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DUNLOP

Investigation of Inactive Waste Disposal Sites

Buffalo Plant
October 3, 1983

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Ref. No. 1135

ADVANCED ENVIRONMENTAL SYSTEMS
CONESTOGA ROVERS & ASSOCIATES LIMITED

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1.0 INTRODUCTION

On October 8, 1982 Advanced Environmental Systems (AES) and Conestoga-Rovers & Associates Limited (CRA) submitted a proposal entitled "Investigation of Inactive Waste Disposal Sites - Buffalo Plant" to Dunlop Tire and Rubber Corporation. In the proposal six (6) work items were identified and are briefly described as follows:

1) Determine historical disposal practices and document any historical overland discharges to or from neighbouring properties.

2) Define present waste generation and disposal procedures.

3) Upgrade existing plant practices regarding hazardous waste handling - if required.

4) Perform a site investigation which consists of;
   a) soil sample collection from the overburden during well installation
   b) water sample collection from the proposed well installations
   c) define the site hydrogeology

5) Identify the waste disposal boundaries using historical records, geophysical remote sensing techniques and backhoe excavation or borehole augering.

6) Propose a remedial plan, if required, using the data collected in work items 1 to 5.

This report discusses and presents the investigative findings of the above work items and recommends the remedial measures to be implemented.

2.0 PROBLEM DEFINITION

As a result of concerns expressed regarding the possible presence of chlorinated solvents in the former disposal areas at the plant, Dunlop has voluntarily undertaken a site investigation to evaluate the existing conditions. This investigation has involved a review of historical and current waste disposal practices and soil and groundwater quality analyses on the plant property.

3.0 DISPOSAL PRACTICES

3.1 HISTORICAL

A review of historical disposal practices was conducted by Dunlop. Through conversations with Dunlop personnel and retirees it was determined that, in fact, some chemicals and solvents were deposited in the former disposal area on the eastern portion of the plant property.

A summary of the historical disposal practice investigation is presented in Appendix A.

3.2 CURRENT

A compilation of all current in-house waste generation was completed by Dunlop in January 1983. This investigation involved a department by department review of all waste product generation and the current mode of disposal. A complete listing of the current waste disposal practices are presented in Appendix A. In addition, as part of a feasibility study for an on-site incinerator, Dunlop has quantified the current waste generation rates for the plant.

A summary of the waste generation volumes are also presented in Appendix A.

4.0 SITE INVESTIGATION

4.1 WASTE DISPOSAL LIMITS

In order to identify the areal and vertical limits of waste disposal, a field investigation was conducted using a backhoe in January 1983. The investigation involved the excavation and logging of 26 testholes throughout the former disposal areas. The locations of the boreholes are identified on enclosed Map 1. The stratigraphic logs of the testholes are presented in Appendix B.

In addition to the testholes, the Geological Survey of the United States Department of the Interior conducted an electromagnetic conductivity survey along five (5) vectors across the plant property. The survey alignments are presented on Map 1 and the raw data is presented in Appendix C. A list of conductivity ranges for various native materials are also included in Appendix C. Given that the native soils of the upper overburden regime are generally silts and clays, it is possible to differentiate between some of the background noise and highly conductive foreign matter. The apparent high conductivity intervals are plotted on Map 1. These appear to coincide fairly consistently with the waste

disposal limits identified during the testhole survey. The two instances of apparent nonconformance are:

1) Along line 3 and 4 where no significant conductivity variations were noted. However, this may simply be a result of the waste character deposited in that area.

2) The northerly high conductivity interval along line 5 coincides with the presence of a 54" x 85" metal arch storm sewer pipe.

Based on the above two investigations and a visual field delineation survey which was tied in by stadia, the approximate extent of the disposal areas has been defined. The estimated disposal area limits are presented in Map 1 (enclosed).

4.2 MONITORING WELL INSTALLATION

From December 8 to 17, 1982, Empire Soils Investigations, Inc. installed a total of six (6) groundwater monitoring wells; four (4) overburden monitoring wells and two (2) bedrock monitoring wells. The locations of these wells are presented in Figure 1.

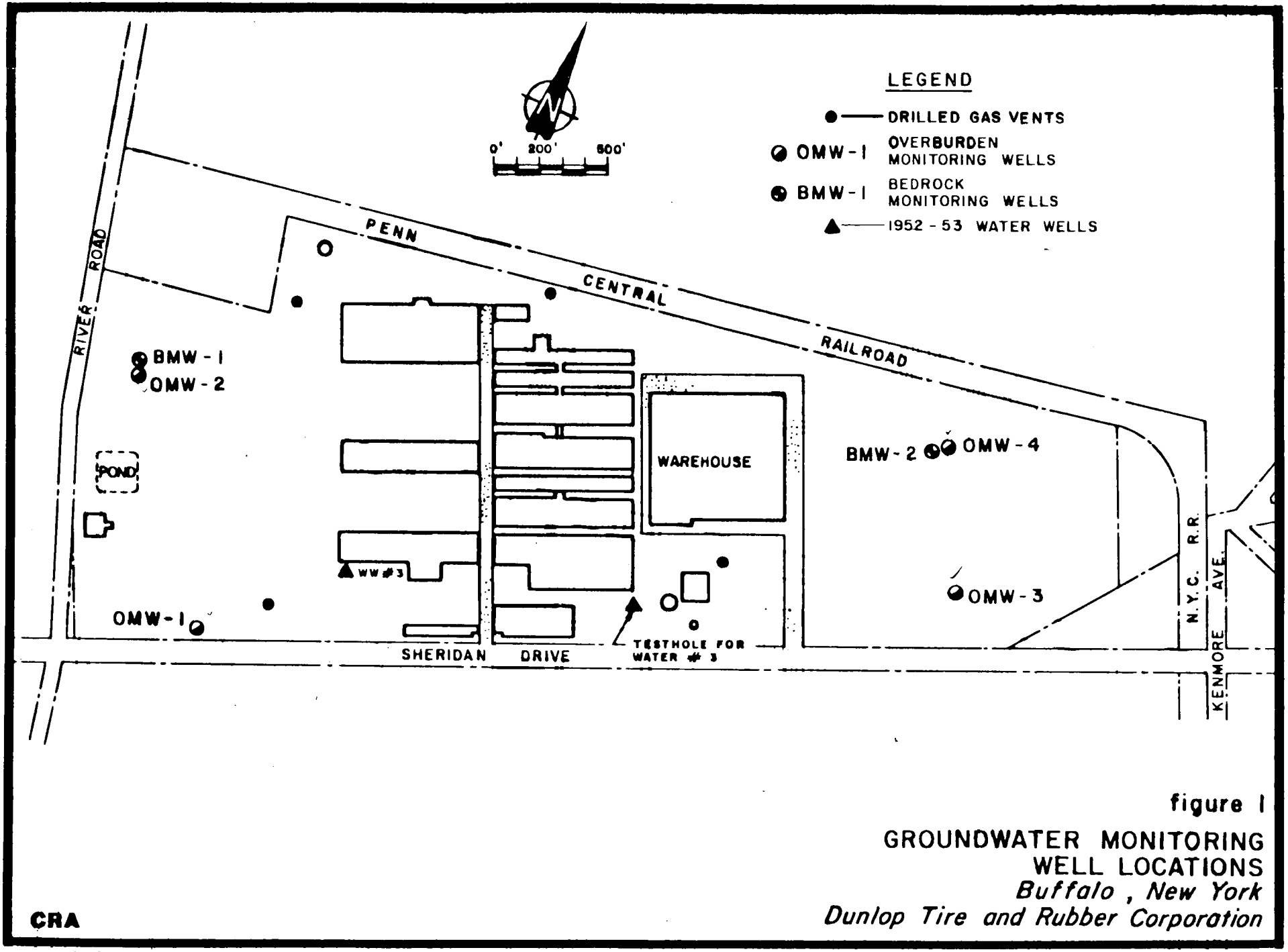

figure 1

GROUNDWATER MONITORING WELL LOCATIONS

Buffalo, New York

Dunlop Tire and Rubber Corporation

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Three (3) overburden monitoring wells were installed around former disposal areas to identify overburden groundwater characteristics and movement. One (1) overburden monitoring well was placed directly into a known disposal area to provide landfill characteristic information including disposal depth, refuse components and groundwater conditions.

The three overburden wells installed adjacent to the former disposal areas were installed to a depth of approximately 10 feet into native soils. The landfill overburden well was installed approximately 2.5 feet into the native soils underlying the fill. Continuous split spoon samples of the overburden materials were collected in advance of the augering operation to provide the geologic stratigraphy. (Note: it is assumed that the soil stratigraphy at OMW-2 and OMW-4 are identical to the adjacent bedrock wells BMW-1 and BMW-2 respectively. Therefore, split spoon sampling was not required for these two overburden wells).

The bedrock monitoring wells were installed to identify the local bedrock groundwater conditions. One of the bedrock monitoring wells was installed adjacent to a former disposal area in the west sector of the plant and the second bedrock

monitoring well was installed directly below the former disposal area in the east sector of the plant.

The two bedrock monitoring wells were installed to a depth of 7 feet into the bedrock regime.

Appendix D presents the stratigraphic and instrumentation logs for each of the installed monitoring wells. Additional geologic stratigraphy information obtained from previous well drilling programs conducted in the 1950's is presented in Appendix E. The locations of the previous drilling sites are presented on Figure 1.

4.3 MONITORING WELL CONSTRUCTION

The overburden wells were constructed of two inch diameter black steel pipe welded to a 5.0 foot galvanized well screen (#10 slot). A measured quartsite sandpack was placed around each well screen. A bentonite seal was placed above the sandpack and the remaining annular space around the well was backfilled to the ground surface with a cement-grout mixture. Each well was fitted with a lockable cap.

The bedrock wells were constructed of two inch diameter black steel pipe, fitted with an inverted flange which was set into the top of the bedrock. No well screen was used for the bedrock wells. Typical monitoring well installation details for both the overburden and bedrock wells are presented in Figure 2. The bedrock well installations were completed as follows:

1) Split spoon samples of the overburden soils were taken in advance of the augering operation to the top of the bedrock regime.

2) A 5-3/4"Ø tricone bit was used to ream (2.0') two feet into the bedrock. (No bedrock core sample recovered.)

3) A 3"Ø NX core barrel was used to penetrate an additional five (5) feet into the bedrock (5.0' bedrock core recovered). Total penetration into bedrock was 7.0 feet

4) After completion of the bedrock coring, the flanged black steel pipe was lowered into the open core hole. The purpose of the flange is to center the well pipe into the 3" diameter borehole and to provide a proper seal between the overburden and bedrock regimes.

5) A two foot bentonite seal was then installed above the steel flange to seal the well pipe into place.

6) The remaining annular space was backfilled to the ground surface with a cement grout mixture.

7) Each bedrock well was fitted with a lockable cap.

A summary of the well installation and elevation details are presented in Table 1.

All soil cuttings from the fill areas were placed in 55 gallon steel drums for subsequent disposal.

During the installation of BMW-1 the drilling augers became seized at a depth of 74.0'. The driller utilized a biodegradable drilling fluid to free the seized augers. The augers were then removed and a 6" inch diameter hollow casing was installed to facilitate completion of the monitoring well installation. Prior to bedrock coring, the 6" diameter casing was flushed with clean water to remove the remaining drilling fluid.

