist inhalation and prolonged skin contact. Wear protective rubber gloves and chemical safety glasses where contact with liquid or high mist concentration may occur. Additional suitable protective clothing may be required depending on working conditions. Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Practice good personal hygiene and housekeeping procedures. Do not wear oil contaminated clothing. At least weekly laundering of work clothes is recommended. Do not put oily rags in pockets. When working with this material, wear gloves or use barrier cream.

Transportation Data (49 CFR 172.101)

DOT Shipping Name: Fuel oil

DOT Hazard Class: Combustible liquid

ID No.: NA1993

DOT Label: None

DOT Packaging Exceptions: 173.118a

DOT Packaging Requirements: None

MSDS Collection **References:** 1, 6, 7, 12, 73, 84, 101, 103, 126, 127, 132, 133, 136, 143, 146

Prepared by: MJ Allison, BS; **Industrial Hygiene Review:** DJ Wilson, CIH; **Medical Review:** AC Darlington, MD; **Edited by:** JR Stuart, MS 97

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Material Safety Data Sheets Collection:

Sheet No. 718
Portland Cement

Issued: 8/90

Section 1. Material Identification

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Portland Cement (<1% quartz) Description: Tricalcium silicate ($3CaO \cdot SiO_2$) and dicalcium silicate ($2CaO \cdot SiO_2$) are portland cement's essential constituents, along with varying amounts of alumina, tricalcium aluminate, and iron oxide as tetracalcium aluminoferrate. Small amounts of magnesia, sodium, potassium, and sulfur are also present. Chromium may be present in the finished cement since the kiln's refractory lining and the steel balls used in the finish-milling operations are possible sources. To improve adhesion, strength, and flexibility, cement may be modified with various plastic latexes. Portland cement is used as a binding agent in concrete (a mixture of cement, gravel, and sand) and mortar. Concrete is cement diluted with 15% sand or other coarse particles, and approximately 3.75% calcium oxide.
Other Designations: CAS No. 65997-15-1, hydraulic cement, portland cement silicate.
Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*(TM) for a suppliers list.

Cautions: *Portland cement's primary danger is its alkalinity.* Calcium hydroxide, an alkaline, abrasive, and hygroscopic (moisture-absorbing) material, forms when water is added to dry cement. *Acute contact with wet cement may cause extensive burns; chronic exposure may lead to dermatitis.* Severe tissue damage may result if the cement hardens.

R	0
I	2
S	3
K	0

Genium

HMIS
H 2
F 0
R 1
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* Sec. 8

Section 2. Ingredients and Occupational Exposure Limits

Portland cement, ca 100%
Average Composition of Portland Cement:

	%
CaO (calcium oxide)	64.0
SiO_2 (silicon dioxide)	21.0
Al_2O_3 (aluminum oxide)	5.8
Fe_2O_3 [iron (III) oxide]	2.9
MgO (magnesium oxide)	2.5
Alkali Oxides	1.4
SO_3 (sulfur trioxide)	1.7

1989 OSHA PELs	1989-90 ACGIH TLV	1988 NIOSH REL	1985-86 Toxicity Data*
8-hr TWA: 10 mg/m³ (total dust) 8-hr TWA: 5 mg/m³ (respirable fraction)	TLV-TWA: 10 mg/m³ nuisance dust	None established	None listed

* Monitor NIOSH, *RTECS* (VV8770000), for future data.

Section 3. Physical Data

Vapor Pressure: Approximately 0 mm **pH:** 12 (wet cement)* **Water Solubility:** Insoluble

Appearance and Odor: Odorless, gray powder with <1% crystalline silica.

* Cement's alkalinity varies from batch to batch, depending on the excessive calcium oxides the manufacturer uses.

