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PLANT 11
REMEDIAL ACTION PLAN

MOOG, INC.
EAST AURORA, NEW YORK

APRIL 1995

MALCOLM PIRNIE, INC.

S-3515 Abbott Road
P. O. Box 1938
Buffalo, New York 14219

2630-001-200/DEC

MALCOLM PIRNIE

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REMEDIAL ACTION PLAN

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MOOG INC.

PLANT 11 REMEDIAL ACTION PLAN

EXECUTIVE SUMMARY

1.0 Introduction

This document presents a conceptual plan for the remediation of solvent-contaminated groundwater at Plant 11 on the Moog, Inc. East Aurora campus. Volatile organic compounds (VOCs) were detected in groundwater and subsurface soils near an underground waste oil tank during an environmental site assessment in May and June 1994 conducted by Blasland, Bouck, and Lee, Inc. for a third party. Moog Controls, Inc. leases a portion of Plant 11 from Moog, Inc., and also operates and controls the waste oil tank. The current waste oil tank has been in use since 1990, when a former tank was removed from the same location by Moog Controls.

2.0 Site Description

The 1000-gallon, double-walled waste oil tank is located near the Plant 11 loading dock, adjacent to a below-grade loading dock access road. A storm water drainage trench crosses the access road and drains to a indoor sump. Storm water is pumped from the sump to sewer pipes discharging to an on-site cooling pond.

3.0 Previous Investigations

The subsurface investigation performed by Blasland, Bouck, and Lee, Inc. at Plant 11 identified the presence of five chlorinated volatile organic compounds, two freon compounds and total petroleum hydrocarbons in the shallow groundwater and soil adjacent to the existing waste oil tank, and at monitoring well MW-2, approximately 30 feet downgradient of the waste oil tank. Sampling results from locations downgradient of MW-2 indicated that there is minimal potential for groundwater migration off-site in the shallow flow zone. The vertical extent of VOCs in groundwater was not determined.

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4.0 Site Characterization

Malcolm Pirnie performed a site investigation to collect the site data necessary to develop a conceptual remedial plan. The objectives of the investigation were as follows:

- Determine the vertical extent of halogenated VOCs in groundwater.
- Evaluate upgradient groundwater quality.
- Evaluate the potential for contaminant migration via subsurface utilities.
- Identify, if present, a continuing source of groundwater contamination in soil adjacent to the waste oil tank.

Hydrogeologic Conditions

An evaluation of site-specific hydrogeologic conditions was performed based on data from the four new wells and the information provided in the environmental site assessment report prepared by Blasland, Bouck, and Lee.

Groundwater occurs in an unconfined shallow water-bearing zone comprised of saturated till and weathered bedrock; and in an underlying aquitard comprised of the massive slightly weathered bedrock. The shallow water-bearing zone overlies massive, petroliferous, black shale bedrock with hydraulic conductivity values that are three to four orders of magnitude smaller. Based on drilling observations, hydraulic testing results, and measured groundwater levels, the shallow water-bearing zone has an estimated saturated thickness of only 6 feet. This zone is interpreted to be the only significant migration pathway for contaminated groundwater.

Groundwater flows toward decreasing hydraulic head in a north-northwest direction. The calculated horizontal hydraulic gradient for the shallow water-bearing zone is 0.002 ft/ft based on January 1995 water levels. This is a low hydraulic gradient reflective of the low topographic relief. Groundwater seepage velocities, which approximate the maximum rate of contaminant migration, range from 20 to 40 feet per year.

A storm water collection trench located approximately 15 feet from the waste oil tank is a groundwater discharge point.

Vertical hydraulic gradients were vertically downward in January 1995. Therefore, a potential exists for groundwater and dissolved waste constituents to flow downward.

However, the rate of vertical groundwater seepage is likely to be orders of magnitude lower than the horizontal flow rate.

Source Investigation

A total of six soil borings were drilled to investigate the extent of soil contamination around the existing tank. Soil and rock samples from these borings and other soil borings completed previously for the environmental site assessment exhibited very low levels of halogenated volatile organics, TPH, and acetone. As would be expected with a solvent contaminated oil, TPH and chlorinated organics are co-contaminants. This would corroborate the suspected source of solvent contaminated oil. The levels of halogenated organics and TPH detected in soil in close proximity to the waste oil tank are residual concentrations and are well below soil cleanup guidance values. In general, the analytical data indicate that the source of the halogenated organic releases to groundwater has been removed.

Low levels of acetone were detected in all soil samples, including samples with no detectable TPH or VOCs. Therefore, the acetone is a suspected laboratory contaminant.

Groundwater Quality

Concentrations of halogenated volatile organics above the NYS Class GA Groundwater Quality Standards (GWQS) were detected during the current investigation downgradient of the waste oil tank in MW-2 and in the storm water trench crossing the access road. Groundwater flow directions indicate that the halogenated organics will be advected with groundwater flow toward the north-northwest in the direction of MW-4. A concentration of a halogenated organic compound above the GWQS was detected in MW-4. This well is likely near the northern limit of the plume originating at the waste oil tank. The comparatively low concentrations of halogenated organics detected in groundwater relative to published aqueous solubility limits indicate that the presence of non-aqueous phase solvents below the waste oil tank is unlikely.

The vertical hydraulic gradient between the shallow water-bearing zone and the deep groundwater zone indicate a potential for vertical migration of dissolved VOCs. However, halogenated organics were not detected in the groundwater in the deep well, indicating that the constituents have not migrated downward. The absence of halogenated VOCs deep most likely reflects the combined influences of the time that has elapsed since the release occurred and the low hydraulic conductivity of the underlying black shale.

The volatile aromatic hydrocarbons, benzene, toluene, ethylbenzene, and total xylenes (BTEX), were detected in groundwater samples collected from the storm trench and in the deep bedrock wells. BTEX compounds have not been detected in the shallow water-bearing zone; therefore, it is not likely that the BTEX originates from the waste oil tank. The BTEX detected in the deep wells are suspected to originate as naturally occurring hydrocarbons present in the petroliferous black shale bedrock.

Acetone was detected in the absence of halogenated organics and is upgradient of the waste oil tank; thus acetone is a suspected laboratory contaminant. Acetone was not detected upon resampling.

Site characterization data indicate that remediation of the release of halogenated organics at the Plant 11 site should focus on the collection and treatment of contaminated groundwater. There is reportedly no evidence of leakage from the tank.

5.0 Remedial Action Plan

Groundwater remediation at the Moog site will consist of groundwater collection, groundwater treatment, and discharge of the treated effluent. The site investigation revealed that the storm trench and sump act as a collection point for contaminated groundwater. The trench will be lined to prevent future infiltration of groundwater following removal of sediment from this structure. The conceptual design of the groundwater collection and treatment systems are presented below.

Groundwater Collection

The conceptual groundwater collection system includes two collection trenches with preliminary locations identified on Figure 5. The purpose of the trenches is to intercept the flow of contaminated groundwater downgradient of the source area. The building footprint necessitates two offset trench alignments. One 50-foot trench will be positioned immediately downgradient of the area of elevated contaminant concentrations near MW-2. The second trench will be positioned close to the estimated limit of the contaminant plume. Contaminants that bypass the near trench will be intercepted at the far trench.

After a year of pumping with uniform recharge to the water table and a constant drawdown of two feet in the trench, the average pumping rate is estimated to be 2.5 gpm per trench.

Groundwater Treatment

Air stripping provides the most economical long-term treatment alternative. Volatile organics will be removed from the groundwater by a low profile air stripper. The treated groundwater will accumulate in an integral air stripper sump, and will be discharged through the storm sewer to the cooling pond for ultimate discharge to Buffalo Creek through Outfall 004. The air stream will be discharged to the atmosphere through an elevated stack. Assuming the maximum groundwater concentrations encountered to-date and an average flow rate of 5 gpm, air treatment is not anticipated to be necessary.

A NYSDEC Permit to Construct and a Certificate to Operate will be procured prior to air stripper construction and operation. In addition, ongoing discussions by Moog, Inc. with the NYSDEC indicate that revision of the existing SPDES permit for Outfall 004 may be required.

Based on the conceptual remedial plan presented above, this remediation could be designed, constructed, and installed within an approximately 5 to 7-month time frame.

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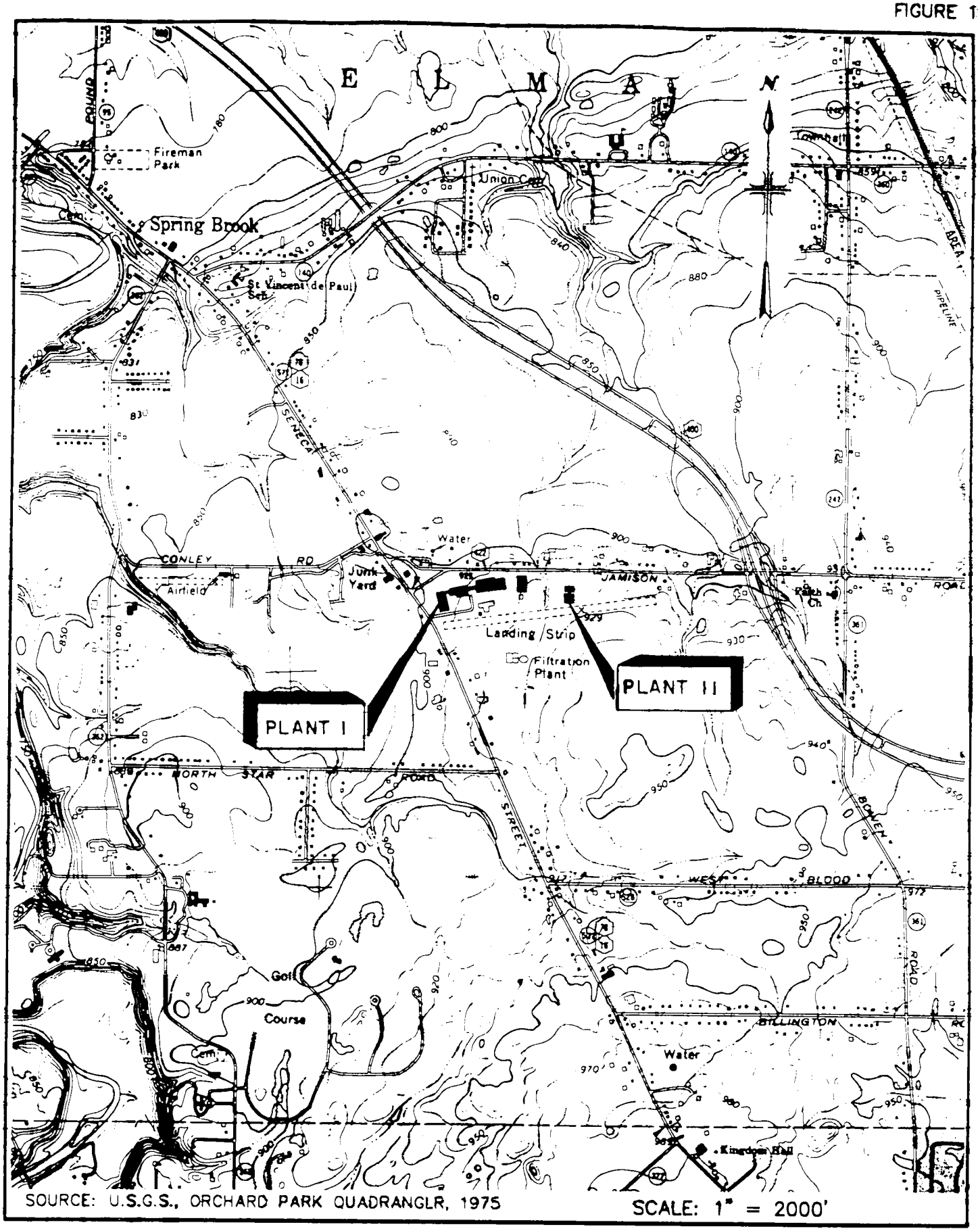
1.0 INTRODUCTION

This document presents a conceptual plan for the remediation of solvent-contaminated groundwater at Plant 11 on the Moog, Inc. East Aurora campus (see Figure 1). Volatile organic compounds (VOCs) were detected in groundwater and subsurface soils near an underground waste oil tank during an environmental site assessment in May and June 1994 conducted by Blasland, Bouck, and Lee, Inc. for a third party.

This remedial plan is based on the findings of the site characterization conducted by Malcolm Pirnie in October 1994 through March 1995 for Moog, Inc., and on information from the July 1994 environmental site assessment report (Ref. No. 1).

FIGURE 1



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MOO-PR-LOC

MOOG, INC.
SITE INVESTIGATION
SITE LOCATION MAP

MOOG, INC. AUGUST 1994

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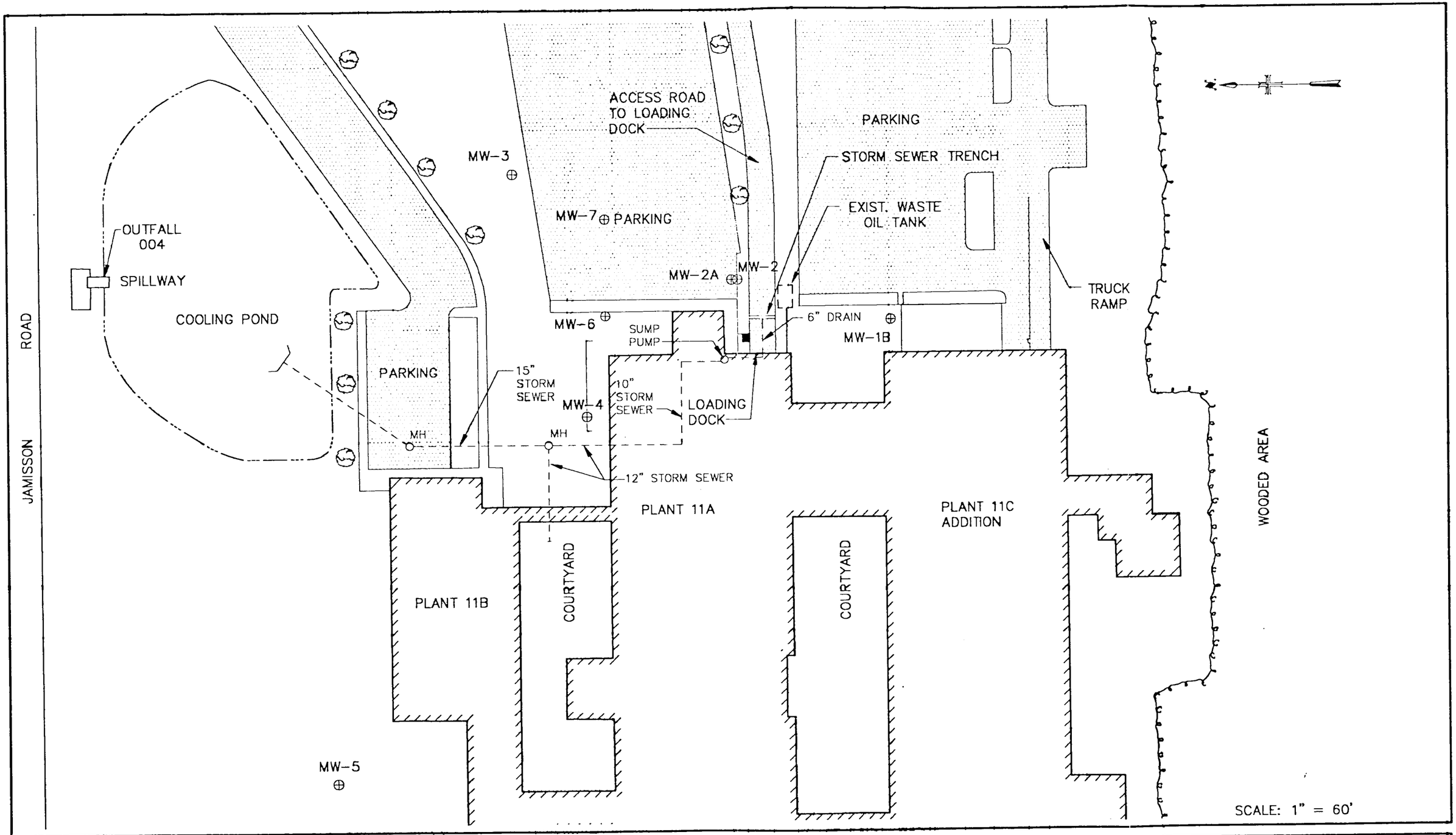
2.0 DESCRIPTION OF THE SUSPECTED SOURCE AREA

The 1,000-gallon, double-walled waste oil tank is located southeast of the Plant 11A loading dock and south of the loading dock access road (see Figure 2). Moog Controls, Inc. leases a portion of Plant 11 from Moog, Inc., and also operates and controls the waste oil tank. The current waste oil tank has been in use since 1990, when a former tank was removed from the same location by Moog Controls.

The topography of the area around Plant 11 is flat, except for the access road, which slopes downward toward the facility to approximately four feet below the floor of the loading dock. The waste oil tank is located in a soil bank on the edge of the access road. Storm water draining into the access road collects in a storm water drainage trench located approximately 25 feet from Plant 11A and 15 feet from the waste oil tank. Water is conveyed from the trench by gravity drainage to a sump inside Plant 11A. Water entering the sump is pumped to storm sewers that discharge to the on-site cooling pond. Figure 2 illustrates the storm water drainage system.



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MOO-00-SIT

PLANT 11
REMEDIAL EVALUATION
SITE MAP

MOOG, INC. APRIL 1995

SECTION III

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3.0 PREVIOUS INVESTIGATIONS

Blasland, Bouck, and Lee, Inc. performed an initial subsurface investigation across the entire Plant 11 Complex in May 1994. This investigation included the analysis of subsurface soils, groundwater using seven Geoprobe™ soil borings (MC-1 through 5, 7, and 8) and the analysis of surface water and sediment samples from the cooling pond. Halogenated solvents were detected in soil and groundwater samples collected in the vicinity of the waste oil tank. Therefore, a second site investigation was performed to further define the extent of groundwater contamination. Monitoring wells MW-2, MW-3, MW-4, and MW-5 were installed at locations illustrated on Figure 2. Sampling results of MW-2 through MW-5 and groundwater data from the Geoprobe(™) locations which were reported in the July 1994 site assessment report are summarized in Table 3-1.

The subsurface investigation performed by Blasland, Bouck, and Lee, Inc. at Plant 11 identified the presence of five chlorinated volatile organic compounds, two freon compounds and total petroleum hydrocarbons in the shallow groundwater and soil adjacent to the existing waste oil tank, and at monitoring well MW-2, approximately 30 feet downgradient of the waste oil tank. Sampling results from locations downgradient of MW-2 indicated that there is minimal potential for groundwater migration off-site in the shallow flow zone. The vertical extent of VOCs in groundwater was not determined.

Groundwater upgradient of the waste oil tank was collected from a temporary Geoprobe soil boring during the initial subsurface investigation. No VOCs were found in the temporary upgradient sampling location at that time. Two attempts were made to install an upgradient monitoring well during the June 1994 investigation. However, both boreholes remained dry to a depth of 10 feet for one full day. Because groundwater was not encountered, no upgradient monitoring well was installed.

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TABLE 3-1

MOOG, INC.
PLANT 11 REMEDIAL ACTION PLAN

PREVIOUS SAMPLING RESULTS[1,2,3]

Parameter	Groundwater (ug/l)						Soil (ug/kg)	
	MC-2	MC-8	MW-2	MW-3	MW-4	MW-5	MC-1	MC-2
							4'-7'	4-5.5'
Freon 11	110		91					
Freon 113	3,500		1,200					
Tetrachloroethene	3,400		860				120	91
Trichloroethene	3,500		980				12	27
1,2 Dichloroethene	1,600		1,900		59		70	49
1,1,1 Trichloroethane	2,600		4,700					45
1,1 Dichloroethane	1,300	1.1	4,300		2			9.1
4 Chloro 3 Methylphenol			13					
Fuel Oil #2							71,000	
bis(2-Ethylhexyl)phthalate			16					

Notes:
(1) Obtained from "Summary of Hydrogeologic Site Conditions, 300 Jamison Road, East Aurora, New York." Prepared by Blasland, Bouck, and Lee, Inc. (July 1994).
(2) Locations are illustrated in Appendix A. MC-2, MC-1 are adjacent to the waste oil tank.
(3) MC = Geoprobe locations.
MW = Monitoring well locations.

4.0 SITE CHARACTERIZATION

4.1 Investigative Methodology

Malcolm Pirnie, Inc. performed geologic and hydrogeologic investigations during the periods of late October 1994 through January 1995. A supplemental sampling program was performed in March 1995. The investigations were conducted to collect the site data necessary to develop a conceptual remedial plan. The objectives of the investigation were as follows:

- Determine the vertical extent of halogenated VOCs in groundwater.
- Evaluate upgradient groundwater quality.
- Evaluate water quality for remedial design requirements.
- Evaluate the potential for contaminant migration via subsurface utilities.
- Identify, if present, a continuing source of groundwater contamination in soil adjacent to the waste oil tank.

The scope of these investigations and specific field procedures used were in accordance with the Work Plan for the Plant 11 Remedial Evaluation (Ref. No. 2), which is provided in Appendix A. The field data collected during the investigations performed by Malcolm Pirnie, Inc. are presented in Appendix B.

4.1.1 Drilling and Monitoring Well Installation

Four boreholes were drilled to obtain physical soil samples, bedrock cores, and to install monitoring wells for groundwater sampling. The boring logs, and monitoring well construction and development details are presented in Appendix B. Well installation was performed by Earth Dimensions, Inc. of Elma, New York with oversight provided by Malcolm Pirnie, Inc.

Boring MW-1B was drilled near the same location that Blasland, Bouck, and Lee attempted to install an upgradient well in June 1994. Similar water-bearing characteristics were encountered at that location during October 1994. Groundwater did not flow into the borehole as it was advanced to 14 feet bgs although moisture was observed along a small

number of the bedding planes in the bedrock. After leaving the augers in the open borehole overnight, approximately 1.5 feet of water was observed in the borehole. The borehole was then advanced to 17 feet and the monitoring well was installed. The initial recovery of MW-1B required a period of two months following well installation, therefore, MW-1B was not developed prior to sampling.

Well MW-2A was drilled adjacent to MW-2 to determine the vertical extent of VOC contamination in groundwater and the potential for downward migration of VOCs. The borehole was advanced with 6 ¼ inch augers to auger refusal at 14 feet below grade. A four-inch PVC casing was installed and grouted in-place at 14 feet to prevent the downhole migration of contaminants, which were known to occur in groundwater at MW-2. An NX-sized core barrel was used to collect bedrock core samples from 14 to 26 feet below grade, where the monitoring well was installed.

Two shallow wells designated MW-6 and MW-7 were installed in March 1995 in order to provide a better assessment of the extent of volatile organics in groundwater downgradient of MW-2. Both wells were installed at the depth of auger refusal in the upper, weathered bedrock.

Wells MW-2A, MW-6, and MW-7 were developed by bailing until the specific conductivity, temperature, and pH stabilized. Five well volumes were removed from MW-2A over 12 days. The well recharged slowly preventing further development; wells MW-6 and MW-7 recharge rapidly.

4.1.2 Well Testing, Water Level Measurement, and Well Survey

In situ hydraulic conductivity tests (slug tests) were performed on MW-1B, MW-2A, MW-2, MW-5, MW-6, and MW-7. Blasland, Bouck, and Lee, Inc. reported the results of slug tests on MW-3 and MW-4. Field data sheets, and methods of analysis are presented in Appendix B.

The locations and elevations of new and existing wells were surveyed by Malcolm Pirnie Inc. in November 1994 and March 1995, relative to the finished floor grade of Plant 11. Six rounds of groundwater elevations were collected from November 1994 through March 1995 and are summarized in Appendix B.

4.1.3 Soil Gas Survey

A soil gas survey was proposed in the Work Plan to identify the extent of contaminated groundwater by detecting total organic vapors volatilizing from the water table into the shallow soil zone. The initial target area of the soil gas survey was the suspected bedding surrounding storm water piping connecting the storm water drainage trench in the loading dock access road to the cooling pond. Granular backfill was suspected to be a potential migration pathway for solvent contaminated groundwater. However, site utilities maps subsequently indicated that water collected in the access road storm drainage trench flows by gravity to an indoor sump. The water is pumped upward to a drain pipe that is situated above the water table where it runs through the Plant 11 structure. Therefore, there is no granular backfilled storm water line directly connecting the storm water trench and the cooling pond that may influence groundwater flow.

Soil gas samples were collected at nine locations including the storm sewer bedding (see Figure 3) between MW-3 and MW-4 to identify the potential for an additional source of contamination. The resulting values were comparable with the background reading obtained upgradient of the site at G-1. Soil gas monitoring procedures are presented in Appendix A. Soil gas measurements are summarized in Appendix B.

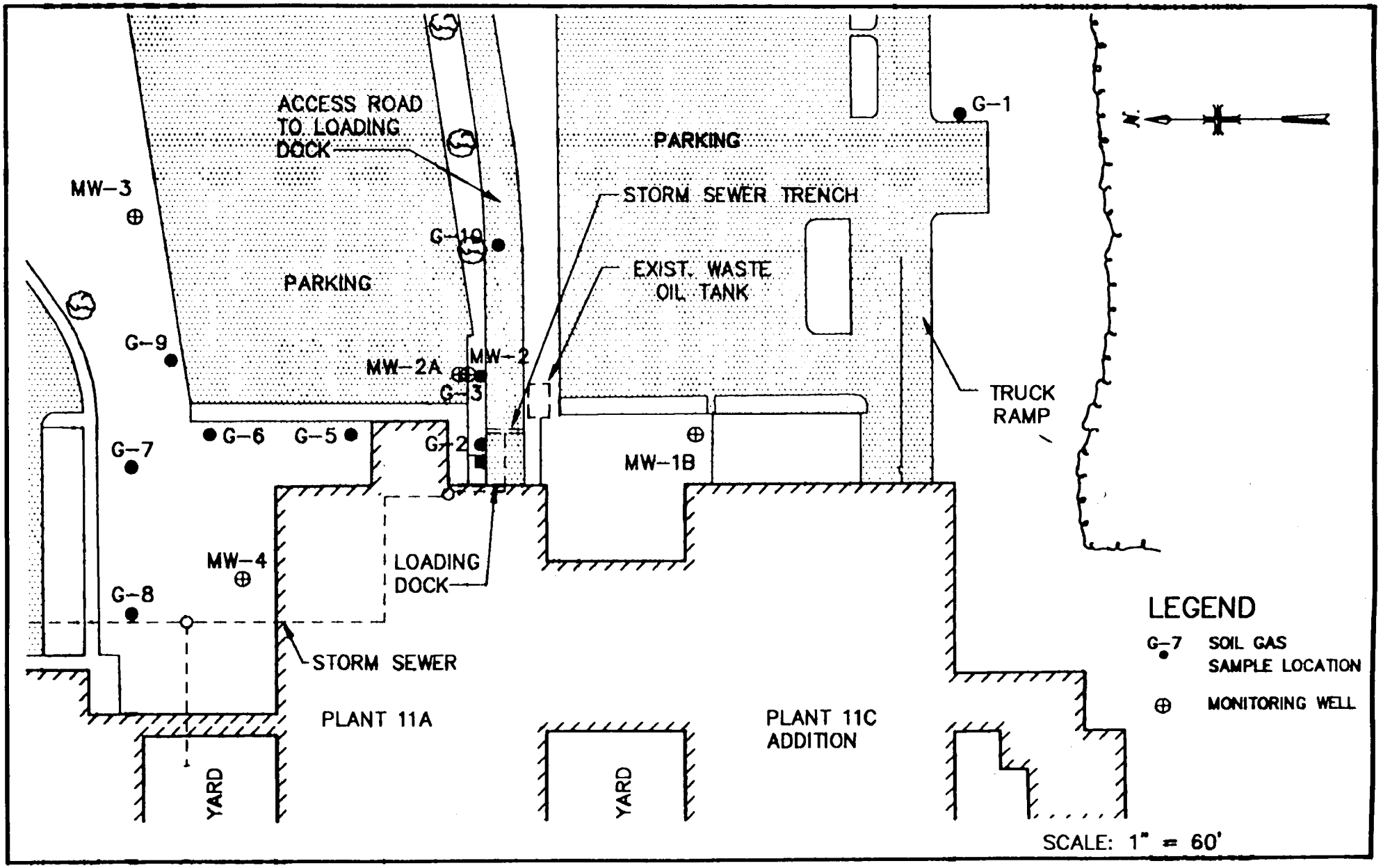
4.2 Site Geology

This section presents a discussion of site geologic conditions based on the drilling conducted in October 1994 by Malcolm Pirnie, and in May/June 1994 by Blasland, Bouck and Lee, Inc.

A geologic cross section through MW-1B, the storm water trench, MW-2/MW-2A, and MW-4 is presented in Figure 4. The cross section location is shown on Figure 6. Stratigraphic units identified on-site from the youngest to the oldest include:

- Fill material
- Till
- Weathered black shale bedrock
- Black shale bedrock

Overburden - The overburden is comprised of approximately 4 to 8 feet of fill material and glacial till. The till has a variable composition ranging from clayey silt to a gravelly silty sand. The overburden thins south of the waste oil tank near MW-1B.



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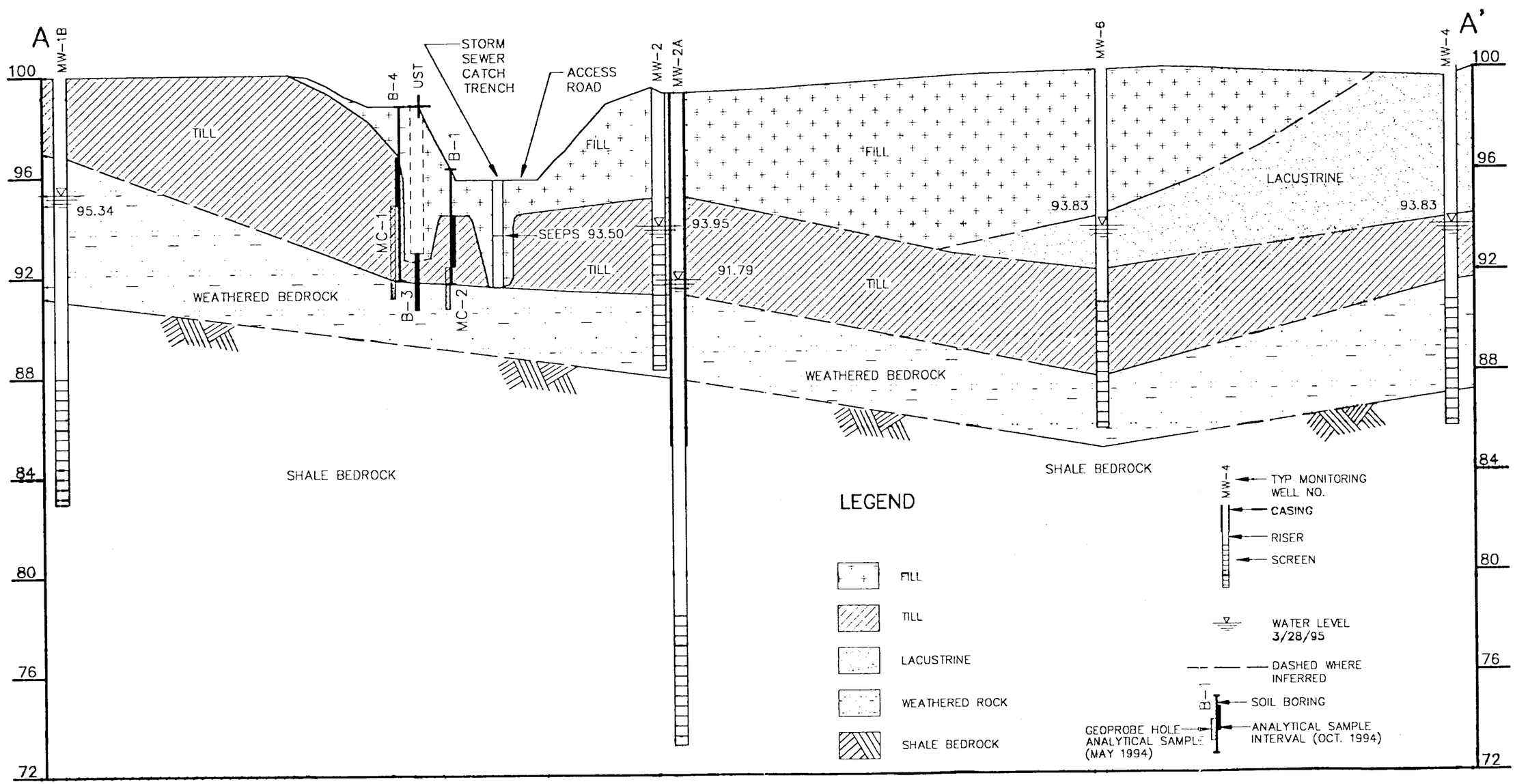
MOO-00-SGL

PLANT 11
REMEDIAL EVALUATION
SOIL GAS LOCATION

MOOG, INC. JANUARY 1995

FIGURE 3



NOTE: ELEVATIONS IN FEET (REFERENCE: FINISHED FLOOR EL. 100')

SCALE: HORIZ. 1"= 20', VERT. 1" = 4'

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MOO-00-SEC

PLANT II
REMEDIAL EVALUATION
CROSS SECTION A-A'

MOOG, INC.

APRIL 1995

Bedrock - The major rock formation underlying the site, as mapped by Buehler and Tesmer (Ref. No. 3) is the Rhinestreet Shale member of the West Falls Formation. The Rhinestreet Shale is described as a fissile to massive black shale, which may be slightly petroliferous and is locally oil-bearing (Ref. No. 4).

At all drilling locations at the Plant 11 site, the uppermost bedrock is an extremely weathered black shale approximately 3 to 6 feet in thickness. The base of the weathered zone occurs at approximately 12 to 15 feet below grade and was defined in the field as the depth of split-spoon sample refusal. Core samples of the competent shale collected below the weathered bedrock zone at MW-2A indicate that the bedrock is massive, slightly weathered with few fractures in the interval 14 to 26 feet below grade.

4.3 Site Hydrogeology

Groundwater occurs in an unconfined shallow water-bearing zone comprised of saturated till and weathered bedrock; and in an aquitard comprised of the massive slightly weathered bedrock.

Hydraulic tests performed on the shallow wells and summarized in Table 4-1 indicate that the shallow water-bearing zone has a moderate hydraulic conductivity ranging from 8.1 E-3 cm/s to 1.3 E-4 cm/s. This range reflects a variability in the soil types present and in the degree and thickness of weathering of the black shale bedrock. The geometric mean of hydraulic test results for the shallow water-bearing zone is 2.0E-3 cm/s.

The shallow water-bearing zone overlies massive black shale bedrock with hydraulic conductivity values that are three to four orders of magnitude smaller. Based on the transition from extremely weathered rock to slightly weathered rock observed in the rock samples, the hydraulic testing results, and measured groundwater levels, the zone of moderate permeability (the shallow water-bearing zone) has an estimated saturated thickness of only 6 feet. This zone is interpreted to be the only significant migration pathway for contaminated groundwater.