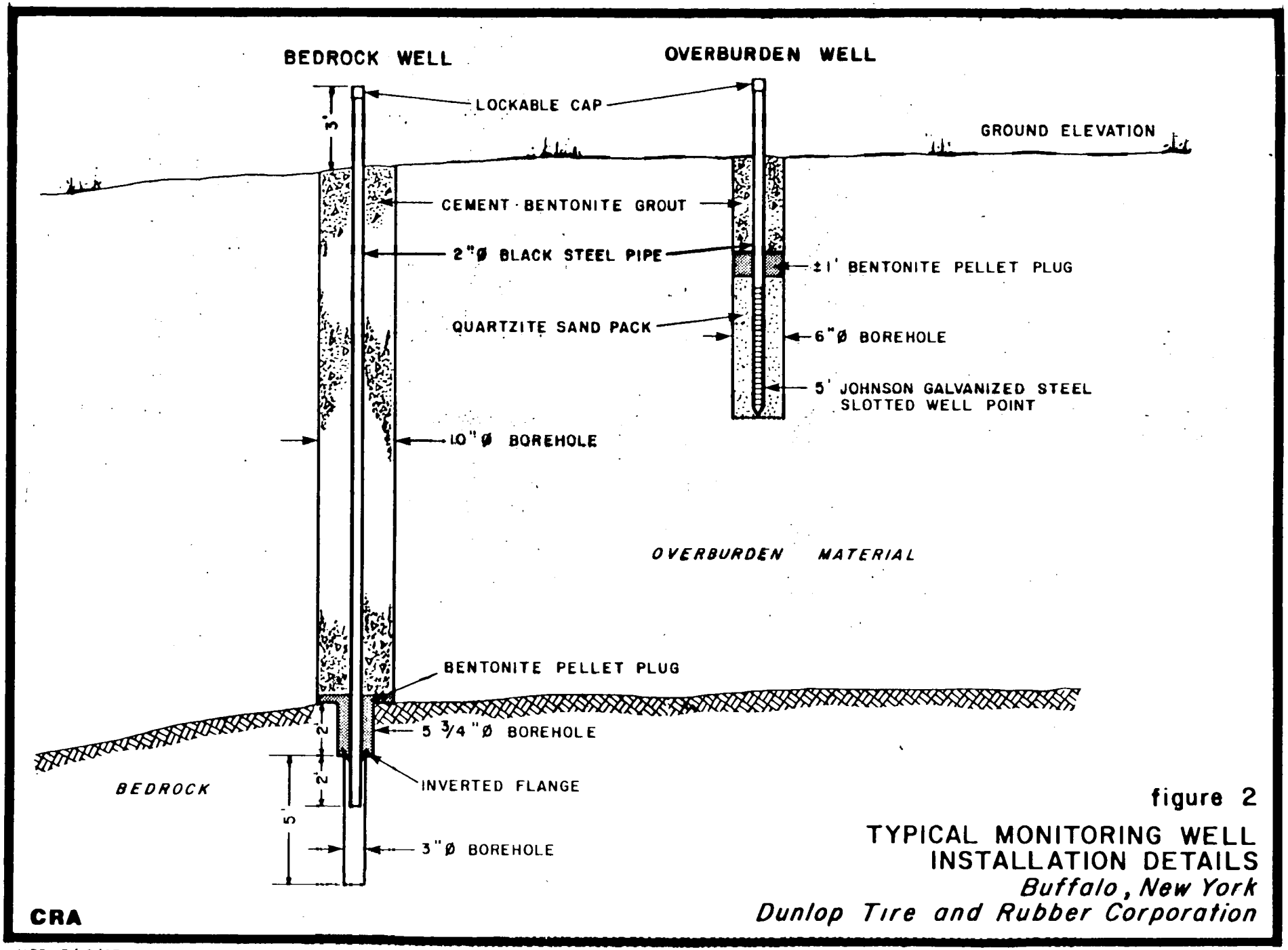

figure 2

TYPICAL MONITORING WELL INSTALLATION DETAILS

Buffalo, New York

Dunlop Tire and Rubber Corporation

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TABLE 1

WELL INSTALLATION AND ELEVATION DETAILS
DUNLOP TIRE CORPORATION

Well No.	Installation Type	Top of Casing Elevation	Ground Elevation	Well Screen Interval	Sand Pack Interval	Top of Bedrock Elevation
OMW-1	Overburden - installed into native soil	593.66	591.5	584.5 - 579.5	579.4 to 589.5	--
OMW-2	Overburden - installed into native soil	589.22	585.9	580.6 - 575.6	575.5 to 583.9	--
OMW-3	Overburden - installed into native soil	604.27	601.5	594.1 - 589.1	589.2 to 600.0	--
OMW-4	Overburden - installed 2.7 into native soils below landfill base	610.36	608.2	604.2 - 599.2	599.1 to 605.7	--
BMW-1	Bedrock	588.62	585.6	523.1 - 516.1 (Bottom of Core Hole) No Screen)	--	523.1
BMW-2	Bedrock	610.62	607.6	533.4 - 525.9 (Bottom of Core Hole) No Screen	--	533.4
Water Well Testhole #3	Bedrock (1952)		605.4			530.4

Note: Benchmark reference was the concrete loading docks south side of Building 6
ELEVATION - 598.50

4.4 CLEANING PROCEDURES

To prevent the introduction of outside contamination or cross-contamination during the well installation program, the drilling and sampling equipment was cleaned prior to each use in the following manner:

1) high pressure steam cleaning
2) rinse with a mixture of acetone and water
3) rinse with a mixture of hexane and water
4) rinse with a mixture of acetone and water
5) rinse with distilled water

The used cleaning solvents were contained in 55 gallon drums for subsequent disposal.

5.0 GEOLOGIC INVESTIGATION

5.1 OVERBURDEN STRATIGRAPHY

During the monitoring well installation program, split spoon samples of the overburden material were collected and classified for geologic identification. The geologic stratigraphy at the site consists of an upper layer (Approximately 15 to 20 feet thick) of very stiff silt and clay which gradually changes to a soft silty clay - reddish brown in color (approximately 40' thick). The strata immediately overlying the bedrock generally consisted of a sandy silt till which ranged in thickness from approximately 8 feet at BMW-1 to 12-1/2 feet at BMW-2. Complete stratigraphic information is presented in Appendix D.

The overburden thickness at BMW-1 and BMW-2 were recorded as 62.5 and 74.2 feet respectively. Information regarding two of the previously installed wells (1952 and 1953), indicate overburden thicknesses of 75 and 69 feet respectively.

The maximum fill thickness encountered during the site investigation was 10 feet at TH12. OMW-4 which was also installed through the

fill encountered approximately 8 feet of fill materials. Common refuse encountered included ash, cinders, slag, gravel, rubber, wood, brick and metal fragments in a clay, sand or silt matrix.

5.2 BEDROCK STRATIGRAPHY

The upper bedrock regime is generally gray aphanitic dolomite of the Salina Formation of the Paleozoic Era, Upper Silurian Age. The bedrock was thin bedded to very thin bedded and contained numerous gypsum deposits.

6.0 HYDROLOGIC INVESTIGATION

6.1 SURFACE WATER

The surface water drainage around the immediate plant facility is generally handled by a storm sewer network which discharges through the Oil and Floating Object Trapping Pond on the west sector of the site. The discharge from the pond flows through a series of culverts and ditches which ultimately discharge into the Niagara River. The general surface drainage configuration for the Dunlop property is presented in Figure 3.

The open areas to the east and west of the plant facilities are generally serviced by overland flow paths. Two major drainage ditches provide the only significant drainage routes through the open areas. The existing drainage system and their off-site receivers are presented on Figure 3.

The topographic relief through the open areas is not continuous and as a result several ponded areas have developed in pocketed areas throughout the site. The fill areas are surrounded by ponded surface water and are themselves entrappment areas for surficial water. For this reason, it is not

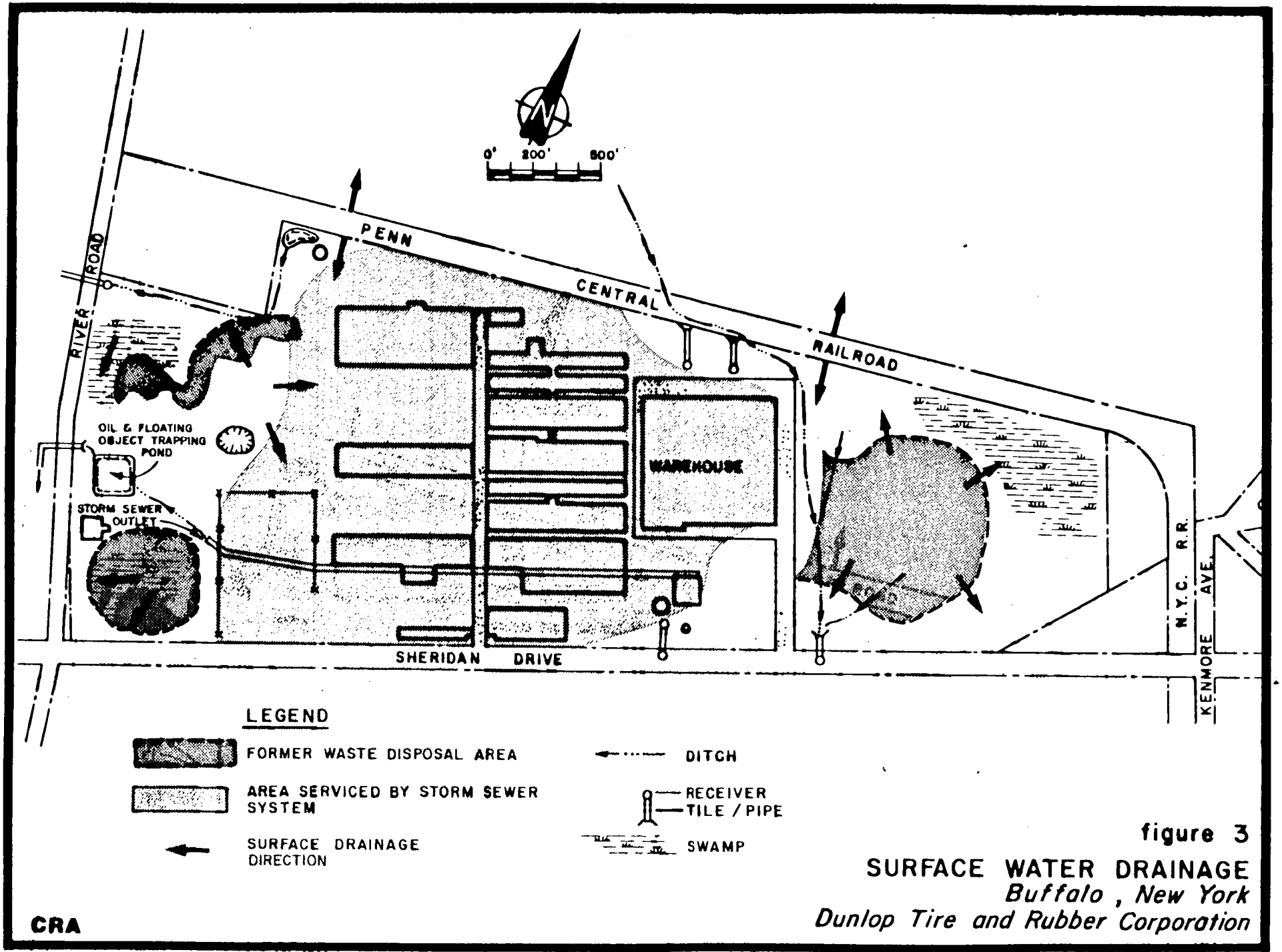

figure 3

SURFACE WATER DRAINAGE

Buffalo , New York

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clearly understood why overburden well OMW4-83 remained dry. Especially considering that the soil stratigraphy noted was moist to wet.

The fine grained nature of the native subsurface soils does not promote significant infiltration and therefore the major avenues of surface water removal from the area are via evapotranspiration and overland flow.

6.2 OVERBURDEN GROUNDWATER

The massive deposits of clayey material underlying the Dunlop Plant are not condusive to groundwater transport. Of the split spoon samples collected during the well installation program, the only significant wetted intervals were noted in the surficial fill and in the till materials immediately overlying the bedrock. As a result of the impermeable clayey soil conditions, the shallow overburden monitoring wells were very slow to recharge following installation. Water level measurements taken during the site investigation are presented in Table 2.