Section 4. Fire and Explosion Data

Flash Point: None reported	Autoignition Temperature: None reported	LEL: None reported	UEL: None reported

Extinguishing Media: This material is noncombustible. Use extinguishing media appropriate to the surrounding fire.
Special Fire-fighting Procedures: Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode. Calcium hydroxide forms when water is added to portland cement. Do not expose skin to wet cement. Be aware of runoff from fire control methods. Do not release to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Portland cement is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.
Chemical Incompatibilities: No hazardous incompatibilities are reported.
Hazardous Products of Decomposition: None reported.

Section 6. Health Hazard Data

Carcinogenicity: The NTP, IARC, and OSHA do not list portland cement as a carcinogen.

Summary of Risks: Portland cement is a nuisance dust and skin, eyes, and mucous membrane irritant. Its principle health hazard–with the addition of water–occurs when it forms alkaline, abrasive, hygroscopic (moisture-absorbing) calcium hydroxide (slaked lime). Dry cement alone does not cause an alkaline burn. Some individuals appear to tolerate brief skin contact with wet cement, but others develop extensive skin burns. Repeated and prolonged skin contact can cause dermatitis including skin dryness, fissures, eczematous rashes, and dystrophy of nails. Allergic dermatitis may result from the presence of heavy metals such as chromium in the mixture. In one study, 15 of 95 cement workers reported dermatitis of the hands.

Medical Conditions Aggravated by Long-Term Exposure: Individuals with chronic respiratory disorders or skin diseases should minimize inhalation and skin contact.

Target Organs: Respiratory system, skin, eyes.

Primary Entry Routes: Inhalation, ingestion, skin contact.

Acute Effects: Inhalation symptoms include eye, nose, and upper respiratory tract irritation, cough, expectoration, shortness of breath, and wheezing. Eye contact (splashes) cause burning and possible corneal edema. Direct contact with wet cement may result in extensive skin burns with dermal necrosis. Within 12 to 48 hr after 1- to 6-hr exposures, first, second, and third degree burns may occur. There may be no obvious pain at the time of exposure. Ingestion of the powder or liquid form causes esophagus and stomach burns.

Chronic Effects: Chronic bronchitis and chronic dermatitis may result from chronic exposure. There are reports of x-ray changes without symptoms in cement workers exposed to portland cement. Other studies showing x-ray changes with pulmonary symptoms are noted in workers exposed primarily to the silica-containing products in portland cement. The contact dermatitis it causes may clear up only after a prolonged time after the exposures end.

FIRST AID

Eyes: Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.

Skin: *Quickly* remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. Rinsing the exposed area with dextrose water may slow the hardening process. For reddened or blistered skin, consult a physician. Wash affected area with soap and water. Treat acute dermal reactions to wet cement as you would lye burns. Consult a physician immediately.

Inhalation: Remove exposed person to fresh air and support breathing as needed.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. If ingested, have that *conscious* person drink 4 to 8 oz. of milk or water. Consult a physician immediately.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Physician's Note: Ingestion of large amounts of cement is unlikely. However, to prevent re-exposing the esophagus and stomach, do not induce emesis or perform gastric lavage. Immediate dilution may prevent esophageal burns. For severe esophageal burns, consider esophagoscopy within the first 24 hr. Neutralization with acidic agents is not advised because of increased risks of exothermic burns. Water-mineral oil soaks may aid in removing hardened cement from the skin. Dried on cement is extremely difficult to remove; surgical debridement and even skin grafting may be necessary. Consult an opthalmologist for ocular burns. Consider topical mydriatic-cycloplegics to guard against development of posterior synechiae and ciliary spasm.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel of spill and provide adequate ventilation. Cleanup personnel should protect against dust inhalation and direct contact with wet cement. Avoid creating airborne dust conditions. Cleanup methods such as vacuuming (with an appropriate filter) or wet mopping minimizes dust dispersion. Carefully scoop spilled dry material into a suitable container (with a secure lid) for disposal or reclamation. Follow applicable OSHA regulations (29 CFR 1910.120).