Hydraulic head distributions within the shallow water-bearing zone are depicted in Figure 5 for January 1995 water levels and Figure 6 for March 1995 water levels. Groundwater flows toward decreasing hydraulic head in a north-northwest direction. The groundwater flow is slightly dammed at the cooling pond. The water level in the cooling pond is maintained at the elevation of the pond spillway (94.1 feet), and has been

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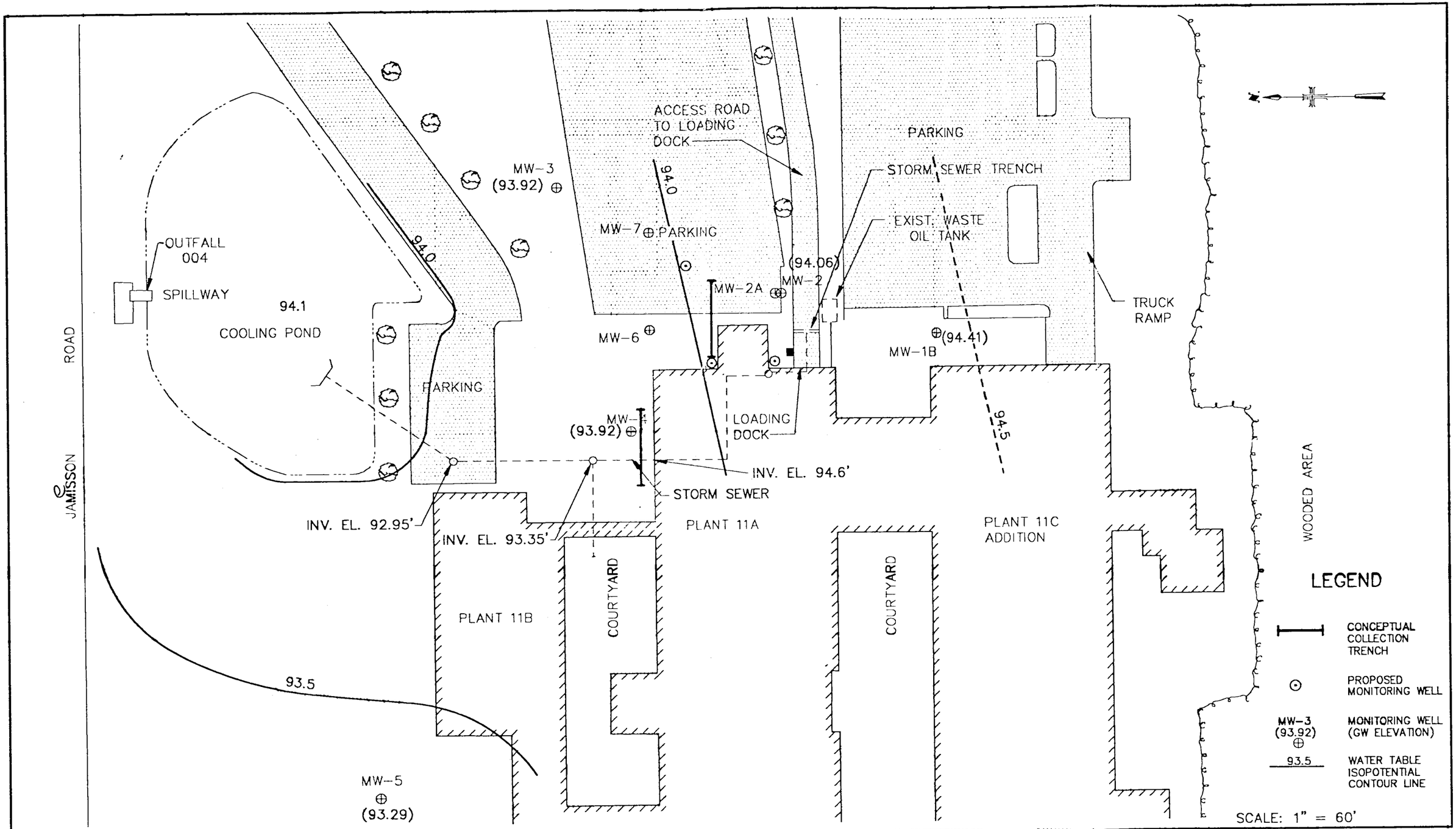
TABLE 4-1

MOOG, INC.
PLANT 11 REMEDIAL ACTION PLAN

IN-SITU HYDRAULIC CONDUCTIVITY TEST RESULTS

Location	Screened Zone	K (cm/s)
MW-1B	Weathered Bedrock	E-7
MW-2A	Bedrock	7.1E-7
MW-2	Till/Bedrock Interface	1.3E-4
MW-3	Till/Bedrock Interface	5.0E-3(1)
MW-4	Weathered Bedrock	2.5E-3(1)
MW-5	Till/Bedrock Interface	8.4E-4
MW-6	Till/Bedrock Interface	6.7E-3
MW-7	Till/Bedrock Interface	8.1E-3

Note:
(1) Analyzed via Bower-Rice (Blasland, Bouck & Lee, Inc., 1994)



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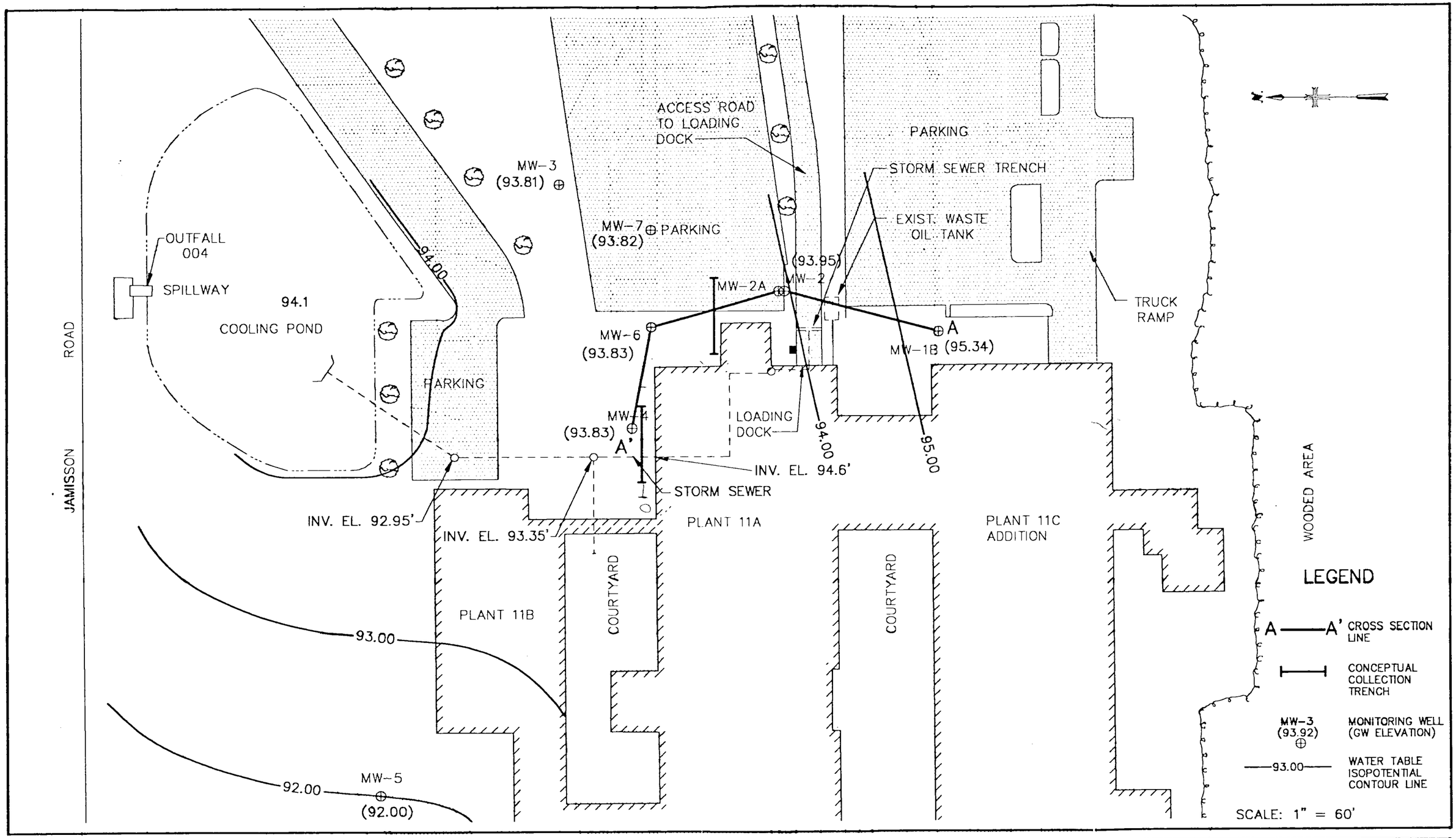
MOOG005

PLANT 11
REMEDIAL EVALUATION
ISOPOTENTIAL MAP FOR JANUARY 1995

MOOG, INC. APRIL 1995



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MOOG008

PLANT 11
REMEDIAL EVALUATION
ISOPOTENTIAL MAP FOR MARCH 1995
WITH CROSS SECTION A–A'

MOOG, INC. APRIL 1995

consistently higher than the groundwater levels measured at MW-3, and MW-4. Groundwater likely flows around the pond, but the flow direction may change seasonally. The calculated horizontal hydraulic gradient for the shallow water-bearing zone is 0.002 ft/ft based on January 1995 water levels and somewhat lower based on March 1995 water levels. This is a low hydraulic gradient reflective of the low topographic relief.

Although the storm water drainage trench is constructed of concrete, water was observed seeping into the trench at joints in the concrete after standing water was pumped out. The invert of the storm water trench was surveyed and found to be below the groundwater elevations measured in MW-2, the nearest shallow well. Therefore, the seeps in the storm water trench are inferred to be a groundwater discharge point. The base and walls of the sump are not open to the weathered bedrock; therefore, the indoor sump is not a groundwater discharge point.

The rates of horizontal and vertical groundwater seepage are a function of the hydraulic gradients, average hydraulic conductivity values, and the effective porosity of the saturated medium. Effective porosity values (the volume actually open to groundwater flow) were selected from the range of total porosity values in the hydrogeologic literature for weathered shale bedrock (0 to 10%) and till (10 to 20%) (Ref. Nos. 5 and 6). Depending upon the effective porosity value assumed in the calculation, groundwater seepage velocities range from 40 to 20 feet per year. The calculated seepage velocities and hydrogeologic properties of the shallow water-bearing zone are summarized in Table 4-2.

Vertical hydraulic gradients calculated from water elevations at MW-2 and MW-2A were vertically downward in January 1995. However, the rate of vertical groundwater seepage is estimated to be orders of magnitude lower than the horizontal flow rate.

4.4 Source Investigation

4.4.1 Methodology

Six soil borings were completed adjacent to the waste oil tank in October 1994 to determine whether solvent-contaminated soil reported in the July 1994 environmental site assessment report may present a continuing release of contaminants to the groundwater. Soil borings locations B-1 to B-6 are shown on Figure 7. Soil samples were screened for organic vapors using procedures discussed in Appendix A. Two soil borings (MC-1 and

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TABLE 4-2

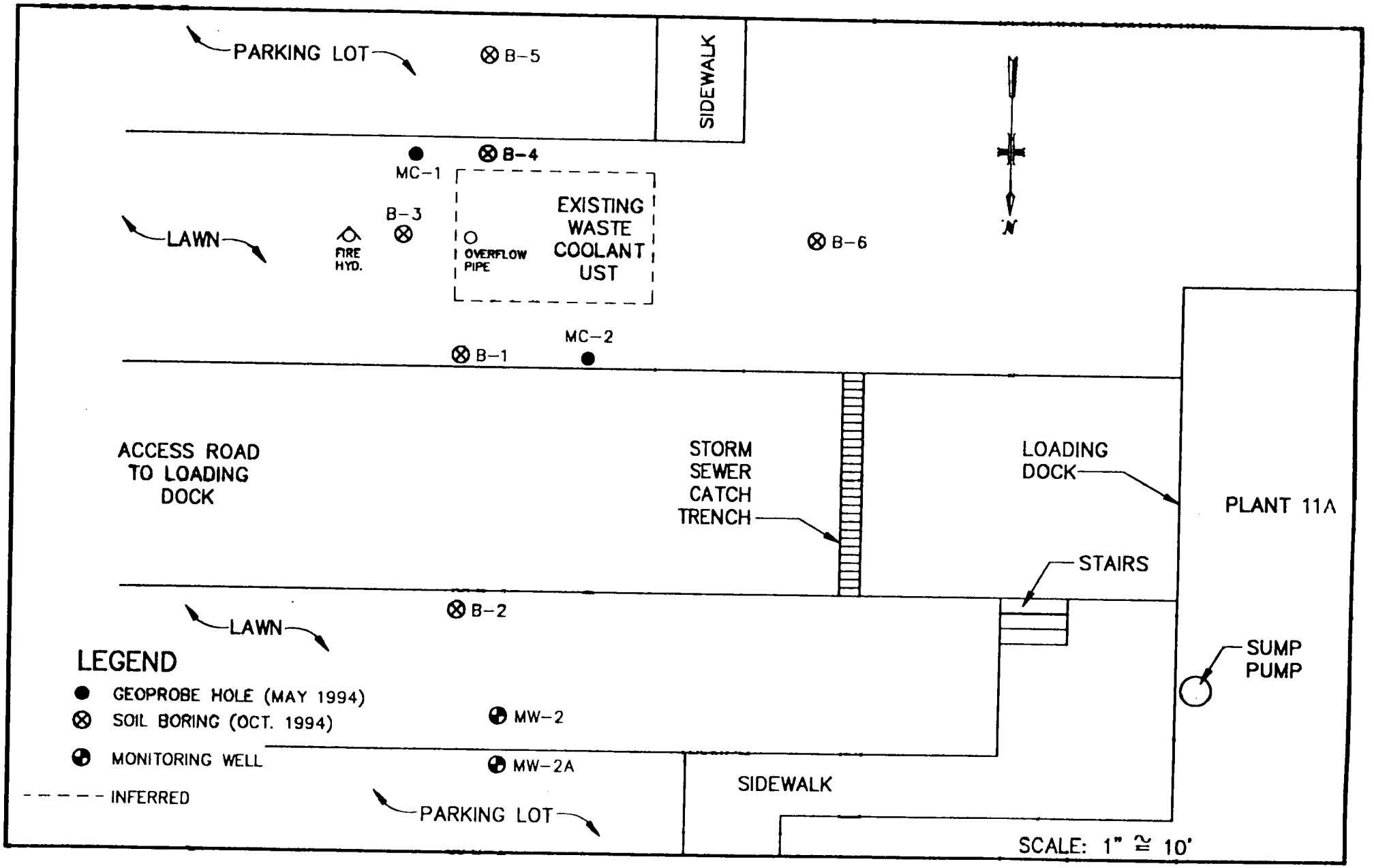
MOOG, INC.
PLANT 11 REMEDIAL ACTION PLAN

SUMMARY OF HYDROGEOLOGIC PROPERTIES

Hydrostratigraphic Unit	Geologic Unit	Physical Properties			Groundwater Flow Properties		
		Saturated Thickness ft.[1][4]	Hydraulic Conductivity cm/s[3]	Effective Porosity[2]	Principal Flow Direction	Horizontal Gradient ft./ft.	Flow Velocity ft./day
Water Table Aquifer	Till/Weathered Bedrock	6	2.0E-3	.1 to .2	North	.002	0.11 - 0.06

Notes:

(1) Average valve.
(2) Effective porosity values are estimated from the low end of a range of total porosity values provided in the literature (Freeze and Cherry, 1979 and Fetter, 1980).
(3) Geometric Mean of slug test results from MW-2, MW-3, MW-4, MW-5, MW-6, and MW-7.
(4) Groundwater level data from 1/13/95.



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MOO-00-BRE

PLANT 11
REMEDIAL EVALUATION
SOIL BORING LOCATIONS

MOOG, INC.

APRIL 1995

FIGURE 7

MC-2) completed near the waste oil tank during the environmental site assessment are also illustrated on Figure 7.

One soil sample having the greatest concentrations of organic vapors from each boring was submitted for analysis of Total Petroleum Hydrocarbons (USEPA Method 418), Target Compound List (TCL) organics and Freon 113 using USEPA Methods SW-846 Method 8260. The laboratory analytical report prepared by General Testing Corporation of Rochester, New York is presented in Appendix C. Table 4-3 summarizes the October 1994 soil sampling results. Analytical results for soil and groundwater from borings MC-1 and MC-2 reported in the July 1994 site assessment report are listed in Table 3-1.

4.4.2 Findings

As illustrated on Figure 4, the existing waste oil tank was installed in fill and saturated till, which is underlain by weathered shale bedrock. Soil and rock samples from borings B-1, B-3, B-4, MC-1 and MC-2 exhibited very low levels of halogenated volatile organics, TPH, and acetone. The close proximity of the tank and sampling intervals where the TPH and VOCs were detected is also illustrated on Figure 4.

The sum of halogenated volatile organic concentrations at any one soil sampling location range from 7.9 ug/kg to 221 ug/kg. Total Petroleum Hydrocarbons concentrations ranged from 10.7 mg/kg to 71 ug/kg. As would be expected with a solvent-contaminated oil, TPH and chlorinated organics are co-contaminants. This would corroborate the suspected source of solvent contaminated oil. The levels of halogenated organics and TPH detected in soil in close proximity to the waste oil tank are low level residual concentrations. In general, the analytical data indicate that the source of the releases to groundwater of halogenated organics has been removed.

Low levels of acetone were detected in all soil samples, including samples with no detectable TPH or VOCs. Acetone was not present in the findings of the May 1994 investigation. Therefore, acetone is a suspected laboratory contaminant.

4.5 Groundwater Sampling Results

4.5.1 Methodology

Groundwater samples were collected on November 18 and 22, 1994 from the six on-site monitoring wells (MW-1B, MW-2, MW-2A, MW-3, MW-4, and MW-5) and the storm

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TABLE 4-3

MOOG, INC.
PLANT 11 REMEDIAL ACTION PLAN

NOVEMBER 1994 SOIL SAMPLING RESULTS

Location	Petroleum Hydrocarbons ug/g	Methylene Chloride ug/kg	Acetone ug/kg	CIS-1,2-Dichloroethene ug/kg	Trichloroethene ug/kg	Tetrachloroethene ug/kg
B-1 2-4'	10.7		33	8.3	64	70
B-2 2-4'	U		14			
B-3 6-8'	38.2		12	7.9		
B-4 2-4'	33.7		40			9.2
B-5 2-4'	U	8.9	51			
B-6 4-6	U	7.1	36			

sewer trench in the access road. Groundwater sampling was also performed at MW-1B, MW-2A, MW-6, and MW-7 on March 28, 1995. Each monitoring well was purged prior to sample collection until successive measurements of the field parameters (pH, temperature, and specific conductivity) stabilized. However, well MW-1B could be purged of only one well volume due to very slow well recovery. Field sampling logs and field parameter measurements are provided in Appendix B.

Groundwater analyses were performed for volatile organics on the Target Compound List (TCL) and Freon 113 using EPA SW-846 Method 8260. During the November 1994 sampling event, one sample was analyzed for oil and grease, TSS, hardness, alkalinity, sulfate, iron, manganese, magnesium, and calcium to determine potential pretreatment needs. Quality control samples included one duplicate field sample, a matrix spike, and a matrix spike duplicate, and the internal quality control samples required by Method 8260. The laboratory analytical reports prepared by General Testing, Inc. of Rochester, New York are presented in Appendix C.

4.5.2 Groundwater Analytical Results

Groundwater data collected between May 1994 and March 1995 are presented in Table 4-4. The concentrations of halogenated organics detected in all sampling events are very similar. In addition, aromatic hydrocarbons were detected in groundwater and the storm water trench. Acetone was also detected in the upgradient well. The March 1995 sampling event was performed to determine the extent of halogenated organics in the area between MW-2, MW-3, and MW-4, to evaluate the detection of acetone, and to evaluate the source of the aromatic hydrocarbons. The occurrence of each contaminant group; halogenated organics, aromatic hydrocarbons, and acetone, is discussed below.

Halogenated Volatile Organics - Concentrations of halogenated volatile organics above the NYS Class GA Groundwater Quality Standards (GWQS) were detected during each investigation downgradient of the waste oil tank in MW-2 and, during the current investigation, in the storm water drainage trench crossing the access road. Halogenated organics were not detected in groundwater samples from downgradient wells MW-3, MW-5, and MW-7. However, concentrations of cis-1,2-dichloroethene and 1,1-dichloroethane above the GWQS were detected in MW-4 and MW-6.

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TABLE 4-4

MOOG, INC.
PLANT 11 REMEDIAL ACTION PLAN

SUMMARY OF GROUNDWATER SAMPLING RESULTS[1,2]

Detected Parameters	Monitoring Well Locations								Class GA Stds
	MW-1B		MW-2A		MW-2		MW-3		
	Nov. '94	March '95	Nov. '94	March '95	Nov '94	Jun '94	Nov '94	Jun '94	
Volatile Organic Parameters (ug/l)[3]:									
Trichlorotrifluoroethane[5]					4,200	1,200			5
Trichlorofluoromethane[6]						11			5
Tetrachloroethene					1,300	860			5
Trichloroethene					1,600	980			5
cis-1,2-Dichloroethene					2,000	1,900			5
1,1-Dichloroethene					42				5
1,1,1-Trichloroethane					6,000	4,700			5
1,1-Dichloroethane					4,300	4,300			5
Benzene	210	78							0.7
Toluene	120		5.9						5
Ethylbenzene	36	31							5
Total Xylene (o,m,p)	190	8.3	33	11					5
Acetone	160								50 *
Volatile Organic Parameters (ug/l)[4]:									
4 Chloro 3 Methylphenol	NA		NA		NA	13	NA		
bis (2-ethylhexyl)phthalate	NA		NA		NA	16	NA		50
Petroleum Product in Water (ug/l):[7]									
n-dodecane	NA	90	NA	<20	NA	NA	NA	NA	

Notes:
(1) Only compounds detected above the Analytical Detection Limit in in either sampling event are shown here. Blank space means the compound was analyzed for, but was not detected above the Analytical Detection Limit.
(2) May 1994 and June 1994 data obtained from Blauland Bouck and Lee (July 1994). Nov. 1994 and March 1995 data are from the current investigation.
(3) Analyzed by EPA Method 8260.
(4) Analyzed by EPA Method 8270.
(5) Freon 113
(6) Freon 11
(7) NYSDOH Method 310-13
* Guidance Value
NA Not Analyzed

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TABLE 4-4 (Continued)

MOOG, INC.
PLANT 11 REMEDIAL ACTION PLAN

SUMMARY OF GROUNDWATER SAMPLING RESULTS[1,2]

Detected Parameters	Monitoring Well Locations						Class GA Stds
	MW-4		MW-5		MW-6	MW-7	
	Nov. '94	Jun '94	Nov. '94	Jun. '94	Mar. '95	Mar. '95	
Volatile Organic Parameters (ug/l)[3]:							
Trichlorotrifluoroethane[5]							5
Trichlorofluoromethane[6]							5
Tetrachloroethene							5
Trichloroethene							5
cis-1,2-Dichloroethene		59				21	5
1,1-Dichloroethene							5
1,1,1-Trichloroethane							5
1,1-Dichloroethane	92	2				92	5
Benzene							0.7
Toluene							5
Ethylbenzene							5
Total Xylene (o,m,p)							5
Acetone							50 *
Volatile Organic Parameters (ug/l)[4]:							
4 Chloro 3 Methylphenol	NA		NA		NA	NA	
bis (2-ethylhexyl)phthalate	NA		NA		NA	NA	50

Notes:
(1) Only compounds detected above the Analytical Detection Limit in either sampling event are shown here. Blank space means the compound was analyzed for, but was not detected above the Analytical Detection Limit.
(2) May 1994 and June 1994 data obtained from Blauland Bouck and Lee (July 1994). Nov. 1994 and March 1995 data are from the current investigation.
(3) Analyzed by EPA Method 8260.
(4) Analyzed by EPA Method 8270.
(5) Freon 113
(6) Freon 11
* Guidance Value
NA Not Analyzed

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TABLE 4-4 (Continued)

MOOG, INC.
PLANT 11 REMEDIAL ACTION PLAN

SUMMARY OF GROUNDWATER SAMPLING RESULTS[1,2]

Detected Parameters	Storm Trench	Geoprobe(TM) Locations			Class GA Stds
		MC-2	MC-8	MC-1	
	Nov '94	May 1994			
Volatile Organic Parameters (ug/l)[3]:					
Trichlorotrifluoroethane[5]	800	3,500			5
Trichlorofluoromethane[6]		110			5
Tetrachloroethene	33	3,400			5
Trichloroethene	44	3,500			5
cis-1,2-Dichloroethene	250	1,600			5
1,1-Dichloroethene					5
1,1,1-Trichloroethane	130	2,600			5
1,1-Dichloroethane	250	1,300	1.1		5
Benzene	5				0.7
Toluene	23				5
Ethylbenzene	11				5
Total Xylene (o,m,p)	83				5
Acetone					50*
Volatile Organic Parameters (ug/l)[4]:					
4 Chloro 3 Methylphenol	NA				
bis (2-ethylhexyl)phthalate	NA				50

Notes:
(1) Only compounds detected above the Analytical Detection Limit in either sampling event are shown here. Blank space means the compound was analyzed for, but was not detected above the Analytical Detection Limit.
(2) May 1994 and June 1994 data obtained from Blauland Bouck and Lee (July 1994). Nov. 1994 and March 1995 data are from the current investigation.
(3) Analyzed by EPA Method 8260.
(4) Analyzed by EPA Method 8270.
(5) Freon 113
(6) Freon 11
* Guidance Value
NA Not Analyzed

As discussed in Section 4.3, the hydraulic head in the pond maintained by the spillway would divert groundwater flow and the migration of VOCs around the pond. The detection of VOCs at MW-4 and MW-6 is consistent with the inferred groundwater flow pattern.

As illustrated in the cross-section (Figure 4), the screened interval of MW-2A was located to intercept a dissolved VOC plume downgradient of the waste oil tank and below the shallow water-bearing zone. The vertical hydraulic gradient between MW-2 and MW-2A indicate a potential for vertical migration of dissolved VOCs. However, halogenated organics were not detected in the groundwater in MW-2A, indicating that the constituents have not migrated downward. The absence of halogenated VOCs in MW-2A most likely reflects the combined influences of the time that has elapsed since the release occurred and the low hydraulic conductivity of the underlying black shale.

Because a source for the halogenated groundwater constituents was suspected in the soil borings, the possibility that non-aqueous phase liquid organics (NAPL) were present directly beneath the waste oil tank was also evaluated. However, concentrations of halogenated VOCs in the groundwater are substantially less than the published water solubilities for these contaminants. For example, the maximum detected groundwater concentrations for tetrachloroethane (3400 ug/l) and Freon 113 (4200 ug/l) are only 2.2 and 2.5%, respectively, of the published aqueous solubility values at 25°C (Ref. No. 5). The maximum detected concentrations of the other VOCs are less than 0.3% of their published aqueous solubility values. Therefore, a liquid source (NAPL) is likely not present. The halogenated organics are present as a slow moving plume of dissolved constituents that has spread downgradient from the waste oil tank.

The halogenated organics detected in the storm water drainage trench are most likely present due to groundwater discharge into the trench. The concentrations of VOCs detected in the sewer are however substantially lower than VOC concentrations in groundwater. This difference is likely due to VOC volatilization to the atmosphere, and/or dilution by surface water runoff. Water in the storm sewer is drained by gravity to a sump located inside Plant 11A. Therefore, the water in the sump may currently contain low levels of VOCs.

Aromatic Hydrocarbons - The volatile aromatic hydrocarbons, benzene, toluene, ethylbenzene, and total xylenes (BTEX), were detected in groundwater samples collected

from the storm sewer, MW-1B, and MW-2A. BTEX compounds have not been detected at MW-2 or previously at MC-2. Therefore, it is not likely that the BTEX originates from the waste oil tank. The BTEX detected at MW-1B and MW-2A may originate as naturally occurring hydrocarbons present in the petroliferous black shale bedrock. The presence of BTEX compounds are likely due to the combined influence of the drilling, which creates drill cuttings with increased surface area more amenable to leaching; and the low well recovery rates, which inhibits the thorough development of the well. This explanation was explored during the March 1995 sampling event. Well MW-1B was further developed by purging in February 1995, allowing the well to fully recover, and purging again in March 1995 prior to sampling. A substantial decrease in the concentrations of BTEX compounds detected in MW-1B occurred between November 1994 and March 1995.

In addition, General Testing, Inc. performed NYSDOH Method 310-13 (Petroleum Products in Water) on groundwater samples from MW-1B and MW-2A in March 1995. The resulting chromatogram was not identifiable as a petroleum product (i.e., gasoline, lubricating oils, kerosene, or fuel oil); therefore, the results were quantified as concentrations of n-dodecane.

The Method 310-13 results and the decrease in total BTEX concentrations after further well development support the theory that the hydrocarbons detected in groundwater are natural constituents released from the black shale. The BTEX constituents detected in the storm water drainage trench may originate from vehicle traffic at the loading dock, or as natural groundwater constituents.

Acetone - A concentration of 160 ug/l acetone was detected at MW-1B during November 1994. However, no acetone was detected during the March 1995 sampling event, and no acetone was detected in the quality control samples (trip blank, and method blank). Because acetone was detected with an absence of halogenated organics, in an upgradient well, and could not be verified by resampling, the acetone is a suspected laboratory contaminant.

4.6 Site Characterization Summary

This section summarizes the findings of the site characterization activities that are pertinent to the Plant 11 remedial evaluation.

4.6.1 Hydrogeologic Conditions

Groundwater occurs in a shallow water-bearing zone comprised of overburden and weathered bedrock, and in an underlying aquitard comprised of competent bedrock. The shallow water-bearing zone has limited aquifer potential due to a moderate hydraulic conductivity, and a small saturated thickness. The aquitard consists of the regional bedrock formation, which in the vicinity of Plant 11 is relatively unfractured and slightly weathered. The estimated hydraulic conductivity of the wells installed within the aquitard is approximately three to four orders of magnitude less than the estimated hydraulic conductivity of wells installed in the shallow water-bearing zone.

The horizontal hydraulic gradient in the shallow water-bearing zone is very low and limits the rate of groundwater flow to an estimated 20 to 40 feet per year. Vertical hydraulic gradients between the shallow water-bearing zone and the aquitard are downward.

4.6.2 Nature and Source of Contamination

Constituents identified in groundwater and soil include tetrachloroethane (PCE), trichloroethene (TCE), 1,1,1 trichloroethane (TCA), the breakdown products of PCE, TCE and TCA, and Freon 113. Freon 11 has also been detected at low concentrations previously. Halogenated organics are present in groundwater at concentrations above the 6NYCRR Part 700-705 Water Quality Regulations for Groundwaters.

The levels of halogenated organics and TPH detected in the soils in close proximity to the waste oil tank are low level residual concentrations indicating that the source of halogenated organics has been removed. The residual soil concentrations are well below calculated soil cleanup guidance values (NYSDEC TAGM No. 4046). Thus, there is no evidence of an ongoing release from the existing waste oil tank of the magnitude required to produce the concentrations of halogenated organics detected in the groundwater. There is reportedly no evidence of leakage from the tank. The comparatively low concentrations of halogenated organics detected in groundwater relative to published aqueous solubility limits indicate that the presence of non-aqueous phase solvents below the waste oil tank is unlikely.

4.6.3 Extent of Contamination

Groundwater flow directions indicate that the halogenated organics will be advected with groundwater flow toward the north-northwest in the direction of MW-4. Downgradient concentrations of organics indicate that the leading edge of the contaminant plume is localized between MW-4 and MW-5, or approximately 150 feet from the waste oil tank. However, the concentrations at MW-4 are two orders of magnitude lower than the levels detected at MW-2. Groundwater data from MW-2A indicates that halogenated organics have not migrated downward. While the hydrogeologic data indicates the potential for downward migration, the data at MW-2A indicates that this would occur extremely slowly.

Site characterization data indicate that remediation of the release of halogenated organics at the Plant 11 site is achievable and should focus on the collection and treatment of contaminated groundwater.

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5.0 REMEDIAL ACTION PLAN

5.1 INTRODUCTION

As discussed in Section 4.6.2, halogenated organic contaminants were detected in groundwater downgradient of the waste oil tank at concentrations above 6NYCRR Part 703 groundwater quality standards, indicating that groundwater remediation is appropriate for the site. Maximum concentrations of halogenated organic contaminants detected during this and previous investigations (MW-2 and MC-2) are presented in Table 5-1 for comparison. Other volatile organic compounds including benzene, toluene, ethylbenzene, and xylene were detected at monitoring wells MW-1B, and MW-2A which were advanced through the competent shale. As discussed in Section 4.5.2, the BTEX compounds are suspected as naturally-occurring and do not appear to be co-contaminants with the volatile organic compounds. However, even if BTEX compounds are present in the influent to a treatment system, they do not measurably impact the cost of treatment. Acetone is a suspected laboratory contaminant and will thus not be assumed present in the influent to a treatment system.

The objectives of the groundwater remediation are to mitigate the advective migration of groundwater contaminants and to reduce contaminant concentrations in overburden groundwater to meet 6NYCRR Part 703 groundwater quality standards.

Both in situ and ex situ technologies were considered for groundwater remediation. However, remedial technologies that directly remove contaminants in situ, such as air sparging, are not suitable to the subsurface conditions encountered at the Plant 11 site. All in situ processes are best suited to comparatively homogeneous, or nearly homogeneous conditions so that the medium used to remove the contaminants (e.g., air) can make uniform contact with contaminated media. At Plant 11, contaminated groundwater occurs in saturated till and saturated weathered rock. Both of these units possess different textures and are each variably weathered and fractured. Therefore, the probable success of in situ treatment processes would be very difficult to evaluate and likely have limited success. Thus, groundwater remediation at the Moog site will consist of groundwater collection with treatment by air stripping, and discharge of the treated effluent. The site investigation also

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TABLE 5-1

MOOG INC.
PLANT 11 REMEDIAL ACTION PLAN

MAXIMUM GROUNDWATER CONTAMINANT CONCENTRATIONS[1]

Parameter	6NYCRR Part 703 Limit (ug/l)	Maximum Conc.(ug/l)[1]
1,1-Dichloroethene	5	42
1,1-Dichloroethane	5	4300
cis-1,2-Dichloroethene	5	2000
1,1,1-Trichloroethane	5	6000
Trichloroethene	5	3500
Tetrachloroethene	5	3400
Trichlorotrifluoroethane (Freon 113)	5	4200

Notes:
(1) Maximum contaminant concentrations observed in MW-2 and MC-2 during this and previous investigations.

revealed that groundwater seeps enter the storm sewer trench. The trench will be lined to prevent future infiltration of groundwater following the removal of sediment.

5.2 GROUNDWATER COLLECTION

The groundwater collection system will include two collection trenches with locations identified on Figure 5. The purpose of the trenches is to intercept the flow of contaminated groundwater in the shallow waterbearing zone downgradient of the source. Factors considered in the selection of the trench locations included: the distribution of contaminants in groundwater; the direction of groundwater flow; and the building footprint. Sampling results from MW-3, MW-4, MW-6, and MW-7 confirmed that halogenated organics are migrating in a north-northwest direction. Therefore, the trenches will be located northwest of the source area. The building footprint necessitates two offset trench alignments. One trench will be positioned close to the area of known elevated contaminant concentrations at MW-2. A second trench will be positioned close to the estimated limit of the contaminant plume near MW-4. Contaminants that bypass the first trench to the west will be intercepted at the second trench.

The collection trenches will consist of a 6-inch diameter slotted PVC pipe installed within excavated trenches approximately 12 to 15 feet bgs. This places the slotted pipe approximately four feet into the weathered bedrock, near the approximate top of the competent bedrock, allowing collection of groundwater from both the overburden and the weathered bedrock. The pipe will be surrounded by gravel bedding, and the excavation will be backfilled with excavated soil. Duplex sump pumps will be placed in a precast concrete manhole in each trench. The collection trench sump pumps will deliver collected groundwater via a below grade force main to an equalization tank at the head of the groundwater treatment system. Cleanouts will be located at the ends of each trench.

Calculations presented in Appendix E indicate that each collection trench will yield an estimated steady state flow rate of 2.5 gpm (total 5 gpm), a flow rate of 5 gpm during drawdown/development (total 10 gpm). The system will be designed for a flow rate of 15 gpm to account for increased flows during precipitation events.

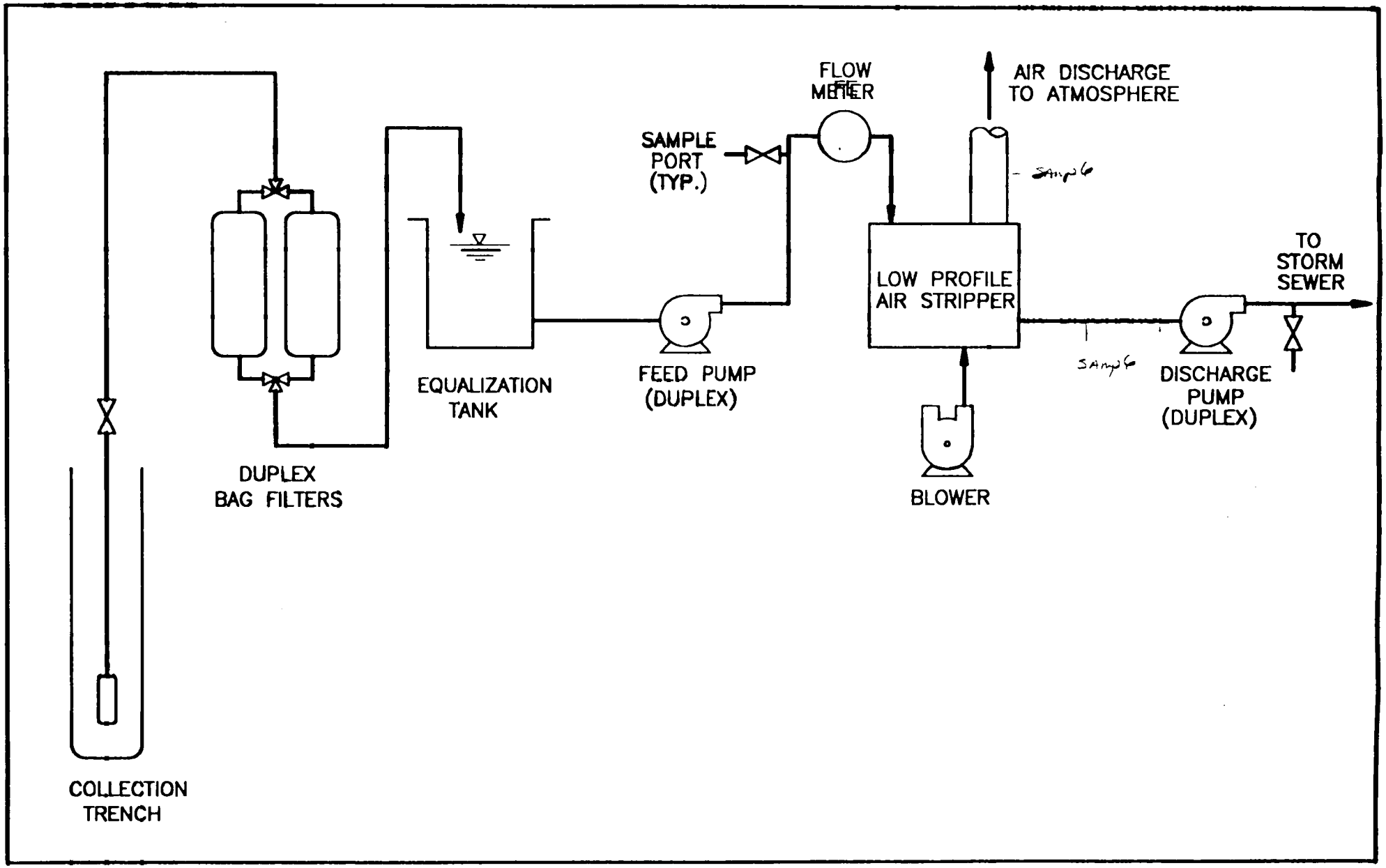
The area of influence of each trench will increase with time. Over the course of a year, with uniform recharge to the watertable and a constant drawdown of two feet in the

trench, the area of influence is estimated to extend on the order of 8 feet from the trench. Under the same conditions, the average pumping rate is estimated to be 2.5 gpm per trench or 5 gpm total. However, during significant precipitation events the pumping rates necessary to maintain a constant water level in the trenches may triple (i.e., 15 gpm maximum flow rate). The actual area of influence is difficult to predict due to variations in rainfall and the presence of paved parking lots and roof areas that intercept potential infiltration.