Based on the results of grain size distribution analyses performed on two shallow

TABLE 2

DUNLOP GROUNDWATER ELEVATIONS

Well Designation	OMW1	OMW2	OMW3	OMW4	BMW1	BMW2
Top of Casing Elevation	593.66	589.22	604.27	610.36	588.62	610.62
Date						
12/21/82	579.36	575.92	589.07	599.06	534.62	549.12
12/22/82	579.46	576.02	589.17	599.06	534.32	549.32
1/6/83	579.46	576.02	589.07	599.16	528.62	555.92
1/10/83	579.46	576.02	589.07	599.16	537.82	552.72
3/7/83	586.26	578.97	593.52	599.06	533.17	548.17
3/22/83	587.26	579.22	595.27	599.06	536.87	548.92
4/5/83	587.86	580.67	596.77	599.06	542.12	552.52
4/19/83	588.26	581.82	597.97	599.06	538.52	551.32
5/2/83	588.16	582.27	598.67	599.06	537.92	550.72
5/16/83	588.51	582.67	599.02	599.06	535.32	549.87
5/31/83	587.71	582.27	599.37	599.06	542.82	554.07
9/21/83	585.49	583.59	594.31	601.42	542.64	555.17

overburden samples, it is possible to estimate the permeability of the upper overburden regime. Using the Hazen Permeability Equation:

$K = 100\ (D_{10})^2$

where K = permeability

D_{10} = Hazen Effective Size (cm) (10% passing by weight)

The estimated permeability of the overburden is:

Location	Sample #	Depth	Estimated Permeability
BMW-1	S-4	6-7'	4.9×10^{-8} cm/sec
OMW-3	S-4	6-8'	4.9×10^{-8} cm/sec

The low permeability calculated above supports the observed low permeabilities indicated by extremely slow well recovery. Figures 4 and 5 present the grain size distribution curves for the tested samples.

6.3 BEDROCK GROUNDWATER

The upper bedrock layer of dolomite is sufficiently fractured to comprise a water bearing interval. The primary water transport medium in the bedrock is via the fractures and solution cavities. Secondary permeability is not significant.

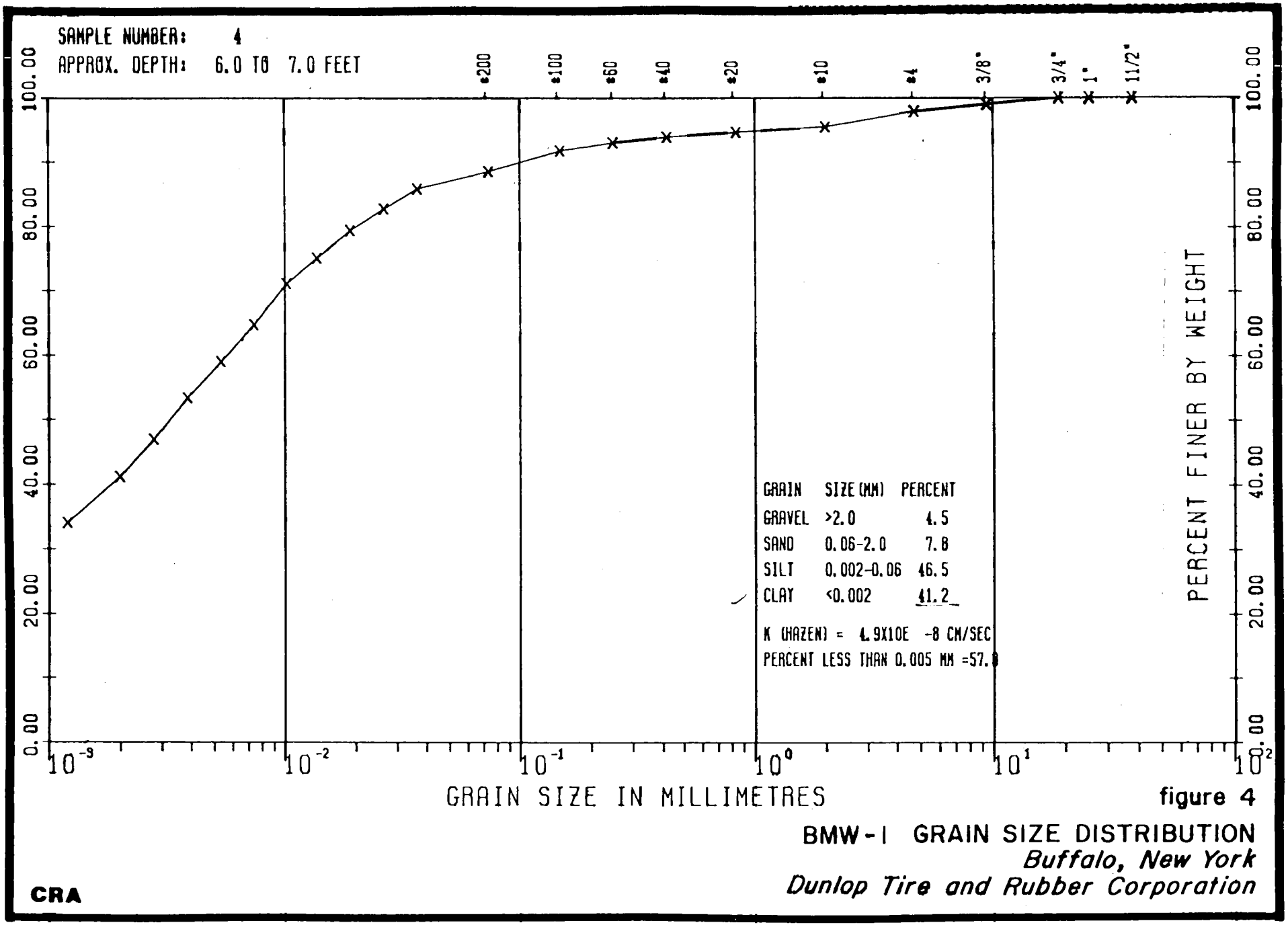

figure 4

BMW-1 GRAIN SIZE DISTRIBUTION

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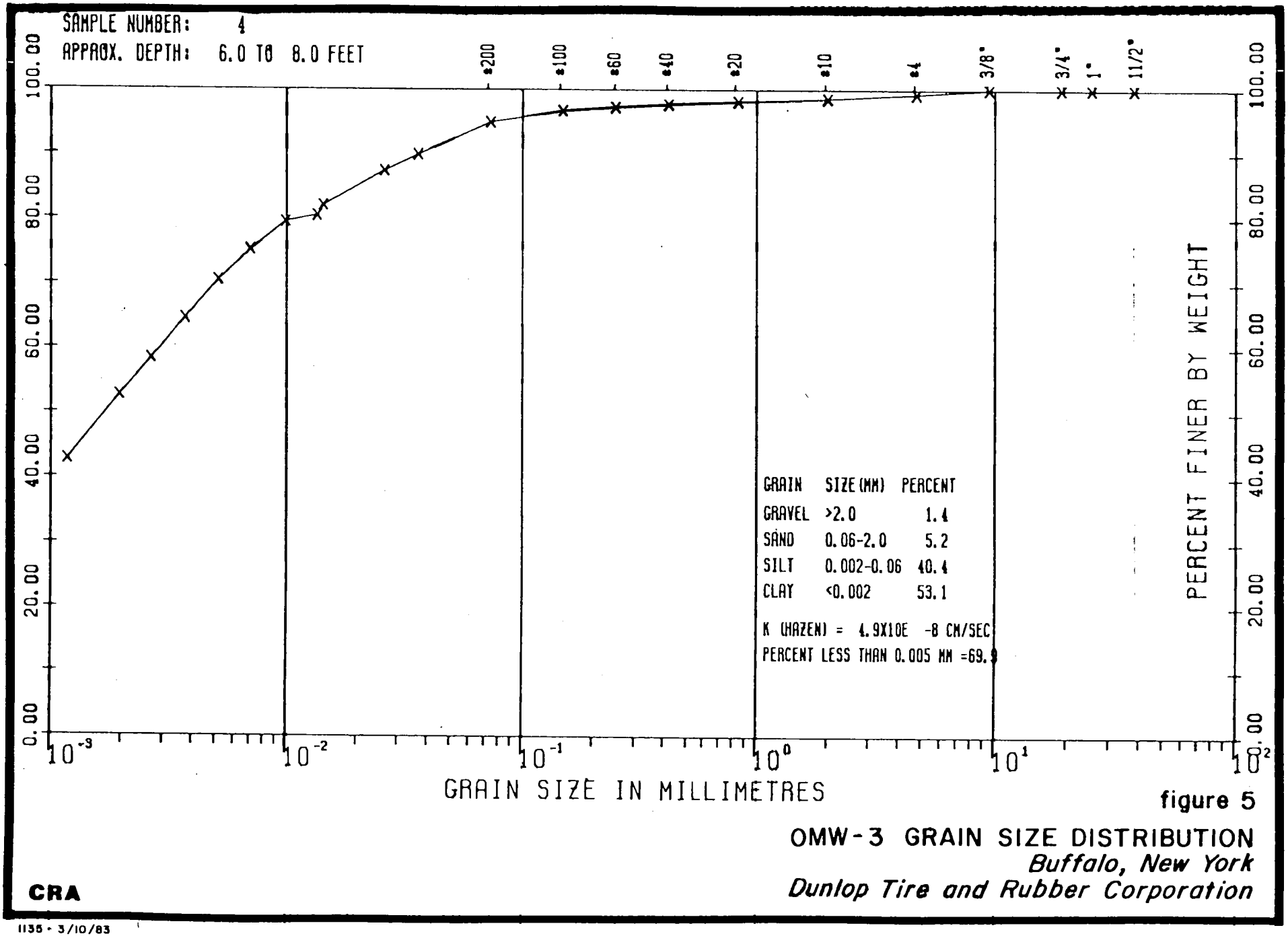

figure 5

OMW-3 GRAIN SIZE DISTRIBUTION

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7.0 SAMPLE COLLECTION

7.1 ANALYTICAL RESULTS - SOIL

The initial soil investigation at the Dunlop Plant consisted of the collection of four surface soil samples in July 1982. The locations of the four sampling stations are identified in Figure 6. Each sample was analyzed for Total Volatile Halogenated Organics, Total Kjeldahl Nitrogen and Total Recoverable Phenols. The results of the testing program are presented in Table 3A. The quality assurance documentation is presented in Appendix F.

During the installation of wells BMW-1, BMW-2, OMW-1 and OMW-3, a total of 10 split spoon soil samples were collected for chemical analysis. Each sample was analyzed for the following five parameters: chloroform, carbon tetrachloride, trichloroethylene, tetrachloroethylene, and total phenols.

The analytical results are presented in Table 3B.