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations

RCRA Hazardous Waste (40 CFR 261.33): Not listed
CERCLA Hazardous Substance (40 CFR 302.4): Not listed
SARA Extremely Hazardous Substance (40 CFR 355): Not listed
SARA Toxic Chemical (40 CFR 372.65): Not listed

OSHA Designations

Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133).

Respirator: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.*

Other: Wear impervious gloves, boots, aprons, and gauntlets to prevent skin contact.

Ventilation: Provide general and local ventilation systems to maintain airborne concentrations below the OSHA PELs and ACGIH TLV (Sec. 2). Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.[103]

Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.

Contaminated Equipment: Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Remove this material from your shoes and equipment. Launder contaminated clothing before wearing.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in tightly closed containers in a cool, dry, well-ventilated area. Protect containers from physical damage.

Engineering Controls: Avoid dust inhalation and direct contact with skin and eyes. Wear gloves, impervious boots, and other protective gear when pouring cement. Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Differentiate between cement and concrete usage and the degree of hazard. Practice good personal hygiene and housekeeping procedures.

Other Precautions: Provide preplacement and annual physical examinations with emphasis on the respiratory tract, eyes, and skin. Avoid exposing individuals sensitive to hexachromium salts. Adding iron to cements reduces chromium levels.

Transportation Data (49 CFR 172.101, .102): Not listed

MSDS Collection **References:** 26, 38, 73, 88, 89, 100, 101, 103, 126, 127, 132, 133, 134, 136, 138, 143

Prepared by: MJ Allison, BS; **Industrial Hygiene Review:** DJ Wilson, CIH; **Medical Review:** W Silverman, MD; **Edited by:** JR Stuart, MS

***** IV. FIRE AND EXPLOSION HAZARDS *****

LASH POINT (eg C):	Not available.
LAMMABLE LIMITS (in air):	Not available.
JTO-IGNITION TEMP. (deg C):	Not available.
LAMMABILITY LASSIFICATION:	Combustible.
TINGUISHING EDIA:	SMALL FIRE: Use DRY chemicals, CO2, water spray or foam. LARGE FIRE: Use water spray, fog or foam. DO NOT use water jet.
IRE FIGHTING OCEDURES:	Wear MSHA/NIOSH approved self-contained breathing apparatus or equivalent and full protective gear.
KPLOSIVE HAZARD:	Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. No specific information is available in our database regarding the product's risks of explosion in the presence of various materials.
AZARDOUS MBUSTION PRODUCTS:	Not available.

***** V. REACTIVITY *****

EVEL OF STABILITY: The product is stable.

NDITIONS TO AVOID: No additional remark.

COMPATIBILITY:	No specific information is available in our database regarding the reactivity of this material in presence of various other materials.
ZARDOUS COMPOSITION RODUCTS:	Not available.
ZARDOUS OLYMERIZATION:	No.

***** VI. TOXICOLOGICAL PROPERTIES *****

RESHOLD LIMIT ALUE:	Not available.

FECTS OF EXPOSURE: Very hazardous in case of inhalation. Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion.

CARCINOGENIC EFFECTS: Classified 1 (Known.) by NTP [Quartz]. Classified 2A (Probable for human.) by IARC [Quartz].
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.There is no known effect from chronic exposure to this product. Repeated or prolonged exposure is not known to aggravate medical condition.

..ICOLOGICALLY NERGISTIC DUCTS: Not available.

HER HEALTH ZARDS: Very hazardous in case of inhalation. Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion.

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***** VII. EMERGENCY FIRST AID *****

S: Check for and remove any contact lenses. DO NOT use an eye ointment. Seek medical attention.

'N CONTACT GHT, RONIC: After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

HALATION SLIGHT, ONIC: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

No additional information.

ESTION SLIGHT, ONIC: DO NOT induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

No additional information.