5.3 GROUNDWATER TREATMENT

The conceptual design of the air stripper groundwater treatment system is illustrated on Figure 8. Groundwater from the collection trenches is expected to be extremely low volume. The groundwater would be pumped through dual bag filters placed upstream of a small equalization tank. The bag filters will accumulate any solids which may initially be present during development of the trench to protect downstream treatment units and prevent solids accumulation in the equalization tank. Over time, the bag filters are not anticipated to be necessary. The equalization tank will allow the groundwater treatment system to operate on a batch basis. Groundwater accumulates in the equalization tank until a high level sensor triggers one of two (duplex) air stripper feed pumps to start. The high level sensor will also signal the air stripper blower to start. (The blower can be started just prior to water flow to the stripper to prevent any untreated groundwater from passing through the system.) A digital flow meter with totalizer upstream of the air stripper will provide instantaneous and cumulative flow data. Volatile organic compounds can be removed from the groundwater by a low profile air stripper. The treated groundwater will accumulate in an integral air stripper sump, and will be discharged through the storm sewer to the cooling pond for ultimate discharge to Buffalo Creek through Outfall 004. The air stream will be discharged to the atmosphere through an elevated stack.

North East Environmental Products, Inc., a manufacturer of low profile shallow tray air strippers, was contacted to model the performance and estimate the size of an air stripper to reduce the design concentrations of chlorinated organic and BTEX compounds to meet an assumed effluent limit of 10 ug/l for each compound. An air flow rate of 150 cfm and four aeration trays provide the desired contaminant removal. This results in an approximately 6-foot long by 2.5-foot wide by 7-foot high unit.



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MOOG007

PLANT 11
REMEDIAL EVAULUATION
LOW PROFILE AIR STRIPPER
PROCESS SCHEMATIC

MOOG, INC. APRIL 1995

FIGURE 8

Air strippers can be prone to fouling from deposition of iron and/or hardness scale. Periodic pressure washing to remove scale will be required and/or a sequestering agent will be added upstream of the air stripper to reduce precipitation of iron and hardness ions, thus reducing the frequency of pressure washing.

Air emissions modeling was conducted for the air stripper. Maximum potential annual impacts (ug/m^3) and short-term impacts (ug/m^3) were calculated using procedures presented in Appendix B of NYSDEC Air Guide-1 (April, 1994), and compared to Annual Guideline Concentrations (AGCs) and Short-term Guideline Concentrations (SGCs), respectively. Air emissions controls are not required when maximum potential annual impacts and short-term impacts are below 1/2 AGCs and SGCs, respectively.

It is anticipated that the maximum flow rate and contaminant concentrations will not be encountered simultaneously, therefore, an air emissions evaluation was performed using an average groundwater flow rate of 5 gpm and maximum groundwater contaminant concentrations observed to-date. Calculations are presented in Appendix D. An air emission stack height of 45 feet above grade will be required to keep calculated maximum potential annual impacts and short term impacts for all contaminants below respective 1/2 AGCs and SGCs. The maximum height of the groundwater treatment system enclosure was assumed to be 12 feet. According to Good Engineering Practice (GEP) air emission stack design (Appendix B of NYSDEC Air Guide-1, April, 1994), the recommended stack height is 2.5 times the building height. Provisions will be made in the design of the emissions stack so that the stack height can be reduced to 30 feet if lower contaminant concentrations are encountered over time.

A NYSDEC Permit to Construct and a Certificate to Operate will be procured prior to air stripper construction and operation. In addition, ongoing discussions by Moog, Inc. with the NYSDEC indicate that revisions to the existing SPDES permit for Outfall 004 may be required.

5.4 STORM WATER COLLECTION TRENCH AND SUMP

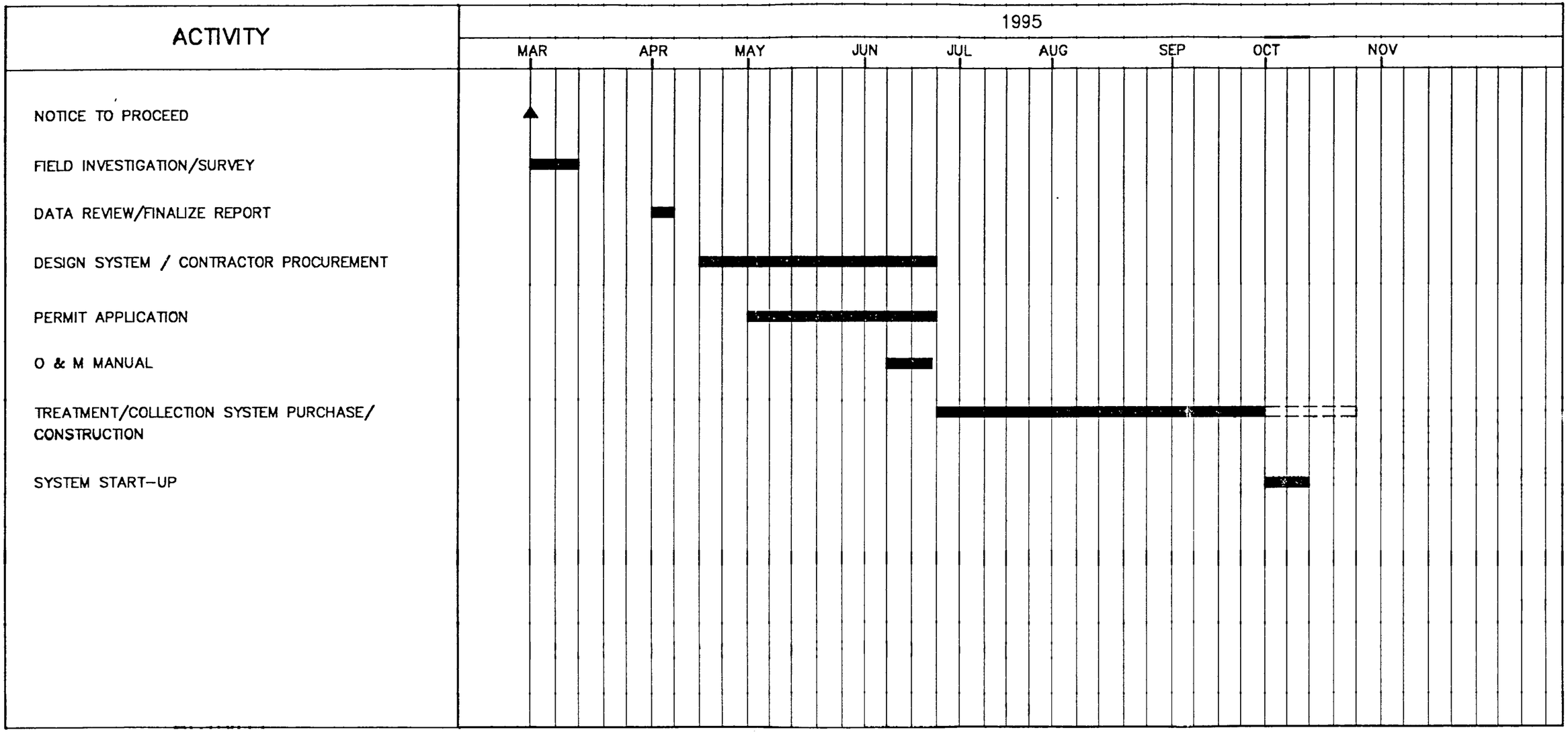
Groundwater was observed during the site investigation seeping into the storm water drainage trench in the loading dock access road. Groundwater may also be seeping into the pipe which conveys storm water from the drainage trench to the indoor sump. Therefore,

to prevent contaminated groundwater from being pumped into the storm sewers, the trench and pipe will be lined to prevent further infiltration.

5.5 SCHEDULE

Based on the conceptual remedial plan presented above, this remediation will be designed, constructed, and installed within an approximately 5 to 7-month time frame, as illustrated in the enclosed projected construction schedule (see Figure 9).

PROJECTED DESIGN/CONSTRUCTION SCHEDULE



LEGEND:

PROJECTED WORK TASK SCHEDULE

CONTINGENCY

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2630SCH

PLANT 11 REMEDIAL PLAN
GROUNDWATER COLLECTION
AND TREATMENT SYSTEM
PROJECTED CONSTRUCTION SCHEDULE

MOOG, INC. APRIL 1995

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APPENDIX A

WORK PLAN FOR REMEDIAL EVALUATION/ WELL INSTALLATION PROCEDURES

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WORK PLAN FOR
PLANT 11 REMEDIAL EVALUATION

MOOG INC.
EAST AURORA, NEW YORK

OCTOBER 1994

MALCOLM PIRNIE, INC.

S-3515 Abbott Road
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Buffalo, New York 14219

2630-001-110

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INTRODUCTION

An environmental site assessment report prepared by Blasland, Bouck, and Lee, Inc. (July 1994) for an independent third party has reportedly documented the detection of volatile organic compounds (VOCs) in groundwater and subsurface soil near an underground storage tank (UST) at Plant 11 on the Moog Inc. East Aurora campus (see Figure 1). At that time, Moog Inc. leased a portion of Plant 11 to Moog Controls, Inc. Moog Controls, Inc. owned and operated the UST for the storage of waste cutting oils. The existing UST has been in use since 1990, when a previous UST was removed from the same location. The previous UST was used during its lifetime by both Moog Controls, Inc. and Moog Inc.

Malcolm Pirnie, Inc. has been retained to develop a remedial response for the UST site. Remedial technologies that may be feasible for the site are identified and discussed in this Work Plan based on a review of existing site information and discussions with Moog, Inc. Site characterization activities are planned in order to support evaluation of the identified potentially feasible technologies.

A remedial response will be developed for:

- Suspect hydrocarbon and solvent contaminated soil near the existing 1000 gallon UST that may present a continuing release of contaminants to groundwater. The existing tank replaced an older tank at the same location and is reportedly four years old. The volume of contaminated soils has not been determined.

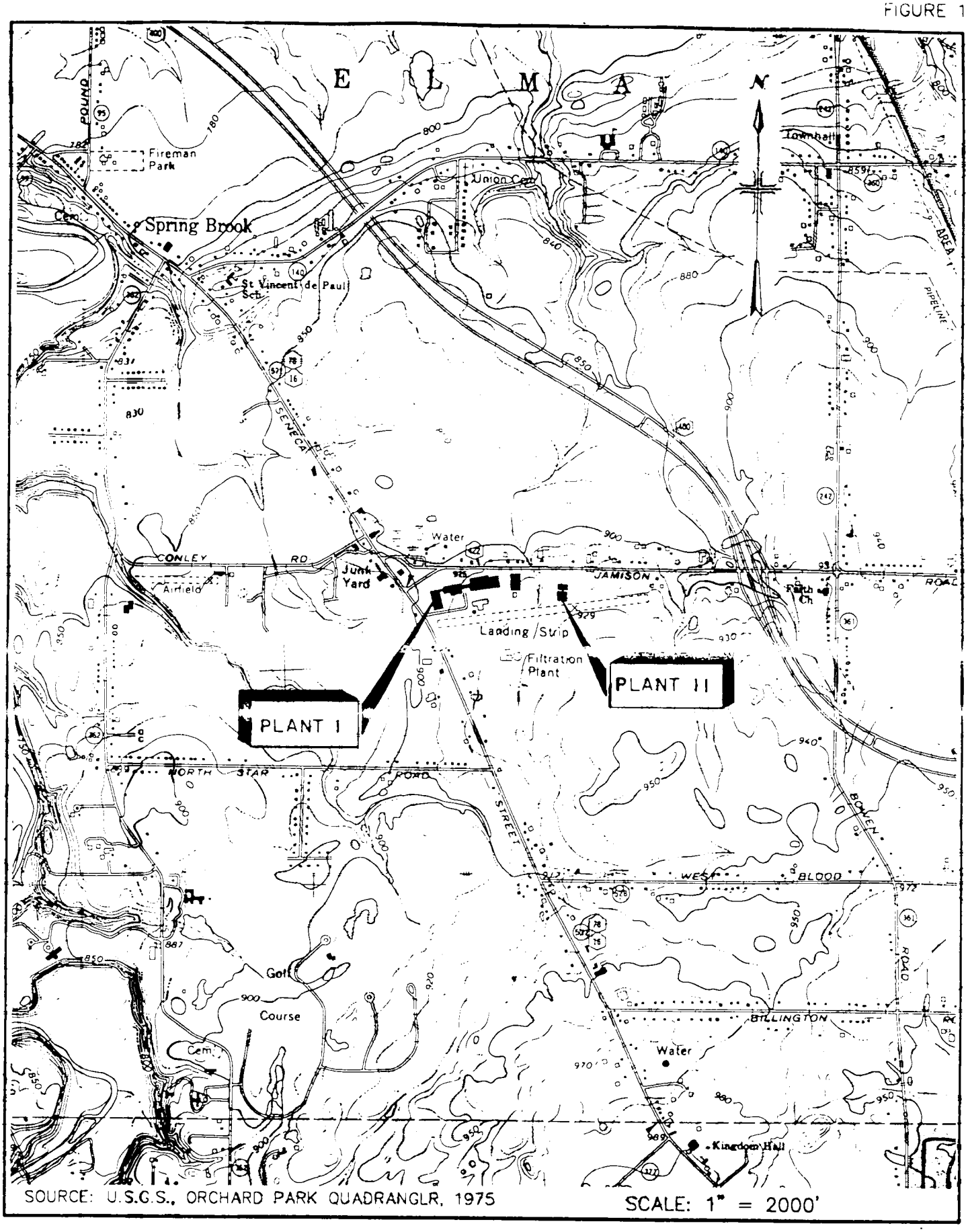
- Suspect solvent contaminated groundwater downgradient of the UST. Existing data indicate that the lateral extent of groundwater impact is limited. The depth of contaminated groundwater has not been determined.

PREVIOUS INVESTIGATIONS

Previous subsurface investigations performed at Plant 11 include subsurface soil and groundwater sampling at 11 locations illustrated on Figure 2. Table 1 lists the analytical results for locations where VOCs were detected in soil and groundwater.

Sampling results reportedly indicate the presence of five chlorinated organics and two freon compounds in the shallow groundwater at MC-2 adjacent to the existing UST, and at MW-2, approximately 40 feet downgradient from the UST. Chlorinated VOCs and

FIGURE 1



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MOO-PR-LOC

MOOG, INC.
SITE INVESTIGATION
SITE LOCATION MAP

MOOG, INC.

AUGUST 1994

petroleum products were also detected in soil samples collected adjacent to the existing UST.

Based on sampling results at locations downgradient of MW-2, the potential impact to groundwater quality in off-site areas from the shallow flow zone appears to be minimal. However, the vertical extent of VOCs in groundwater has not been determined.

Monitoring wells hydraulically upgradient of the UST were not installed, because no ground water was observed in the borings at the time of the well installations (June 1994). However, groundwater was observed and collected from a temporary upgradient sampling location in May 1994. No VOCs were detected at that time.

The UST is located adjacent to a below grade service road that provides access to the Plant 11 loading dock. A storm water drain located in the service road is downgradient of the UST. The stormwater sewer and granular fill that may have been used as bedding material for the sewer pipe are potential migration pathways for solvent contaminated groundwater.

Because solvents and hydrocarbons have reportedly been detected in the soil adjacent to the existing UST, there is a possibility the contaminated soil is an on-going contribution to the observed groundwater contamination. Therefore, the lateral extent of solvent contaminated soil near the UST will be determined and this data will be used to determine the approximate volume of contaminated soil which must be addressed as part of the remedial program.

REMEDIAL ALTERNATIVES

A limited number of remedial alternatives will be evaluated for the Plant 11 UST site in order to streamline the investigation and clean-up actions. This approach is consistent with the Presumptive Remedy Selection Process adapted by the U.S. Environmental Protection Agency (USEPA) to speed up feasibility studies conducted for superfund sites. Presumptive remedies are preferred technologies for common categories of sites that are selected based on historical patterns of remedy selection, and scientific and engineering evaluation of performance data.

Source Area Remediation

Potential remedial alternatives that will be considered for contaminated soil in the source area underlying the UST are soil excavation and disposal, and vacuum extraction/ groundwater withdrawal as discussed below:

- Soil Excavation and Disposal - This option includes the excavation of contaminated soil, backfilling with clean soil, and removal and possible reinstallation or replacement of the existing UST. Soil disposal options that will be evaluated include direct disposal at an approved landfill if solvent concentrations in soil are below Land Disposal Restrictions. The treatment of soil that cannot be landfilled will also be evaluated. The most likely soil treatment technologies include thermal desorption or bioremediation with subsequent on-site or off-site disposal. Potential air pollution impacts and the need for air emission controls will be evaluated for soil excavation and soil treatment options.

- Vacuum Extraction and Groundwater Withdrawal - This option includes vacuum extraction of air from the unsaturated zone to volatilize solvents and volatile hydrocarbons. Due to the shallow depth to groundwater and the density of some of the solvents, it may be necessary to perform vacuum extraction in concert with groundwater withdrawal in order to enlarge the volume of the unsaturated zone. An alternative cover material over the vicinity of the UST may be required to enhance the efficiency of the vacuum extraction system. Vacuum extraction may accomplish remediation of the source area with out disturbing the existing UST.

Groundwater Collection/Treatment

Groundwater remediation will likely include groundwater collection and groundwater treatment. The alternative technologies for groundwater collection are controlled by the hydraulic properties of the subsurface and the extent of groundwater contamination. Based on regional geologic and site specific geologic information, the site is underlain by 4 to 8 feet of unconsolidated material comprised of fill and native till overlying a highly weathered black shale bedrock. Hydraulic conductivity tests reported in the environmental site assessment report indicate that the till/weathered shale interface is moderately permeable. However, based on typical characteristics of unweathered black shale, the hydraulic conductivity is expected to decrease below the zone of weathering, where hydraulic conductivity primarily originates from groundwater flow through fractures. Therefore, the options for groundwater collection include:

- Shallow groundwater interception trench. Locate a trench alignment to intercept contaminated groundwater flow, excavate a trench using a backhoe, place a perforated pipe in a granular media and backfill to grade. Groundwater would be collected for on-site or off-site treatment/disposal.

- Deep groundwater fracture zone. Locate an alignment to intercept contaminated groundwater, fracture the competent low permeability shale using a controlled underground blasting procedure, install a groundwater extraction well in the fracture zone and collect the groundwater for on-site or off-site treatment/disposal. A single extraction well installed in the artificial fracture zone can yield groundwater at rates up to five to ten times greater than a well installed in competent rock.

A review of available treatment technologies and the existing groundwater analytical data summarized in Section 3.0 indicates that no single technology provides adequate removal efficiencies for all compounds. For example, the use of air stripping may be limited by trichloroethene (TCE) and tetrachlorethene (PCE); the use of Advanced Oxidation Processes (AOP) is limited by removal efficiencies for chlorinated ethanes and Freon 113. Therefore, the evaluation of groundwater treatment alternatives will include the following:

- On-site treatment using air stripping with pretreatment by AOP to remove trichloroethylene (TCE) and tetrachloroethylene (PCE).

- On-site treatment using air stripping followed by granular activated carbon to remove TCE and PCE.

- Off-site transport and disposal at a TSDF.

SITE CHARACTERIZATION PLAN

The following tasks will be performed:

- Perform an elevation survey of existing monitoring wells and the on-site cooling pond. Measure groundwater levels and evaluate the groundwater flow direction reported in the July 1994 environmental assessment report.

- The integrity of the existing UST will be evaluated by a review of installation and monitoring records obtained through Moog, Inc.

- Install one ground water monitoring well to determine background groundwater quality. The well location will be determined based on the results of groundwater level monitoring.

Because no groundwater was observed above bedrock south of the UST during June 1994, the monitoring well will be constructed in bedrock using rotary drilling techniques. The boring will be advanced using 4 1/4 inch diameter hollow-stem augers to five feet below the top of weathered bedrock or to auger refusal, which ever is shallower. A five foot NX core will be collected from the uppermost bedrock to determine the competency of the rock and to screen the rock fractures for total volatile organics using a photoionization detector. The hole will be cored to a depth sufficient to encounter groundwater. The core hole will be reamed to 3 7/8 inches diameter to facilitate the installation of a screened monitoring well constructed of two inch diameter SCH 40 PVC. Well installation procedures are described in Appendix A. Well installation will be performed by Earth Dimensions, Inc. of Elma, New York. Malcolm Pirnie will provide on-site inspection during well installation.

- Install one groundwater monitoring well adjacent to MW-2 to determine the vertical extent of VOC contamination in groundwater, and the potential for downward migration of VOCs. The hole will be augered to refusal, a casing will be grouted into the top of rock to prevent potential downhole migration of contaminants from the shallow zone during drilling, and the hole will be cored through the casing to a depth at least fifteen feet below the existing well.

- In situ hydraulic conductivity tests will be performed in each new well and in existing wells MW-2 and MW-5. Water level recovery vs. time data, collected in these tests, will be analyzed by the method of Bouwer and Rice (1978). The test results will supplement existing hydraulic conductivity data reported by Blasland, Bouck,and Lee (July 1994). The mean of the hydraulic conductivity test results will be used to estimate hydraulic properties of the geologic formation in the monitored intervals.

- Complete two to three soil borings with continuous split spoon sampling on a line perpendicular to each side and each end of the existing UST (a total of eight to twelve soil borings). Each soil sample will be screened for total organic vapors (TVO) in the sample jar headspace using the procedure provided in Appendix B. Additional soil borings will be completed opposite each side and each end of the UST until the jar headspace TVO concentrations substantially decline. One soil sample from a total of eight boring having the greatest concentrations of TVO (a total of eight soil samples) will be submitted for analysis of Total Petroleum Hydrocarbons (USEPA Method 418) and Target Compound List (TCL) organics, and Freon 113 using SW-846 Method 8260.

- Conduct a soil gas survey along the alignment of the storm sewer to determine whether volatile contaminants are preferentially migrating along the sewer bedding. If present in the sewer bedding (or dissolved in groundwater in the sewer bedding), solvents may volatilize into the air filled porosity of the storm sewer backfill material. Preferential migration in the sewer bedding would be detected by a localized increase in TVO concentrations near the sewer.

  The soil gas survey will be performed as follows:

  a. Determine the storm sewer alignment from existing site plans and layout the alignment in the field.

  b. Layout sampling locations at ten foot spacings on lines perpendicular to the sewer at three or four locations along the alignment.

  c. Advance a 7/8" diameter hole approximately three to four feet using slam hammer at each sample location. Seal the top of the hole until the gas can be extracted.

  d. Purge each hole through a Tygon tube for approximately two minutes using a 12-volt portable vacuum pump.

  e. Monitor the airstream for TVO using an HNu photoionization meter equipped with a 10.2 electron volt lamp. The HNu will be calibrated before the initial test hole using isobutylene gas according to manufacturers specifications.

- Collect and analyze six ground water samples to confirm previous sampling results, assess the potential for an upgradient source of VOCs, and evaluate the vertical extent of VOCs in groundwater. One groundwater sample will be analyzed for oil and grease, TSS, hardness, alkalinity, sulfate, iron, manganese, magnesium, and calcium to determine pretreatment needs. Analytical services will be provided by General Testing, Inc. of Rochester, New York.

- Collect and analyze a water sample from the storm sewer, if there is flow in the sewer. This sample will be collected from the drain near the loading dock if accessible, or from the sewer outfall, if accessible.

  Analyses will be performed for TCL organics using SW-846 Method 8260. Freon 113 will be included in the parameter list.

  Quality control samples that will be analyzed will include one duplicate field sample, a matrix spike, and a matrix spike duplicate, and the internal laboratory quality control samples required by Method 8260.

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- Prepare a report summarizing site characterization results, evaluating alternative remedial technologies identified herein and recommending remedial program. A preliminary remedial concept design will be developed that will:

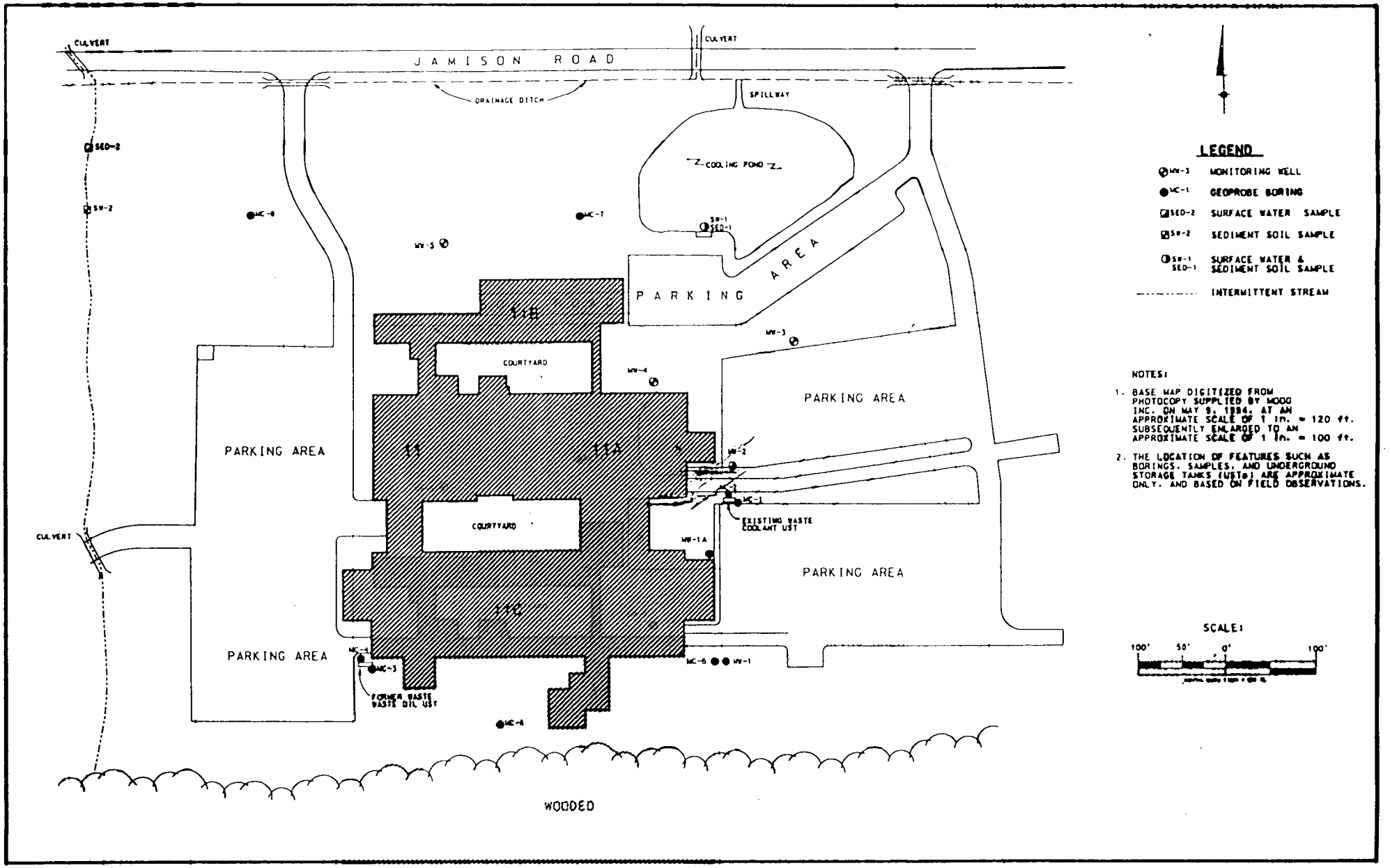
  a) identify major remedial elements

  b) identify the lateral and vertical extent of the soil excavation or a vacuum extraction system and a groundwater collection system

  c) estimate groundwater extraction flow rates and treatment system capacity

  d) provide a preliminary cost estimate

  e) provide a preliminary schedule of construction.



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MOO-PR-PL2

MOOG, INC./MOOG CONTROLS, INC.
PLANT 11 SITE INVESTIGATION

SITE PLAN

MOOG, INC.

AUGUST 1994

FIGURE 2

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TABLE 1

MOOG, INC.
PLANT 11 SITE INVESTIGATION

SUMMARY OF PARAMETERS DETECTED[1]

Parameter	Groundwater (ug/l)					Soil (ug/kg)		
	MC-2	MC-3	MC-8	MW-2	MW-4	MC-1	MC-2	MC-4
1,1 Dichloroethane	1,300	28	1.1	4,300	2		9.1	
1,1,1 Trichloroethane	2,600	73		4,700			45	5.4
1,2 Dichloroethene	1,600			1,900	59	70	49	
Trichloroethene	3,500			980		12	27	
Tetrachloroethene	3,400			860		120	91	
Freon 11	110			91				
Freon 113	3,500	2		1,200				
Xylene								1.3
4 Chloro 3 Methylphenol				13				
Fuel Oil #2						71,000		
bis(2-Ethylhexyl)phthalate				16				

Note:
(1) Obtained from "Summary of Hydrogeologic Site Conditions, 300 Jamison Road, East Aurora, New York." Prepared by Blasland, Bouck, and Lee, Inc. (July 1994).

? Any vinyl chloride

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APPENDIX A

WELL INSTALLATION PROCEDURES

Appendix A: Item _____ - BEDROCK WELL CONSTRUCTION PROCEDURES

Applicability: NYSDEC SPECIFICATION Revision No.: ____ Date: _____

Prepared By: MKR Date: 11/28/89 Approved By: GHF Date: 12/6/89

1.0 INTRODUCTION

This guideline presents a method for the construction of monitoring wells and piezometers in consolidated materials.

2.0 METHODOLOGY

1. Review the borehole/well installation program with the drilling contractor to ensure that the contractor has the necessary equipment and supplies, and is familiar with the program requirements.

2. Advance borehole to the desired depth by means of hollow stem auger (HSA) drilling or advancement of temporary casing. Seat augers or casing as far as possible into the upper bedrock zone. HSA or casing should be a minimum of two (2) inches larger than the well OD.

3. Advance the boring into consolidated materials by standard rock coring procedures using a triple wall core barrel of NX or HQ size. Log bedrock core according to rock core logging guidance.

4. Perform packer permeability testing at this stage if the project requires such testing.

5a. If an NX core barrel is used, ream the hole to at least four (4) inches diameter using an appropriate rotary drilling bit. Flush the hole with potable water to clean out drill cuttings.

5b. If an HQ core barrel is used, giving a nominal four (4) inch diameter hole, proceed to step 6.

6. Construct the open hole or screened using appropriate Bedrock Well Design Guidance for materials and the following steps:

A. Screened Installations

a. Verify borehole depth using weighted measuring tape. (Ensure that the rig is turned off and all equipment which may obstruct well installation or represent a safety hazard is removed.)

b. Add a minimum of two (2) inches to a maximum of six (6) inches of filter pack material of appropriate grade through the permanent or temporary casing to base of borehole. (Note: This step may be avoided if dense non-aqueous phase liquids are suspected to be present and it is desireable to have the screen at the base of the borehole.)

c. Insert well screen and riser pipe equipped with centralizers into borehole through the permanent or temporary casing.

d. Add filter pack materials to the screen section of well while slowly backing temporary casing out of the borehole (if used). The primary filter pack, when complete, should extend no more than two feet above the well screen within the borehole. Measure the depth of the sand pack carefully and frequently with weighted tape while adding sand.

e. Add a thin (6-inch) layer of secondary filter pack material above the primary filter pack.

f. Add bentonite pellet seal above the secondary filter pack and again remove the temporary casing slowly (if used). The bentonite seal should extend at least three feet above the top of the filter pack section. Measure the depth with a weighted tape. (Note: If bentonite seal is placed above the ground water level within the borehole, potable water should be added to hydrate the bentonite pellets.) The required hydration time for the pellets should be established prior to setting the seal. (Note: The position of the bentonite seal is dependent on the program requirements.)

g. Tremie grout into the remaining annular space under pressure to about 2 to 3 feet below surface while slowly backing the HSA or temporary casing out of the borehole. Allow grout to set up for 6 to 12 hours, install protective casing, with weep holes, cap and lock; and cement in place. Under circumstances where the borehole is deep and the formation has a low hydraulic conductivity it may be desirable to add potable water to the well prior to grouting to offset the pressure (weight) of the grout to minimize the potential for the grout to penetrate the sand pack. The well number should be permanently painted or stamped on the protective casing or placed on a marker post.

h. Document construction details in the Project Field Book.

B. Open Bedrock Installations

a. Open bedrock boreholes should only be used where the length of the open borehole is less than about twenty (20) feet.

b. Once bedrock is encountered during conventional drilling using hollow stem augers or temporary casing the hollow stem augers or temporary casing should be seated into the top of rock. The rig should be converted to rock coring and the borehole advanced about five (5) feet into bedrock or until two (2) feet of competent bedrock is encountered based on inspection of the rock core. The core hole should then be reamed using an appropriate bit to create a socket into the top of rock.

c. Verify borehole depth using weighted measuring tape. (Ensure that the rig is turned off and all equipment which may represent a hazard is removed.)

d. Appropriately sized permanent casing (containing a drillable plug at its base if tremie grout methods are used) should then be centered in the socket. Using tremie pipe, pressure packer or other methods which introduce grout from the base of the annular space, grout the

borehole annulus from bottom to top of hole. An optional method involves grouting the bedrock socket and inserting the casing to the base of socket prior to the grout setting up. If a bentonite pellet seal is used at the base of the annular space before placement of the grout, a minimum of 60 minutes should be allowed for the bentonite to swell before grouting. Select the size and shape of the seal such that the bentonite can reach the socket and form a complete seal around the casing.

e. Allow 48 hours for the grout to set and assess the integrity of the grout seal by either filling the casing with potable water and monitoring water level decline or bailing the casing dry and monitoring any water level increase.

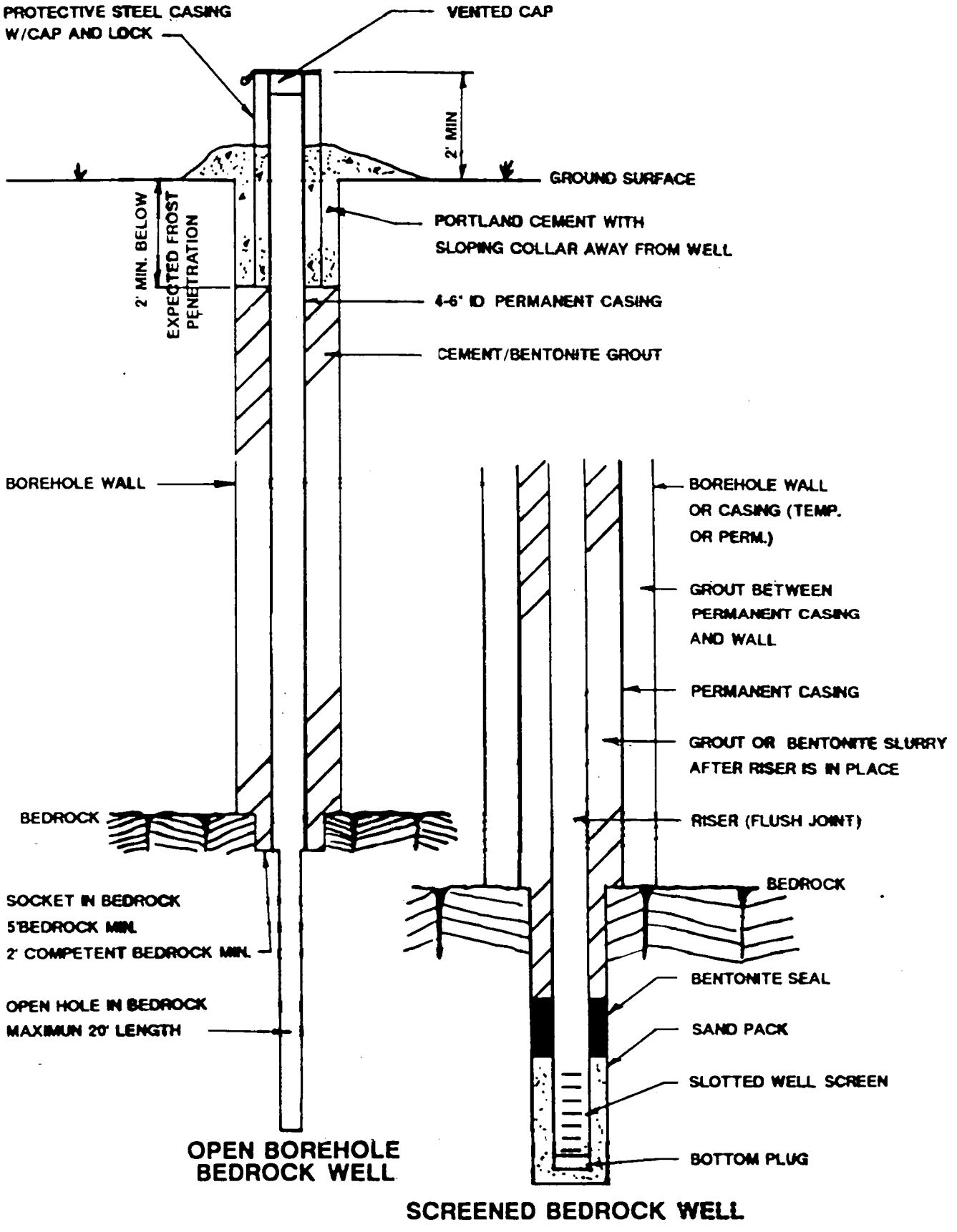
f. Drilling may proceed through the casing following testing of the grout seal, to create an open borehole to a predetermined depth. After drilling is complete, install protective casing, with weep holes, cap, and lock and cement in place. Construct a conical pad of cement which slopes away from the well. The well number should be permanently painted or stamped on the protective casing.

g. Document construction details in the Project Field Book.