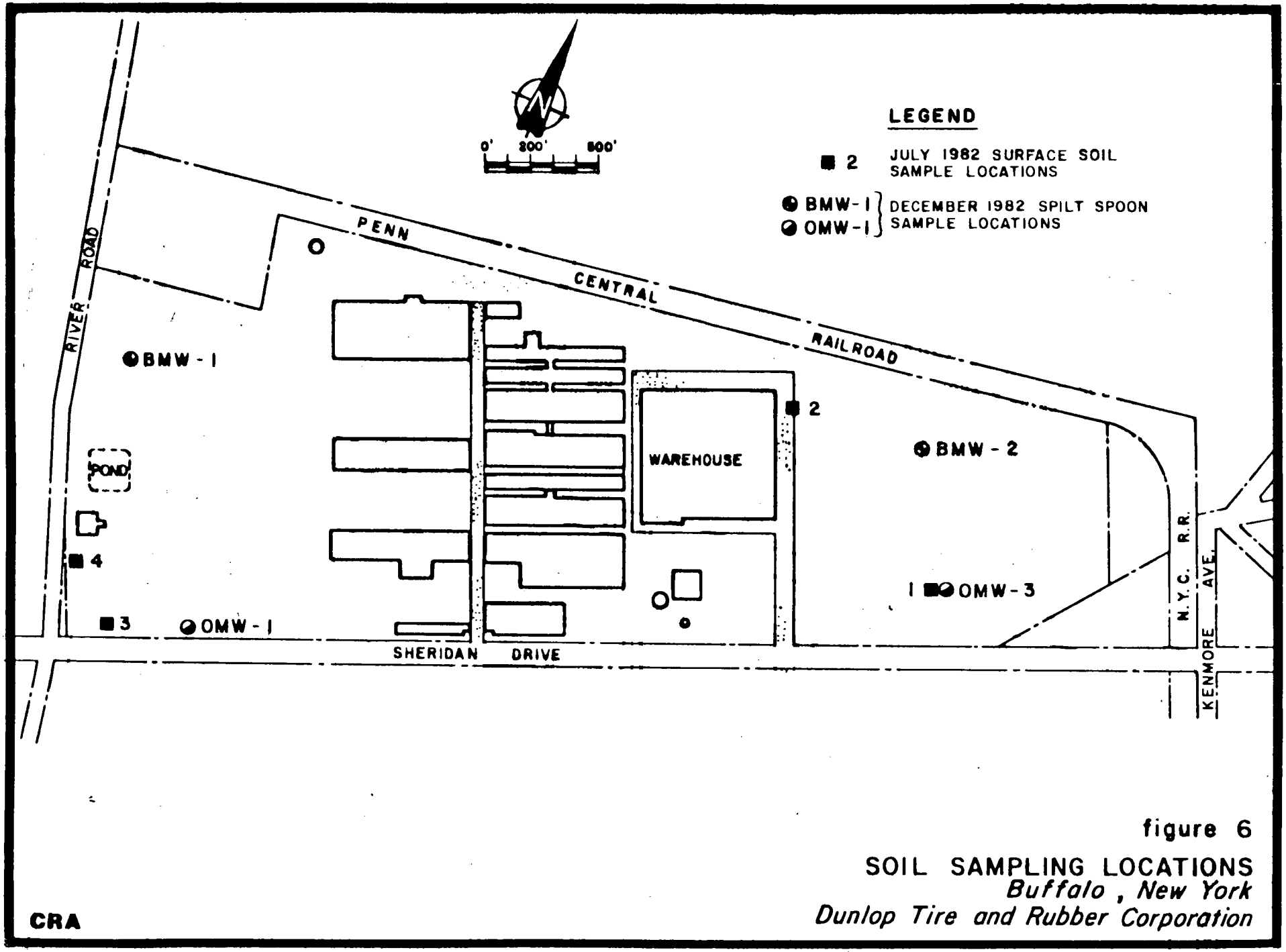

figure 6

SOIL SAMPLING LOCATIONS

Buffalo, New York

Dunlop Tire and Rubber Corporation

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TABLE 3A

SOIL ANALYSIS RESULTS

SURFACE SOIL SAMPLES (JULY 13, 1982)

Sample Identification	Total Volatile Halogenated Organics (ppm)	Total Kjeldahl Nitrogen (ppm)	Total Recoverable Phenols (ppm)
Hole #1 (1.8 ft.)	1.070	1,680.	0.188
Hole #2 1	0.351	708.	0.219
Hole #3 3 DEPTH	0.448	747.	0.194
Hole #4 1.5	0.082	673.	0.196

TABLE 3B

SOIL ANALYSIS RESULTS

SPLIT SPOON SAMPLES (DECEMBER 8 TO 17, 1982)

Sample Identification	Phenols (ppm)	Chloroform (ppb)	Carbon Tetrachloride (ppb)	Trichloroethylene (ppb)	Tetrachloroethylene (ppb)
BMW #1 - 0-2'	0.11	20.6	<0.20[2]	5.5	7.4
BMW #1 - 14'-16'	0.03	18.2	<0.10	3.4	2.6
BMW #1 - 60'-61.5'	0.08	6.9	<0.10	1.5	2.6
BMW #2 - 0-2'	0.35	18.6	<0.10	12.6	30.9
BMW #2 - 16'-18'	0.09	13.5	<0.10	3.5	2.9
BMW #2 - 65'-66'	0.32	4.4	<0.10	0.9	1.1
OMW #1 - 0-2'	0.32	14.5	<0.09	6.3	18.4
OMW #1 - 8'-10'	0.15	1.5	<0.09	0.5	1.4
OMW #3 - 0-2'	0.30	38.9	<0.17	7.3	9.2
OMW #3 - 6'-8'	0.14	9.5	<0.13	1.7	3.0

[1] Phenol in soil expressed as micrograms per gram and phenol in water expressed as milligrams per liter (ppm). Volatiles in soil expressed as nanograms per gram and volatiles in water given as micrograms per liter (ppb).

[2] (<) less than equals the limits of detection

7.2 ANALYTICAL RESULTS - WATER

Due to the slow recovery of the shallow overburden wells, water sample collection from the newly installed overburden wells was delayed until July 1983. OWM-4 was not sampled as sufficient water was not available. Each overburden well was bailed dry and allowed to recover prior to sampling.

Bedrock groundwater samples were collected in January following three separate prebailing operations. Each bedrock well was prebailed a total five (5) well volumes of groundwater on each of the three pre-bailing dates.

Each groundwater sample was analyzed for phenol, carbon tetrachloride, chloroform, trichloroethylene and tetrachloroethylene. The analytical results are presented in Table 4 and the quality assurance documentation is presented in Appendix F.

TABLE 4

GROUNDWATER ANALYTICAL RESULTS

Sample Identification	Phenols	Carbon Tetrachloride	Chloroform	Trichloroethylene	Tetrachloroethylene
BMW #1	0.00	<0.10[1]	<0.10	<0.10	<0.40
BMW #1 (Duplicate)	0.00	<0.10	<0.10	<0.10	<0.10
BMW #2	0.00	<0.10	<0.10	<0.10	<0.10
BMW #2 (Duplicate)	0.00	<0.10	<0.10	<0.10	<0.10
Field Blank (1/13/83)	0.00	<0.10	0.60	<0.10	<0.10
OMW #1	7.28	<0.20	0.09	0.09	0.38
OMW #1 (Duplicate)	7.36	<0.20	0.08	0.10	0.12
OMW #2	4.76	<0.20	0.07	0.06	0.16
OMW #2 (Duplicate)	3.55	<0.20	0.04	0.06	0.09
OMW #3	7.18	<0.20	0.08	0.06	0.08
OMW #3 (Duplicate)	5.29	<0.20	0.10	0.04	0.13
Field Blank (6/27/83) #1	*	<0.20	0.13	0.05	0.22
Field Blank (6/27/83) #2	*	<0.20	0.16	0.07	0.22
Field Blank (7/5/83) #1	*	<0.20	0.60	0.14	0.13
Field Blank (7/5/83) #2	*	<0.20	0.31	<0.03	0.05

[1] (<) Less than equals the limits of detection
* No Field Blank for Phenols
All results expressed as micrograms per liter, or ppb

8.0 ENVIRONMENTAL DISCUSSION

The initial four soil samples analyzed by AES in July 1982 provided Dunlop with a preliminary set of volatile halogenated organic parameters. These parameters were then used to evaluate subsequent analytical investigations.

The results of the split spoon sample analyses indicate that the concentrations of volatile organics drop significantly with depth. The analytical results are consistent with the soil stratigraphy information considering the relatively impermeable nature of the soil underlying the fill materials.

The highest volatile organic concentration recorded was that of chloroform (38.9 ppb) at OMW3 (0-2' depth). The concentration dropped to 9.5 ppb for the interval from 6 to 8 feet in depth. Carbon tetrachloride was not detected in any of the soil samples.

The phenol concentrations also dropped between the surface and next sample interval tested indicating that the clayey soils are effectively restricting the downward migration of contaminants. Considering the massive layers of clayey soils, it is unlikely that the relatively high phenol concentrations recorded in the wet

till overlying the bedrock are the result of on-site disposal practices.

As noted in Table 4, the analytical results of the overburden groundwater samples collected do not indicate the presence of any volatile organic in excess of 1 ppb. In fact, the analyzed groundwater results are generally lower than those recorded for the field blanks. Once again, the presence of carbon tetrachloride was not recorded in any of the samples.

All of the phenol results are on the order of 4 to 7 ppb for the overburden samples. This is above the New York State guideline for wastewater of 1 ppb, however, considering the rate of groundwater flow through the lower permeable soils, there will not be a significant environmental impact resulting from the presence of the phenols in the overburden regime.

The analytical results for the bedrock groundwater samples do not show the presence of any of the parameters for which tests were conducted.

All of the above results indicate that the problem of contaminant migration, if any, would be restricted to the surficial flow regimes.

9.0 RECOMMENDATIONS AND CONCLUSIONS

Based on the information collected to date, the following conclusions and recommendations have been formulated:

1. It is concluded that the clayey soils underlying the plant site are effectively preventing the vertical migration of contaminants, thus protecting the groundwater of both the overburden and bedrock regimes.

2. It is concluded that the limits of refuse disposal are approximately as identified on enclosed Map 1.

3. It is concluded that the only significant environmental impact, if any, would be limited to surface water discharge from the fill areas.

4. It is recommended that a surface water sampling program be undertaken to identify surface water discharge quality from the former disposal areas.

5. It is recommended that a surface contouring plan be developed to promote surface water drainage in identified problem areas.

6. It is recommended that fill areas be appropriately graded (minimum 5% slope) and capped with impermeable materials ($K = 10^{-7}$ cm/sec) to eliminate surface water/fill contact in these areas.

All of Which is Respectfully Submitted,

ADVANCED ENVIRONMENTAL SYSTEMS INC.

W. Joseph McDougall

W. Joseph McDougall, Ph.D.

CONESTOGA-ROVERS & ASSOCIATES LIMITED

Frank A. Rovers, P. Eng.

James Kay

James K. Kay, P. Eng.

APPENDIX A

WASTE DISPOSAL PRACTICES

APPENDIX A-1

HISTORICAL

DUNLOP

TO: D. Pyanowski FROM: T. L. Zera DATE: 12/10/82

SUBJECT: History - Use of Dumpsite by Warehouse

In an effort to determine what substances and if any substances were dumped on Dunlop property in the past, conversations took place with S. Tumidolsky, G. Pitman, K. Boerst, H. Tyrell, and R. Potzler. The summary of information obtained is as follows:

1. It was common practice to dump waste in an unofficial dumpsite East of the Warehouse, North of the ashpit.

2. Even as recently as November, 1982, 55 gallon drums and smaller containers were found protruding from the ground in this area.

3. Only H. Tyrell could cite specific liquid waste substances being dumped in this area. He stated that waste solvent and degreaser substances were dumped in this area. Machine cleaning solvents as well as those used in golf ball production were referred to. "Phanalene" was specified as a chemical solvent used.

4. R. Potzler referred to urethane production as a possible source of the chloroform found in samples taken recently. Chloroform also was used in balada processing in the manufacture of golf balls (methyl chloroform - remold cement - 37-561) in Buffalo.

5. The trichloroethylene and carbon tetrachloride are common solvents that could have been used for golf ball production and machine/parts cleaning years ago. Carbon tetrachloride is the most hazardous of the substances and has been discontinued as a cleaning solvent by general industry probably twenty years ago.

6. S. Tumidolsky and G. Pitman were of the opinion that liquid wastes were put in a tank on the back dock of Receiving or the Calender Department and the tank was taken off site by Seaway, a firm that disposed of its contents for Dunlop.

Conclusion:

1. At least one former Dunlop employee can recall first-hand that chemicals and solvents were dumped out in the field East of the Warehouse. The other retirees can only corroborate that; that area was used as a dumpsite.

2. We can attribute the chlorinated solvents found in recent water samples, to prior chemicals and processes used at the Buffalo Plant years ago.