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***** VIII. PREVENTIVE MEASURES *****

ERSONAL PROTECTIVE UIPMENT:	Splash goggles. Lab coat. Vapor and dust respirator. Be sure to use a MSHA approved respirator or equivalent. Gloves. Wear appropriate respirator when ventilation is inadequate.
EPS TO BE TAKEN F MATERIAL IS ILLED OR RELEASED:	Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements. Our database contains no additional information in case of a spill and/or a leak of the product. Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.
STE DISPOSAL THODS:	Recycle, if possible. Consult your local or regional authorities.
ORAGE AND NDLING:	Keep container dry. Keep in a cool place. Ground all equipment containing material. Carcinogenic, teratogenic or mutagenic materials should be stored in a separate locked safety storage cabinet or room. Not available.
ECIAL ENGINEERING ONTROLS:	Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.
ECIAL SHIPPING FORMATION:	Not applicable.
ECIAL INFORMATION:	No additional remark.

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*** IX. PREPARATION INFORMATION REGULATORY AFFAIRS DEPARTMENT *****

==========MSDS INFORMATION==========

ONTACT MSDS CO-ORDINATOR, VAN WATERS & ROGERS LTD. DURING BUSINESS HOURS, PACIFIC TIME (604) 273-1441

TE ISSUED: June 4, 1997
PERCEDES: New

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INJURY AND ILLNESS PREVENTION PROGRAM

In California, all locations must implement an Injury and Illness Prevention Program (IIPP) as a result of legislation popularly known as SB 198. Field operations, such as those covered in this health and safety plan, are also covered by the IIPP. The purpose of this document is to provide a summary of the elements of Dames & Moore's IIPP and guidance concerning aspects of the IIPP about which all field personnel should be aware. Complete details of the IIPP are found in the Firmwide Health and Safety Manual at Procedure HS 330.

- The Western Division Health and Safety Manager (WDHSM) is responsible for the overall implementation of the IIPP. The WDHSM is John Danby, CIH, in the Sacramento office. The Managing-Principal-In-Charge (MPIC) or Group Leader (GL) will be responsible for the IIPP at his/her location.

- To ensure that employees comply with safe and healthy work practices, increasing disciplinary actions will be utilized for employees who engage in unsafe or unhealthy work practices. Written acknowledgement will also be placed in the employee's personnel file for those persons who make a significant contribution toward workplace safety. Health and safety compliance will be evaluated during each employee's annual performance review.

- Employees are encouraged to report suspected workplace hazards to their supervisors, the WDHSM, or Office 165 personnel. However, any employee may make such notification anonymously. Forms for this purpose are located at the IIPP bulletin board at each office. NO EMPLOYEE WILL BE RETALIATED AGAINST FOR REPORTING HAZARDS OR FOR MAKING SUGGESTIONS RELATED TO SAFETY.

- Workplace hazards will be identified by reviewing applicable regulations and consensus standards for comparison to Dames & Moore operations. For activities such as hazardous-substance related field work, potential hazards are evaluated during the preparation of the site-specific health and safety plan. In accordance with Procedure HS 280, periodic audits will also be conducted by members of the health and safety staff during field activities.

- Workplace injuries and illnesses will be appropriately investigated. All injuries or illnesses that are known or suspected to result from workplace activities must be reported for proper recordkeeping. Certain injuries or illnesses may require formal investigation. The Accident Report Form included in this Plan at Attachment C is to be completed for injuries or illnesses arising from activities conducted at the site. A complete discussion of injury and illness reporting is found at Procedure HS 210.

- Prevention of unsafe or unhealthy conditions can usually be achieved by proper training, advanced planning, and resolution of issues by responsible management or a health and safety professional. Such prevention will be a primary method used by Dames and Moore to minimize or abate hazards. At any site, any employee may contact a member of the Health and Safety staff (Office 165) if he or she is concerned that a health and safety problem may exist. The WDHSM is the primary contact. The Site Safety Officer or Project Manager may stop operations at any time if it is believed that an unsafe or unhealthy condition may be developing.

- Each employee will receive health and safety training appropriate to their job function. Several training classifications are used for this purpose. All employees will be classified for training purposes.