3.0 REFERENCES

New York State Department of Environmental Conservation, July 1988, Drilling and Monitoring Well Installation Guidance Manual.

027


PROTECTIVE STEEL CASING
W/CAP AND LOCK
VENTED CAP
2' MIN
GROUND SURFACE
2' MIN. BELOW
EXPECTED FROST
PENETRATION
PORTLAND CEMENT WITH
SLOPING COLLAR AWAY FROM WELL
4-6" ID PERMANENT CASING
CEMENT/BENTONITE GROUT
BOREHOLE WALL
BEDROCK
SOCKET IN BEDROCK
5'BEDROCK MIN.
2' COMPETENT BEDROCK MIN.
OPEN HOLE IN BEDROCK
MAXIMUN 20' LENGTH
OPEN BOREHOLE
BEDROCK WELL
BOREHOLE WALL
OR CASING (TEMP.
OR PERM.)
GROUT BETWEEN
PERMANENT CASING
AND WALL
PERMANENT CASING
GROUT OR BENTONITE SLURRY
AFTER RISER IS IN PLACE
RISER (FLUSH JOINT)
BEDROCK
BENTONITE SEAL
SAND PACK
SLOTTED WELL SCREEN
BOTTOM PLUG
SCREENED BEDROCK WELL

APPENDIX B

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APPENDIX B

JAR HEADSPACE PROCEDURES

Appendix B : Item _____ - SCREENING OF SOIL SAMPLES FOR ORGANIC VAPORS

Applicability: GENERAL Revision No.: ____ Date: _____

Prepared By: MKR Date: 12/3/89 Approved By: GHF Date: 1/5/89

1.0 INTRODUCTION

This guideline presents a method for screening soil samples. During drilling activities, a total hydrocarbon vapor analyzer (HNu, OVA, or TIP) should be used to monitor the borehole and split spoon samples upon opening of each sampler. The monitoring results provide a vertical profile of soil contamination by volatile organic substances.

2.0 METHODOLOGY

1. Upon opening each split spoon sampler, place a subsample of the soil in a 40 ml, precleaned, glass VOA vial. Seal the vial with a teflon-lined septum cap, label, and place the vial immediately on ice in an ice chest.

2. Place the remainder of the sample in a labeled wide-mouthed glass jar. Seal the jar with aluminum foil and a screw top cap.

   a. Keep these samples at as near to 70°F as possible.
   b. At the end of each day check head space of each sample for any organic vapor present by inserting the probe of the organic vapor analyzer through the aluminum foil seal.
   c. The soil sample from each borehole will be noted where VOA's were detected and the corresponding VOA sample (#1 above) should be submitted to a laboratory for analysis.

Appendix B: Item _____ - SCREENING OF SOIL SAMPLES FOR ORGANIC VAPORS

Applicability: GENERAL Revision No.: ____ Date: _____

Prepared By: MKR Date: 12/3/89 Approved By: GHF Date: 1/5/89

3.0 EQUIPMENT REQUIREMENTS

- 40 ml. precleaned and prelabeled glass VOA vials with teflon-lined septum caps
- ice and ice chest
- wide mouthed glass jars with screw caps
- aluminum foil
- Organic Vapor Analyzer

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APPENDIX B

FIELD DATA

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APPENDIX B
LIST OF FIELD DATA

SECTION	ITEM
B-1.	Boring Logs (Malcolm Pirnie, Inc., and Blasland, Bouck, and Lee, Inc.)
B-2.	Well Construction Summary including Table B-1, and field sheets for MW-1B, MW-2A, MW-6, and MW-7
B-3.	Water Levels from Top of Riser, Table B-2
B-4.	Summary of Soil Gas Results, Table B-3
B-5.	Field Hydraulic Conductivity Test Data, including method of interpretation
B-6.	Well Development Field Data Sheet for MW-2A
B-7	Summary of Sampling Field Measurements, Table B-4, including Sampling Data Sheets

BOREHOLE LOG MW-1B

PROJECT: PLANT II REMEDIAL EVALUATION
PROJECT NO.: 2830-00-1
LOCATION: EAST AURORA, NEW YORK
SURVEY COORDINATES:
SURVEY DATUM: FINISHED FLOOR ELEV. OF 100 FEET

CLIENT: MOOG, INC.
DRILLING DATES: 10/26/84-10/27/84
DRILLING METHOD: 4.25-inch ID HSA
LOGGED/CHECKED BY: JMA/RHO
SURFACE ELEVATION: 99.81ft.

SYMBOLS AND DEFINITIONS

SS Split Spoon (2in.ID)
SS3 Split Spoon (3in.ID)
ST Shelby Tube (2.8in.ID)
WR Weight of Rods
NR No Recovery
- Sampler Refusal

JHS HNU reading in jar headspace
GAS Combustible Gas reading in augers

x---x Penetration Resistance ('N' Blows/1.0 ft.)
o---o Moisture Content ('N' %)

DEPTH (ft.BGS)	ELEVATION (ft AMSL)	SOIL/ROCK DESCRIPTION	SOIL DATA: GRAPHIC LOG	SAMPLE NO. / RUN NO.	BLOWS / 6"	RECOVERY (in)	'N'-VALUE	ROCK DATA: FROM/TO	DRILL RATE MIN./FT.	% REC.	% RQD.	WELL DIAGRAM	COMMENTS (USCS)
1	98.81	Dark brown moist SILT LOAM, some roots, grass at top		1 SS	2 4 5 8	1.4	9						JHS=0.4 ppm
2	97.81	Brown with orange mottling moist SANDY SILT, mostly fine sand, trace gravel, occasional root, till											
3	96.81	Brown moist-extremely moist SANDY SILT, with trace clay, mostly fine size sand, little shale gravel, till		2 SS	7 7 13 20	1.2	20						JHS=0.1 ppm
4	95.81	Black dry SHALE BEDROCK, weathered											JHS=0.8 ppm
5	94.81	Black dry-moist SHALE BEDROCK, wet along bedding planes, weathered, some silt and clay as matrix with the layered shale		3 SS	8 8 7 8	1.0	13						
6	93.81												JHS=3.2 ppm
7	92.81			4 SS	8 10 13 13	1.3	23						
8	91.81												JHS=20 ppm
9	90.81	SHALE becoming more competent		5 SS	20 30 100/1"	1.0	>130						
10	89.81	wet along bedding planes											JHS=30 ppm
11	88.81			6 SS	32/1"	0.1	>32						
12	87.81			7 SS	100/4"	0.1	>100						JHS=84 ppm
13	86.81			8 SS	100/8"	0.2	>100						
14	85.81	wet along bedding planes water level @12.5' BGS @ 8:30 am 10/27/84 w/augers @ 14' BGS											JHS=80 ppm
15	84.81			9 SS	100/3"	0.2	>100						JHS=180 ppm
16	83.81			10 SS	100/4"	0.3	>100						JHS=110 ppm
17	82.81			11 SS	100/4"	0.2	>100						
18	81.81	Advanced augers to 17.5 feet BGS. Installed monitoring well.											
19	80.81												
20	79.81												

MALCOLM PIRNIE, INC.

BOREHOLE LOG MW-2A

PROJECT: PLANT 1 REMEDIAL EVALUATION
PROJECT NO.: 2830-00-1
LOCATION: EAST AURORA, NEW YORK
SURVEY COORDINATES:
SURVEY DATUM: FINISHED FLOOR ELEV. OF 100 FEET

CLIENT: MOOG, INC.
DRILLING DATES: 10/28/84-10/28/84
DRILLING METHOD: 8.25-inch ID HSA, 3-7/8" ROLLER BIT
LOGGED/CHECKED BY: JMA/RHO
SURFACE ELEVATION: 99.10ft.

SYMBOLS AND DEFINITIONS

SS Split Spoon (2in.ID)
SS3 Split Spoon (3in.ID)
ST Shelby Tube (2.8in.ID)
WR Weight of Rods
NR No Recovery
- Sampler Refusal

JHS HNU reading in jar headspace
GAS Combustible Gas reading in augers

x---x Penetration Resistance ('N' Blows/1.0 ft.)
o---o Moisture Content ('N' %)

DEPTH (ft.BGS)	ELEVATION (ft AMSL)	SOIL/ROCK DESCRIPTION	SOIL DATA: GRAPHIC LOG	SOIL DATA: SAMPLE NO. / RUN NO.	SOIL DATA: BLOWS / 6"	SOIL DATA: RECOVERY (in)	SOIL DATA: 'N'-VALUE	ROCK DATA: FROM/TO	ROCK DATA: DRILL RATE MIN./FT.	ROCK DATA: % REC.	ROCK DATA: % RQD.	WELL DIAGRAM	COMMENTS (USCS)
1	98.1	Asphalt over crushed gravel, dry		1 SS	21 10 13 10	0.7	23						JHS=0.7 ppm
2	97.1	Slag, dry											JHS=0.7 ppm
3	96.1			2 SS	38 50/3"	0.8	>50						
4	95.1	Reddish brown moist SILTY SAND, mostly fine-medium sand, trace gravel, little silt, massive, some layering 4.0-4.2', till											JHS=0.1 ppm
5	94.1			3 SS	14 15 16 11	1.0	31						
6	93.1	Gray dry weathered shale boulder, silty gravel											JHS=0.1 ppm
7	92.1	Brown extremely moist GRAVELLY SILTY SAND, little silt, some fine to coarse sand, little gravel, massive, till		4 SS	8 18 27 38	2.0	45						
8	91.1												JHS=80 ppm
9	90.1	Gray moist SHALE, some shale fragments, some silt and clay, weathered, wet along bedding planes		5 SS	8 8 24 30	2.0	32						
10	89.1												JHS=98 ppm
11	88.1	Black wet SHALE BEDROCK		6 SS	7 42 100/4"	0.8	>142						
12	87.1												JHS=48 ppm
13	86.1			7 SS	100/4"	0.1	>100						
14	85.1	Auger refusal at 14' BGS. Installed 4" PVC casing by grouting casing in place at 14'. Continued advancing borehole using NX core barrel and 3-7/8" roller cone. Black SHALE BEDROCK, thinly bedded, fine grained, broke along bedding planes so that rock pieces were .1-.2' long						14/14.7		88	88		
15	84.1												
16	83.1												
17	82.1	little water loss occurred						15/20		100	100		
18	81.1												
19	80.1	horizontal fracture											
20	79.1												

BOREHOLE LOG MW-2A

PROJECT: PLANT II REMEDIAL EVALUATION
PROJECT NO.: 2830-00-I
LOCATION: EAST AURORA, NEW YORK
SURVEY COORDINATES:
SURVEY DATUM: FINISHED FLOOR ELEV. OF 100 FEET

CLIENT: MOOG, INC.
DRILLING DATES: 10/26/94-10/28/94
DRILLING METHOD: 6.25-inch ID HSA, 3-7/8" ROLLER BIT
LOGGED/CHECKED BY: JMA/RHO
SURFACE ELEVATION: 99.10ft.

SYMBOLS AND DEFINITIONS

SS Split Spoon (2in.ID)
SS3 Split Spoon (3in.ID)
ST Shelby Tube (2.8in.ID)
WR Weight of Rods
NR No Recovery
- Sampler Refusal

JHS HNU reading in jar headspace
GAS Combustible Gas reading in augers

x---x Penetration Resistance ('N' Blows/1.0 ft.)
o---o Moisture Content ('N' %)

DEPTH (ft.BGS)	ELEVATION (ft AMSL)	SOIL/ROCK DESCRIPTION	SOIL DATA: GRAPHIC LOG	SOIL DATA: SAMPLE NO. / RUN NO.	SOIL DATA: BLOWS / 6"	SOIL DATA: RECOVERY (in)	SOIL DATA: 'N'-VALUE	ROCK DATA: FROM/TO	ROCK DATA: DRILL RATE MIN./FT.	ROCK DATA: % REC.	ROCK DATA: % RQD.	WELL DIAGRAM	COMMENTS (USCS)
21	78.1												
22	77.1	Wet CLAYEY SILT seam, .1' thick horizontal fracture											
23	76.1	horizontal fracture horizontal fracture						20/28		100	92		
24	75.1	Very thin wet CLAYEY SILT seam, .01' thick											
25	74.1	Light gray material deposited in shale on a layer as round sphere objects.											
26	73.1	Advanced NX core to 28.0 feet BGS. Reamed hole with 3-7/8" roller bit to 28.0 feet BGS. Installed monitoring well.											
27	72.1												
28	71.1												
29	70.1												
30	69.1												
31	68.1												
32	67.1												
33	66.1												
34	65.1												
35	64.1												
36	63.1												
37	62.1												
38	61.1												
39	60.1												
40	59.1												

BOREHOLE LOG MW-6

PROJECT: MOOG INC. PLANT II REMEDIAL EVALUATION
PROJECT NO.: 2830-00-1200
LOCATION: EAST AURORA, NEW YORK
SURVEY COORDINATES:
SURVEY DATUM:

CLIENT: MOOG INC.
DRILLING DATES: 3/21/85
DRILLING METHOD: 6.25-inch ID HSA
LOGGED/CHECKED BY: JMA/RHO
SURFACE ELEVATION: 99.87ft.

SYMBOLS AND DEFINITIONS

SS Split Spoon (2in.ID)
SS3 Split Spoon (3in.ID)
ST Shelby Tube (2.8in.ID)
WR Weight of Rods
NR No Recovery
- Sampler Refusal

JHS HNU reading in jar headspace

x---x Penetration Resistance ('N' Blows/1.0 ft.)
o---o Moisture Content ('N' %)

DEPTH (ft.BGS)	ELEVATION (ft AMSL)	SOIL/ROCK DESCRIPTION	SOIL DATA: GRAPHIC LOG	SOIL DATA: SAMPLE NO. / RUN NO.	SOIL DATA: BLOWS / 6"	SOIL DATA: RECOVERY (in)	SOIL DATA: 'N'-VALUE	ROCK DATA: FROM/TO	ROCK DATA: DRILL RATE MIN./FT.	ROCK DATA: % REC.	ROCK DATA: % RQD.	WELL DIAGRAM	COMMENTS (USCS)
1	98.87	Dark brown SANDY SILT, w/some fine sand, occasional fine gravel, roots, moist, topsoil		1 SS	1 3 7 11	1.8	10						JHS=0
2	97.87	Brown SILTY SAND, w/little gravel, some silt, mostly fine sand, moist, fill											JHS=0.5
3	96.87	Brown SILTY SAND w/some gravel, little silt, fine-coarse sand, moist, fill		2 SS	14 18 27 18	1.1	45						
4	95.87	Boulder size slag											JHS=NR
5	94.87	Brown SANDY SILT w/some gravel, little fine to coarse sand, moist, fill No recovery, drilling easy		3 SS	5 2 2 8	0	4						
6	93.87	Driller reports gravel at approx. 5.5'											JHS=0.2
7	92.87	Black and dark gray CLAYEY SILT with little clay, slag top 0.1', faint laminations, wet top 0.1', moist below, no odor		4 SS	5 6 8 11	1.0	14						
8	91.87	Olive gray to brown CLAYEY SILT, little fine sand, little clay, moist, laminated, CL											JHS=0.3
9	90.87	Brown SANDY SILT w/little fine to coarse sand, little gravel, moist, massive		5 SS	7 8 8 10	1.1	14						
10	89.87	Brown SILTY SAND with mostly fine sand, trace medium and coarse, little gravel, moist-extremely moist, massive											JHS=0.3
11	88.87			6 SS	4 8 15 18	1.1	23						
12	87.87	Gray SILTY SAND w/mostly fine sand, trace medium and coarse, little gravel, moist, massive											JHS=3.4
13	86.87			7 SS	10 15 15 18	0.8	30						
14	85.87	Black GRAVEL, shale fragments, slightly weathered, some sand size fragments, top 0.2 moist to extemely moist, wet 0.2-0.8											JHS=0.8
15	84.87	Dark gray CLAYEY WEATHERED SHALE, moist, approx. 8' water in borehole		8 SS	17 58 50 80/4"	1.1	108						
16	83.87	Auger refusal @ 14.8'. Water @ 7' BGS @ 10:30 am. Installed well.											
17	82.87												
18	81.87												
19	80.87												
20	79.87												

BOREHOLE LOG MW-7

PROJECT: MOOG INC. PLANT II REMEDIAL EVALUATION
PROJECT NO.: 2830-00-1200
LOCATION: EAST AURORA, NEW YORK
SURVEY COORDINATES:
SURVEY DATUM:

CLIENT: MOOG INC.
DRILLING DATES: 3/21/85
DRILLING METHOD: 8.25-inch ID HSA
LOGGED/CHECKED BY: JMA/RHO
SURFACE ELEVATION: 87.80ft.

SYMBOLS AND DEFINITIONS

SS Split Spoon (2in.ID)
SS3 Split Spoon (3in.ID)
ST Shelby Tube (2.8in.ID)
WR Weight of Rods
NR No Recovery
- Sampler Refusal

JHS HNU reading in jar headspace

x---x Penetration Resistance ('N' Blows/1.0 ft.)
o---o Moisture Content ('N' %)

DEPTH (ft.BGS)	ELEVATION (ft AMSL)	SOIL/ROCK DESCRIPTION	SOIL DATA: GRAPHIC LOG	SOIL DATA: SAMPLE NO. / RUN NO.	SOIL DATA: BLOWS / 6"	SOIL DATA: RECOVERY (in)	SOIL DATA: 'N'-VALUE	ROCK DATA: FROM/TO	ROCK DATA: DRILL RATE MIN./FT.	ROCK DATA: % REC.	ROCK DATA: % RQD.	WELL DIAGRAM	COMMENTS (USCS)
1	86.8	Gray & brown SAND and GRAVEL, slag fill, slightly moist		1 SS	27 15 23 28	1.1	38						JHS=0.8
2	85.8												JHS=0.1
3	84.8	Becoming wet at 3.2' BGS		2 SS	12 26 21 22	1.3	47						
4	83.8	Dark gray SLAG FILL, wet			8								JHS=0.1
5	82.8	Small amount of clay and silt material in bootom of shoe		3 SS	23 17 13	0.7	40						
6	81.8				5								JHS=0.2
7	80.8	Brown SANDY SILT w/some sand, mostly fine sand, trace medium and coarse, trace gravel, moist, massive		4 SS	11 15 14	1.1	28						
8	79.8				2								JHS=0.0
9	78.8	Gray SANDY SILT, some sand, mostly fine size sand, trace medium and coarse, trace clay, tracel gravel, moist, massive		5 SS	8 11 13	1.1	19						
10	77.8	Gray CLAYEY SILT with little clay, little weathered shale gravel, moist		6 SS									JHS=2.4
11	76.8	Black wet shale fragments, bedrock, petroleum odor			5 100/5	0.8	>100						
12	75.8	Auger refusal @ 11.4'. Installed well.											
13	74.8												
14	73.8												
15	72.8												
16	71.8												
17	70.8												
18	69.8												
19	68.8												
20	67.8												

Date Start/Finish: 05/18/84 – 05/18/84	Northing: N/A	Boring No.: MC-1
Drilling Company: Nittany Geoscience, Inc.	Easting: N/A	Site:
Driller's Name: Steve Keller	Borehole Depth: 8 ft.	
Drilling Method: Geoprobe	Ground Surface Elev.: 925 ft.	
Bit Size: N/A-in. Auger Size: N/A-in.		Moog Controls, Inc.
Rig Type: Van-mounted	Geologist: Lynette B. Mokry	East Aurora, New York
Spoon Size: 2-in.		
Hammer Weight: N/A-lb		
Height of Fall: N/A-in.		

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Boring Construction
gs elevation 925 ft										GROUND SURFACE	
	925						4.0			*TOPSOIL* from 0–3"	
							10			*FILL* Brown Clayey SILT, stiff, dry.	Filled boring with cuttings and bentonite chips
		(0–4')		N/A	N/A	3.0	3.0			Brown and/or tan Clayey SILT, trace medium to fine Gravel (shale and slag), occaisional black staining.	
										WEATHERED SHALE Tan Clayey SILT, little medium to fine Gravel (shale), wet, stiff.	
5	920						1.5			Strong organic odor from 3 to 8 ft. Occaisional black staining from 1.5 to 8 ft.	
		(4–8')*		N/A	N/A	2.3	2.5				
										SHALE Refusal, black SHALE bedrock, wet to saturated, dense.	
10	915									End of Boring @ 8.0 ft. bgs	
15	910										

Notes:
** Analytical soil sample collected from 4.0 to 7.0 ft. bgs.*
Not enough water in hole to collect ground-water sample.
Grade elevation is approximate.
Geoprobe location immediately south of existing UST location and east of Plant Building IIA

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:
Soil descriptions after Burmister, 1868.
bgs – below ground surface.
N/A – not applicable.

Saturated Zones

Date / Time	Elevation	Depth

Project: 307.15
Script: DAN-bore
Date: 08/23/84

Date Start/Finish: 05/18/94 — 05/18/94
Drilling Company: Nittany Geoscience, Inc.
Driller's Name: Steve Keller
Drilling Method: Geoprobe
Bit Size: N/A-in. Auger Size: N/A-in.
Rig Type: Van-mounted
Spoon Size: 2-in.
Hammer Weight: N/A-lb.
Height of Fall: N/A-inch

Northing: N/A
Easting: N/A
Borehole Depth: 5.5 ft.
Ground Surface Elev.: 925 ft.

Geologist: Lynette B. Mokry

Boring No.: MC-2
Site:

Moog Controls, Inc.
East Aurora, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Boring Construction
gs elevation 925 ft											
	925									GROUND SURFACE	
										TOPSOIL from 0–3"	
							3.2			*FILL* Tan with black-stained Clayey SILT, moist, stiff.	Filled boring with cuttings and bentonite chips
		(0–4')		N/A	N/A	3.5	10				
5	920	(4–5.5')*		N/A	N/A	1.5				*WEATHERED SHALE* Tan Clayey SILT, little medium to fine Gravel (shale), wet, stiff. Strong organic odor from 3 to 5.5 ft.	
										SHALE Refusal, *SHALE* bedrock, saturated, dense. End of Boring @ 5.5 ft. bgs	
10	915										
15	910										

Notes:
** Analytical soil sample collected from 4.0 to 5.5 ft. bgs.*
Ground-water sample collected using peristaltic pump at approximately 5.3 ft. bgs.
Grade elevation is approximate.
Geoprobe location immediately north of existing UST location and east of Plant Building IIA

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:
Soil descriptions after Burmister, 1968.
bgs – below ground surface.
N/A – not applicable.

Saturated Zones

Date / Time	Elevation	Depth

Project: 3071.5
Script: DAN-bore
Date: 08/23/94

Date Start/Finish: 05/18/84 - 05/18/84
Drilling Company: Military Geoscience, Inc.
Driller's Name: Steve Keller
Drilling Method: Geoprobe
Bit Size: N/A - in. Auger Size: N/A - in.
Rig Type: Van-mounted
Spoon Size: 2-in.
Hammer Weight: N/A - lb
Height of Fall: N/A - in.

Northing: N/A
Easting: N/A
Borehole Depth: 5.5 ft.
Ground Surface Elev: 925 ft.
Geologist: Lynette B. Mokry

Boring No.: MC-3
Site:
Moog Controls, Inc.
East Aurora, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Boring Construction
gs elevation 925 ft											
	925									GROUND SURFACE	
		(0-2')		N/A	N/A	L0	L0			*TOPSOIL* from 0-4" Brown fine SAND, little Silt, roots, moist.	Filled boring with cuttings and bentonite chips
										FILL Tan coarse to fine SAND, some medium to fine Gravel, dry.	
		(2-5.5')*		N/A	N/A	L3				Orange-brown fine SAND, little Silt, dry to moist.	
5	920						3.5			Becomes wet at approximately 3.5 ft.	
										SHALE Refusal, *SHALE* bedrock, saturated.	
10	915									End of Boring @ 5.5 ft. bgs	
15	910										

Notes:
* *Analytical soil sample collected from 4.0 to 5.0 ft. bgs.*
Ground-water sample collected using peristaltic pump from approximately 5.3 ft. bgs.
Grade elevation is approximate.
Geoprobe location immediately south of former UST location in southwest corner of Plant Building IIC

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:
Soil descriptions after Burmister, 1958.
bgs - below ground surface.
N/A - not applicable.

Saturated Zones

Date / Time	Elevation	Depth

Project: 3071.5
Script: DAN-bore
Date: 08/23/84

Date Start/Finish: 06/18/84 - 06/18/84
Drilling Company: Tiffany Geoscience, Inc.
Driller's Name: Steve Keller
Drilling Method: Geoprobe
Bit Size: N/A-in. Auger Size: N/A-in.
Rig Type: Van-mounted
Spoon Size: 2-in.
Hammer Weight: N/A-lb
Height of Fall: N/A-in.

Northing: N/A
Easting: N/A
Borehole Depth: 8.5 ft.
Ground Surface Elev.: 825 ft.
Geologist: Lynette B. Mokry

Boring No. MC-4
Site:

Moog Controls, Inc.
East Aurora, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Boring Construction
	825 ft elevation									GROUND SURFACE	
		(0-4')		N/A	N/A	3.5	N/A			*TOPSOIL* from 0-3" Brown medium to fine (+) SAND, little Clayey Silt, moist to dry.	Filled boring with cuttings and bentonite chips
5	820	(4-8.5')*		N/A	N/A	2.0	N/A			Gray and orange-brown mottled CLAY & SILT, dry, firm. Orange-brown fine SAND, little (+) Clayey Silt, wet. Slight organic odor from 3-8.5 ft.	
										SHALE Refusal, *SHALE* bedrock, dense. End of Boring @ 8.5 ft. bgs	
10	815										
15											

Notes:
* *Analytical soil sample collected from 4.0 to 8.5 ft. bgs.*
Grade elevation is approximate.
Geoprobe location immediately north of former UST location in southwest corner of Plant Building #C

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:
Soil descriptions after Burmister, 1958.
bgs - below ground surface.
N/A - not applicable.

Saturated Zones

Date / Time	Elevation	Depth

Project: 3071.5
Script: DAN-bore
Date: 08/23/84

Date Start/Finish: 05/17/94 - 06/17/94
Drilling Company: Nittany Geoscience, Inc.
Driller's Name: Steve Keller
Drilling Method: Geoprobe
Bit Size: N/A-in. Auger Size: N/A-in.
Rig Type: Van-mounted
Spoon Size: 2-in.
Hammer Weight: N/A-lb
Height of Fall: N/A-in.

Northing: N/A
Easting: N/A
Borehole Depth: 7.5 ft.
Ground Surface Elev.: 925 ft.
Geologist: Lynette B. Mokry

Boring No.: MC-5
Site:

Moog Controls, Inc.
East Aurora, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Boring Construction
gs elevation 925 ft.											
	925									GROUND SURFACE	
							0.8			Tan and/or brown fine SAND, little Clayey Silt, moist to wet.	Filled boring with cuttings and bentonite chips
		(0-4')		N/A	N/A	3.4	0.7			*TILL* Tan fine SAND, some Clayey Silt, some medium to fine Gravel (Shale fragments), dry. Tan fine SAND, some (+) medium Gravel (Shale fragments), little Clayey Silt, wet.	
5	920						0.3				
		(4-7.5')*		N/A	N/A	2.8	0.2			*SHALE* SHALE bedrock, saturated to wet.	
										Refusal @ 7.5 ft. End of Boring @ 7.5 ft. bgs	
10	915										
15	910										

Notes:
* *Analytical soil sample collected from 4.0 to 8 ft. bgs.*
Ground-water sample collected using peristaltic pump at approximately 7.4 ft. bgs.
Grade elevation is approximate.
Geoprobe location southeast of Plant Building IIC, near loading dock.

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:
Soil descriptions after Burmister, 1968.
bgs - below ground surface.
N/A - not applicable.

Saturated Zones		
Date / Time	Elevation	Depth

Project: 3071.15
Script: GAN-bore
Date: 08/23/94

Date Start/Finish: 05/17/94 - 05/17/94
Drilling Company: Tiffany Geosciences, Inc.
Driller's Name: Steve Keller
Drilling Method: Geoprobe
Bit Size: N/A-in. Auger Size: N/A-in.
Rig Type: Van-mounted
Spoon Size: 2-in.
Hammer Weight: N/A-lb
Height of Fall: N/A-in.

Northing: N/A
Easting: N/A
Borehole Depth: 7.5 ft.
Ground Surface Elev.: 825 ft.
Geologist: Lynette B. Mokry

Boring No.: MC-7
Site:
Moog Controls, Inc.
East Aurora, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Boring Construction
gs elevation 825 ft											
	825									GROUND SURFACE	
		(0-4')*		N/A	N/A	4.0	0.0			Orange-brown fine SAND, little Silt, moist.	Filled boring with cuttings and bentonite chips
							0.0			*TILL* Orange-brown fine SAND, some (+) Clay & Silt, trace medium Gravel (Shale fragments), moist.	
										@ 3 ft., a 2" lens of coarse to medium SAND, well-sorted.	
5	820	(4-7.5')		N/A	N/A	3.0	0.2			@ 3.17 ft., becomes orange-brown fine SAND, some Clayey Silt, some medium Gravel (Shale fragments), wet.	
							0.0			*WEATHERED SHALE* Black medium GRAVEL (Shale fragments), little Clayey Silt, saturated, with increasing competence with depth.	
										SHALE SHALE bedrock, saturated.	
10	815									Refusal @ 7.5 ft. End of Boring @ 7.5 ft. bgs	
15	810										

Notes:
* *Analytical soil sample collected from 3.0 to 4.0 ft. bgs.*
Ground-water sample collected using peristaltic pump at approximately 7.4 ft. bgs.
Grade elevation is approximate.
Geoprobe location approx. 70 ft. north of Plant Building 11B, and approx. 70 ft. west of pond.

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:
Soil descriptions after Burmister, 1958.
bgs - below ground surface.
N/A - not applicable.

Saturated Zones

Date / Time	Elevation	Depth

Date Start/Finish: 05/17/84 – 05/17/84
Drilling Company: Nittany Geoscience, Inc.
Driller's Name: Steve Keller
Drilling Method: Geoprobe
Bit Size: N/A-in. Auger Size: N/A-in.
Rig Type: Van-mounted
Spoon Size: 2-in.
Hammer Weight: N/A-lb
Height of Fall: N/A-in.

Northing: N/A
Easting: N/A
Borehole Depth: 8 ft.
Ground Surface Elev.: 925 ft.
Geologist: Lynette B. Mokry

Boring No.: MC-8
Site:
Moog Controls, Inc.
East Aurora, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Boring Construction
gs elevation 925 ft											
	925									GROUND SURFACE	
							0.0			Orange-brown fine SAND, little (–) Silt, moist.	
		(0–4')		N/A	N/A	4.0	0.0			*TILL* Orange-brown and/or tan fine SAND, little to some Clayey Silt, trace medium Gravel (Shale fragments), moist to wet.	Filled boring with cuttings and bentonite chips
5	920	(4–8')*		N/A	N/A	3.0	0.0			*WEATHERED SHALE* Orange-brown and/or dark gray fine SAND, some Clay, some medium Gravel (Shale fragments), wet.	
							0.0			Black medium GRAVEL (Shale fragments), little Clayey Silt, slightly weathered, wet.	
10	915									*SHALE* Refusal, SHALE bedrock, saturated. End of Boring @ 8.0 ft. bgs	
15	910										

Notes:
** Analytical soil sample collected from 5.0 to 7.0 ft. bgs.*
Ground-water sample collected using peristaltic pump at approximately 7.9 ft. bgs.
Grade elevation is approximate.
Geoprobe location northwest of Plant Building IIB.

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:
Soil descriptions after Burmister, 1968.
bgs – below ground surface.
N/A – not applicable.

Saturated Zones		
Date / Time	Elevation	Depth

Project: 3075
Script: DAN-bore
Date: 08/23/84

Date Start/Finish: 08/02/84 – 08/02/84
Drilling Company: SJB Services, Inc.
Driller's Name: Jeff Leavelle
Drilling Method: Hollow-stem Auger
Bit Size: N/A – in. Auger Size: 4.25 ID – in.
Rig Type: CME-550 ATV
Spoon Size: 2-in.

Northing: N/A
Easting: N/A
Well Casing Elev.:
Corehole Depth:
Borehole Depth: 10 ft.
Ground Surface Elev.: ft.
Geologist: Lynette B. Mokry

Well No. MW-1
Site:
Moog Controls, Inc.
East Aurora, New York

DEPTH ELEVATION	Sample Run Number	Sample/Int./Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
gs elevation ft									GROUND SURFACE	
	(0-2')		2-2 18-24	20	1.3	1.0			*TOPSOIL* from 0-5" Black and/or dark brown fine SAND, some Clayey Silt, moist.	
	(2-4')		30-50 32-28	82	1.5	1.0			Black medium to fine GRAVEL (angular Shale fragments), some Clayey Silt, moist. Brown and/or tan fine SAND and mf GRAVEL (Shale), dry.	Filled in boring with soil cuttings.
5	(4-8')		32-31 38-28	87	1.5	1.0			*TILL* Brown medium to fine (+) SAND, little (-) Silt, trace medium to fine Gravel (Shale, limestone), dry.	
	(6-8')		25-23 24-50/4"	47	1.4	2.0			*WEATHERED SHALE* Black medium to fine GRAVEL (weathered Shale fragments), little fine Sand, trace Clay & Silt, dry.	
	(8-10')		50/4"	N/A	0.2	N/A			Black medium to fine GRAVEL (Shale), trace fine Sand, trace Clay & Silt, moist. *MUDSTONE* Gray MUDSTONE, competent. End of Boring @ 10.0 ft. bgs	
10										
15										

Notes:
No ground-water in hole after drilling, so no well was set.
Grade elevation is approximate.
Boring location immediately south of Plant Building IIC loading dock, and 5 ft. east of boring MC-5 location.

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:
Soil descriptions after Burmister, 1958.
bgs – below ground surface.
N/A – not applicable.

Water Levels

Date / Time	Elevation	Depth

Project: 307.15
Script: DAN-well
Date: 08/23/84

Date Start/Finish: 08/03/94 – 08/03/94
Drilling Company: SJB Services, Inc.
Driller's Name: Jeff Leavette
Drilling Method: Hollow-stem Auger
Bit Size: N/A-in. Auger Size: 4.25 ID-in.
Rig Type: CME-550 ATV
Spoon Size: 2-in.

Northing: N/A
Easting: N/A
Well Casing Elev.:
Corehole Depth:
Borehole Depth: 10 ft.
Ground Surface Elev.: ft.

Geologist: Lynette B. Mokry

Well No. MW-1A
Site:

Moog Controls, Inc.
East Aurora, New York

DEPTH ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
gs elevation ft									GROUND SURFACE	
	(0-2')		2-4 6-11	80	L4	0.0			*TOPSOIL* from 0-7" Brown fine SAND, little Silt, trace medium to fine Gravel (Shale fragments), moist.	
	(2-4')		10-8 8-12	17	L5	0.0			Brown medium to fine SAND, little Clayey Silt, trace medium to fine Gravel (Shale fragments), dry.	Filled in boring with cement/bentonite grout.
5	(4-6')		8-8 8-10	18	L3	L0			Brown fine SAND, some medium to fine Gravel (Shale fragments), moist to dry. *WEATHERED SHALE* Black medium to fine GRAVEL (weathered Shale fragments), some (-) Clay & Silt, moist to dry.	
	(6-8')		12-12 12-20	24	L0	L0			Light brown SILT, thinly-bedded, dry to moist, firm. *SHALE* Black medium to fine GRAVEL (Angular Shale fragments), little Clayey Silt, damp to wet.	
	(8-10')		15-50/3"	N/A	L25	0.0			End of Boring @ 8.5 ft. bgs	
10										
15										

Notes:
No ground-water in hole after drilling, so no well was set.
Grade elevation is approximate.
Boring location north of Plant Building 11C.

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:
Soil descriptions after Burmister, 1958.
bgs - below ground surface.
N/A - not applicable.

Water Levels

Date / Time	Elevation	Depth

Project: 307.15 Script: DAN-well

Date Start/Finish: 08/03/94 – 08/03/94
Drilling Company: SJB Services, Inc.
Driller's Name: Jeff Leavelle
Drilling Method: Hollow-stem Auger
Bit Size: N/A in. Auger Size: 4.25 ID in.
Rig Type: CME-650, ATV
Spoon Size: 2-in.

Northing: N/A
Easting: N/A
Well Casing Elev.:
Corehole Depth:
Borehole Depth: 10 ft.
Ground Surface Elev.: ft.

Geologist: Lynette B. Mokry

Well No.: MW-2
Site:

Moog Controls, Inc.
East Aurora, New York

DEPTH / ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
gs elevation ft										8" dia. water-tight flush-mount protector
									GROUND SURFACE	
	(0-2')		2-3 5-8	8	LI	LO			*TOPSOIL* from 0-13" Brown medium to fine (+) SAND, little (-) Silt, moist to dry.	Concrete pad Morie No. 3 sand drain
	(2-4')		34-50/3"	N/A	0.7	2.0			*FILL* Gray coarse to fine SAND, little coarse to fine Gravel, dry.	2" dia. PVC riser, Sch. 40. Bentonite pellet seal
5	(4-6')*		30-18 12-12	28	L3	21.0			Brown coarse to medium SAND, some coarse to fine Gravel (Slag), dry. *TILL* Brown SILT, dry, very firm, slight odor.	Morie No. 0 sand
	(6-8')*		8-15 12-18	27	LO	10.0			Gray-brown medium to fine (+) SAND, little Clay & Silt, little medium to fine Gravel (Shale fragments), dry.	2" dia. PVC screen, 10-slot
10	(8-10')		8-18 27-25	45	L8	100.0			*WEATHERED SHALE* Black medium to fine GRAVEL (Shale fragments), slightly weathered, fissile, odor.	
	(10-12')		30-50/3"	N/A	0.7	100.0			*SHALE* Black medium GRAVEL (Shale fragments), competent, odor, dry. End of Boring @ 11 ft. bgs Notes: *Ground-water sample collected.* ** Soil sample collected from 4-7 ft.* *Grade elevation is approximate.* *Monitoring well location north of existing UST and east of Plant Building IIA.*	
15										

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:
Soil descriptions after Burmister, 1858.
bgs – below ground surface.
N/A – not applicable.