T. L. Zera

TLZ/smh

APPENDIX A-2

CURRENT

WASTE DISPOSAL - BUFFALO

MATERIAL	COLLECTION	DISPOSAL
1. Carbon Black	1a. Dept. 201 floor sweepings, spillage. b. Dept. 201 dust collectors c. Carbon Black tower pit	1. Sludge container on back dock between Bldgs. #1 & 4.
2. Buffing Dust	2. Dept. 237 dust collectors floor sweepings.	2. Put in 55 gal. drums. Drums emptied into 30 cu. yd. container : 60 ft. rdwy. Contain taken off-site and emptied by Downing.
3. Diaphragms	3. All curing departments	3. Dept. 145 personnel collect and pile at e: of 60 ft. rdwy, by R.: tracks. Sold to scra: dealers who remove th: from Company property
4. Scrap Tires	4. Dept. 237, Adjustments, Tire Test, Curing Depts.	4. Scrap tires are cut a: put in 30 cu. yd. con-tainer - back dock of Bldg. 4. Container taken off- site and emptied by Frontier.
5. Scrap Rubber	5a. Dept. 201 - bad batches	5a Put into 30 cu. yd. c: tainer at end of 80 f: rdwy. Container take: off-site and emptied : Downing.
	b. Tire Test - pieces	b Put into compactor at back dock - Bldg. 4 Taken off-site by Downing.
6. Tire Beads	6. Dept. 206, Tire Bldg. Depts.	6. Put into compactor at back dock - Bldg. 4 Taken off-site by Downing.
7. Tire Trimmings	7. Dept. 237, 214	7. Shoveled into Hoppers in dept. Trucked to compactor at back doc: Bldg. 4 and warehouse compactor. Taken off-site and emptied by Downing.

MATERIAL	COLLECTION	DISPOSAL
8. Plastic	8a. Dept. 201, packaging material b. Warehouse	8. Put in Hoppers. Trucked to compactor at back dock - Bldg. Taken off-site and emptied by Downing.
9. Fabric	9. Dept. 202, Tire Bldg. Depts., scrap	9. Collected in Depts. taken to Dept. 202 dock - baled, weighed sold to scrap dealer. Taken off-site.
10. Oils, gear lubricants	10a. Banburys - Dept. 201	10a Collected in buckets. Emptied in Hopper in Dept. Trucked to sludge container - ba dock, between Bldgs. & 4.
	b. Gas Truck Garage motor oil	b Emptied into submarin Taken to Boiler House and burned.
	c. Dept. 237 hydraulic leaks residue in oil lines - N. end of 80 ft. rdwy. Curing Dept. hydraulic oil.	c Emptied into submarin Taken to Boiler House and burned as fuel.
11. Sludge	11 Banburys - Dept. 201	11. Put into plastic line 55 gal drum - emptied into Hopper in Dept. Trucked to sludge con tainer between Bldgs. #1 &4, back dock.
12. Rubber Cement	12. Dept. 204, 239, Tread line over spray and waste	12. Put into drums, taken to sludge container between Bldgs. #1 & 4 back dock.
13. Floor Sweepings.	13. Plantwide power floor sweepers.	13. 145 personnel empty into Hoppers. Trucke to compactor - back dock - Bldg. #4. b Dept. 201 sweepings emptied into Hooper a put in sludge contain between Bldgs. 1-4, back dock

MATERIAL	COLLECTION	DISPOSAL
14. Penetone	14. Machine Shop	14 Mixed into contents of submarines as clea ing agent. Submarine taken to Boiler House contents burned as fu
15. Kerosene	15. Maintenance shops in Depts. - parts cleaning solvent.	15 Drum taken to sludge container between Bld #1-4, back dock.
16. Acid Tanks Oakite 32 (38-310) Oakite M-3 Stripper	16. Dept. 213 acid tank	16 Neutralized, emptied into drain.
17. Wood, pallets, refuse	17. Dept. 201, 181 Warehouse	17 Collected by 145 Dept personnel, emptied in compactor - back dock Bldg. #4
18. Green Tire Paint	18. Tire Bldg. Depts. residue and when tanks flushed.	18. Dept. 145 personnel c lects and puts liquid in sludge container - back dock, between Bldgs. 1-4 and solids in compactor back doc Bldg. 4
19. Spray Lat	19. Dept. 237 Dept. overspray	19. Dept. 145 personnel take solids to compac tor - back dock Bdlg.

January, 1983
T. L. Zera
W. Podlewski

6/1/83

TABLE 1 - REFUSE DATA - DUNLOP TIRE & RUBBER - BUFFALO, N.Y.

Container	Location	Nominal Weight (Lbs.)	Pickup Frequency	Daily Waste Generation (Lbs.)	Waste Type	BTU/Lb.	BTU/Day	BTU/Hr.	% Rubber Waste	Lb. Rubber/ Day
Compactor No. 1	Building 1	9,000	1½/Day	14,000	Pallets, paper, cardboard	8,500	1.2×10^8	4,958,333	0	0
Compactor No. 2	Building 4	18,500	1/Week	3,700	Pallets, paper, cardboard	8,500	3.1×10^7	1,310,417	10	370
Compactor No. 3	Warehouse	23,000	1/3 Weeks	1,500	Pallets, paper, spew vents	10,000	1.5×10^7	625,000	25	375
Dust Container	Warehouse	8,000	1/Week	1,600	Buffing dust, general trash	10,000	1.6×10^7	666,667	75	1,200
Sludge Container	Building 1	35,000 Total	1/2 Weeks							
	Breakdown of Sludge Container	8,000 Sludge 11,500 Powders 5,700 Trash			Banbury waste oil sludge Carbon black & powders					
				570	Bags, paper, general refuse	8,500	4.9×10^6	202,000	10	57
Extra Container	Building 1	Say 8,000 2,000-16,000	1/2 Weeks	800	Overflow from Compactor No. 1	8,500	6.8×10^6	283,333	0	0
Scrap Rubber	North End Roadway	5,600	1/Month	280	Cured rubber, general trash	10,000	2.8×10^6	116,667	10	28
Railroad	Scale House	---	4/Year	---	R.R. car waste	---		---	---	---
Boiler House	Boiler House	---	5/Year	---	General refuse	---		---	---	---
Machine Shop (30 yd³)	Building 6	N/A	N/A	N/A	Metal waste	---		---	---	---
Machine Shop (10 yd³)	Building 6	?	?	?	General trash	---		---	---	---
2-Tire Containers	Building 4	?	3/Week	4,500	Tires	12,000	5.4×10^7	2,250,000	100	4,500
Tire Container	Tire Adjustment	1,000	1/Week	200	Tires	12,000	2.4×10^6	100,000	100	200
Other Plant Waste Sources										
Tire Test Lab	Building 6	800	1/Week	160	Tires	12,000	1.9×10^6	80,000	100	160
Scrap Bladders		N/A	N/A	830	Cured rubber	13,000	10.8×10^6	450,000	100	830
Scrap Cord, Fabric & Green Tires		N/A	N/A	3,000	Fabric, uncured rubber	13,000	3.9×10^7	1,625,000	75	2,250
Liquid (sludge) Waste from Sludge Container		6,912 Lb./Wk. (864 gal./Wk.)		1,383	Banbury waste oil mixed with powders & rubber	17,000	23.5×10^6	980,000	10	138
Total (up to scrap bladders)				28,140 Lb./Day				11,942,417		7,720
Total (including scrap cord)				31,140 Lb./Day				12,667,417		9,970
Total (including sludge)				32,523 Lb./Day				13,647,417		10,180

/ja

J. LaBuda

APPENDIX B

TESTHOLE STRATIGRAPHIC LOGS

TH 1
DATE: January 10, 1983

DEPTH	DESCRIPTION
0-0.3'	Dark brown topsoil
0.3-1.7'	Red-brown silt and clay, trace of slag, some steel particles.
1.7-2.0'	Dark brown topsoil, native.
2.0-3.7'	Red-brown silt and clay.

TH 2
DATE: January 10, 1983

DEPTH	DESCRIPTION
0-0.3'	Dark brown topsoil.
0.3-2.3'	Mottled red-brown silt and clay, some gravel.
2.3-3.5'	Black slag mixed with gravel and clay.
3.5-4.4'	Native red-brown silt and clay.

NOTE: Some water collecting in bottom of excavation.

TH 3
DATE: January 10, 1983

DEPTH	DESCRIPTION
0-0.3'	Dark brown topsoil.
0.3-2.3'	Mottled light and dark brown silt & clay.
2.3-3.2'	Black gravel, sand and slag.
3.2-4.2'	Native red-brown silt and clay.

TH 4
DATE: January 10, 1983

DEPTH	DESCRIPTION
0-0.3'	Dark brown topsoil.
0.3-1.3'	Brown and red-brown silt and clay, some gravel, trace of slag, pieces of brick.
1.3-1.5'	Black sand and topsoil, trace of slag.
1.5-2.0'	Native red-brown silt & clay.

TH 5
DATE: January 10, 1983

DEPTH	DESCRIPTION
0-1.2'	Red-brown silt and clay, some gravel, topsoil to 3".
1.2-1.6'	Dark brown and black gravel, some slag.
1.6-2.2'	Native red-brown silt and clay.

TH 6
DATE: January 10, 1983

DEPTH	DESCRIPTION
0-1.5'	Mottled red-brown silt and clay, topsoil.
1.5-2.5'	Black slag, gravel, wood pieces.
2.5-3.5'	Native red-brown clay and silt.

TH 7
DATE: January 10, 1983

DEPTH	DESCRIPTION
0-0.3'	Dark brown topsoil.
0.3-2.1'	Mottled red-brown silt and clay, some topsoil.
2.1-2.8'	Black slag, sand and gravel

NOTE: 10" of water in bottom of excavation.

TH 8
DATE: January 10, 1983

DEPTH	DESCRIPTION
0-0.3'	Dark brown topsoil.
0.3-1.4'	Brown and red-brown silt and clay.
1.4-2.2'	Dark black and reddish orange sand, flyash, gravel, slag, trace of steel particles.
2.2-3.2'	Native red-brown silt and clay.

NOTE: 6" of water collected in bottom of excavation.

TH 9
DATE: January 10, 1983

DEPTH	DESCRIPTION
0-0.3'	Dark brown topsoil.
0.3-1.0'	Black and brown slag, sand and gravel.
1.0-2.0'	Golden brown sand and gravel with 2"-3" Ø rocks, some brick.
2.0-3.0'	Native red-brown silt and clay.

NOTE: 12" of water collected in excavation bottom.

TH 10
DATE: January 10, 1983

DEPTH	DESCRIPTION
0-3.5'	Native soils.

TH 11
DATE: January 10, 1983

DEPTH	DESCRIPTION
0-1.5'	Black sand and slag and gravel, flyash and yellow brick.
1.5-3.5'	Native red-brown silt and clay.

NOTE: 6" of water in bottom of excavation.

TH 12
DATE: January 10, 1983

DEPTH	DESCRIPTION
0-10.0'	Flyash, sand, gravel, brick, paper, rags - black and dark grey.
10.0-10.5'	Native red-brown silt and clay.

TH 13
DATE: January 10, 1983

DEPTH	DESCRIPTION
0-0.3'	Dark brown topsoil.
0.3-1.0'	Dark brown and black topsoil, gravel, glass fragments, red brick.
1.0-2.0'	Brown, red-brown silt and clay and topsoil.
2.0-4.0'	Native red-brown silt and clay.

TH 14
DATE: January 10, 1983

DEPTH	DESCRIPTION
0-0.3'	Dark brown topsoil
0.3-0.8'	Topsoil and sand, red brick, some gravel.
0.8-3.5'	Native red-brown silt and clay.

TH 15
DATE: January 10, 1983

DEPTH	DESCRIPTION
0-0.1'	Topsoil
0.1-1.1'	Mottled brown and red-brown silt and clay, some topsoil.
1.1-1.4'	Black sand and gravel, some slag, large stones 2"-3", angular shaped.
1.4-3.5'	Native red-brown silt and clay.

NOTE: 10" water collected in excavation.

TH 16
DATE: January 10, 1983

DEPTH	DESCRIPTION
0-0.5'	Topsoil
0.5-2.0'	Red-brown silt and clay.

TH 17
DATE: January 10, 1983

DEPTH	DESCRIPTION
0-0.2'	Topsoil.
0.2-0.9'	Red-brown and brown silt, some clay, some topsoil, some gravel.
0.9-2.1'	Black and dark brown gravel and sand, 2"-3" angular stones, red brick, some pieces of steel.
2.1-3.5'	Native red-brown silt and clay.