Water Levels

Date / Time	Elevation	Depth

Date Start/Finish: 08/02/94 – 08/02/94
Drilling Company: SJB Services, Inc.
Driller's Name: Jeff Leavelle
Drilling Method: Hollow-stem Auger
Bit Size: N/A-in.; Auger Size: 4.25 ID-in.
Rig Type: CME-550, ATV
Spoon Size: 2-in.

Northing: N/A
Easting: N/A
Well Casing Elev.:
Corehole Depth:
Borehole Depth: 10 ft.
Ground Surface Elev.: ft.

Geologist: Lynette B. Mokry

Well No.: MW-3
Site:

Moog Controls, Inc.
East Aurora, New York

DEPTH ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
ge elevation ft									GROUND SURFACE	Locking 4" dia. aluminum protective casing
	(0–2')		2-3 4-7	7	0.8	17.0			*TOPSOIL* from 0–8" Brown and/or dark brown medium to fine (+) SAND, little Silt, moist.	Concrete pad
	(2–4')		2-7 4-3	11	0.4	17.0			*FILL* Brown medium to fine (+) SAND, some (–) Clayey Silt, trace medium Gravel (Slag), moist.	2" dia. PVC riser, Sch. 40 Bentonite pellet seal
5	(4–6')		3-3 4-8	7	L2	20.0			*TILL* Olive-brown fine SAND, some Clayey Silt, moist to wet.	Morie No. 0 sand
	(6–8')		N/A	N/A	L3	7.0			Orange and/or tan Clayey SILT, dry to moist, firm.	
	(8–10')		8-10 12-50/3"	22	L4	8.0			*WEATHERED SHALE* Brown and/or black fine SAND, some Clayey Silt, little medium Gravel (Shale fragments), moist.	2" dia. PVC screen, 10-slot
10									*SHALE* Black medium GRAVEL (Shale fragments), saturated.	
									End of Boring @ 9.9 ft. bgs	
15									Notes: *Ground-water sample collected.* *Grade elevation is approximate.* *Monitoring well location east of Plant Building 11B*	

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:
Soil descriptions after Burmister, 1958.
bgs – below ground surface.
N/A – not applicable.

Water Levels		
Date / Time	Elevation	Depth

Date Start/Finish: 06/02/84 – 06/02/84	Northing: N/A	Well No.: MW-4
Drilling Company: SJB Services, Inc.	Easting: N/A	Site:
Driller's Name: Jeff Leaveille	Well Casing Elev.:	
Drilling Method: Hollow-stem Auger	Corehole Depth:	
Bit Size: N/A-in. Auger Size: 4.26.10-in.	Borehole Depth: 18 ft.	Moog Controls, Inc.
Rig Type: CME-650, ATV	Ground Surface Elev.: ft.	East Aurora, New York
Spoon Size: 2-in.	Geologist: Lynette B. Mokry	

DEPTH ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
ft elevation									GROUND SURFACE	Locking 4" dia. aluminum protective casing
	(0-2')		1-5 8-7	13	1.1	1.0			*TOPSOIL* from 0-8" Brown and/or dark brown medium to fine (+) SAND, little Clay & Silt, moist to damp.	Concrete pad
	(2-4')		5-10 8-8	18	1.3	21.0			@ 0.5 ft., grades to medium to fine SAND, little medium to fine Gravel (Shale, limestone), little Silt, moist to dry. Brown SILT, thinnly-bedded, dry, firm.	2" dia. PVC riser, Sch. 40
5	(4-6')*		4-3 6-7	9	1.4	30.0				Bentonite pellet seal
	(6-8')		8-8 10-10	18	1.5	45.0			*TILL* Gray-brown fine SAND and Clayey SILT, trace medium to fine Gravel (sub-rounded limestone), saturated to wet.	Morie No. 0 sand
	(8-10')*		2-10 13-8	23	0.5	9.0			Brown fine SAND and Clayey SILT, damp to wet, firm. *WEATHERED SHALE* Gray-brown medium to fine GRAVEL (weathered Shale fragments), damp.	2" dia. PVC screen, 10-slot
10	(10-12')		7-12 14-28	26	1.5	4.0			Black and/or dark brown fine SAND, some medium to fine Gravel (angular Shale fragments), little Clayey Silt, damp.	
	(12-14')		33-22 18-50/3"	38	1.5	4.0			*SHALE* Black medium GRAVEL (Shale fragments), saturated.	
15									End of Boring @ 13.8 ft. bgs	

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:

Soil descriptions after Burmister, 1958.
bgs = below ground surface.
N/A = not applicable.

Water Levels

Date / Time	Elevation	Depth

Moog Controls Inc.
East Aurora, New York

Well No. MW-4
Total Depth = 18 ft.

DEPTH ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
20									Notes: Ground-water sample collected. * Total organic carbon analysis from 4-6 ft. Volatile organic analysis from 8-10 ft. Grade elevation is approximate. Monitoring well location immediately north of Plant Building IIA	
25										
30										
35										

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:

Water Levels		
Date / Time	Elevation	Depth

Date Start/Finish: 08/03/94 – 08/03/94
Drilling Company: SJB Services, Inc.
Driller's Name: Jeff Leavelle
Drilling Method: Hollow-stem Auger
Bit Size: N/A-in. Auger Size: 4.25 ID-in.
Rig Type: CME-550 ATV
Spoon Size: 2-in.

Northing: N/A
Easting: N/A
Well Casing Elev.:
Corehole Depth:
Borehole Depth: 10 ft.
Ground Surface Elev.: ft.

Geologist: Lynette B. Mokry

Well No. MW-5
Site:
Moog Controls, Inc.
East Aurora, New York

DEPTH ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
gs elevation ft									GROUND SURFACE	8" dia. water-tight flush-mount protector
	(0-2')		3-3 7-5	10	L4	1.0			*TOPSOIL* from 0 – 17". Brown medium to fine (+) SAND, little Silt, moist.	Concrete pad Morie No. 3 sand drain 2" dia. PVC riser, Sch. 40 Bentonite pellet seal
	(2-4')		8-10 10-8	20	L5	2.0			*TILL* Brown medium to fine (+) SAND, little Clayey Silt, trace medium to fine (+) Gravel (Angular shale and sub-rounded hematitic sandstone), dry to moist.	
5	(4-6')*		8-8 10-17	18	L4	4.0				Morie No. 0 sand
	(8-8')		19-17 18-15	38	L8	1.0			Brown and/or tan medium to fine SAND, little medium to fine Gravel (Angular shale and sub-rounded hematitic sandstone), trace (+) Clayey Silt, damp to wet.	2" dia. PVC screen, 10-slot
	(8-10')		14-10 12-8	22	0.5	2.0			*SHALE* Black medium to fine GRAVEL (Shale fragments), saturated.	
10	(10-12')		15-50/6"	N/A	0.8	4.0			End of Boring @ 10.5 ft. bgs	
15									Notes: *Ground-water sample collected.* ** Total organic carbon analysis from 4-8 ft.* *Grade elevation is approximate.* *Monitoring well location north of Plant Building 11B.*	

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:
Soil descriptions after Burmister, 1958.
bgs – below ground surface.
N/A – not applicable.

Water Levels

Date / Time	Elevation	Depth

TABLE B-1

MOOG, INC.
PLANT II REMEDIAL EVALUATION

WELL CONSTRUCTION SUMMARY

Well No.	Ground Elev.(1)	PVC Riser Elev.	Borehole Diam. Well Diam.(in.)	Depths (ft. below grade)					Type of Sand Pack	Screen Slot Size	Install. Date
				Top of Seal	Top of Sand Pack	Top of Screen	Screen Bottom	Bottom of Sand Pack			
MW-2	99.24	98.90	8.25/2	1.8	3.8	6.0	11.0	11.0	#0 Morie	0.010	6/3/94
MW-3	97.46	99.66	8.25/2	1.0	2.7	5.0	10.0	10.0	#0 Morie	0.010	6/2/94
MW-4	99.67	101.59	8.25/2	4.0	6.3	8.8	13.8	13.8	#0 Morie	0.010	6/2/94
MW-5	97.23	96.95	8.25/2	1.0	3.5	5.5	10.5	10.5	#0 Morie	0.010	6/3/94
MW-6	99.97	99.62	10/2	6.1	8.1	9.5	14.5	14.8	#0 Morie	0.010	3/21/95
MW-7	97.80	97.43	10/2	3.5	5.0	6.2	11.2	11.4	#0 Morie	0.010	3/21/95
MW-1B	99.81	99.47	8.25/2	8.0	11.0	12.0	17.0	17.5	#0 Morie	0.010	10/27/94
MW-2A	99.10	98.70	4/2	14.0	18.5	20.8	25.8	26.0	#0 Morie	0.010	10/28/94

Note:
(1) Based on reference elevation of 100.00' of finished floor elevation.

MALCOLM PIRNIE

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MALCOLM PIRNIE

OVERBURDEN MONITORING WELL SHEET

WELL NO. MW-1B

PROJECT 2630-00-1 START DATE 10/27 END DATE 10/27/94

PROJECT NO. Moog Inc. FIELD GEOLOGIST JMA

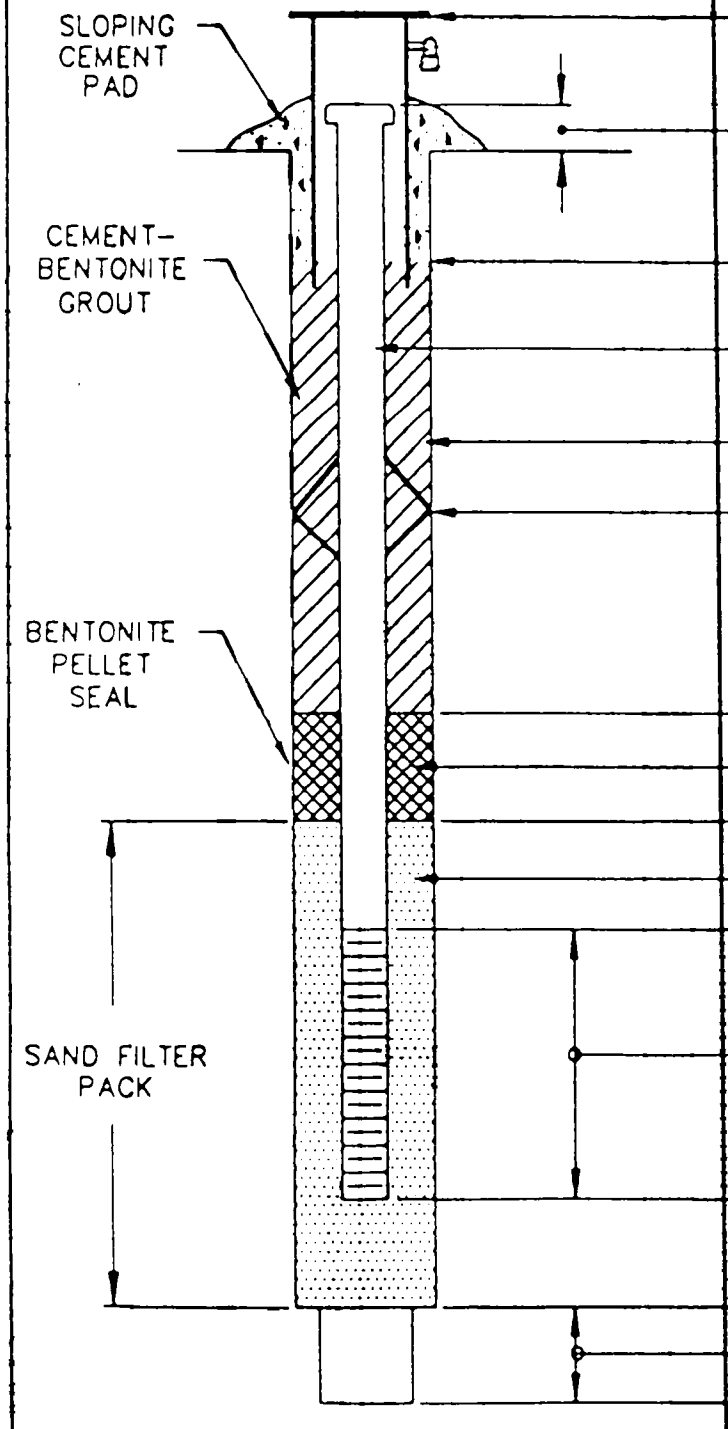
LOCATION UST Investigation at Bldg 11

DRILLING CO. Earth Dimensions

DRILLER(S) Rich
Dale Gramza

DRILLING METHOD(S) 4¼" Auger

DEVELOPMENT METHOD(S)



SIZE AND LENGTH OF LOCKABLE PROTECTIVE STEEL CASING _____

LOCKED? X YES ___ NO

STICK-UP NA

FLUSH MOUNT

DEPTH TO TOP OF GROUT/ BOTTOM OF CEMENT 1.0'

RISER DIAMETER AND MATERIAL 2", PVC

BOREHOLE DIAMETER 8.25"

DEPTH TO CENTRALIZERS NA

DEPTH 9.0'

PELLET SIZE 3/8"

DEPTH 11.0

SAND SIZE MORIE O

DEPTH 12.0

SCREEN DIAMETER, SLOT SIZE, AND MATERIAL 2", 10 SLOT, PVC

DEPTH 17.0

DEPTH 17.0

BACKFILL MATERIAL MORIE O

BOTTOM OF BOREHOLE 17.5

NOTE: DEPTHS ARE FEET BELOW GRADE

OMWSHEET.DWG 9-20-90

MALCOLM PIRNIE

OVERBURDEN MONITORING WELL SHEET

WELL NO. MW-2A

PROJECT Moore Inc START DATE 10/27/94 END DATE 10/28/94

PROJECT NO. 2630-00-1 FIELD GEOLOGIST JMA

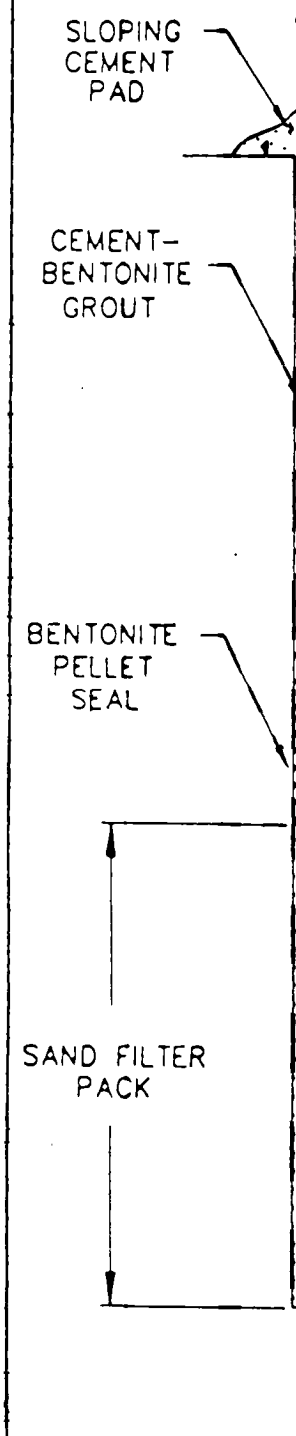
LOCATION UST Investigation at Bldg 11

DRILLING CO. Earth Dimensions, Inc.

DRILLER(S) B. Shaw Rick, Gerrich

DRILLING METHOD(S) 6¼" Augers to 14' Core/Bailer bit 3⅞" to 26'

DEVELOPMENT METHOD(S) Bailer, Polyethylene Disposable



SIZE AND LENGTH OF LOCKABLE PROTECTIVE STEEL CASING NA

LOCKED? X YES __ NO

STICK-UP NA

FLUSH MOUNT

DEPTH TO TOP OF ~~GROUT~~/ ~~BOTTOM OF CEMENT~~ BENTONITE SLURRY 1'

RISER DIAMETER AND MATERIAL 2", PVC

6¼" Auger 8" 4" CASING TO 14'

BOREHOLE DIAMETER 8

DEPTH TO CENTRALIZERS NA

DEPTH 14'

PELLET SIZE 3/8"

DEPTH 18.5

SAND SIZE Morie O

DEPTH 20.3

4" borehole

SCREEN DIAMETER, SLOT SIZE, AND MATERIAL 2", 10 slot, PVC

DEPTH 25.3

DEPTH 26.0'

BACKFILL MATERIAL NA

BOTTOM OF BOREHOLE NA

NOTE: DEPTHS ARE FEET BELOW GRADE

OMWSHEET.DWG 9-20-90

TABLE B-2

MOOG, INC.
PLANT II REMEDIAL EVALUATION

SUMMARY OF WATER LEVELS FROM TOP OF RISER

Well No.	PVC Riser Elev.	6/2, 3/94	10/31/94		11/18/94		12/19/94		1/5/95		1/13/95		3/28/95	
		Elev.[4] (ft.)	Depth (ft.)	Elev. (ft.)	Depth (ft.)	Elev. (ft.)	Depth (ft.)	Elev. (ft.)	Depth (ft.)	Elev. (ft.)	Depth (ft.)	Elev. (ft.)	Depth (ft.)	Elev. (ft.)
MW-1B	99.47	(5)	(1)	–	(1)	–	5.27[2]	94.20[2]	4.98	94.49	5.06	94.41	4.13	95.34
MW-2A	98.70	(5)	(1)	–	(1)	–	6.70	92.00	7.35	91.35	7.23	91.47	6.91	91.79
MW-2	98.90	93.3	5.98	92.92	5.39	93.51	4.66	94.24	5.43	93.47	4.84	94.06	4.95	93.95
MW-3	99.66	93.2	6.85	92.81	6.17	93.49	5.50	94.16	6.25	93.41	5.74	93.92	4.85	94.81
MW-4	101.59	93.2	8.80	92.79	8.13	93.46	7.44	94.15	8.18	93.41	7.67	93.92	7.76	93.83
MW-5	96.95	91.2	6.11	90.84	5.50	91.45	3.73	93.22	(3)	–	3.66	93.29	4.92	92.00
MW-6	99.62	(6)	(6)	–	(6)	–	(6)	–	(6)	–	(6)	–	5.79	93.83
MW-7	97.43	(6)	(6)	–	(6)	–	(6)	–	(6)	–	(6)	–	3.61	93.82

Notes:
(1) Water levels measured did not represent static water level.
(2) Water level measurement may not represent static water level.
(3) Not able to obtain water level.
(4) From Blasiound, Bouck, Lee, Inc.
(5) Wells installed 10/94.
(6) Wells installed 3/95.

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TABLE B-3

MOOG, INC.
PLANT II REMEDIAL EVALUATION

SUMMARY OF SOIL GAS RESULTS

Location and Hole Number	HNu Reading (PPB)	Depth of Hole (ft.)
Background:		
G-1	.5 ppm	2'
In Vicinity of Tank:		
G-2	.4 ppm	2'
G-3	.2 ppm	2'
G-4	.5 ppm	2.5'
G-10	.3 ppm	2'
In Vicinity of MW-4 and MW-3		
G-5	.3 ppm	2.5'
G-6	.4 ppm	4'
G-7	.3 ppm	4'
G-8 *	.3 ppm	4'
G-9	.3 ppm	4'

* Near manhole of storm sewer.

5. FIELD HYDRAULIC CONDUCTIVITY METHODS OF INTERPRETATION

The data collected from MW-1B and MW-2A were evaluated using the method of Hvorslev (1951). The water in MW-1B and MW-2A was removed until the wells were dry. The water was then allowed to recharge and measurements were made at a number of time intervals. The hydraulic conductivity data of MW-1B was evaluated, and based on very early recharge data, the resulting value was 1.5 E-7 cm/s. Since the data was only collected for the first 20% of the total well recovery, the actual hydraulic conductivity is likely less than 1.0 E-7 cm/s.

The data collected from MW-2 and MW-5 was evaluated using the method of Bouwer & Rice (1976). Water was removed from the wells and allowed to recharge while water level measurements were obtained.

REFERENCES

1. Hvorslev, M.J. 1951. Time lag and soil permeability in groundwater observations. U.S. Army Corps Engineers Waterways Exp. Sta. Bull. 36, Vicksburg, Miss.

2. Bouwer, H. and Rice, R.C. 1976. "A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers With Completely or Partially Penetrating Wells." Water Resources Research, Vol. 12, No. 3.

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.

BY JMA DATE 12/20/94 SHEET NO. ..... OF .....

CHKD. BY RHO DATE 1-30-95 JOB NO. 2630-001-200

SUBJECT CALCULATION OF HYDRAULIC CONDUCTIVITY HOOD, INC.
USING HVORSLEV

MW-1B

Porosity of sand pack, $n = .3$
4.25" Augers, 8.25" hole

R = radius of hole = .344 feet

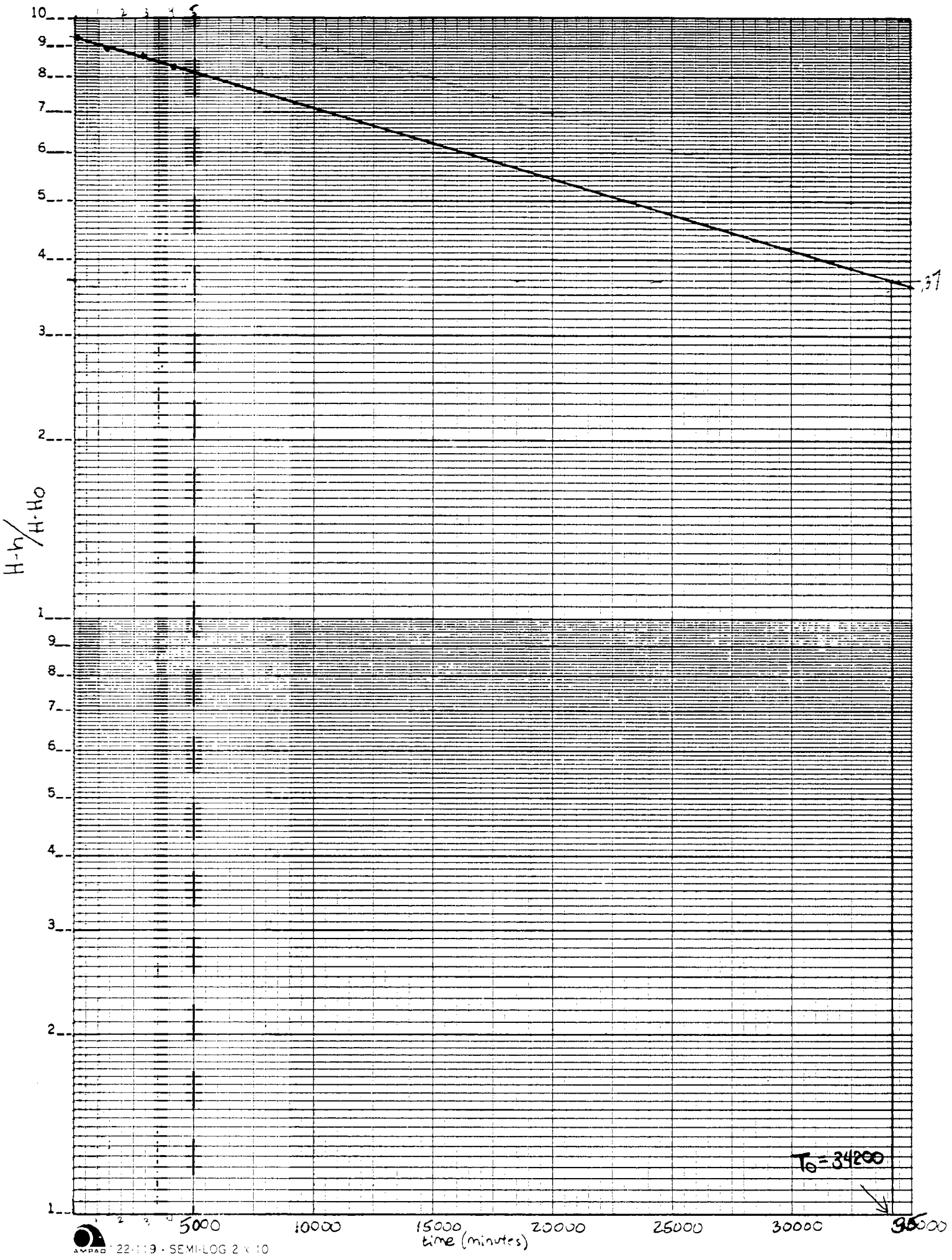
r = effective radius = $\left[(1-.3)\,.083^2 + .3(.344)^2\right]^{1/2} = .201$ ft

L = length of sand pack = 6.5 feet

$$K = \frac{r^2 \left(\ln(L/R)\right)}{2\,L\,T_0}$$

$$= \frac{(.201)^2 \ln(6.5/.344)}{2(6.5)\,34200} = 3\,E{-}7 \text{ ft/min} = 1.5 \times 10^{-7} \text{ cm/s}$$

MW-1B


10
9
8
7
6
5
4
3
2
1
9
8
7
6
5
4
3
2
1
H-h/H-Ho
5000
10000
15000
20000
25000
30000
time (minutes)
T₀=34200
AMPAD 22-119 - SEMI-LOG 2 CYCLE

FIELD SLUG TEST LOG

PROJECT: Moog Control Bldg II UST Inv.
CLIENT: Moog Inc. WELL/BOREHOLE NO.: MW-1B
JOB NO.: 2630-00-1 COMPLETED BY: JMA/BCH

WELL/BOREHOLE DETAILS:

Installation Date: 10/27/94 Ground Elevation: 99.81 ft. AMSL
Reference Point (RP): T of Riser RP Elevation: 99.47 ft. AMSL
Stratigraphic Unit Monitored: Competent Shale Bedrock
Hydrostratigraphic Unit Monitored: Aquitard
Slug Test Method: Well bailed until dry & allowed to recharge
Riser Length: 12 ft. Riser I.D.: .083 ft. Riser Material: PVC
Screen Length: 5 ft. Screen I.D.: .083 ft. Screen Material: PVC Slot: .010"
L (Length of Sand Pack) 1.0 5 ft above top of Screen r_s (Radius of Borehole at Screen) .344 ft. r_c (Radius of Screen) .083 ft
Slug Dimensions or Volume

TEST:

Start Date: 11/18/94 Static Level (H): 5.27 (measured on 12/19) ft. BRP
Start Time (To): 12:34:00 Initial Pressure Head (Ho): ft. BRP
Will Water Level Remain Above the Screen During the Test? (Yes) (No) X

H=5.27

CLOCK TIME	ELAPSED TIME t(h-m-s)	DEPTH h(ft. BRP)	h-H (ft.)	h-H / Ho-H (ho=11.13)
12:34:00	0 START			
12:34:30	30s	16.4	11.13	1.0
12:35	1m	16.25	10.98	.987
12:36	2m	16.16	10.89	.978
12:39	5m	16.03	10.76	.967
1:22	48m	15.61	10.34	.929
11/19 10:43	1329m	15.22	9.95	.894
11/20 1:46	2952m	14.93	9.666	.868
11/22 9:10	4116m	14.50	9.23	.829

CLOCK TIME	ELAPSED TIME t(h-m-s)	DEPTH h(ft. BRP)	h-H (ft.)	h-H / Ho-H

COMMENTS:

$$K = \frac{r_c^2 \ln(L/R) \ln(h_1/h_2)}{2(L)(t_2 - t_1)}$$

MALCOLM PIRNIE

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.

BY JMA DATE 12/20/94 SHEET NO. ..... OF .....

CHKD. BY RHO DATE 1-30-95 JOB NO. 2630-001-200

SUBJECT CALCULATION OF HYDRAULIC CONDUCTIVITY MOOG, INC.
USING HVORSLEV

MW-2A

Porosity of sand pack, $n = .3$
4" casing @ 3 7/8" Roller bit (4" hole)

R = radius of hole = 4" = .167 feet

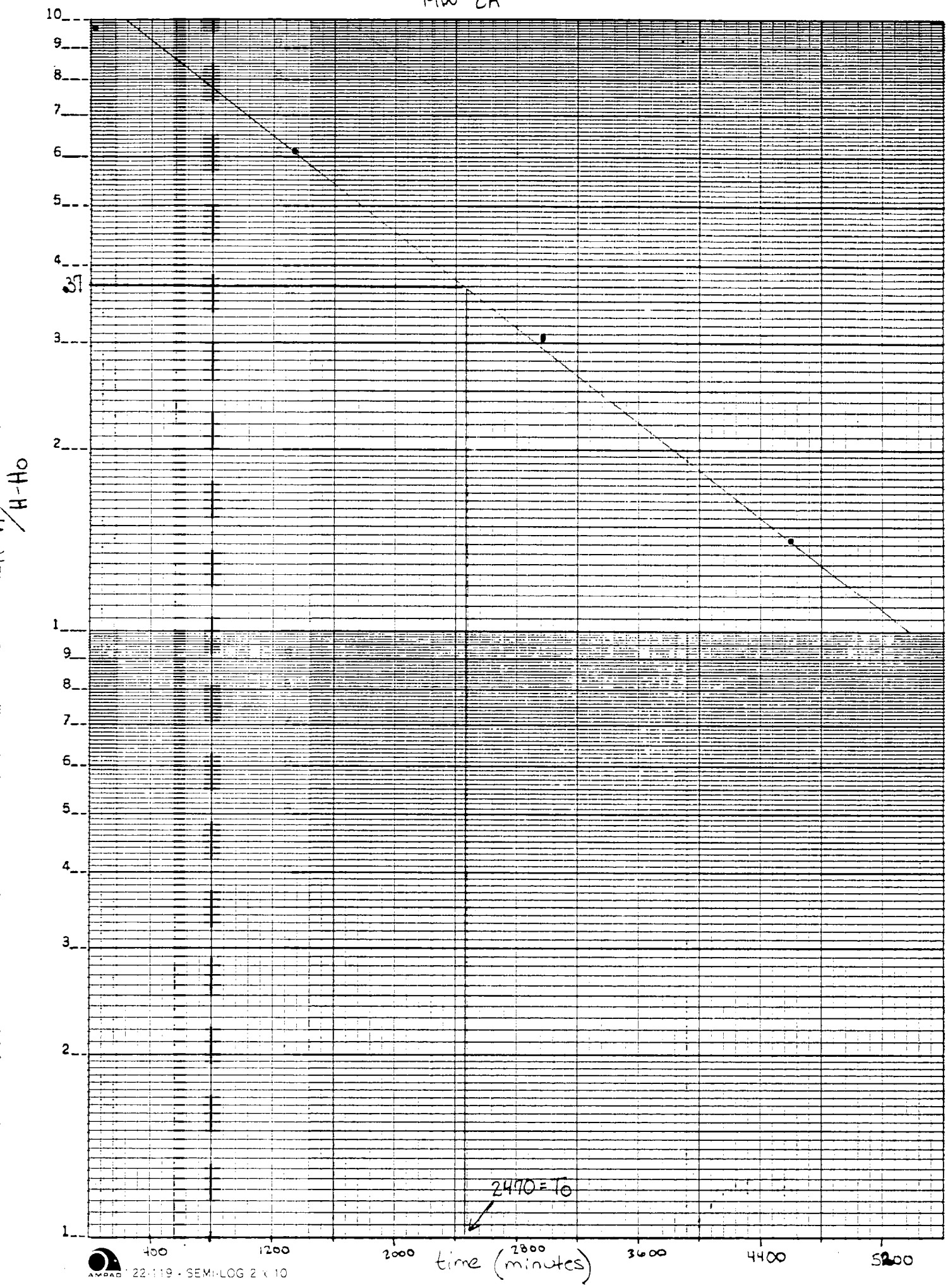
r = effective radius = $\left[(1-.3)\ .083^2 + (.3)(.167)^2\right]^{1/2} = .115$ ft

L = Length of sand pack = $26 - 18.5 = 7.5'$

$$K = \frac{r^2 \left(\ln\left(L/R\right)\right)}{2 L T_o}$$

$$= \frac{(.115)^2 \ln\left(7.5/.167\right)}{2(7.5)\,2470} = 1.4\text{ E-}6\ ^{ft}/_{min} = 7.1\text{ E-}7\ ^{cm}/_{s}$$

MW-2A



AMBAG 22-119 - SEMI-LOG 2 x 10

FIELD SLUG TEST LOG

PROJECT: Moog Control Bldg 11 UST Inv.
CLIENT: Moog, Inc.
JOB NO.: 2630-00-1
WELL/BOREHOLE NO.: MW-2A
COMPLETED BY: JMA / BCH

WELL/BOREHOLE DETAILS:
Installation Date: 10/28/94
Ground Elevation: 99.10 ft. AMSL
Reference Point (RP): T. of Riser
RP Elevation: 98.70 ft. AMSL
Stratigraphic Unit Monitored: Competent Shale Bedrock
Hydrostratigraphic Unit Monitored: Aquitard
Slug Test Method: Well bailed until dry & allowed to recharge
Riser Length: 20.8 ft. Riser I.D.: 2 in Riser Material: PVC
Screen Length: 5 ft. Screen I.D.: 2 in Screen Material: PVC Slot: .010

L (Length of Sand Pack) 2.3 ft. above t of screen
r_s (Radius of Borehole at Screen) 4 in = .167 Ft
r_c (Radius of Screen) 2 in = .093 Ft
Slug Dimensions or Volume

TEST:
WATER LEVEL AFTER SAMPLING & ALLOWING SOME RECHARGE @ 12:09 → 23.85
Start Date: 11/8/94
Static Level (H): 8.58 ft. BRP
Start Time (To): 12:11:00
Initial Pressure Head (Ho): ft. BRP
Will Water Level Remain Above the Screen During the Test? (Yes) (No) X

CLOCK TIME	ELAPSED TIME t (h-m-s)	DEPTH h (ft BRP)	h-H (ft.)	h-H / Ho-H (ho=16.6)	CLOCK TIME	ELAPSED TIME t (h-m-s)	DEPTH h (ft. BRP)	h-H (ft.)	h-H / Ho-H
12:11:00	0								
12:11:43	43 s	25.18	16.6	1.0					
12:13	2 m	25.06	16.48	.993					
12:16	5 m	24.99	16.41	.989					
12:21	10 m	24.91	16.33	.984					
12:41	30 m	24.72	16.14	.972					
11/9 10:38a	1347 m	18.75	10.17	.613					
11/20 1:41p	2970 m	13.65	5.07	.305					
11/21 4:53p	4602 m	10.93	2.35	.142					
11/22 9:00a	5569	10.09	1.51	.0910					

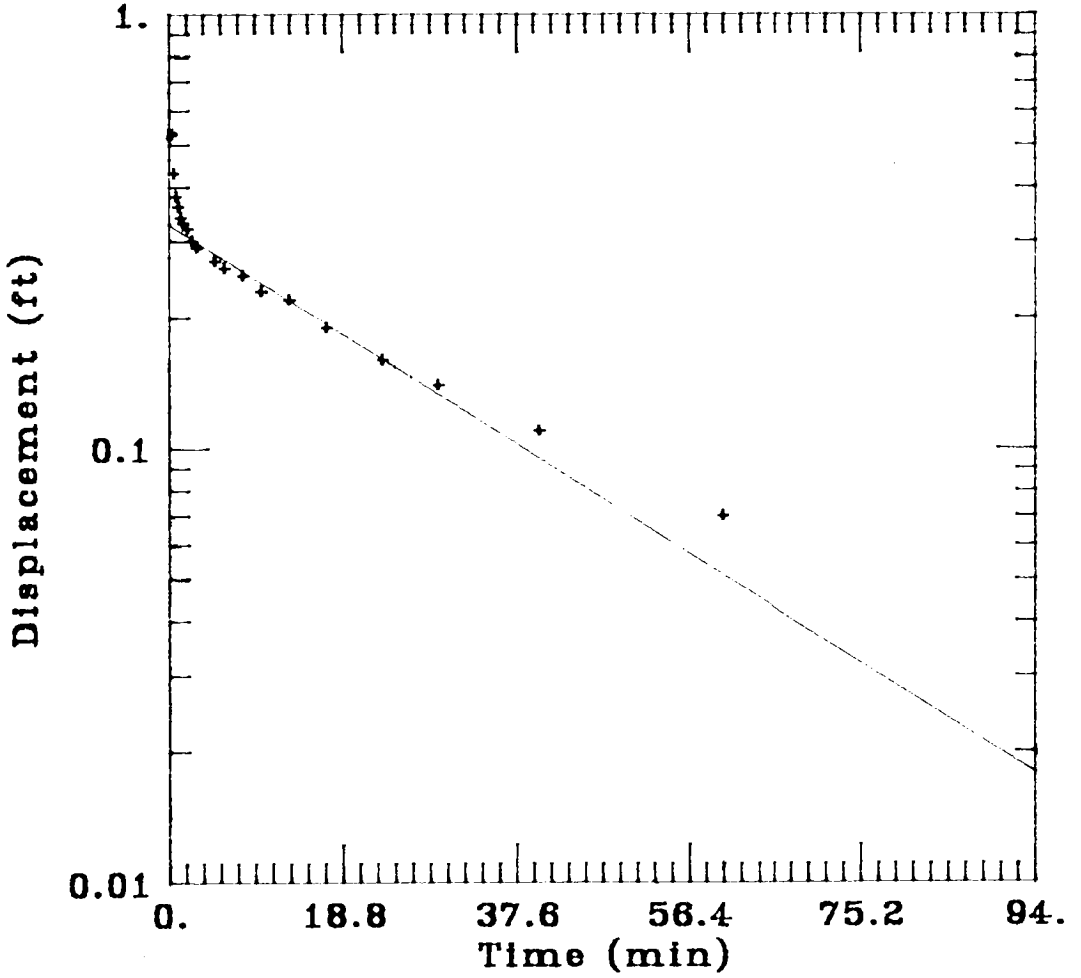
COMMENTS:

$$K = \frac{r^2 \ln(L/R) \ln(h_1/h_2)}{2(L)(t_2 - t_1)}$$ Hv

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.	Client: MOOG, INC.
Project No.: 2630-001-200	Location: MOOG CONTROLS BLDG 11

MW-2



DATA SET:
MW2.IN
01/28/95

AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Bouwer-Rice
TEST DATE:
11/2/94

ESTIMATED PARAMETERS:
K = 0.0002525 ft/min
y0 = 0.328 ft

TEST DATA:
H0 = 0.53 ft
rc = 0.202 ft
rw = 0.346 ft
L = 5. ft
b = 5.47 ft
H = 5.47 ft

FIELD SLUG TEST LOG

PROJECT: Moog Inc UST Invest — FLUSHMOUNT
CLIENT: Moog Inc. — WELL/BOREHOLE NO.: MW-2 (BBL well)
JOB NO.: 2630-00-1 — COMPLETED BY: JMH

WELL/BOREHOLE DETAILS:

Installation Date: 6/3/94 — Ground Elevation: _____ ft. AMSL
Reference Point (RP): T.O. Riser — RP Elevation: _____ ft. AMSL
Stratigraphic Unit Monitored: TILL & WEATHERED SHALE
Hydrostratigraphic Unit Monitored: _____
Slug Test Method: Rising Head
Riser Length: ~5.6 ft. — Riser I.D.: 2" ft. — Riser Material: PVC
Screen Length: 5' ft. — Screen I.D.: 2" ft. — Screen Material: PVC — Slot: 10
L (Length of Sand Pack) 7.2 ft. — r_w (Radius of Borehole at Screen) .346 ft. — r_c (Radius of Screen) ____ ft
Slug Dimensions or Volume effective radius = .202 ft

TEST:

Start Date: 11/2/94 — Static Level (H): 5.47 ft. BRP
Start Time (To): 10:29:15 — Initial Pressure Head (Ho): _____ ft. BRP
Will Water Level Remain Above the Screen During the Test? (Yes) _____ (No) X

CLOCK TIME	ELAPSED TIME t (hrs:mins)	DEPTH h (ft BRP)	h-H (ft.)	h-H / Ho-H	CLOCK TIME	ELAPSED TIME t (hrs:mins)	DEPTH h (ft BRP)	h-H (ft.)	h-H / Ho-H
10:29:15	15 s	6.00			10:39:15	10 m	5.70		
	30 s :15	5.90			10:40:15	13 m	5.69		
	45 s :15	5.85			10:44:15	17 m	5.606		
	1 m 1	5.83			10:48:15	28 m	5.63		
	1:15 :15	5.81			10:56:15	29 m	5.61		
	1:30 :15	5.80			11:07:15	40 m	5.58		
	1:45 :15	5.80			11:27:15	1 hr	5.54		
	2:00 m 2	5.79			12:01:15	1 hr 34 m	5.49		
	2:30 :15	5.77							
	3:00 3	5.76							
	3:30 :15	5.76							
12:31:15	4 m 4	5.76							
10:32:15	5 m 5	5.74							
	6 m 6	5.73							
10:35:15	8 m 8	5.72							

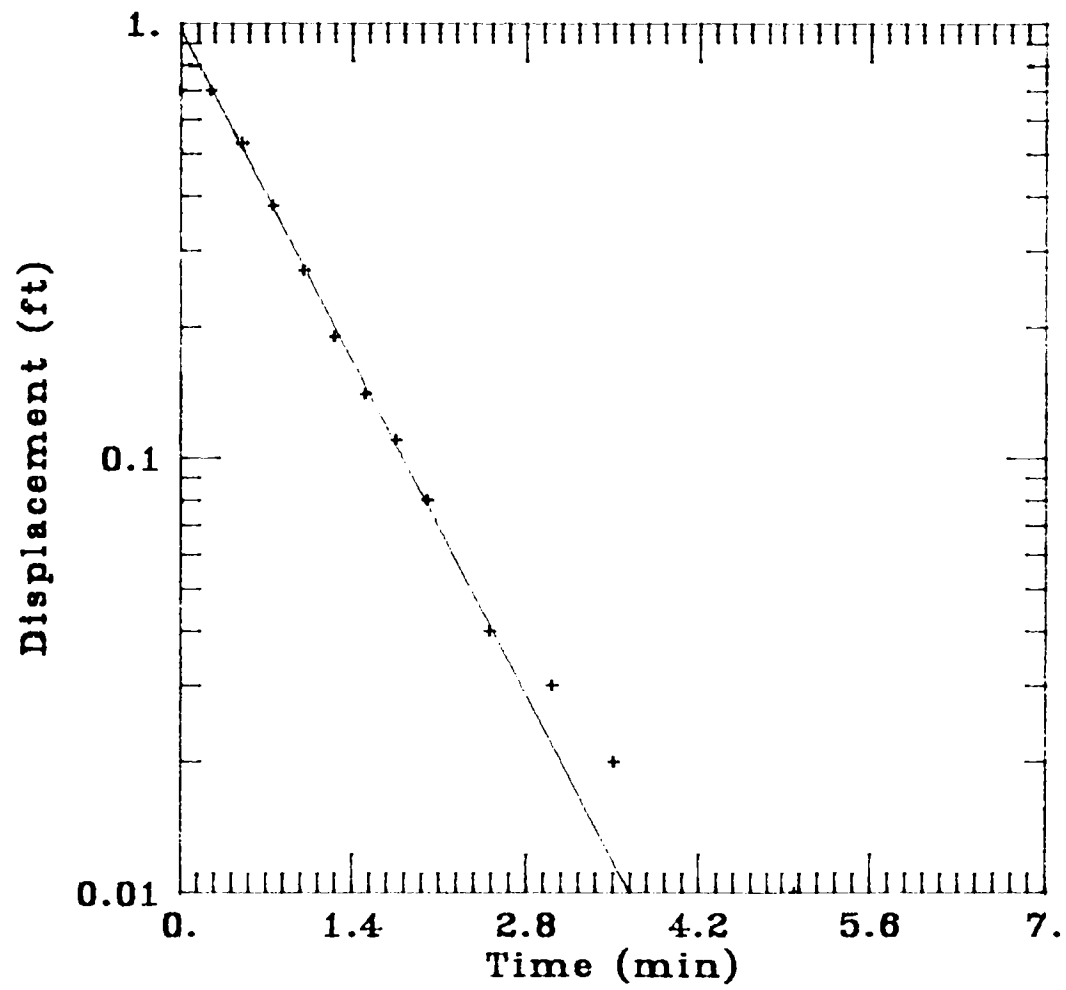
COMMENTS:

$$K = \frac{r^2 \ln(L/R) \ln(h_1/h_2)}{2(L)(t_2 - t_1)}$$ (Hv)

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.	Client: MOOG, INC.
Project No.: 2630-001-200	Location: MOOG CONTROLS BLDG 11

MW-5



DATA SET:
MW5.IN
01/28/95

AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Bouwer-Rice
TEST DATE:
11/2/94

ESTIMATED PARAMETERS:
K = 0.001649 ft/min
y0 = 0.9697 ft

TEST DATA:
H0 = 0.7 ft
rc = 0.083 ft
rw = 0.346 ft
L = 5. ft
b = 4.61 ft
H = 4.61 ft

FIELD SLUG TEST LOG

PROJECT: Moore Inc Underground ST Inv. Flushmount
CLIENT: Moore Inc
JOB NO.: 20352-20-1
WELL/BOREHOLE NO.: MW-5 (BB@ well)
COMPLETED BY: JMA

WELL/BOREHOLE DETAILS:
Installation Date: 6/3/94
Ground Elevation: _____ ft. AMSL
Reference Point (RP): T of Riser
RP Elevation: _____ ft. AMSL
Stratigraphic Unit Monitored: TILL & SHALE
Hydrostratigraphic Unit Monitored: _____
Slug Test Method: Rising Head
Riser Length: ~5.3' ft. Riser I.D.: 2" ft. Riser Material: PVC
Screen Length: 5' ft. Screen I.D.: 2" ft. Screen Material: PVC Slot: 10
L (Length of Sand Pack) 7 ft. r_s (Radius of Borehole at Screen) ~~.042~~ .346 ft. r_c (Radius of Screen) .083 ft.
Slug Dimensions or Volume 4' Bailer, PVC, 2"

TEST
Start Date: 11/2/94
Static Level (H): 4.61 ft. BRP
Start Time (To): _____
Initial Pressure Head (Ho): _____ ft. BRP
Will Water Level Remain Above the Screen During the Test? (Yes) X (No) _____

CLOCK TIME	ELAPSED TIME t (hrs/min/s)	DEPTH h(ft. BRP)	h-H (ft.)	h-H / Ho-H
~~10:50:15~~	~~10'15~~ s .25	5.3		
	~~30~~ s .5	5.1		
	~~45~~ 30 s .75	4.99		
	~~60~~ 45 s 1	4.89		
	~~75~~ 1m s 1.25	4.81		
	90 s 1.5	4.77		
	105 s 1.75	4.71		
	120 s 2	4.70		
	150 s 2.5	4.68		
	3 m 3	4.664		
	3.5 m	4.63		
	4 m	4.62		
~~10:55:15~~	5 m	4.62		
~~10:57:15~~	7 m	4.62		
~~10:59:15~~	10 m	4.61		

CLOCK TIME	ELAPSED TIME t (hrs/min/s)	DEPTH h(ft. BRP)	h-H (ft.)	h-H / Ho-H
10:01:15	15 s	5.31		
	30 s	5.14		
	45	4.99		
	60	~~4.85~~		
	75	4.80		
	90	4.75		
	105	4.72		
	120	4.69		
	150	4.65		
	3 m	4.64		
	3.5 m	4.63		
	4m	4.63		
	5 m	4.62		
10:25:15	7m	4.62		
10:39:15	~~10~~ 8 m	4.61		

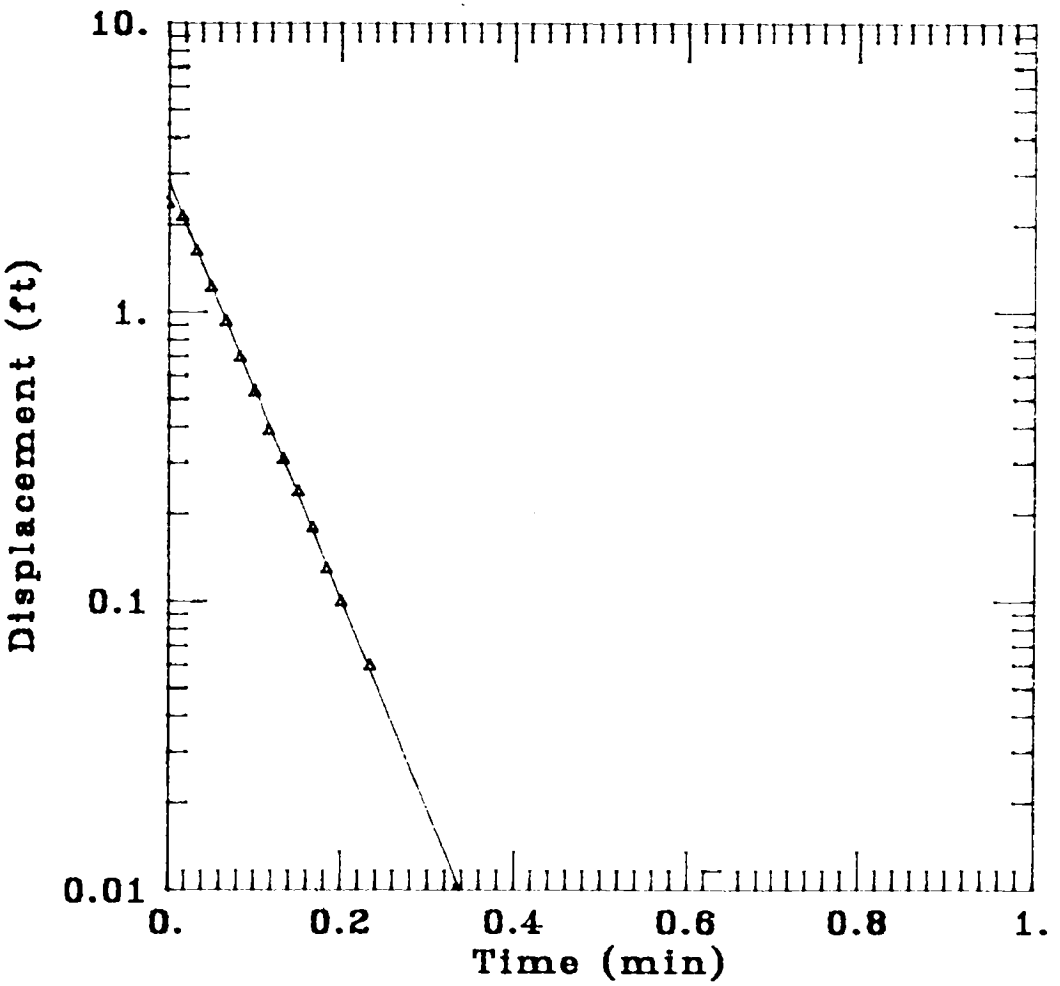
COMMENTS:

$$K = \frac{r^2 \ln(L/R) \ln(h_1/h_2)}{2(L)(t_2 - t_1)}$$ Hv

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.	Client: MOOG, INC.
Project No.: 2630-00-1200	Location: BUILDING 11

MW-7



DATA SET:
F: MOOGMW7.DAT
03/29/95

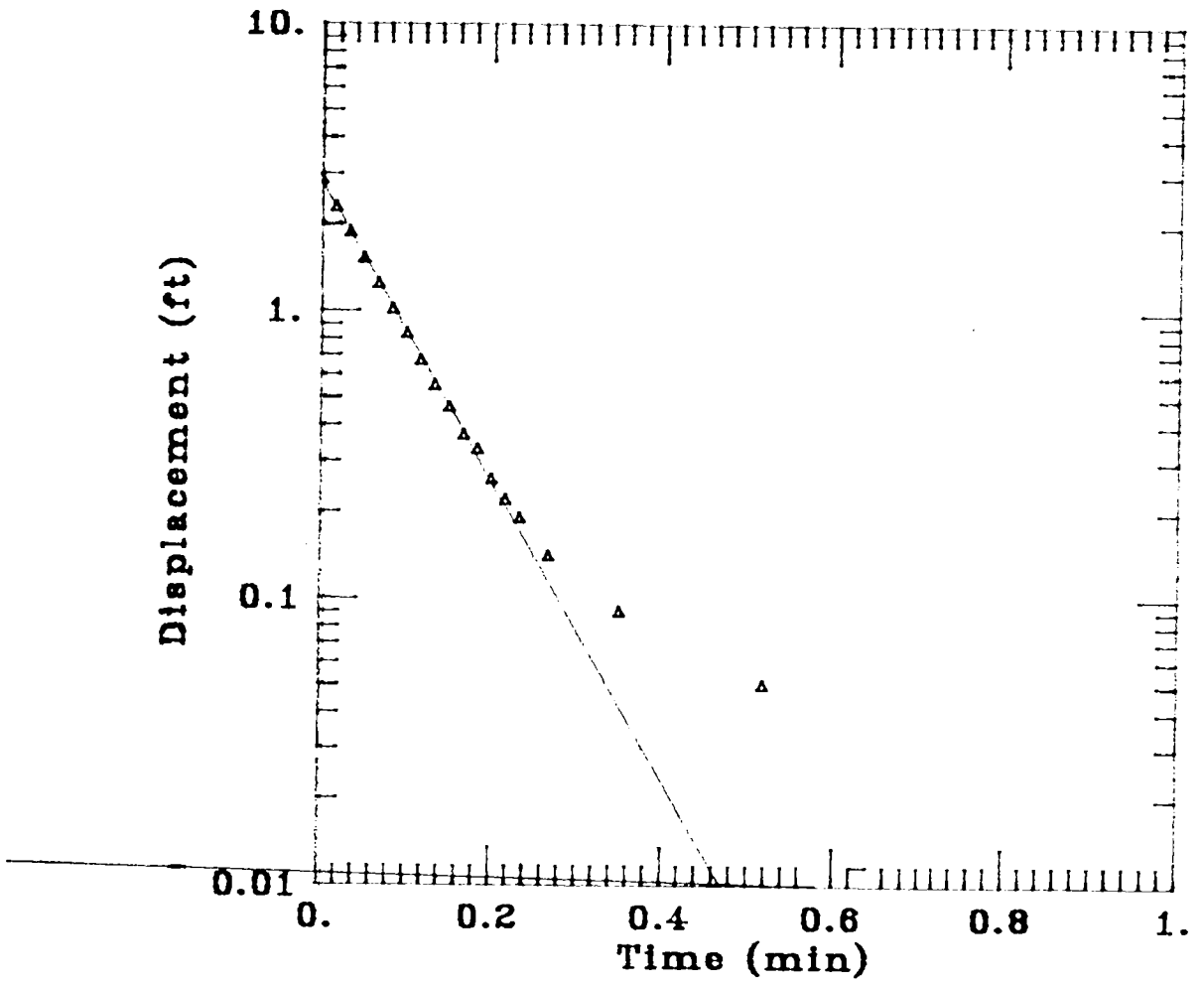
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Bouwer-Rice
TEST DATE:
9/28/95

ESTIMATED PARAMETERS:
K = 0.0159 ft/min
y0 = 2.832 ft

TEST DATA:
H0 = 2.38 ft
rc = 0.083 ft
rw = 0.417 ft
L = 5. ft
b = 7.78 ft
H = 3.62 ft

MALCOLM PIRNIE INC.	Client: MOOG INC.
Project No.: 2630-00-1200	Location: BUILDING 11

MW-6



DATA SET:
F: MOOGMW6.DAT
03/29/95

AQUIFER TYPE:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST DATE:
9/28/95

ESTIMATED PARAMETERS:
K = 0.01323 ft/min
y0 = 2.789 ft

TEST DATA:
H0 = 2.85 ft
rc = 0.083 ft
rw = 0.417 ft
L = 5. ft
b = 8.69 ft
H = 5.81 ft

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Moog Inc.

PROJECT NO.: 2630-00-1

STAFF: JMA, BCH

DATE: 10/31/94

WELL NO.: MW-2A

① TOTAL CASING AND SCREEN LENGTH (FT.):	25.57											
② CASING INTERNAL DIAMETER (in.):	2											
③ WATER LEVEL BELOW TOP OF CASING (FT.)	10.51	10/31	11/2 16.57									
④ VOLUME OF WATER IN CASING (GAL.)	2.6		11/10 16.38	11/11 13.99								

WELL I.D. / VOL. GAL./FT.

WELL I.D.	VOL. GAL./FT.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5" ~16.5	1.04
6"	1.50
8"	2.60

11/4 11/7 11/8 13.6 19.8

$V = 0.0408 (②)^2 \times (① - ③) =$ 2.6 GAL.

10/31 11/2 11/4 11/7 11/8 11/10 11/11

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	2.5	5	6.5	9	10	11.5	12.5				
Appearance	Thick DK Br-Bl →		Suspended Sed., Dk Br	Sediment DK Br	→	Suspended DK Br Sediment					
turbidity, NTU	>100	>100	>100	>100*	>100	>100	>100				
Conductivity	1483	1653	1497	1348	~~1504~~ 1426 ~~1625~~	1620 ~~1770~~	1463				
PH	10.82	7.23	6.91	7.27	7.21	7.30	7.28				
Temp	14.5	14.2	15.1	15.0	14.9	14.9	10.9				
~~Eh~~	-213	~~-013~~ -032	~~-016~~	~~-034~~							

COMMENTS: purged ~3.0 g from well & purged dry on 10/31
purged dry on 11/2 after 1. volume

* Not as thick as 1st 6.5 g

MALCOLM PIRNIE

MALCOLM PIRNIE

TABLE B-4

MOOG, INC.
PLANT II REMEDIAL EVALUATION

SUMMARY OF SAMPLING FIELD MEASUREMENTS

Location	Sampling Date	Sampling Time	Temp (°C)	pH (Units)	Eh (mV)	Conductance (umhos/cm)[2]	Turbidity[3] (NTU	Sample Appearance/Odor
MW-1B	11/22/94 3/28/95	9:10 1:38	13.6 16	6.75 7.46	-197 -106	1173 1124	15 35	Clear/SLT Petroleum Clear/Petroleum
MW-2	11/18/94	11:55	15.2	7.41	-247	1608	>100	Contained Sediment/ Petroleum Chemical
MW-2A	11/18/94 3/28/95	11:10 1:51	14.0 17	7.14 7.26	-87 -15	1538 1418	>100 41	Brown/SLT Petroleum Clear/SLT Petroleum
MW-3	11/18/94	10:57	14.3	7.02	-197	1126	>100	Contained Sediment/ None
MW-4	11/18/94	10:47	15.5	6.87	-220	1209	>100	Contained Sediment/ None
MW-5	11/18/94	10:13	14.1	7.11	+225	619	>100	Contained Sediment/ None
MW-6	3/28/95	10:40	16	7.65	-	965	>100	Sediment/Sulfer
MW-7	3/28/95	10:55	16	7.88	-263	1019	81	SLT Turbid/Sulfer
Storm Sewer	11/18/94	11:55	13.1	7.53	-182	990	90	Clear/None

WATER SAMPLING FIELD DATA SHEETS

PROJECT: Moore Central Plant II UST Inv. TYPE OF SAMPLE: GROUNDWATER
CLIENT: Moore Inc. LOCATION NO.: MW-1B
JOB NO.: 2630-00-1 LAB SAMPLE NO.: #7

WELL DATA: DATE: 11/18/94 TIME: 9:02 am
Casing Diameter (inches): 2" Casing Material:
Screened Interval (ft BGS): Screen Material:
Static Water Level Below TOR (ft.): 12.61 Bottom Depth (ft.) 16.84
Elevation Top of Well Riser: Datum Ground Surface:
Elevation Top of Screen:

11/18/94 12:31

PURGING DATA: DATE: 11/18/94 TIME: Start: 12:25 Finish:
Method: Disposable Bluethylene Bailer Pumping Rate (gal/min):
Well Volumes Purged ($\pi R^2 H/231$): 2.8 Was well purged dry? Yes X No
Standing Volume (GAL.) .72 Was well purged below sand pack? Yes X No
Volume Purged (GAL.) 2.0

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Is purging equipment dedicated to sample location?
Yes X No
Field Personnel: JMA

SAMPLING DATA: DATE: 11/22/94 TIME: Start: 9:10 Finish: 9:12
Method: Disposable polyethylene Bailer Sampler: BCH
Present Water Level (ft.): 14.5 Air Temperature (F°): 35
Depth of Sample (ft.): 14.5 Weather Conditions: cloudy
Is sampling equipment dedicated to sample location: Yes X No
Source and type of water used in field for QC purposes:

PRESERVATION DATA: DATE: TIME: Start: Finish:
Filtered: Yes No Cool to 4°C:
Preservative: H_2SO_4 HNO_3 NaOH Other

PHYSICAL AND CHEMICAL DATA:
Appearance: Clear: X Turbid: Color:
Contains Sediment Odor: Other:
Temperature (°C): 13.6 pH 6.75 Specific Conductivity (μmhos/cm): 1173
Turbidity (NTU): 15 Other: Eh: -197

REMARKS:

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Moore Inc.

PROJECT NO.: 2630-00-1

STAFF: JMA / BCH

DATE: 11/18/94

WELL NO.: MW-1B

1	TOTAL CASING AND SCREEN LENGTH (ft.)	16.84
2	CASING INTERNAL DIAMETER (in.)	2"
3	WATER LEVEL BELOW TOP OF CASING (ft.)	12.61
4	VOLUME OF WATER IN CASING (gal.)	

WELL I.D.	VOL. GAL./FT.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$V = 0.0408 (2^2 \times (1 - 3) = .72$ gal.

PARAMETERS	11/18 12:31 ACCUMULATED VOLUME PURGED (GALLONS)									
	20									
pH (units)	7.25									
CONDUCTIVITY (uMHOS/CM)	1997									
TURBIDITY (NTU)	>100									
APPEARANCE	Brown mixed									
TEMPERATURE(C)	15.5									

COMMENTS:

1.97
.35
32

WATER SAMPLING FIELD DATA SHEETS

PROJECT: Moog Control Bldg 11 UST Inv. | TYPE OF SAMPLE: Groundwater
CLIENT: Moog Inc. | LOCATION NO.: MW-2
JOB NO.: 2630-00-1 | LAB SAMPLE NO.: #6, #11 (VOA; Hardness, TSS, Oil & Grease, Sulfate)

WELL DATA: DATE: 11/18/94 | TIME: 9:08 am
Casing Diameter (inches): 2" | Casing Material:
Screened Interval (ft BGS): | Screen Material:
Static Water Level Below TOR (ft.): 5.39 | Bottom Depth (ft.) 10.32
Elevation Top of Well Riser: | Datum Ground Surface:
Elevation Top of Screen:

PURGING DATA: DATE: 11/18/94 | TIME: Start: 9:20 am Finish: 9:35 am
Method: Disposable Polyethylene Bailer | Pumping Rate (gal/min):
Well Volumes Purged ($\pi R^2 H/231$): | Was well purged dry? Yes X No ___ mostly - about 1' of water left
Standing Volume (GAL.) ~84 | Was well purged below sand pack? Yes X No ___
Volume Purged (GAL.) 3.36

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Is purging equipment dedicated to sample location? Yes X No ___
Field Personnel: JMA / BCH

SAMPLING DATA: DATE: 11/18/94 | TIME: Start: 1115 Finish: 11:25
Method: Disposable Polyethylene Bailer | Sampler: JMA / BCH
Present Water Level (ft.): 5.58 | Air Temperature (F°): 55°
Depth of Sample (ft.): 5.58 | Weather Conditions: cloudy
Is sampling equipment dedicated to sample location: Yes X No ___
Source and type of water used in field for QC purposes: NA

PRESERVATION DATA: DATE: | TIME: Start: Finish:
Filtered: Yes ___ No ___ | Cool to 4°C:
Preservative: H_2SO_4 ___ HNO_3 ___ NaOH ___ Other

PHYSICAL AND CHEMICAL DATA:
Appearance: Clear: NO Turbid: X | Color:
Contains Sediment: Yes | Odor: petroleum/chemical Other:
Temperature (°C): 14.8/15.2 pH 7.32/7.41 | Specific Conductivity (μmhos/cm): 1478/1608
Turbidity (NTU): >100/>100 | Other: Eh: -260/-247

REMARKS:

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: MOOG

PROJECT NO.: [redacted] 2630-001

STAFF: JMA/RCH

DATE: 11/18/94

WELL NO.: MW-2

1	TOTAL CASING AND SCREEN LENGTH (ft.)	10.32
2	CASING INTERNAL DIAMETER (in.)	2
3	WATER LEVEL BELOW TOP OF CASING (ft.)	5.39
4	VOLUME OF WATER IN CASING (gal.)	

$V = 0.0408 (2^2 \times (1 - 3) = .84$ gal.

WELL I.D.	VOL. GAL./FT.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)									
	9:29	9:33	9:38							
Time / gallons	.84	1.68	2.52	3.36						
pH (units)	7.07	7.03	7.32	7.35						
CONDUCTIVITY (uMHOS/CM)	3580	3070	2750	2380						
TURBIDITY (NTU)	>100	>100	>100	>100						
APPEARANCE	gr-brown sand sediment	→	→	→						
TEMPERATURE(C)	16.7	17.2	16.9	15.7						

COMMENTS: Slight petroleum odor
Sheen on surface

WATER SAMPLING FIELD DATA SHEETS

PROJECT: Moog Control Bldg 11 UST Inv. TYPE OF SAMPLE: Groundwater
CLIENT: Moog Inc. LOCATION NO.: MW-2A
JOB NO.: 2630-00-1 LAB SAMPLE NO.: #4

WELL DATA: DATE: 11/18/94 TIME: 9:06am
Casing Diameter (inches): 2" Casing Material:
Screened Interval (ft BGS): Screen Material:
Static Water Level Below TOR (ft.): 8.58 Bottom Depth (ft.) 25.57
Elevation Top of Well Riser: Datum Ground Surface:
Elevation Top of Screen:

PURGING DATA: DATE: 11/18/94 TIME: Start: 0915 Finish: 0930
Method: Disposable Polyethylene Bailers Pumping Rate (gal/min):
Well Volumes Purged (ft^2/231): 1.18 Was well purged dry? Yes X No
Standing Volume (GAL.) 2.89 Was well purged below sand pack? Yes X No
Volume Purged (GAL.) 3.4

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Is purging equipment dedicated to sample location?
Yes X No
Field Personnel: JMA/BCH

SAMPLING DATA: DATE: 11/18/94 TIME: Start: 1110 Finish: 1114
Method: Disposable Polyethylene Bailer Sampler: JMA/BCH
Present Water Level (ft.): 23.72 Air Temperature (F°): 55°
Depth of Sample (ft.): 23.72 Weather Conditions: rainy
Is sampling equipment dedicated to sample location: Yes X No
Source and type of water used in field for QC purposes: N/A

PRESERVATION DATA: DATE: TIME: Start: Finish:
Filtered: Yes No Cool to 4°C:
Preservative: H_2SO_4 HNO_3 NaOH Other

PHYSICAL AND CHEMICAL DATA:
Appearance: Clear: Turbid: Color: Brown
Contains Sediment Odor: Slight Chemical Other:
Temperature (°C): 14.0 pH 7.14 Specific Conductivity (µmhos/cm): 1538
Turbidity (NTU): >100. Other: -87

REMARKS: Blind Duplicate taken - bottle set #5

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: MOOG Control

PROJECT NO.: 2630-001

STAFF: JMA/BCH

DATE: 11/18/94

WELL NO.: MW-2A

1	TOTAL CASING AND SCREEN LENGTH (ft.)	25.57
2	CASING INTERNAL DIAMETER (in.)	2
3	WATER LEVEL BELOW TOP OF CASING (ft.)	8.58
4	VOLUME OF WATER IN CASING (gal.)	

WELL I.D.	VOL. GAL./FT.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$V = 0.0408 (2^2 \times (1 - 3) = 2.89$ gal.

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)									
	9:21	9:37								
Time / gallons	2.89	3.4								
pH (units)	6.88	7.13								
CONDUCTIVITY (uMHOS/CM)	1410	1404								
TURBIDITY (NTU)	>100	>100								
APPEARANCE	Suspended brown sediment	→								
TEMPERATURE(C)	15.3	15.2								

COMMENTS:

WATER SAMPLING FIELD DATA SHEETS

PROJECT: Moog Control Bldg. 11 UST Inv. | TYPE OF SAMPLE: GROUNDWATER
CLIENT: Moog Inc. | LOCATION NO.: MW 3
JOB NO.: 2630-00-1 | LAB SAMPLE NO.: #3

WELL DATA: DATE: 11/18/94 | TIME: 9:08 am
Casing Diameter (inches): 2" | Casing Material:
Screened Interval (ft BGS): | Screen Material:
Static Water Level Below TOR (ft.): 6.17 | Bottom Depth (ft.) 11.40
Elevation Top of Well Riser: | Datum Ground Surface:
Elevation Top of Screen:

PURGING DATA: DATE: 11/18/94 | TIME: Start: 10:26 a Finish: 10:44
Method: Disposable Polyethylene Bailer | Pumping Rate (gal/min):
Well Volumes Purged ($\pi R^2 H/231$): 3.03 | Was well purged dry? Yes ___ No X
Standing Volume (GAL.) = .89 | Was Well purged below sand pack? Yes ___ No ___
Volume Purged (GAL.) 2.7

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Is purging equipment dedicated to sample location?
Yes X No ___
Field Personnel: JMA/BCH

SAMPLING DATA: DATE: 11/18/94 | TIME: Start: 10:57 Finish: 11:00
Method: Disposable Polyethylene Bailer | Sampler: JMA/BCH
Present Water Level (ft.): 6.27 | Air Temperature (F°): 55°
Depth of Sample (ft.): 6.27 | Weather Conditions: Cloudy
Is sampling equipment dedicated to sample location: Yes X No ___
Source and type of water used in field for QC purposes:

PRESERVATION DATA: DATE: | TIME: Start: Finish:
Filtered: Yes ___ No ___ | Cool to 4°C: ___
Preservative: H_2SO_4 ___ HNO_3 ___ NaOH ___ Other ___

PHYSICAL AND CHEMICAL DATA:
Appearance: Clear: ___ Turbid: X | Color:
Contains Sediment | Odor: Other:
Temperature (°C): 14.3 pH 7.02 | Specific Conductivity (μmhos/cm): 1126
Turbidity (NTU): >100. | Other: Eh -197

REMARKS:

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Moog Inc

PROJECT NO.: 2630-00-1

STAFF: JMA/BCH

DATE: 11/18/94

WELL NO.: MW-3

1	TOTAL CASING AND SCREEN LENGTH (ft.)	11.40
2	CASING INTERNAL DIAMETER (in.)	2"
3	WATER LEVEL BELOW TOP OF CASING (ft.)	6.17
4	VOLUME OF WATER IN CASING (gal.)	

$V = 0.0408 (2^2 \times (1 - 3) = .89$ gal.

WELL I.D.	VOL. GAL./FT.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)									
	10:29	10:39	10:47							
	.9	1.8	2.7							
pH (units)	6.95	7.03	7.07							
CONDUCTIVITY (uMHOS/CM)	1380	1176	1152 ~~1208~~							
TURBIDITY (NTU)	>100	>100	>100							
APPEARANCE	DK Br Sed water	→	→							
TEMPERATURE(C)	14.6	14.3	14.3							

COMMENTS:

WATER SAMPLING FIELD DATA SHEETS

PROJECT: Moody Control Bldg H UST INV
CLIENT: MOOD Inc.
JOB NO.: 2630-00-1
TYPE OF SAMPLE: GROUNDWATER
LOCATION NO.: MW-4
LAB SAMPLE NO.: #2

WELL DATA: DATE: 11/18/94 TIME: 9:06 am
Casing Diameter (inches): 2" Casing Material:
Screened Interval (ft BGS): Screen Material:
Static Water Level Below TOR (ft.): 8.13 Bottom Depth (ft.) 14.75
Elevation Top of Well Riser: Datum Ground Surface:
Elevation Top of Screen:

PURGING DATA: DATE: 11/18/94 TIME: Start: 10:26 am Finish: 10:44 am
Method: Disposable Polyethylene Bailer Pumping Rate (gal/min):
Well Volumes Purged ($\pi R^2 H/231$): Was well purged dry? Yes ___ No X
Standing Volume (GAL.) 1.13 Was well purged below sand pack? Yes ___ No X
Volume Purged (GAL.) 3.3

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Is purging equipment dedicated to sample location? Yes X No ___
Field Personnel: JMA / BCH

SAMPLING DATA: DATE: 11/18/94 TIME: Start: 10:47 am Finish: 10:55
Method: Disposable Polyethylene Bailer Sampler: JMA / BCH
Present Water Level (ft.): 8.60 Air Temperature (F°): ~55°F
Depth of Sample (ft.): 8.60 Weather Conditions: cloudy
Is sampling equipment dedicated to sample location: Yes X No ___
Source and type of water used in field for QC purposes: N/A

PRESERVATION DATA: DATE: TIME: Start: Finish:
Filtered: Yes ___ No ___ Cool to 4°C:
Preservative: H_2SO_4 ___ HNO_3 ___ NaOH ___ Other

PHYSICAL AND CHEMICAL DATA:
Appearance: Clear: ___ Turbid: X Color:
Contains Sediment Odor: Other:
Temperature (°C): 15.5 pH 6.87 Specific Conductivity (μmhos/cm): 1209
Turbidity (NTU): >100 Other: Eh: -220

REMARKS: MS/MSD

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Moore Center Bldg 11 UST Inv, MOOG Inc.

PROJECT NO.: 2630-00-1

STAFF: JMA / BCH

DATE: 11/18/94

WELL NO.: MW-4

1	TOTAL CASING AND SCREEN LENGTH (ft.)	14.75
2	CASING INTERNAL DIAMETER (in.)	2"
3	WATER LEVEL BELOW TOP OF CASING (ft.)	8.13
4	VOLUME OF WATER IN CASING (gal.)	

$V = 0.0408 (2^2 \times (1 - 3) = 1.13$ gal.