NOTE: 12" of water collected in excavation bottom.

TH 18
DATE: January 10, 1983

DEPTH	DESCRIPTION
0-2.0'	Mottled red-brown silt and clay, trace of slag, some gravel.
2.0-2.5'	Dark brown topsoil with reddish brown streaks throughout, possible cause - decaying root matter.
2.5-3.5'	Native red-brown silt and clay.

TH 19
DATE: January 10, 1983

DEPTH	DESCRIPTION
0-2.8'	Trace of topsoil, mottled red-brown silt and clay, pieces of lumber, some gravel.
2.8-3.4'	Black sand and silt, some slag, some gravel, root matter. Moist at 3.4'.
3.4-5.4'	Native red-brown silt and clay, some subangular stone.

TH 20
DATE: January 10, 1983

DEPTH	DESCRIPTION
0-0.2'	Black peat and decaying vegetative matter.
0.2-0.7'	Topsoil.
0.7-3.5'	Red-brown silt and clay, rounded stone and gravel throughout.

TH 21
DATE: January 11, 1983

DEPTH	DESCRIPTION
0-1.0'	Black topsoil, good roots.
1.0-3.0'	Native red clay, silt.

TH 22
DATE: January 11, 1983

DEPTH	DESCRIPTION
0-0.2'	Topsoil.
0.2-0.8'	Medium red silty clay.
0.8-1.2'	Black topsoil (native).
1.2-1.8'	Brown silty clay.
1.8-2.5'	Red-brown mottled silty clay, organic fibers with reddish brown streaks throughout.
2.5-3.2'	Red silty clay.

TH 23
DATE: January 11, 1983

DEPTH	DESCRIPTION
0-0.2'	Topsoil.
0.2-0.8'	Red silty clay, some pebbles, 2" Ø washer.
0.8-1.1'	Black topsoil (native).
1.1-1.8'	Medium brown silty clay.
1.8-2.3'	Red-brown mottled clay, reddish brown streaks throughout.
2.3-3.0'	Red silty clay.

TH 24
DATE: January 11, 1983

DEPTH	DESCRIPTION
0-0.3'	Topsoil
0.3-0.8'	Medium red silty clay, some pebbles.
0.8-1.1'	Black topsoil (native).
1.1-1.9'	Medium brown silty clay.
1.9-2.5'	Red-brown mottled silty clay with root fibers, reddish brown streaks throughout.
2.5-3.2'	Red silty clay.

TH 25
DATE: January 11, 1983

DEPTH	DESCRIPTION
0-0.3'	Topsoil
0.3-1.2'	Gravel seam 2"-4" diameter intermixed with silt and sand.
1.2-3.2'	Red silty clay.

TH 26
DATE: January 11, 1983

DEPTH	DESCRIPTION
0-0.7'	Topsoil.
0.7-2.0'	Mottled red-brown silty clay.
2.0-3.3'	Red silty clay.

APPENDIX C

ELECTROMAGNETIC CONDUCTIVITY SURVEY

United States Department of the Interior

GEOLOGICAL SURVEY

December 14, 1982

Mr. Daniel Pyanowski
Dunlop Tire & Rubber Corp.
Buffalo, New York

Dear Mr. Pyanowski,

In response to our phone conversation of December 14 I am sending you the results of the electromagnetic conductivity surveys conducted on Dunlop property last month.

According to survey policy, until my report is formally published I am not to release any interpretations of my data to the public or to private individuals. The raw data itself, however, is usually made available per request.

Along with the data I have enclosed a list of references that you may find useful as interpretational aids. If you have any questions please don't hesitate to call me at (609) 989 2162.

Sincerely,

Philip B. Duran

Enc.

Dunlop Tire and Rubber

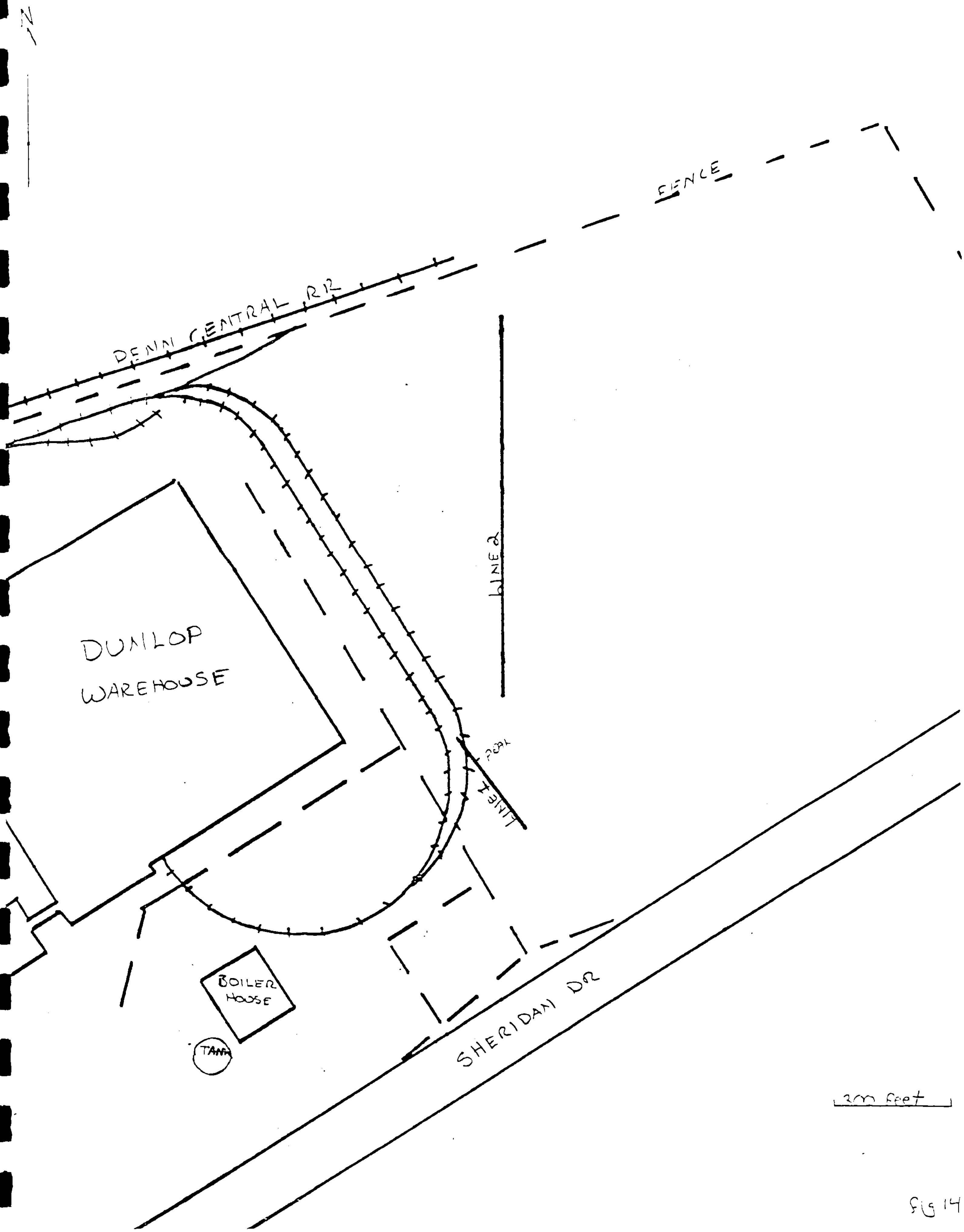
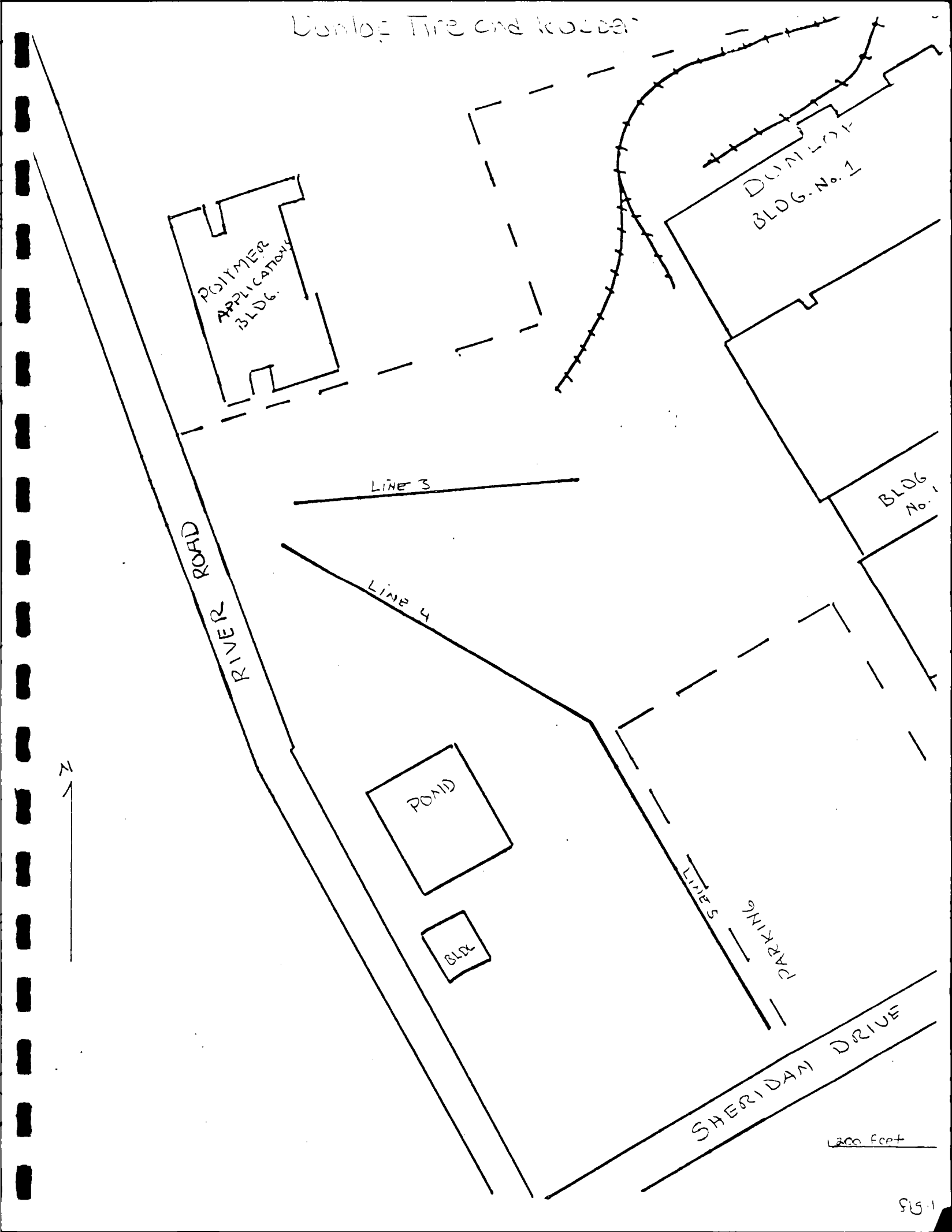