WELL I.D.	VOL. GAL./FT.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)									
	10:30	10:35	10:42							
	1.1	2.2	3.3							
pH (units)	6.77	6.80	6.83							
CONDUCTIVITY (uMHOS/CM)	1186	1210	1208							
TURBIDITY (NTU)	>100	>100	>100							
APPEARANCE	DK Brn Sed Water	→	→							
TEMPERATURE(C)	15.4	16.2	15.5							

COMMENTS:

WATER SAMPLING FIELD DATA SHEETS

PROJECT: Moore Control Bldg 11 UST Inv. | TYPE OF SAMPLE: GROUNDWATER
CLIENT: Moore Inc. | LOCATION NO.: MW-5
JOB NO.: 2630-00-1 | LAB SAMPLE NO.: #1

WELL DATA: DATE: 11/18/94 | TIME: 9:04 am
Casing Diameter (inches): 2" | Casing Material:
Screened Interval (ft BGS): | Screen Material:
Static Water Level Below TOR (ft.): 5.50 | Bottom Depth (ft.) 10.19
Elevation Top of Well Riser: | Datum Ground Surface:
Elevation Top of Screen:

PURGING DATA: DATE: 11/18/94 | TIME: Start: 9:59 Finish: 10:08
Method: Disposable Polyethylene Bailers | Pumping Rate (gal/min):
Well Volumes Purged ($\pi R^2 H / 231$): 4 | Was well purged dry? Yes ____ No X
Standing Volume (GAL.) ~80 | Was well purged below sand pack? Yes ____ No ____
Volume Purged (GAL.) 3.2

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Is purging equipment dedicated to sample location? Yes X No ____
Field Personnel: JMA/BCH

SAMPLING DATA: DATE: 11/18/94 | TIME: Start: 10:13 am Finish: 10:16 am
Method: Disposable Polyethylene Bailer | Sampler: JMA/BCH
Present Water Level (ft.): 5.60 | Air Temperature (F°): ~55°F
Depth of Sample (ft.): 5.60 | Weather Conditions: CLOUDY
Is sampling equipment dedicated to sample location: Yes X No ____
Source and type of water used in field for QC purposes:

PRESERVATION DATA: DATE: | TIME: Start: Finish:
Filtered: Yes ____ No ____ | Cool to 4°C:
Preservative: H_2SO_4 ____ HNO_3 ____ NaOH ____ Other

PHYSICAL AND CHEMICAL DATA:
Appearance: Clear: ____ Turbid: ✓ | Color:
Contains Sediment ✓ BROWN | Odor: NONE Other:
Temperature (°C): 14.1 pH 7.11 | Specific Conductivity (μmhos/cm): 619
Turbidity (NTU): >100 | Other: Eh +225

REMARKS:

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Moore Control Bldg II UST Inv, Moore Inc

PROJECT NO.: 2630-00-1

STAFF: JMM/BCH

DATE: 11/18/94

WELL NO.: MW-5

1	TOTAL CASING AND SCREEN LENGTH (ft.)	10.19
2	CASING INTERNAL DIAMETER (in.)	2"
3	WATER LEVEL BELOW TOP OF CASING (ft.)	5.50
4	VOLUME OF WATER IN CASING (gal.)	

WELL I.D.	VOL. GAL./FT.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$V = 0.0408 (2^2 \times (1 - 3) = .80$ gal.

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)									
	10:01	10:02	10:05	10:08						
	.8	1.6	2.4	3.2						
pH (units)	7.31	7.24	6.99	7.11						
CONDUCTIVITY (uMHOS/CM)	633	635	649	643						
TURBIDITY (NTU)	>100	>100	>100	>100						
APPEARANCE	BRKD WATER	→	→	→						
TEMPERATURE(C)	15.1	14.9	15.0	14.5						

COMMENTS:

WATER SAMPLING FIELD DATA SHEETS

PROJECT: Moog Central Bldg U.S.T. Inv. TYPE OF SAMPLE: Surface Water
CLIENT: Moog Inc. LOCATION NO.: Storm Sewer
JOB NO.: 26630-00-1 LAB SAMPLE NO.: #8

WELL DATA: DATE: TIME:
Casing Diameter (inches): Casing Material:
Screened Interval (ft BGS): Screen Material:
Static Water Level Below TOR (ft.): Bottom Depth (ft.)
Elevation Top of Well Riser: Datum Ground Surface:
Elevation Top of Screen:

PURGING DATA: DATE: TIME: Start: Finish:
Method: Pumping Rate (gal/min):
Well Volumes Purged ($\pi R^2 H/231$): Was well purged dry? Yes ____ No ____
Standing Volume (GAL.) ____ Was well purged below sand pack? Yes ____ No ____
Volume Purged (GAL.) ____

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Is purging equipment dedicated to sample location?
Yes ____ No ____
Field Personnel:

SAMPLING DATA: DATE: 11/18/97 TIME: Start: 11:55 Finish: 12:00
Method: Disposable polyethylene Bailer Sampler: JMA/BCH
Present Water Level (ft.): NA Air Temperature (F°): 55°
Depth of Sample (ft.): NA Weather Conditions: mostly cloudy
Is sampling equipment dedicated to sample location: Yes X No ____
Source and type of water used in field for QC purposes: NA

PRESERVATION DATA: DATE: TIME: Start: Finish:
Filtered: Yes ____ No ____ Cool to 4°C: ____
Preservative: H_2SO_4 ____ HNO_3 ____ NaOH ____ Other ____

PHYSICAL AND CHEMICAL DATA:
Appearance: Clear: X Turbid: ____ Color: ____
Contains Sediment ____ Odor: ____ Other: Cottonwood leaf frags
Temperature (°C): 13.1 pH 7.53 Specific Conductivity (μmhos/cm): 990
Turbidity (NTU): 90 Other: Eh: -182

REMARKS:

WATER SAMPLING FIELD DATA SHEETS

PROJECT: Moog Inc., Bldg 11 UST Inv. | TYPE OF SAMPLE: Groundwater
CLIENT: Moog Inc. | LOCATION NO.: MW-7
JOB NO.: 2630-00-1 | LAB SAMPLE NO.: #2
*5 - Blind Duplicate

WELL DATA: DATE: 3/28/95 | TIME: 9:40 am
Casing Diameter (inches): | Casing Material:
Screened Interval (ft BGS): | Screen Material:
Static Water Level Below TOR (ft.): 3.01 | Bottom Depth (ft.) 11.01
Elevation Top of Well Riser: | Datum Ground Surface:
Elevation Top of Screen:

PURGING DATA: DATE: 3/28/95 | TIME: Start: 10:15 am Finish: 10:35 am
Method: Polyethylene Disposable Bailers | Pumping Rate (gal/min):
Well Volumes Purged ($\pi R^2 H/231$): > 3 | Was well purged dry? Yes ____ No X
Standing Volume (GAL.) 1.3 | Was Well purged below sand pack? Yes ____ No X
Volume Purged (GAL.) 4.5

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Is purging equipment dedicated to sample location?
Yes X No ____
Field Personnel: JMA / BCH

SAMPLING DATA: DATE: 3/28/95 | TIME: Start: ~~10:15 am~~ 10:55 Finish: ~~10:35 am~~ 11:10 am
Method: Polyethylene Disposable Bailers | Sampler: BCH / JMA
Present Water Level (ft.): 3.64 | Air Temperature (F°): ~45°
Depth of Sample (ft.): 3.64 | Weather Conditions: Sunny
Is sampling equipment dedicated to sample location: Yes X No ____
Source and type of water used in field for QC purposes:

PRESERVATION DATA: DATE: | TIME: Start: Finish:
Filtered: Yes ____ No ____ | Cool to 4°C:
Preservative: H_2SO_4 ____ HNO_3 ____ NaOH ____ Other

PHYSICAL AND CHEMICAL DATA:
Appearance: Clear: ____ Turbid: Slightly | Color:
Contains Sediment | Odor: Slight sulfur Other:
Temperature (°C): 16 pH 7.88 | Specific Conductivity (µmhos/cm): 1019
Turbidity (NTU): 81 | Other: Eh -263 mv

REMARKS:

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Moog Inc., Bldg 11 UST Inv.

PROJECT NO.: 2630-00-1

STAFF: JMA/BCH

DATE: 3/28/95

WELL NO.: MW-7

1	TOTAL CASING AND SCREEN LENGTH (ft.)	11.01
2	CASING INTERNAL DIAMETER (in.)	2"
3	WATER LEVEL BELOW TOP OF CASING (ft.)	3.61
4	VOLUME OF WATER IN CASING (gal.)	

WELL I.D.	VOL. GAL./FT.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$V = 0.0408 (2^2 \times (1 - 3) = 1.3$ gal.

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)									
	1.5	3	4.5							
pH (units)	7.99	7.86	7.73							
CONDUCTIVITY (uMHOS/CM)	1205	1045	991							
TURBIDITY (NTU)	>100	>100	91							
APPEARANCE	slightly cloudy	→	→							
TEMPERATURE(C)	16°C	16°C	16°C							

COMMENTS:

WATER SAMPLING FIELD DATA SHEETS

PROJECT: Moog Inc., Bldg 11 UST Inv. | TYPE OF SAMPLE: Groundwater
CLIENT: Moog Inc. | LOCATION NO.: MW1-B
JOB NO.: 2630-00-1 | LAB SAMPLE NO.: VOA: #3 PETROLEUM: #6

WELL DATA: DATE: 3/28/95 | TIME: 9:15 am
Casing Diameter (inches): | Casing Material:
Screened Interval (ft BGS): | Screen Material:
Static Water Level Below TOR (ft.): 4.13 | Bottom Depth (ft.) 16.84
Elevation Top of Well Riser: | Datum Ground Surface:
Elevation Top of Screen:

PURGING DATA: DATE: 3/28/95 | TIME: Start: 9:17 Finish: 9:34
Method: Polyethylene Disposable Bailers | Pumping Rate (gal/min):
Well Volumes Purged ($\pi r^2 h/231$): 1.5 (+2 vol in Feb) | Was well purged dry? Yes X No
Standing Volume (GAL.) 2.2 | Was well purged below sand pack? Yes X No
Volume Purged (GAL.) 7.2 total (4 in Feb, 3.2 in MARCH)

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Is purging equipment dedicated to sample location? Yes ____ No ____
Field Personnel: SMA, BCH

SAMPLING DATA: DATE: 3/28/95 | TIME: Start: 1:38 pm Finish: 1:43 pm
Method: Polyethylene Disposable Bailers | Sampler: JMA / BCH
Present Water Level (ft.): 13.94 | Air Temperature (F°): ~ 50°F
Depth of Sample (ft.): 13.94 | Weather Conditions: SUNNY
Is sampling equipment dedicated to sample location: Yes ___ No ___
Source and type of water used in field for QC purposes:

PRESERVATION DATA: DATE: | TIME: Start: Finish:
Filtered: Yes ____ No ____ | Cool to 4°C:
Preservative: H_2SO_4 ____ HNO_3 ____ NaOH ____ Other

PHYSICAL AND CHEMICAL DATA:
Appearance: Clear: ✓/✓ Turbid: | Color: clear
Containg Sediment | Odor: Fotu Other:
Temperature (°C): 16/17 pH 7.46/7.29 | Specific Conductivity (µmhos/cm): 1124 / 1152
Turbidity (NTU): 35/37 | Other: Eh -106 / -80

REMARKS:

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Moog Inc Bldg 11

PROJECT NO.: 2630-001-200

STAFF: JMA

DATE: 2/10/95 & 3/28/95

WELL NO.: MW-1B

				3/28/95
1	TOTAL CASING AND SCREEN LENGTH (ft.)	16.84		
2	CASING INTERNAL DIAMETER (in.)	2"		
3	WATER LEVEL BELOW TOP OF CASING (ft.)	2/10/95 4.92	4.13	
4	VOLUME OF WATER IN CASING (gal.)			

WELL I.D.	VOL. GAL./FT.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$V = 0.0408 (2^2 \times (1 - 3) =$ 2.0 gal. 2.2

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)									
		3/28/95								
	4	6.2 cal 2.2	7.2							
pH (units)	7.81	7.89	7.19							
CONDUCTIVITY (uMHOS/CM)	1254	1092	1056							
TURBIDITY (NTU)	>100	>100	85							
APPEARANCE	slightly cloudy brown	→								
TEMPERATURE(C)		17°C	17°C							

COMMENTS: 1st 4 g - Petrol Odor!

cal 2.2 - Petrol odor

2nd - 1254

WATER SAMPLING FIELD DATA SHEETS

PROJECT: Moog Inc., Bldg 11 UST Inv. | TYPE OF SAMPLE: Groundwater
CLIENT: Moog Inc. | LOCATION NO.: HW-2A
JOB NO.: 2630-00-1 | LAB SAMPLE NO.: VOA: #4, FMA PETROLEUM: #7

WELL DATA: DATE: 3/28/95 | TIME: ~~9:50 am~~ 9:20 am
Casing Diameter (inches): | Casing Material:
Screened Interval (ft BGS): | Screen Material:
Static Water Level Below TOR (ft.): 6.91 | Bottom Depth (ft.) 25.57
Elevation Top of Well Riser: | Datum Ground Surface:
Elevation Top of Screen:

PURGING DATA: DATE: 3/28/95 | TIME: Start: 9:50 am Finish: 10:04 am
Method: Polyethylene Disposable Bailers | Pumping Rate (gal/min):
Well Volumes Purged ($\pi R^2 N/231$): 1 | Was well purged dry? Yes X No
Standing Volume (GAL.) 3.2 | Was well purged below sand pack? Yes X No
Volume Purged (GAL.) 3.2

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Is purging equipment dedicated to sample location? Yes ____ No ____
Field Personnel: FMA/BGH

SAMPLING DATA: DATE: 3/29/95 | TIME: Start: 1:51 pm Finish: 1:58 pm
Method: Polyethylene Disposable Bailers | Sampler: FMA/BGH
Present Water Level (ft.): 21.91 | Air Temperature (F°): ~50°F
Depth of Sample (ft.): 21.91 | Weather Conditions: SUNNY
Is sampling equipment dedicated to sample location: Yes ____ No ____
Source and type of water used in field for QC purposes:

PRESERVATION DATA: DATE: | TIME: Start: Finish:
Filtered: Yes ____ No ____ | Cool to 4°C:
Preservative: H_2SO_4 ____ HNO_3 ____ NaOH ____ Other

PHYSICAL AND CHEMICAL DATA:
Appearance: Clear: ✓ Turbid: | Color:
Contains Sediment | Odor: Very Slight petro Other:
Temperature (°C): 17/17 pH 7.24/7.29 | Specific Conductivity (μmhos/cm): 1418/1642
Turbidity (NTU): 41/1000 | Other: Eh -15/-15

REMARKS:

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Moog Inc., Bldg 11 UST Inv.

PROJECT NO.: 2630-00-1

STAFF: JMA, BCH

DATE: 3/28/95

WELL NO.: MW-2A

1	TOTAL CASING AND SCREEN LENGTH (ft.)	25.57
2	CASING INTERNAL DIAMETER (in.)	2"
3	WATER LEVEL BELOW TOP OF CASING (ft.)	6.91
4	VOLUME OF WATER IN CASING (gal.)	

$V = 0.0408 (2^2 \times (1 - 3) = 3.2$ gal.

WELL I.D.	VOL. GAL./FT.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)									
	10 cm									
	3.2									
pH (units)	7.39									
CONDUCTIVITY (uMHOS/CM)	1365									
TURBIDITY (NTU)	>100									
APPEARANCE	BROWN SILT SED									
TEMPERATURE(C)	19°C									

COMMENTS:

WATER SAMPLING FIELD DATA SHEETS

PROJECT: Moog Inc., Bldg 11 UST Inv. | TYPE OF SAMPLE: Groundwater
CLIENT: Moog Inc. | LOCATION NO.: MW-6
JOB NO.: 2630-00-1 | LAB SAMPLE NO.: #1

WELL DATA: DATE: 3/28/95 | TIME: 9:38 am
Casing Diameter (inches): | Casing Material:
Screened Interval (ft BGS): | Screen Material:
Static Water Level Below TOR (ft.): 5.79 | Bottom Depth (ft.) 14.26
Elevation Top of Well Riser: | Datum Ground Surface:
Elevation Top of Screen:

JWA 10:21 am

PURGING DATA: DATE: 3/28/95 | TIME: Start: 9:57 am Finish: 10:11 am
Method: Polyethylene Disposable Bailers | Pumping Rate (gal/min):
Well Volumes Purged ($\pi R^2 H/231$): 3 | Was well purged dry? Yes ____ No ✓
Standing Volume (GAL.) 1.4 | Was well purged below sand pack? Yes ____ No ✓
Volume Purged (GAL.) 4.2

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Is purging equipment dedicated to sample location?
Yes X No ____
Field Personnel: JWA / BCH

SAMPLING DATA: DATE: 3/28/95 | TIME: Start: 10:40 am Finish: 10:44 am
Method: Polyethylene Disposable Bailers | Sampler: JWA/BCH
Present Water Level (ft.): 5.83 | Air Temperature (F°): ~45°C
Depth of Sample (ft.): 5.83 | Weather Conditions: SUNNY
Is sampling equipment dedicated to sample location: Yes X No ____
Source and type of water used in field for QC purposes: NA

PRESERVATION DATA: DATE: | TIME: Start: Finish:
Filtered: Yes ____ No ____ | Cool to 4°C:
Preservative: H_2SO_4 ____ HNO_3 ____ NaOH ____ Other

PHYSICAL AND CHEMICAL DATA:
Appearance: Clear: ____ Turbid: X | Color: brown
Contains Sediment Suspended | Odor: * Other:
Temperature (°C): 16°C pH 7.65 | Specific Conductivity (μmhos/cm): 965
Turbidity (NTU): >100 | Other:

REMARKS: * Slight sulfur odor

WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: Moore Inc., Bldg 11 UST Inv.

PROJECT NO.: 2630-00-1

STAFF: JMA, BCH

DATE: 3/28/95

WELL NO.: MW-6

1	TOTAL CASING AND SCREEN LENGTH (ft.)	14.26
2	CASING INTERNAL DIAMETER (in.)	2"
3	WATER LEVEL BELOW TOP OF CASING (ft.)	5.79
4	VOLUME OF WATER IN CASING (gal.)	

WELL I.D.	VOL. GAL./FT.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$V = 0.0408 (2^2 \times (1 - 3) = 1.4$ gal.

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)									
	1.4	2.8	4.2							
pH (units)	7.60	7.59	7.56							
CONDUCTIVITY (uMHOS/CM)	985	993	990							
TURBIDITY (NTU)	>100	>100	>100							
APPEARANCE	Gry-Brn Susp Sed	→	→							
TEMPERATURE(C)	17°C	16°C	19°C							

COMMENTS:

APPENDIX C

MALCOLM PIRNIE

APPENDIX C

ANALYTICAL LABORATORY REPORTS

General Testing Corporation

A Full Service Environmental Laboratory

NOV. 22 1994

Mr. Robert O'Laskey
Malcolm Pirnie, Inc.
So. 3515 Abbott Road
Buffalo, NY 14219

Re: Moog, Inc

Dear Mr. Robert O'Laskey

Enclosed are the results of the analysis requested. All data has been reviewed prior to report submission. Should you have any questions please contact me at 454-3760.

Thank you for letting us provide this service.

Sincerely,

GENERAL TESTING CORPORATION

Janice M Jaeger

Janice Jaeger
Customer Service Representative

Enc.

710 Exchange Street • Rochester, NY 14608 • Tele: (716) 454-3760 • (716) 454-1245
85 Trinity Place • Hackensack, NJ 07601 • Tele: (201) 488-5242 • Fax: (201) 488-6386
435 Lawrence Bell Drive • Amherst, NY 14221 • Tele: (716) 634-0454 • Fax: (716) 634-9019

General Testing Corporation

A Full Service Environmental Laboratory

Effective 10/1/91

GTC LIST OF QUALIFIERS

(The basis of this proposal are the EPA-CLP Qualifiers)

U - Indicates compound was analyzed for but was not detected. The sample quantitation limit must be corrected for dilution and for percent moisture.

J - Indicates an estimated value. For further explanation see case narrative / cover letter.

B - This flag is used when the analyte is found in the associated blank as well as in the sample.

E - This flag identifies compounds whose concentrations exceed the calibration range and reanalysis could not be performed.

A - This flag indicates that a TIC is a suspected aldol-condensation product.

N - Spiked sample recovery not within control limits. (Flag the entire batch - Inorganic analytes only)

* - Duplicate analysis not within control limits. (Flag the entire batch - Inorganic analysis only)

- Also used to qualify Organics QC data outside limits. (Only used on the QC summary sheets)

M - Duplication injection precision not met (GFA only).

S - Reported value determined by Method of Standard Additions. (MSA)

X - As specified in the case narrative.

General Testing Corporation

A Full Service Environmental Laboratory

LABORATORY REPORT

Job No: R94/04262 Date: NOV. 22 1994

Client:
Mr. Robert O'Laskey
Malcolm Pirnie, Inc.
So. 3515 Abbott Road
Buffalo, NY 14219

Sample(s) Reference:

Moog, Inc

Received : 10/31/94

P.O. #:

ANALYTICAL UNITS - ug/g Dry Wt.

Location:		-001 B-1 2-4'	-002 B-2 2-4'	-003 B-3 6-8'	-004 B-4 2-4'	-005 B-5 2-4'	-006 B-6 4-6'
Date Collected:		10/28/94	10/28/94	10/28/94	10/28/94	10/28/94	10/28/94
Time Collected:	PQL	09:15	09:50	10:20	11:15	11:45	12:30
Solids, %		89.4	88.5	87.7	84.6	87.9	90.8
Pet. Hydrocarbons, IR	3.00	10.7	3.31 U	38.2	33.7	3.28 U	3.25 U

Unless otherwise noted, analytical methodology has been obtained from references as cited in 40 CFR, parts #136 & #261.
NY ID# in Rochester: 10145
NJ ID# in Rochester: 73331
NJ ID# in Hackensack: 02317
NY ID# in Hackensack: 10801

Laboratory Director

General Testing Corporation

A Full Service Environmental Laboratory

LABORATORY REPORT

Job No: R94/04262 Date: NOV. 22 1994

Client:
Mr. Robert O'Laskey
Malcolm Pirnie, Inc.
So. 3515 Abbott Road
Buffalo, NY 14219

Sample(s) Reference

Moog, Inc

Received : 10/31/94 P.O. #:

TCL VOLATILES BY EPA METHOD 8260* ANALYTICAL RESULTS - ug/kg Dry Wt.

Sample:		-001	-002	-003	-004	-005	-006	-007
Location:		B-1 2-4'	B-2 2-4'	B-3 6-8'	B-4 2-4'	B-5 2-4'	B-6 4-6'	LAB METH BLANK
Date Collected:		10/28/94	10/28/94	10/28/94	10/28/94	10/28/94	10/28/94	--
Time Collected:	PQL	09:15	09:50	10:20	11:15	11:45	12:30	--
Date Analyzed:		11/10/94	11/10/94	11/10/94	11/10/94	11/10/94	11/10/94	11/10/94
Dilution:		1	1	1	1	1	1	1
Chloromethane	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
Bromomethane	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
Vinyl Chloride	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
Chloroethane	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
Methylene Chloride	5.0	5.6 U	5.6 U	5.7 U	5.9 U	8.9	7.1	5.0 U
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	51	36	[illegible]
Carbon Disulfide	10	11 U	11 U	11 U	12 U	11 U	11 U	10 U
1,1-Dichloroethene	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
1,1-Dichloroethane	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
trans-1,2-Dichloroethene	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
cis-1,2-Dichloroethene	5.0	8.3	5.6 U	7.9	5.9 U	5.7 U	5.5 U	5.0 U
Chloroform	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
2-Butanone (MEK)	10	11 U	11 U	11 U	12 U	11 U	11 U	10 U
1,2-Dichloroethane	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
1,1,1-Trichloroethane	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
Carbon Tetrachloride	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
Bromodichloromethane	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
1,2-Dichloropropane	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
1,3-Dichloropropene-Trans	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
Trichloroethene	5.0	64	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
Dibromochloromethane	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
1,1,2-Trichloroethane	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
Benzene	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
1,3-Dichloropropene(Cis)	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
Bromoform	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
4-Methyl-2-pentanone(MIBK)	10	11 U	11 U	11 U	12 U	11 U	11 U	10 U
2-Hexanone	10	11 U	11 U	11 U	12 U	11 U	11 U	10 U
Tetrachloroethene	5.0	70	5.6 U	5.7 U	9.2	5.7 U	5.5 U	5.0 U
1,1,2,2-Tetrachloroethane	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
Toluene	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
Chlorobenzene	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U

General Testing Corporation

A Full Service Environmental Laboratory

LABORATORY REPORT

Job No: R94/04262 Date: NOV. 22 1994

Client:
Mr. Robert O'Laskey
Malcolm Pirnie, Inc.
So. 3515 Abbott Road
Buffalo, NY 14219

Sample(s) Reference

Moog, Inc

Received : 10/31/94 P.O. #:

TCL VOLATILES BY EPA METHOD 8260* ANALYTICAL RESULTS - ug/kg Dry Wt.

Sample:		-001	-002	-003	-004	-005	-006	-007
Location:		B-1 2-4'	B-2 2-4'	B-3 6-8'	B-4 2-4'	B-5 2-4'	B-6 4-6'	LAB METH BLANK
Date Collected:		10/28/94	10/28/94	10/28/94	10/28/94	10/28/94	10/28/94	--
Time Collected:	PQL	09:15	09:50	10:20	11:15	11:45	12:30	--
Date Analyzed:		11/10/94	11/10/94	11/10/94	11/10/94	11/10/94	11/10/94	11/10/94
Dilution:		1	1	1	1	1	1	1
Ethylbenzene	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
Styrene	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
Total Xylene (o,m,p)	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
Freon 11	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
Freon 113	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
2-Chlorotoluene	5.0	5.6 U	5.6 U	5.7 U	5.9 U	5.7 U	5.5 U	5.0 U
Surrogate Standard Recoveries								
Dibromofluoromethane	80-120	101	99	103	99	101	100	98
Toluene d8	81-117	98	98	96	97	98	98	100
4-Bromofluorobenzene	74-121	88	87	80	87	86	91	95

Unless otherwise noted, analytical methodology has been obtained from references as cited in 40 CFR, parts #136 & #261.

NY ID# in Rochester: 10145
NJ ID# in Rochester: 73331
NJ ID# in Hackensack: 02317
NY ID# in Hackensack: 10801

Laboratory Director

General Testing Corporation

A Full Service Environmental Laboratory

LABORATORY REPORT

Job No: R94/04262 Date: NOV. 22 1994

Client:
Mr. Robert O'Laskey
Malcolm Pirnie, Inc.
So. 3515 Abbott Road
Buffalo, NY 14219

Sample(s) Reference

Moog, Inc

Received : 10/31/94 P.O. #:

TCL VOLATILES BY EPA METHOD 8260* ANALYTICAL RESULTS - ug/kg Dry Wt.

Sample:		-008						
Location:		LAB METH						
		BLANK						
Date Collected:		--						
Time Collected:	PQL	--						
Date Analyzed:		11/10/94						
Dilution:		1						
Chloromethane	5.0	5.0 U						
[illegible]ethane	5.0	5.0 U						
Vinyl Chloride	5.0	5.0 U						
Chloroethane	5.0	5.0 U						
[illegible]	5.0	5.0 U						
Acetone	10	10 U						
Carbon Disulfide	10	10 U						
1,1-Dichloroethene	5.0	5.0 U						
1,1-Dichloroethane	5.0	5.0 U						
trans-1,2-Dichloroethene	5.0	5.0 U						
cis-1,2-Dichloroethene	5.0	5.0 U						
Chloroform	5.0	5.0 U						
2-Butanone (MEK)	10	10 U						
1,2-Dichloroethane	5.0	5.0 U						
1,1,1-Trichloroethane	5.0	5.0 U						
Carbon Tetrachloride	5.0	5.0 U						
Bromodichloromethane	5.0	5.0 U						
1,2-Dichloropropane	5.0	5.0 U						
1,3-Dichloropropene-Trans	5.0	5.0 U						
Trichloroethene	5.0	5.0 U						
Dibromochloromethane	5.0	5.0 U						
1,1,2-Trichloroethane	5.0	5.0 U						
Benzene	5.0	5.0 U						
1,3-Dichloropropene(Cis)	5.0	5.0 U						
Bromoform	5.0	5.0 U						
4-Methyl-2-pentanone(MIBK)	10	10 U						
2-Hexanone	10	10 U						
Tetrachloroethene	5.0	5.0 U						
1,1,2,2-Tetrachloroethane	5.0	5.0 U						
Toluene	5.0	5.0 U						
Chlorobenzene	5.0	5.0 U						

General Testing Corporation

A Full Service Environmental Laboratory

LABORATORY REPORT

Job No: R94/04262 Date: NOV. 22 1994

Client:
Mr. Robert O'Laskey
Malcolm Pirnie, Inc.
So. 3515 Abbott Road
Buffalo, NY 14219

Sample(s) Reference

Moog, Inc

Received : 10/31/94 P.O. #:

TCL VOLATILES BY EPA METHOD 8260* ANALYTICAL RESULTS - ug/kg Dry Wt.

Sample:		-008
Location:		LAB METH BLANK
Date Collected:		--
Time Collected:	PQL	--
Date Analyzed:		11/10/94
Dilution:		1
Ethylbenzene	5.0	5.0 U
Styrene	5.0	5.0 U
[illegible]	[illegible]	[illegible]
Freon 11	5.0	5.0 U
Freon 113	5.0	5.0 U
2-Chlorotoluene	5.0	5.0 U
Surrogate Standard Recoveries		
Dibromofluoromethane	80-120	99
Toluene d8	81-117	98
4-Bromofluorobenzene	74-121	91

Unless otherwise noted, analytical methodology has been obtained from references as cited in 40 CFR, parts #136 & #261.

NY ID# in Rochester: 10145
NJ ID# in Rochester: 73331
NJ ID# in Hackensack: 02317
NY ID# in Hackensack: 10801

General Testing Corporation

A Full Service Environmental Laboratory

LABORATORY REPORT

Job No: R94/04262 Date: NOV. 22 1994

Client:

Malcolm Pirnie, Inc.

Sample(s) Reference

Moog, Inc

Date Received: 10/31/94

Date Sample Taken: 10/28/94

LABORATORY CHRONICLE
DATE ANALYZED

Sample:	-001	-002	-003	-004	-005	-006		
Location:	B-1 2-4'	B-2 2-4'	B-3 6-8'	B-4 2-4'	B-5 2-4'	B-6 4-6'		
Solids, %	11/04/94	11/04/94	11/04/94	11/04/94	11/04/94	11/04/94		
Pet. Hydrocarbons, IR	11/10/94	11/10/94	11/10/94	11/10/94	11/10/94	11/10/94		

R94/4262

MALCOLM PIRNIE, INC.

CHAIN OF CUSTODY RECORD

PROJECT NO.: 2630-00-1

SITE NAME: Moog Inc.

SAMPLERS (SIGNATURE): Jeanne M. Asquith

STATION NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	120 mL Soil VOC Meth. 8240	120 mL TPH By 418.1 Dif				REMARKS
001	10/28/94	0915		X	B-1, 2-4'	3	2	1				
002	↓	0950		X	B-2, 2-4'	3	2	1				
003	↓	1020		X	B-3, 6-8'	3	2	1				
004	↓	1115		X	B-4, 2-4'	3	2	1				
005	↓	1145		X	B-5, 2-4'	3	2	1				
006	↓	1230		X	B-6, 4-6'	3	2	1				
	10/28	9										

RELINQUISHED BY (SIGNATURE):	DATE/TIME:		RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME:		RECEIVED BY (SIGNATURE):
Jeanne Asquith	10/28/94	2:20	K. Wager 10/31/94 8:00	K. Wager	10/31/94	1030	

RELINQUISHED BY (SIGNATURE):	DATE/TIME:		RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME:		RECEIVED BY (SIGNATURE):

RELINQUISHED BY (SIGNATURE):	DATE/TIME:		RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE/TIME:		REMARKS:
			Tom Hastings	10/31/94	1225	

Distribution: Original accompanies shipment, copy to coordinator field files

General Testing Corporation

A Full Service Environmental Laboratory

DEC. 13 1994

Mr. Robert O'Laskey
Malcolm Pirnie, Inc.
So. 3515 Abbott Road
Buffalo, NY 14219

Re: Moog, Inc.

Dear Mr. Robert O'Laskey

Enclosed are the results of the analysis requested. All data has been reviewed prior to report submission. Should you have any questions please contact me at 454-3760.

Thank you for letting us provide this service.

Sincerely,

GENERAL TESTING CORPORATION

Janice Jaeger
Customer Service Representative

Enc.

710 Exchange Street • Rochester, NY 14608 • Tele: (716) 454-3760 • (716) 454-1245
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Effective 10/1/91

GTC LIST OF QUALIFIERS

(The basis of this proposal are the EPA-CLP Qualifiers)

U - Indicates compound was analyzed for but was not detected. The sample quantitation limit must be corrected for dilution and for percent moisture.

J - Indicates an estimated value. For further explanation see case narrative / cover letter.

B - This flag is used when the analyte is found in the associated blank as well as in the sample.

E - This flag identifies compounds whose concentrations exceed the calibration range and reanalysis could not be performed.

A - This flag indicates that a TIC is a suspected aldol-condensation product.

N - Spiked sample recovery not within control limits. (Flag the entire batch - Inorganic analytes only)

* - Duplicate analysis not within control limits. (Flag the entire batch - Inorganic analysis only)

- Also used to qualify Organics QC data outside limits. (Only used on the QC summary sheets)

M - Duplication injection precision not met (GFA only).

S - Reported value determined by Method of Standard Additions. (MSA)

X - As specified in the case narrative.

General Testing Corporation

A Full Service Environmental Laboratory

LABORATORY REPORT

Job No: R94/04618 Date: DEC. 13 1994

Client:
Mr. Robert O'Laskey
Malcolm Pirnie, Inc.
So. 3515 Abbott Road
Buffalo, NY 14219

Sample(s) Reference
Moog, Inc.

Received : 11/22/94 P.O. #:

TCL VOLATILES BY EPA METHOD 8260* ANALYTICAL RESULTS - ug/l

Sample:	-001	-002						
Location:	MW-1B	LAB METH BLANK						
Date Collected:	11/22/94	--						
Time Collected:	09:10	--						
Date Analyzed:	12/02/94	12/02/94						
Dilution:	1	1						
Chloromethane	10 U	5.0 U						
Bromomethane	10 U	5.0 U						
Vinyl Chloride	10 U	5.0 U						
Chloroethane	10 U	5.0 U						
Methylene Chloride	10 U	5.0 U						
Acetone	160	10 U						
Carbon Disulfide	20 U	10 U						
Trichlorofluoromethane	10 U	5.0 U						
1,1-Dichloroethene	10 U	5.0 U						
1,1-Dichloroethane	10 U	5.0 U						
trans-1,2-Dichloroethene	10 U	5.0 U						
cis-1,2-Dichloroethene	10 U	5.0 U						
Chloroform	10 U	5.0 U						
2-Butanone (MEK)	20 U	10 U						
1,2-Dichloroethane	10 U	5.0 U						
1,1,1-Trichloroethane	10 U	5.0 U						
Carbon Tetrachloride	10 U	5.0 U						
Bromodichloromethane	10 U	5.0 U						
1,2-Dichloropropane	10 U	5.0 U						
1,3-Dichloropropene-Trans	10 U	5.0 U						
Trichloroethene	10 U	5.0 U						
Dibromochloromethane	10 U	5.0 U						
1,1,2-Trichloroethane	10 U	5.0 U						
Benzene	210	5.0 U						
1,3-Dichloropropene(Cis)	10 U	5.0 U						
Bromoform	10 U	5.0 U						
4-Methyl-2-pentanone(MIBK)	20 U	10 U						
2-Hexanone	20 U	10 U						
Tetrachloroethene	10 U	5.0 U						
1,1,2,2-Tetrachloroethane	10 U	5.0 U						
Toluene	120	5.0 U						
Chlorobenzene	10 U	5.0 U						

General Testing Corporation

A Full Service Environmental Laboratory

LABORATORY REPORT

Job No: R94/04618 Date: DEC. 13 1994

Client:
Mr. Robert O'Laskey
Malcolm Pirnie, Inc.
So. 3515 Abbott Road
Buffalo, NY 14219

Sample(s) Reference
Moog, Inc.

Received : 11/22/94 P.O. #:

TCL VOLATILES BY EPA METHOD 8260* ANALYTICAL RESULTS - ug/l

Sample:	-001	-002
Location:	MW-1B	LAB METH BLANK
Date Collected:	11/22/94	--
Time Collected:	09:10	--
Date Analyzed:	12/02/94	12/02/94
Ethylbenzene	36	5.0 U
Styrene	10 U	5.0 U
Total Xylene (o,m,p)	190	5.0 U
2-Chlorotoluene	10 U	5.0 U
Trichlorotrifluoroethane	10 U	5.0 U
Surrogate Standard Recoveries		
Dibromofluoromethane	102	104
(Acceptance limits: 86-118%)		
Toluene d8	101	91
(Acceptance limits: 88-110%)		
4-Bromofluorobenzene	99	98
(Acceptance limits: 86-115%)		

Unless otherwise noted, analytical methodology has been obtained from references as cited in 40 CFR, parts #136 & #261.
NY ID# in Rochester: 10145
NJ ID# in Rochester: 73331
NJ ID# in Hackensack: 02317
NY ID# in Hackensack: 10801

Laboratory Director

R94/4618-001 171

MALCOLM PIRNIE, INC.

CHAIN OF CUSTODY RECORD

PROJECT NO.: 2630-001

SITE NAME: MOOG INC

SAMPLERS (SIGNATURE): Brian C. Hamm

STATION NO	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	40 ml VOA by 8260	REMARKS
1848	11/22/94	9:10		X	MW-1B		2	

RELINQUISHED BY (SIGNATURE): Brian C. Hamm — DATE/TIME: 11/22/94 10:28 — RECEIVED BY (SIGNATURE): C. Mecnick

RELINQUISHED BY (SIGNATURE): C. Mecnick — DATE/TIME: 11/23/94 1100 — RECEIVED BY (SIGNATURE): Ellen Powell

RELINQUISHED BY (SIGNATURE): — DATE/TIME: — RECEIVED BY (SIGNATURE):

RELINQUISHED BY (SIGNATURE): — DATE/TIME: — RECEIVED BY (SIGNATURE):

RELINQUISHED BY (SIGNATURE): — DATE/TIME: — RECEIVED FOR LABORATORY BY (SIGNATURE): BR Graham — DATE/TIME: 11/24/94 1215 — REMARKS: Rec'd

Distribution: Original accompanies shipment, copy to coordinator field files

General Testing Corporation

A Full Service Environmental Laboratory

DEC. 13 1994

Mr. Robert O'Laskey
Malcolm Pirnie, Inc.
So. 3515 Abbott Road
Buffalo, NY 14219

Re: Moog, Inc.