fig 14

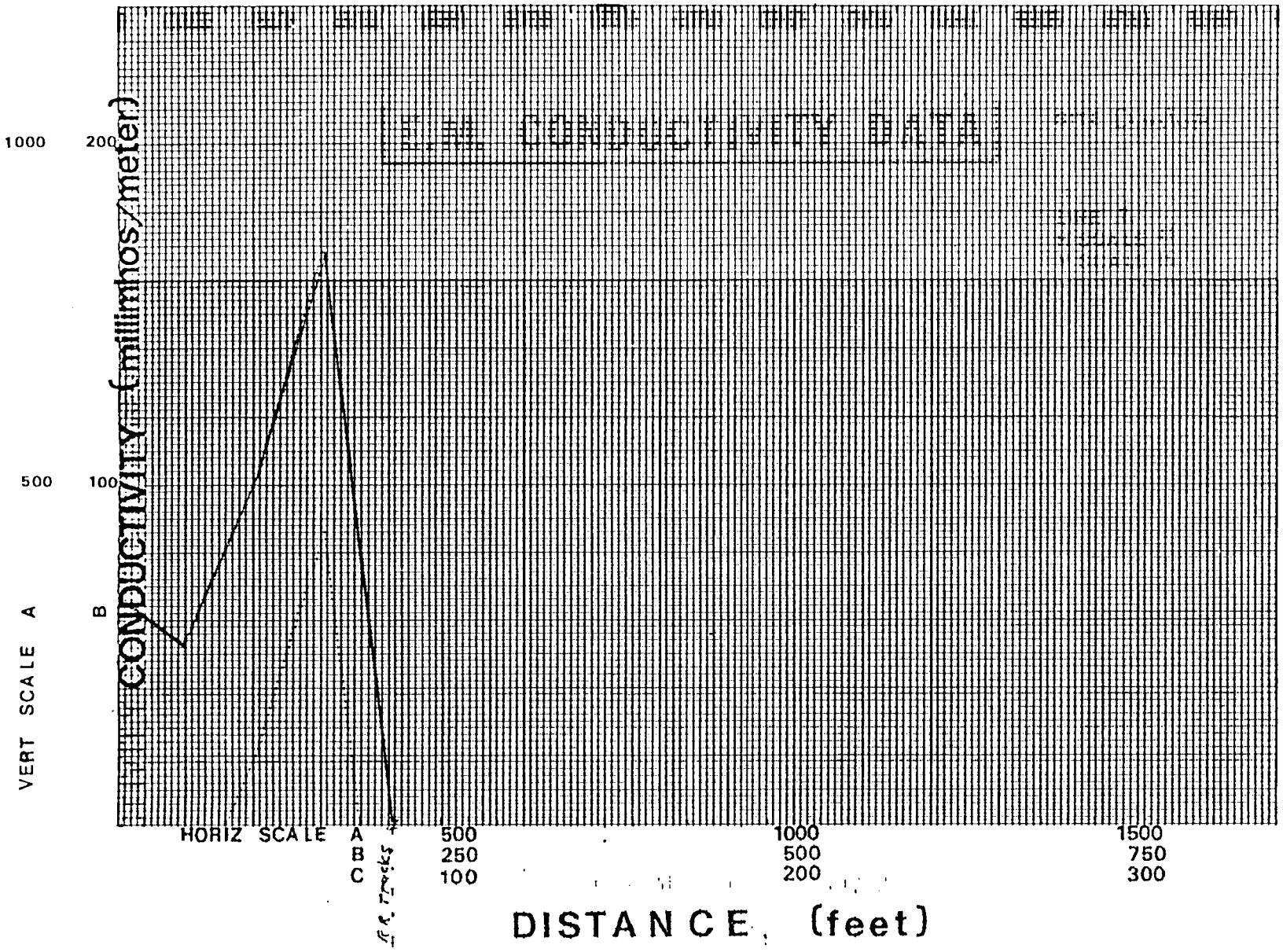

Dunlop Tire and Rubber
POLYMER APPLICATIONS BLDG.
DUNLOP BLDG. No. 1
BLDG No. 1
LINE 3
LINE 4
LINE 5
RIVER ROAD
POND
BLDG
PARKING
SHERIDAN DRIVE
N
1200 Feet

SLS-1

E.M. CONDUCTIVITY DATA

SITE Dunlap

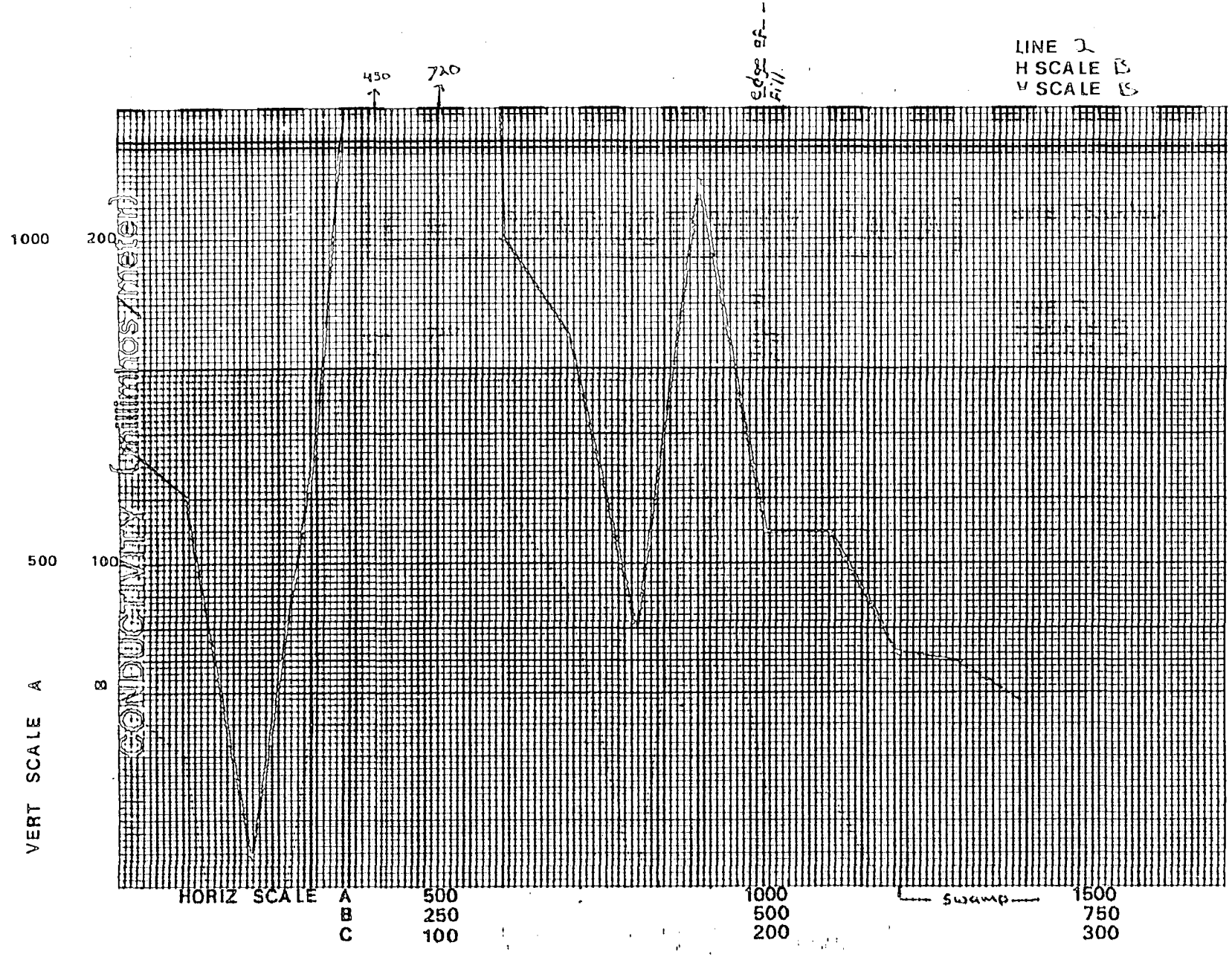
LINE 1.
H SCALE B
V SCALE B



E.M. CONDUCTIVITY DATA

SITE Dunlop

LINE 2
H SCALE B
V SCALE B



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SITE Donlop

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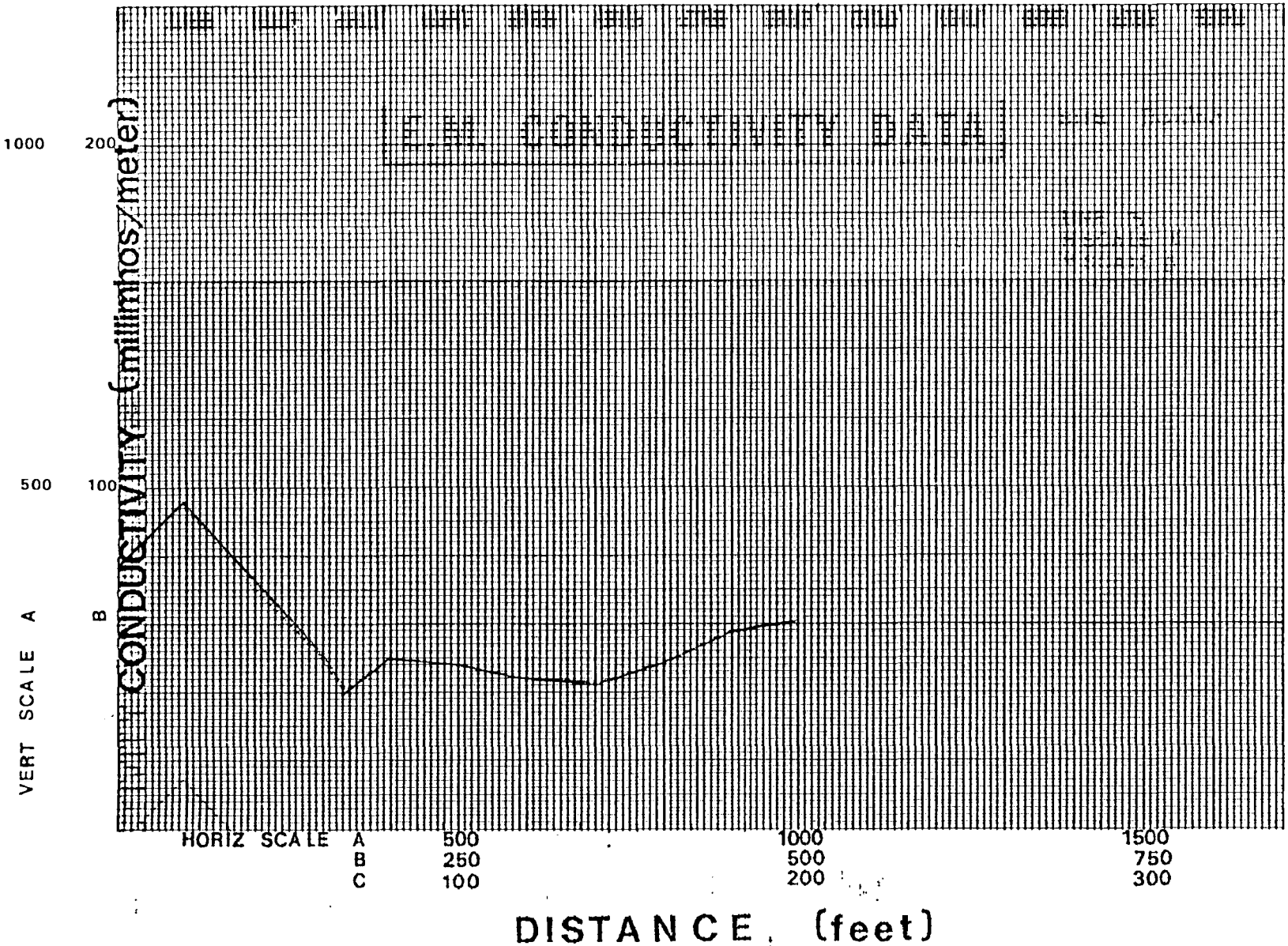
V SCALE B