Dear Mr. Robert O'Laskey

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Thank you for letting us provide this service.

Sincerely,

GENERAL TESTING CORPORATION

Janice M Jaeger

Janice Jaeger
Customer Service Representative

Enc.

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85 Trinity Place • Hackensack, NJ 07601 • Tele: (201) 488-5242 • Fax: (201) 488-6386
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Effective 10/1/91

GTC LIST OF QUALIFIERS

(The basis of this proposal are the EPA-CLP Qualifiers)

U - Indicates compound was analyzed for but was not detected. The sample quantitation limit must be corrected for dilution and for percent moisture.

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M - Duplication injection precision not met (GFA only).

S - Reported value determined by Method of Standard Additions. (MSA)

X - As specified in the case narrative.

General Testing Corporation

CASE NARRATIVE

COMPANY: Malcolm Pirnie, Inc.
Moog, Inc.
JOB #: R94/04594 and 4618

INORGANIC ANALYSIS

MPI water samples were analyzed for Alkalanity by EPA method 310.1, O/G by SW-846 method 9070, Total Hardness by EPA method 130.2, Sulfate by SW-846 method 9038, Total Suspended Solids using EPA method 160.2, and metals were analyzed by ICP method 6010A.

No analytical or QC problems were encountered.

VOLATILE ORGANICS

MPI water samples were analyzed for Target Analyte List (TCL) of volatiles plus Freon 11, Freon 113, and 2-Chlorotoluene by SW-846 method 8260.

All the initial and continuing calibration criteria were met for all analytes.

All surrogate standard recoveries were within acceptance limits.

The Laboratory Blank associated with these analyses was free of contamination.

Samples MW-2 and Storm Sewer (R94/04594-001and 007) were analyzed at several dilutions to bring target analytes within the calibration range of the method.

No other analytical or QC problems were encountered.

General Testing Corporation

A Full Service Environmental Laboratory

LABORATORY REPORT

Job No: R94/04594 Date: DEC. 13 1994

Client:
Mr. Robert O'Laskey
Malcolm Pirnie, Inc.
So. 3515 Abbott Road
Buffalo, NY 14219

Sample(s) Reference
Moog, Inc.

Received : 11/21/94 P.O. #:

ANALYTICAL RESULTS - mg/l

Sample:	-001	-002	-003	-004	-005	-006	-007	-008
Location:	MW-2A	MW-2	BLIND DUPLICATE	MW-3	MW-4	MW-5	STORM SEWER	TRIP BLANK
Date Collected:	11/18/94	11/18/94	11/18/94	11/18/94	11/18/94	11/18/94	11/18/94	11/18/94
Time Collected:	11:10	11:15	09:50	10:57	10:47	10:13	11:55	NA
Alkalinity, Total		292						
Grease/Oil		5.00 U						
Total Hardness		621						
Sulfate		257						
Suspended Solids		14300						
Calcium		179						
Iron		31.8						
Magnesium		38.4						
Manganese		0.843						

Unless otherwise noted, analytical methodology has been obtained from references as cited in 40 CFR, parts #136 & #261.
NY ID# in Rochester: 10145
NJ ID# in Rochester: 73331
NJ ID# in Hackensack: 02317
NY ID# in Hackensack: 10801

Laboratory Director

General Testing Corporation

A Full Service Environmental Laboratory

LABORATORY REPORT

Job No: R94/04594 Date: DEC. 13 1994

Client:
Mr. Robert O'Laskey
Malcolm Pirnie, Inc.
So. 3515 Abbott Road
Buffalo, NY 14219

Sample(s) Reference

Moog, Inc.

Received : 11/21/94 P.O. #:

TCL VOLATILES BY EPA METHOD 8260* ANALYTICAL RESULTS - ug/l

Sample:	-001	-002	-003	-004	-005	-006	-007	-008
Location:	MW-2A	MW-2	BLIND DUPLICATE	MW-3	MW-4	MW-5	STORM SEWER	TRIP BLANK
Date Collected:	11/18/94	11/18/94	11/18/94	11/18/94	11/18/94	11/18/94	11/18/94	11/18/94
Time Collected:	11:10	11:15	09:50	10:57	10:47	10:13	11:55	NA
Date Analyzed:	12/02/94	12/02/94	12/02/94	12/02/94	12/02/94	12/02/94	12/02/94	12/02/94
Dilution:	1	5,50	1	1	1	1	1,5	1
Chloromethane	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromomethane	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Vinyl Chloride	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloroethane	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methylene Chloride.	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	10 U	50 U	10 U	10 U	10 U	10 U	10 U	10 U
Carbon Disulfide	10 U	50 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichlorofluoromethane	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethene	5.0 U	42	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	5.0 U	4300	5.0 U	5.0 U	92	5.0 U	250	5.0 U
trans-1,2-Dichloroethene	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,2-Dichloroethene	5.0 U	2000	5.0 U	5.0 U	5.0 U	5.0 U	250	5.0 U
Chloroform	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Butanone (MEK)	10 U	50 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethane	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,1-Trichloroethane	5.0 U	6000	5.0 U	5.0 U	5.0 U	5.0 U	130	5.0 U
Carbon Tetrachloride	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromodichloromethane	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloropropane	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,3-Dichloropropene-Trans	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Trichloroethene	5.0 U	1600	5.0 U	5.0 U	5.0 U	5.0 U	44	5.0 U
Dibromochloromethane	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2-Trichloroethane	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0	5.0 U
1,3-Dichloropropene(Cis)	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromoform	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone(MIBK)	10 U	50 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	10 U	50 U	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	5.0 U	1300	5.0 U	5.0 U	5.0 U	5.0 U	33	5.0 U
1,1,2,2-Tetrachloroethane	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Toluene	5.9	25 U	5.1	5.0 U	5.0 U	5.0 U	23	5.0 U
Chlorobenzene	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

General Testing Corporation

A Full Service Environmental Laboratory

LABORATORY REPORT

Job No: R94/04594 Date: DEC. 13 1994

Client:
Mr. Robert O'Laskey
Malcolm Pirnie, Inc.
So. 3515 Abbott Road
Buffalo, NY 14219

Sample(s) Reference

Moog, Inc.

Received : 11/21/94 P.O. #:

TCL VOLATILES BY EPA METHOD 8260* ANALYTICAL RESULTS - ug/l

Sample:	-001	-002	-003	-004	-005	-006	-007	-008
Location:	MW-2A	MW-2	BLIND DUPLICATE	MW-3	MW-4	MW-5	STORM SEWER	TRIP BLANK
Date Collected:	11/18/94	11/18/94	11/18/94	11/18/94	11/18/94	11/18/94	11/18/94	11/18/94
Time Collected:	11:10	11:15	09:50	10:57	10:47	10:13	11:55	NA
Date Analyzed:	12/02/94	12/02/94	12/02/94	12/02/94	12/02/94	12/02/94	12/02/94	12/02/94
Ethylbenzene	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	11	5.0 U
Styrene	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Total Xylene (o,m,p)	33	25 U	30	5.0 U	5.0 U	5.0 U	83	5.0 U
2-Chlorotoluene	5.0 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Trichlorotrifluoroethane	5.0 U	4200	5.0 U	5.0 U	5.0 U	5.0 U	800	5.0 U
Surrogate Standard Recoveries								
Dibromofluoromethane	109	115	105	108	108	106	100	98
(Acceptance limits: 86-118%)								
Toluene d8	103	104	103	100	102	101	100	98
(Acceptance limits: 88-110%)								
4-Bromofluorobenzene	101	113	103	92	104	102	102	101
(Acceptance limits: 86-115%)								

Unless otherwise noted, analytical methodology has been obtained from references as cited in 40 CFR, parts #136 & #261.

NY ID# in Rochester: 10145
NJ ID# in Rochester: 73331
NJ ID# in Hackensack: 02317
NY ID# in Hackensack: 10801

Laboratory Director

General Testing Corporation

A Full Service Environmental Laboratory

LABORATORY REPORT

Job No: R94/04594 Date: DEC. 13 1994

Client:
Mr. Robert O'Laskey
Malcolm Pirnie, Inc.
So. 3515 Abbott Road
Buffalo, NY 14219

Sample(s) Reference

Moog, Inc.

Received : 11/21/94 P.O. #:

TCL VOLATILES BY EPA METHOD 8260* ANALYTICAL RESULTS - ug/l

Sample:	-009	-010
Location:	LAB METH BLANK	LAB METH BLANK
Date Collected:	--	--
Time Collected:	--	--
Date Analyzed:	12/02/94	12/02/94
Dilution:	1	1
Chloromethane	5.0 U	5.0 U
Bromomethane	5.0 U	5.0 U
Vinyl Chloride	5.0 U	5.0 U
Chloroethane	5.0 U	5.0 U
Methylene Chloride	5.0 U	5.0 U
Acetone	10 U	10 U
Carbon Disulfide	10 U	10 U
Trichlorofluoromethane	5.0 U	5.0 U
1,1-Dichloroethene	5.0 U	5.0 U
1,1-Dichloroethane	5.0 U	5.0 U
trans-1,2-Dichloroethene	5.0 U	5.0 U
cis-1,2-Dichloroethene	5.0 U	5.0 U
Chloroform	5.0 U	5.0 U
2-Butanone (MEK)	10 U	10 U
1,2-Dichloroethane	5.0 U	5.0 U
1,1,1-Trichloroethane	5.0 U	5.0 U
Carbon Tetrachloride	5.0 U	5.0 U
Bromodichloromethane	5.0 U	5.0 U
1,2-Dichloropropane	5.0 U	5.0 U
1,3-Dichloropropene-Trans	5.0 U	5.0 U
Trichloroethene	5.0 U	5.0 U
Dibromochloromethane	5.0 U	5.0 U
1,1,2-Trichloroethane	5.0 U	5.0 U
Benzene	5.0 U	5.0 U
1,3-Dichloropropene(Cis)	5.0 U	5.0 U
Bromoform	5.0 U	5.0 U
4-Methyl-2-pentanone(MIBK)	10 U	10 U
2-Hexanone	10 U	10 U
Tetrachloroethene	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	5.0 U	5.0 U
Toluene	5.0 U	5.0 U
Chlorobenzene	5.0 U	5.0 U

General Testing Corporation

A Full Service Environmental Laboratory

LABORATORY REPORT

Job No: R94/04594 Date: DEC. 13 1994

Client:
Mr. Robert O'Laskey
Malcolm Pirnie, Inc.
So. 3515 Abbott Road
Buffalo, NY 14219

Sample(s) Reference
Moog, Inc.

Received : 11/21/94 P.O. #:

TCL VOLATILES BY EPA METHOD 8260* ANALYTICAL RESULTS - ug/l

Sample:	-009	-010
Location:	LAB METH BLANK	LAB METH BLANK
Date Collected:	--	--
Time Collected:	--	--
Date Analyzed:	12/02/94	12/02/94
Ethylbenzene	5.0 U	5.0 U
Styrene	5.0 U	5.0 U
Total Xylene (o,m,p)	5.0 U	5.0 U
2-Chlorotoluene	5.0 U	5.0 U
Trichlorotrifluoroethane	5.0 U	5.0 U
Surrogate Standard Recoveries		
Dibromofluoromethane	97	104
(Acceptance limits: 86-118%)		
Toluene d8	99	91
(Acceptance limits: 88-110%)		
4-Bromofluorobenzene	100	98
(Acceptance limits: 86-115%)		

Unless otherwise noted, analytical methodology has been obtained from references as cited in 40 CFR, parts #136 & #261.

NY ID# in Rochester: 10145
NJ ID# in Rochester: 73331
NJ ID# in Hackensack: 02317
NY ID# in Hackensack: 10801

Laboratory Director

General Testing Corporation

A Full Service Environmental Laboratory

LABORATORY REPORT

VOLATILE ORGANICS - AQUEOUS SAMPLE

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: General Testing Corp.

Matrix Spike - Sample No. : R94/04594 -005

COMPOUND	SPIKE ADDED (ug/l)	SAMPLE CONCENTRATION (ug/l)	MS CONCENT. (ug/l)	MS % REC #	QC LIMITS REC.
1,1-Dichloroethene	50	0	48	97	D-234
Trichloroethene	50	0	46	93	71-157
Benzene	50	0	46	92	37-151
Toluene	50	0	47	93	47-150
Chlorobenzene	50	0	46	92	37-160

COMPOUND	SPIKE ADDED (ug/l)	MSD CONCENT. (ug/l)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
1,1-Dichloroethene	50	46	93	4	30	D-234
Trichloroethene	50	43	86	8	30	71-157
Benzene	50	44	87	5	30	37-151
Toluene	50	44	87	7	30	47-150
Chlorobenzene	50	43	87	6	30	37-160

Columns to be used to flag recovery and RPD values with *.
* = Values outside of QC limits
MS QC Limits = EPA Acceptance Criteria
RPD Limits = Internal Acceptance Criteria

RPD: 0 out of 5 outside limits
Spike Recovery: 0 out of 10 outside limits

COMMENTS: _____

General Testing Corporation

A Full Service Environmental Laboratory

LABORATORY REPORT

Job No: R94/04594 Date: DEC. 13 1994

Client:

Malcolm Pirnie, Inc.

Sample(s) Reference

Moog, Inc.

Date Received: 11/21/94

Date Sample Taken: 11/18/94

LABORATORY CHRONICLE
DATE ANALYZED

Sample:	-001	-002	-003	-004	-005	-006	-007	-008
Location:	MW-2A	MW-2	BLIND DUPLICATE	MW-3	MW-4	MW-5	STORM SEWER	TRIP BLANK
Alkalinity, Total		11/28/94						
Grease/Oil		11/29/94						
Total Hardness		12/01/94						
Sulfate		11/28/94						
Suspended Solids		11/23/94						
Calcium		11/29/94						
Iron		11/29/94						
Magnesium		11/29/94						
Manganese		11/29/94						

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MALCOLM PIRNIE, INC.

CHAIN OF CUSTODY RECORD

PROJECT NO.: 2630-00-1

SITE NAME: MOOG Inc.

SAMPLERS (SIGNATURE): Jeanne M. Asquith

	STATION NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	40 ml Vials VOA	8260	16 fl oz plastic Sulfate	8 oz plastic Alkalinity	1 QT plastic Lead	1/2 gal plastic TSS	1 gal plastic Anions	glass Oil & Grease	REMARKS
1350	001	11/8/94	11:10		X	MW-2A	2	2								
1351	002		11:15		X	MW-2	7	2	1	1	1	1	1			
1352	003		9:50		X	BLIND DUPLICATE	2	2								
1353	004		10:57		X	MW-3	2	2								
1354	005		10:49		X	MW-4	2	2								
1355	006		10:13		X	MW-5	2	2								
1352	007		11:55		X	STORM SEWER	2	2								
		11/8/94	10:49		X	MS/MSD (MW 4)	3	3								
1757	008					TRIP BLANK	2	2								

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
[signature]	11/8/94 3:33	[signature]	[signature]	11/9/94 1130	[signature]
[signature]		[signature]	[signature]		

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY (SIGNATURE)	DATE/TIME	REMARKS
		Tom Hasling	11/21/94 1215	via Fed Ex

Distribution: Original accompanies shipment, copy to coordinator field files

General Testing Corporation

A Full Service Environmental Laboratory

APR. 11 1995

Mr. Robert O'Laskey
Malcolm Pirnie, Inc.
So. 3515 Abbott Road
Buffalo, NY 14219

Re: MOOG Plant II Remediation

Dear Mr. Robert O'Laskey

Enclosed are the results of the analysis requested. The Analytical Data was provided to you on 04/04/95 per a Facsimile transmittal. All data has been reviewed prior to report submission.

Should you have any questions please contact me at 454-3760.

Thank you for letting us provide this service.

Sincerely,

GENERAL TESTING CORPORATION

Janice Jaeger
Customer Service Representative

Enc.

710 Exchange Street • Rochester, NY 14608 • Tele: (716) 454-3760 • (716) 454-1245
85 Trinity Place • Hackensack, NJ 07601 • Tele: (201) 488-5242 • Fax: (201) 488-6386
435 Lawrence Bell Drive • Amherst, NY 14221 • Tele: (716) 634-0454 • Fax: (716) 634-9019
1201 E. Fayette Street, Suite 42 • Syracuse, NY 13210 • Tele: (315) 471-0936 • Fax: (315) 471-0943

General Testing Corporation

A Full Service Environmental Laboratory

Effective 4/1/95

GTC List of Qualifiers

(The basis of this proposal are the EPA-CLP Qualifiers)

U - Indicates compound was analyzed for but was not detected.
The sample quantitation limit must be corrected for dilution and for percent moisture

J - Indicates an estimated value.
For further explanation see the case narrative/ cover letter.

B - This flag indicates that the analyte was found in the associated blank and in the sample.

E - This flag indicates compounds whose concentrations exceed the calibration range.

A - This flag indicates that a TIC is a suspected aldol-condensation product.

N - Spiked sample recovery not within control limits.
(Flag entire batch- Inorganic analytes only)

*** -** Duplicate analysis not within control analysis.
(Flag entire batch- Inorganic analytes only)

D - Spike diluted out.

S - Reported value determined by Method of Standard Additions. (MSA)

X - As specified in the case narrative.

GTC Lab ID # for State Certifications

NY ID# in Rochester: 10145
NY ID# in Hackensack: 10801
NY ID# in Massachusetts: NY00032

NJ ID# in Rochester: 73331
NJ ID# in Hackensack: 02317

General Testing Corporation

CASE NARRATIVE

COMPANY: Malcolm Pirnie, Inc.
Moog Plant II Remediation
JOB #: R95/01109

MPI water samples were collected on 3/28/95 and received at GTC on 3/29/95 in good condition at 4.7 C.

PETROLEUM HYDROCARBONS

MPI water samples MW-1B and MW-2A were analyzed for Petroleum Hydrocarbons using NYSDOH method 310-13. One liter of sample was extracted with 10 mls of Hexane and analyzed by GC/FID. Any detected peaks were quantitated as Dodecane since they did not match the peak pattern of any standards.

No analytical or QC problems were encountered with this analysis.

VOLATILE ORGANICS

MPI water samples were analyzed for the Target Compound List (TCL) of volatile organics by method 8260 from SW-846.

All tuning criteria for BFB were within acceptance limits.

The initial and continuing calibration criteria were met for all analytes.

All surrogate standard recoveries were within acceptance limits.

All laboratory blanks were free of any contamination.

The Trip Blank (R95/01109-006) was free from contamiantion.

All required analysis holding times were met.

No analytical or QC problems were encountered.

General Testing Corporation

A Full Service Environmental Laboratory

LABORATORY REPORT

Job No: R95/01109 **Date: APR. 11 1995**

Client:
Mr. Robert O'Laskey
Malcolm Pirnie, Inc.
So. 3515 Abbott Road
Buffalo, NY 14219

Sample(s) Reference

MOOG Plant II Remediation

Received : 03/29/95

P.O. #:

TCL VOLATILES BY EPA METHOD 8260*

ANALYTICAL RESULTS - ug/l

Sample:		-001	-002	-003	-004	-005	-006	-007
Location:		MW-1B	MW-2A	BLIND DUPLICATE	MW-6	MW-7	TRIP BLANK	LAB BLANK
Date Collected:		03/28/95	03/28/95	03/28/95	03/28/95	03/28/95	03/28/95	--
Time Collected:	PQL	13:38	13:51	12:59	10:40	10:55	NA	--
Date Analyzed:		3/30/95	3/30/95	3/30/95	3/30/95	3/30/95	3/30/95	3/30/95
Dilution:		1	1	1	1	1	1	1
Chloromethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromomethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Vinyl Chloride	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chloroethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methylene Chloride	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Carbon Disulfide	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethene	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	5.0	5.0 U	5.0 U	5.0 U	92	5.0 U	5.0 U	5.0 U
trans-1,2-Dichloroethene	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,2-Dichloroethene	5.0	5.0 U	5.0 U	5.0 U	21	5.0 U	5.0 U	5.0 U
Chloroform	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Butanone (MEK)	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,1-Trichloroethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon Tetrachloride	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromodichloromethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloropropane	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,3-Dichloropropene-Trans	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Trichloroethene	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2-Trichloroethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	5.0	78	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,3-Dichloropropene(Cis)	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Bromoform	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone(MIBK)	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2,2-Tetrachloroethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Toluene	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chlorobenzene	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Trichlorofluoromethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

General Testing Corporation

A Full Service Environmental Laboratory

LABORATORY REPORT

Date: APR. 11 1995

Client:
Mr. Robert O'Laskey
Malcolm Pirnie, Inc.
So. 3515 Abbott Road
Buffalo, NY 14219

Sample(s) Reference
MOOG Plant II Remediatio

Received : 03/29/95 P.O. #:

TCL VOLATILES BY EPA METHOD 8260* ANALYTICAL RESULTS - ug/l

Sample:		R95/01109	R95/01109	R95/01109	R95/01109	R95/01109	R95/01109	R95/01109
Sample:		-001	-002	-003	-004	-005	-006	-007
Location:		MW-1B	MW-2A	BLIND DUPLICATE	MW-6	MW-7	TRIP BLANK	LAB BLANK
Date Collected:		03/28/95	03/28/95	03/28/95	03/28/95	03/28/95	03/28/95	--
Time Collected:	PQL	13:38	13:51	12:59	10:40	10:55	NA	--
Date Analyzed:		3/30/95	3/30/95	3/30/95	3/30/95	3/30/95	3/30/95	3/30/95
Ethylbenzene	5.0	31	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Total Xylene (o,m,p)	5.0	8.3	11	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Freon 113	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Chlorotoluene	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
SURROGATE STANDARD RECOVERIES								
Dibromofluoromethane	86 - 118	109	95	108	108	98	109	101
Toluene d8	88 - 110	108	98	106	106	100	107	99
4-Bromofluorobenzene	86 - 115	115	102	110	110	103	111	106

Unless otherwise noted, analytical methodology has been obtained from references as cited in 40 CFR, parts #136 & #261.

NY ID# in Rochester: 10145
NJ ID# in Rochester: 73331
NJ ID# in Hackensack: 02317
NY ID# in Hackensack: 10801

Michael K. Perry

Laboratory Director

General Testing Corporation

A Full Service Environmental Laboratory

LABORATORY REPORT

Job No: R95/01109 Date: APR. 11 1995

Client:
Mr. Robert O'Laskey
Malcolm Pirnie, Inc.
So. 3515 Abbott Road
Buffalo, NY 14219

Sample(s) Reference:
MOOG Plant II Remediation

Received : 03/29/95

P.O. #:

METHOD 310-13

ANALYTICAL RESULTS - ug/l

Sample:		-001	-002	-003	-004	-005	-006	-007
Location:		MW-1B	MW-2A	BLIND DUPLICATE	MW-6	MW-7	TRIP BLANK	LAB BLANK
Date Collected:	----------	03/28/95	03/28/95	03/28/95	03/28/95	03/28/95	03/28/95	--
Time Collected:	PQL	13:38	13:51	12:59	10:40	10:55	NA	--
Petroleum Hydrocarbons, GC								
Date Extracted:		03/30/95	03/30/95					03/30/95
Date Analyzed:		03/31/95	03/31/95					03/30/95
Dilution:		1	1					1
Gasoline								
Kerosene								
Fuel Oil #2/Diesel								
Fuel Oil #4								
Fuel Oil #6								
as *n*-Dodecane	20	90	20 U					20 U

Unless otherwise noted, analytical methodology has been obtained from references as cited in 40 CFR, parts #136 & #261.
NY ID# in Rochester: 10145
NJ ID# in Rochester: 73331
NJ ID# in Hackensack: 02317
NY ID# in Hackensack: 10801

Michael K. Perry

Laboratory Director

R95/1109

9503000552

MALCOLM PIRNIE, INC.

CHAIN OF CUSTODY RECORD

PROJECT NO.: 2630-00-1

SITE NAME: Moog Inc.

SAMPLERS (SIGNATURE): Joanne M. Ouquist

STATION NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	40 ml VOA, 8260	Petrol Hydro (1 qt) Meth. 310-13 (NYSDOH)					REMARKS
	3/28	13:58		X	MW-1B	4	2	2					#9983
	3/28	13:51		X	MW-2A	4	2	2					#9984
	↓	12:59		X	Blind Duplicate	2	2						#9985
	↓	10:40		X	MW-6	2	2						#9986
	↓	10:55		X	MW-7	2	2						#9987
					Trip blank								
	3/28				TRIP BLANK	2	2						#9988

RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):
Bryan C. Ham	3/28/95 3:15	C. Morneau	C. Morneau	3/29/95 10:30	Clell Conner
RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):

RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE/TIME:	REMARKS:
		[signature]	3/29 12:15	

Distribution: Original accompanies shipment, copy to coordinator field files

MALCOLM PIRNIE

APPENDIX D

SHALLOW TRAY AIR STRIPPER EMISSIONS ESTIMATES

MOOG EAST AURORA
COMPARISON OF ANTICIPATED STACK CONCENTRATIONS TO
DRAFT AIR GUIDE 1 LIMITS

(STACK HT./BLDG. HT >2.5 TO REDUCE CALCULATED ANNUAL IMPACTS BY 60%)
GROUNDWATER AVERAGE FLOW RATE = 5 GPM

CONTAMINANT	INFLUENT WATER CONC. (mg/l)	EFFLUENT WATER CONC. (mg/l)	NET (mg/l)	MAX WATER FLOW RATE (GPM)	MASS TRANSFER TO AIR (mg/min)	BLOWER CAP. (cfm)	STACK AIR CONC. (mg/cu m)	MASS TRANSFER TO AIR (lbs/hr)	STACK HT (FT)
1,1-DCE	0.042	0	0.042	5	0.80	150	0.187	1.05E-04	45
1,1-DCA	4.3	0	4.3	5	81.44	150	19.165	1.08E-02	45
1,1,1-TCA	6	0	6	5	113.64	150	26.742	1.50E-02	45
TCE	3.5	0	3.5	5	66.29	150	15.600	8.77E-03	45
PCE	3.4	0	3.4	5	64.39	150	15.154	8.52E-03	45
c-1,2-DCE	2	0	2	5	37.88	150	8.914	5.01E-03	45
Toluene	0.12	0	0.12	5	2.27	150	0.535	3.01E-04	45
Ethyl Benzene	0.036	0	0.036	5	0.68	150	0.160	9.02E-05	45
Total Xylenes	0.19	0	0.19	5	3.60	150	0.847	4.76E-04	45
Benzene	0.21	0	0.21	5	3.98	150	0.936	5.26E-04	45
Freon 113 (1)	4.2	0	4.2	5	79.55	150	18.720	1.05E-02	45

(1) Freon 113 = Trichlorotrifluoroethane
(2) SGC = Air Guide-1 Short Term Guidance Concentration
(3) AGC = Air Guide-1 Annual Guidance Concentration

MOOG EAST AURORA
COMPARISON OF ANTICIPATED STACK CONCENTRATIONS TO
DRAFT AIR GUIDE 1 LIMITS

(STACK HT./BLDG. HT >2.5 TO REDUCE CALCULATED ANNUAL IMPACTS BY 60%)
GROUNDWATER AVERAGE FLOW RATE = 5 GPM

CONTAMINANT	MAX. ACTUAL ANNUAL IMPACT (ug/cu. m)	MAX. POTENTIAL ANNUAL IMPACT (ug/cu. m)	AGC (3) (ug/cu. m)	SHORT-TERM IMPACT (ug/cu. m)	SGC (2) (ug/cu. m)
1,1-DCE	0.000	0.0004	0.02	0.18	2000
1,1-DCA	0.043	0.0431	500	18.12	190000
1,1,1-TCA	0.060	0.0602	1000	25.28	450000
TCE	0.035	0.0351	0.45	14.75	33000
PCE	0.034	0.0341	0.075	14.32	81000
c-1,2-DCE	0.020	0.0201	1900	8.43	190000
Toluene	0.001	0.0012	2000	0.51	89000
Ethyl Benzene	0.000	0.0004	1000	0.15	100000
Total Xylenes	0.002	0.0019	300	0.80	100000
Benzene	0.002	0.0021	0.12	0.88	30
Freon 113 (1)	0.042	0.0421	90000	17.69	1800000

(1) Freon 113 = Trichlorotrifluoroethane
(2) SGC = Air Guide-1 Short Term Guidance Concentration
(3) AGC = Air Guide-1 Annual Guidance Concentration

MALCOLM
PIRNIE

APPENDIX E

PRELIMINARY COLLECTION TRENCH YIELD AND AREA OF INFLUENCE CALCULATIONS

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.

BY Ritter DATE 1-25-95 SHEET NO. ..... OF .....

CHKD. BY RMF DATE 2/10/95 JOB NO. .....

SUBJECT Moog

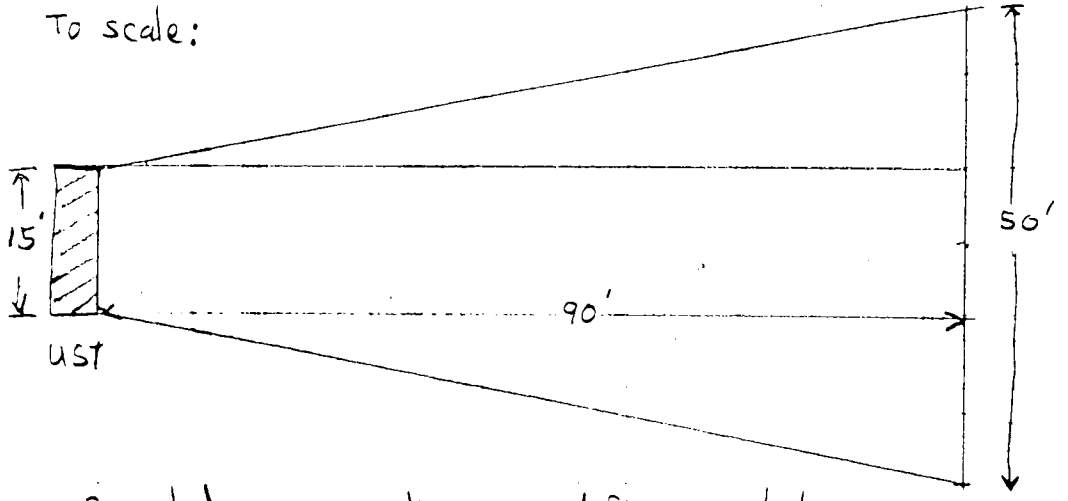
Calculate the yield and area of influence of a pumped Trench fully penetrating the shallow water bearing zone at Plant 11.

Assume the trench geometry is:

L = length = 50 feet = see (1) below
W = width = 2 feet = Backhoe bucket width.
D = depth = 12 feet = Depth to split spoon refusal.

(1) 50 ft is assumed to be greater than lateral dispersion of the GW plume at a distance ≈ 90 feet downgradient of the UST, and where the source area ≈ 15 feet wide.

To scale:



If needed, use one dimensional flow model to verify likely horizontal dispersion, but the assumed 3X widening of plume + the slightly greater capture zone of the trench ~~sh~~ is considered conservative.

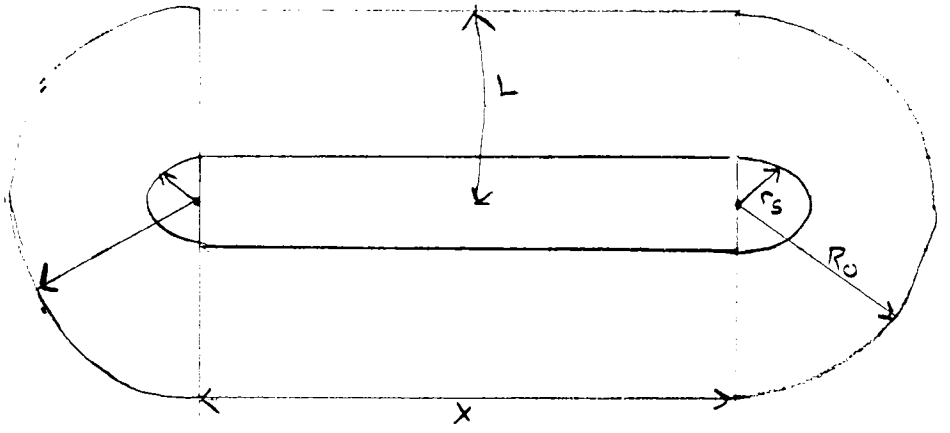
MALCOLM PIRNIE

MALCOLM PIRNIE, INC.

BY RJO DATE 1-25-95 SHEET NO. ..... OF .....

CHKD. BY RMF DATE 2-10-95 JOB NO. 2630-001-200

SUBJECT .....



Evaluate the flow to the trench using relationships from Powers (1981) Construction Dewatering p. 108

$$Q = \frac{\pi K (H^2 - h^2)}{\ln R_o / r_s} + 2\left(\frac{x K (H^2 - h^2)}{2L}\right)$$

Powers (1981) assumes flow to each end of the trench can be approximated by the 1/2 the flow to a circular well of radius r_s.

The flow to the line sink is doubled to consider flow from both sides.

		Assumed value
Q =	flow to trench in ft^3/day	
K =	ft/day	$(10^{-3}\ cm/s) \times (2835) = 2.84\ \frac{ft}{d}$
H =	Saturated thickness	6 ft
h =	Saturated thickness at trench during pumping	4 ft
r_s =	radius of circular well. Assume Trench is 2ft wide	1 ft
R_o =	L (see below)	

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.
BY RHO DATE 1-25-95 SHEET NO. ..... OF .....
CHKD. BY RHF DATE 2-10-95 JOB NO. 7630-001-200
SUBJECT .....

R_o and L = Distance to zero drawdown

Again from Powers (1981) (Page 109) $R_o = r_s + \sqrt{\frac{T t}{C_4 C_s}}$

where T = transmissivity in $\frac{GPD}{ft} = KH$

(1) ~~K~~ $K = 10^{-3}$ cm/s or $2.84 \frac{ft}{day}$ (4) $\times 6$ ft $\times 7.48 \frac{Gal}{ft^3} = 127 \frac{GPD}{ft}$

C_4 = constant depending on units = 4790
C_s = specific yield = 0.2
t = time of pumping

Assume 180 days

$$R_o = 1 \text{ ft} + \sqrt{\frac{\left(127 \frac{GPD}{ft}\right)(180 \text{ days})}{4790\ (0.2)}} = 5.9 \text{ ft}$$

Calculate Yield at 180 days

$$Q = \frac{\pi (2.84 \text{ ft/d})(6^2 - 4^2)}{\ln(5.9/1)} + 2\left(\frac{(50 \text{ ft})(2.84 \text{ ft/d})(6^2 - 4^2)}{2(5.9)}\right)$$

$$= 178.4 / 1.775 + 48.1 = 582 \text{ ft}^3/\text{d}$$

$$= 582 \frac{ft^3}{d} \times 7.48 \text{ Gal}/ft^3 = 4350 \text{ GPD} = 3 \text{ gpm}$$

Calculate Yield at 360 d

$R_o = 7.9$

$Q = 86 + 359 = 445 \frac{ft^3}{d} \times 7.48 \text{ g}/ft^3 = 3329 \text{ GPD} = 2.3 \text{ gpm}$

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.
BY RHO DATE 2-7-95 SHEET NO. ..... OF .....
CHKD. BY RHF DATE 2-10-95 JOB NO. 2630-001-200
SUBJECT .....

calculate yield @ 60 days

$R_o = 3.8$

$Q = 133 + 747 = 880\ ft^3/d \times 7.48\ g/ft^3 = 6585\ GPD$

$= 4.6\ GPM$

calculate yield @ 10 days

$R_o = 2.2$

$Q = 226 + 1291\ \frac{ft^3}{d} = 1517\ \frac{ft^3}{d} \times 7.48\ g/ft^3 = 11,345\ GPD$

$= 7.9\ GPM.$

Area of Influence

@ 3600 days Trench length + 12 ft = 62 ft

3600 days Trench width + 6 ft (upgradient) = 8 ft.

Area ~~can~~ of Influence can be increased slightly faster by using a higher pumping rate (greater drawdown), but the area is primarily time dependent as shown by:

$$R_o = r_s + \sqrt{\frac{T\ (t)}{C_4\ C_5}}$$

Equations do not consider recharge from precip. ∴ Steady state flow rate @ 180 days may be 2 to 3 x's greater during significant precip. events.

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.
BY RHO DATE 5-1-95 SHEET NO. ..... OF .....
CHKD. BY ..... DATE ..... JOB NO. 2630-001
SUBJECT MOG

Revise Flow calculations to reflect one trench 125 ft in Length.

Assume all variables are the same as in previous calculation except X = length of trench

Instead to two 50 ft trenches
use ~~one~~ X = 125 ft and a single trench

Yield @ 180 days

$$Q = \frac{\pi (2.84\ ft/d)(6^2 - 4^2)}{\ln \left(\frac{5.9}{1}\right)} + 2\left(\frac{(125\ ft)(2.84\ ft/d)(6^2-4^2)}{2\,(5.9)}\right)$$

$$= 178.4/1.775 + 1203$$

$$= 1303\ \frac{ft^3}{D} \times 7.48\ gal/ft^3 = \frac{9746\ GPD}{1440\ m/d} = 6.8\ gpm$$

vs 6. gpm
w/ two trenches

Yield @ 360 days

$R_o = 7.9$ $\ln 7.9 = 2.067$

$Q = 86 + 899 = 985 \times 7.48 = 7366\ GPD = 5.1\ gpm$

vs 4.6 gpm
w/ two trenches

Steady State flows at 360 days are still ≈ 5 gpm
" at 180 days ≈ 7 gpm

Conclude that 15 gpm capacity will be sufficient