E.M. CONDUCTIVITY DATA

SITE Dunlop

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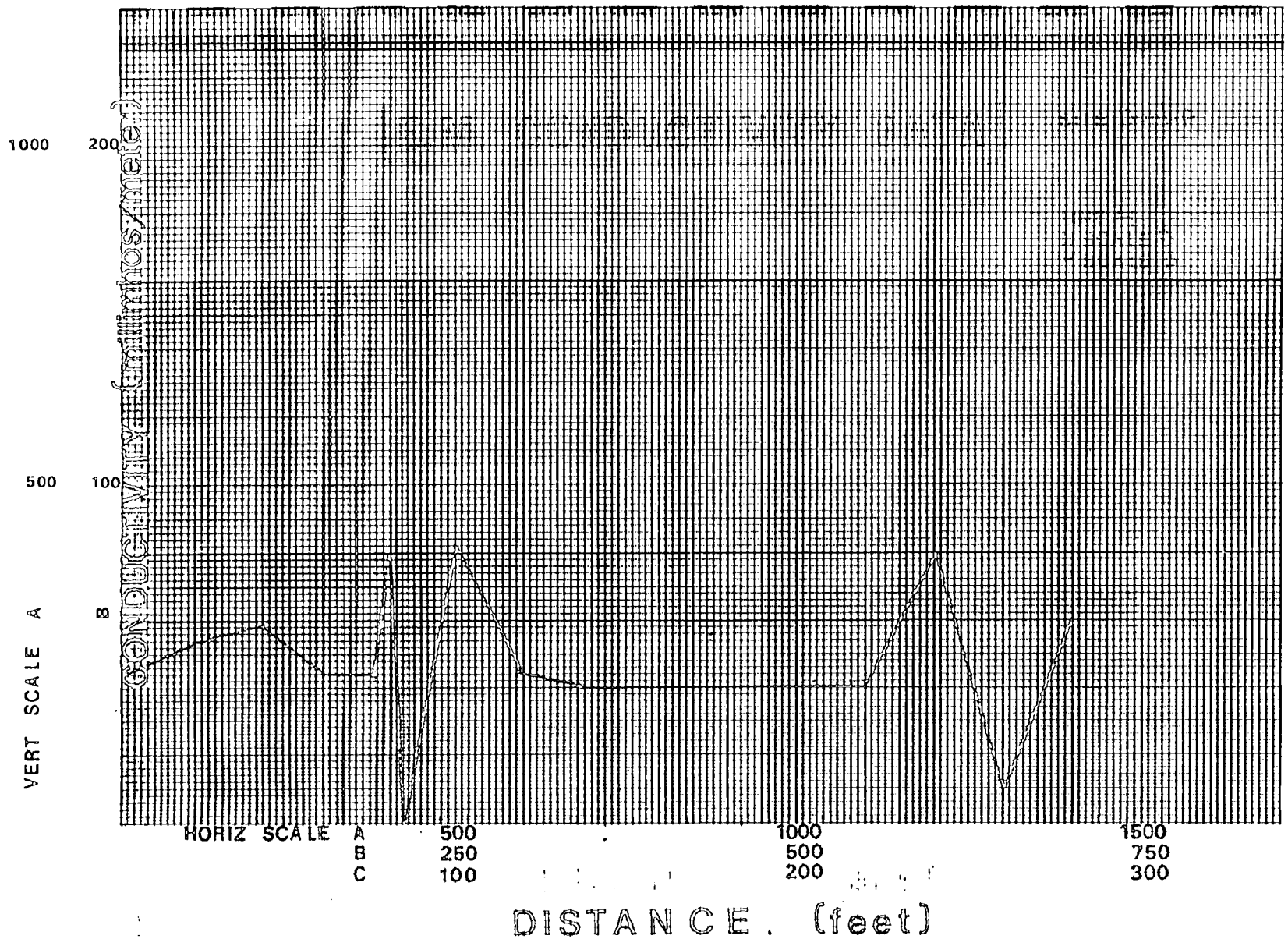
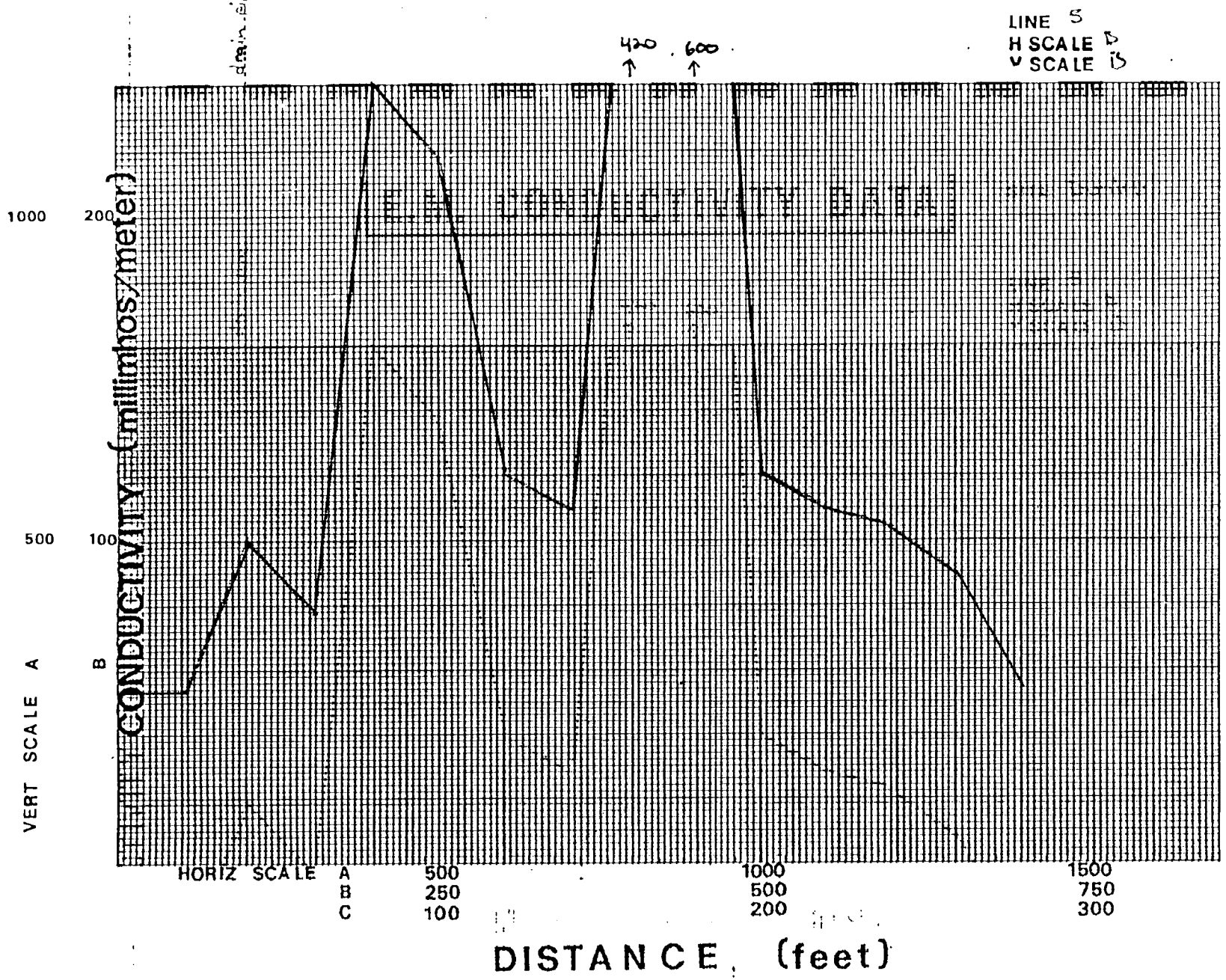
V SCALE B



E.M. CONDUCTIVITY DATA

SITE Dunlap



RANGE OF CONDUCTIVITY

Material	Conductivity Range (millimhos/meter)
Lime Stone	10^{-4} - 20
Sands	1.25 - 100
Clays	10 - 1000
Unconsolidated Wet Clay	50

Source - Technical Note TN-5
Electrical Conductivity of Soils & Rocks
Geonics Limited

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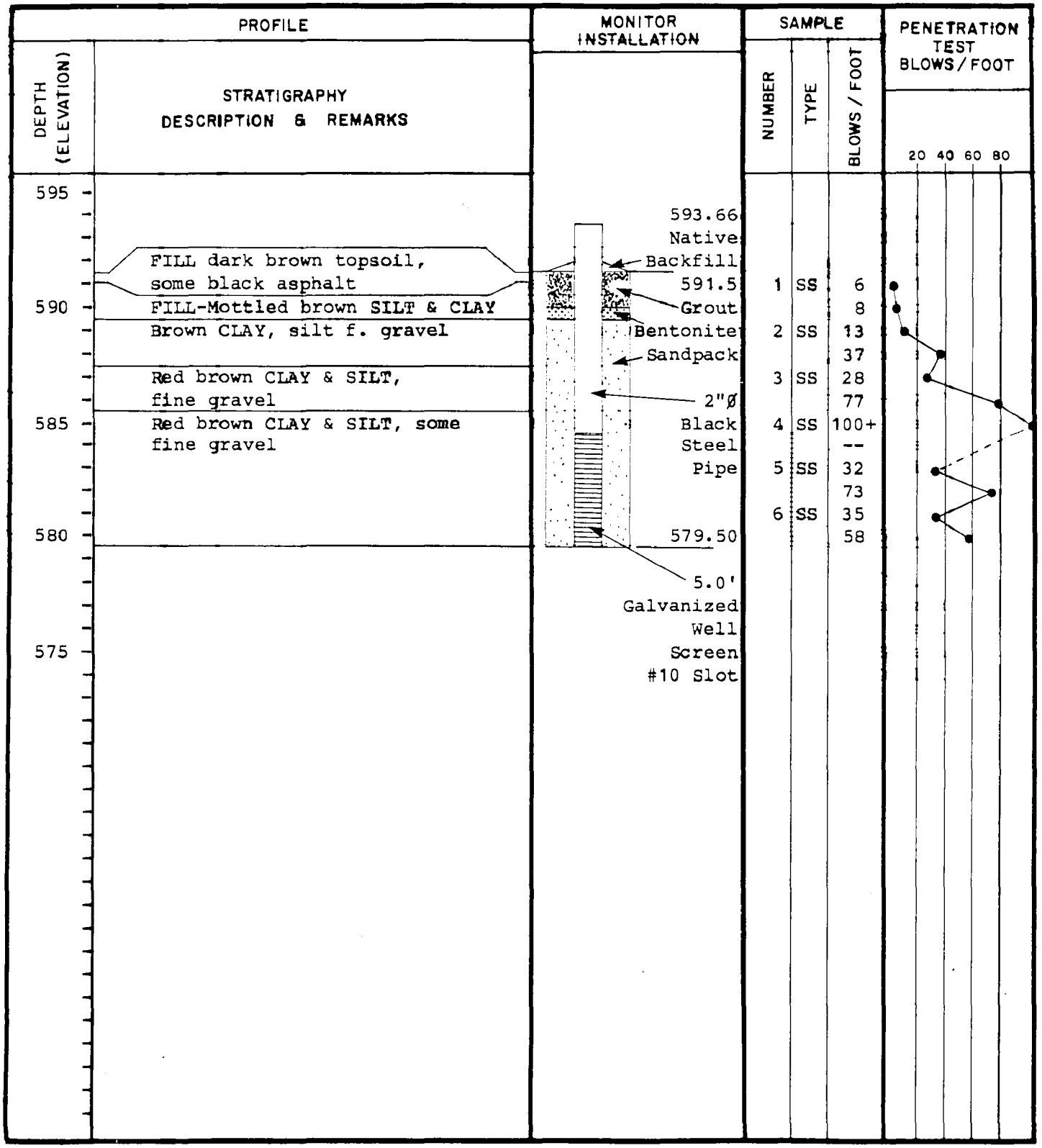
APPENDIX D

STRATIGRAPHIC AND INSTRUMENTATION LOGS

1983 MONITORING WELL INSTALLATIONS

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME : DUNLOP - BUFFALO PLANT
HOLE Nº: OMW-1
JOB Nº : 9-1135
DATE COMPLETED: DECEMBER 17, 1982
CLIENT : DUNLOP TIRE CORPORATION
GEOLOGIST/ENGINEER: D. MILLARD
HOLE TYPE : 6"Ø HOLLOW STEM AUGER
GROUND ELEVATION: 591.5
LOCATION : DUNLOP PROPERTY - SOUTHWEST SECTOR
TOP OF PIPE ELEVATION: 593.66



○ GRAIN SIZE ANALYSIS ▼ WATER FOUND ▽ STATIC WATER LEVEL

STRATIGRAPHIC AND INSTRUMENTATION LOG

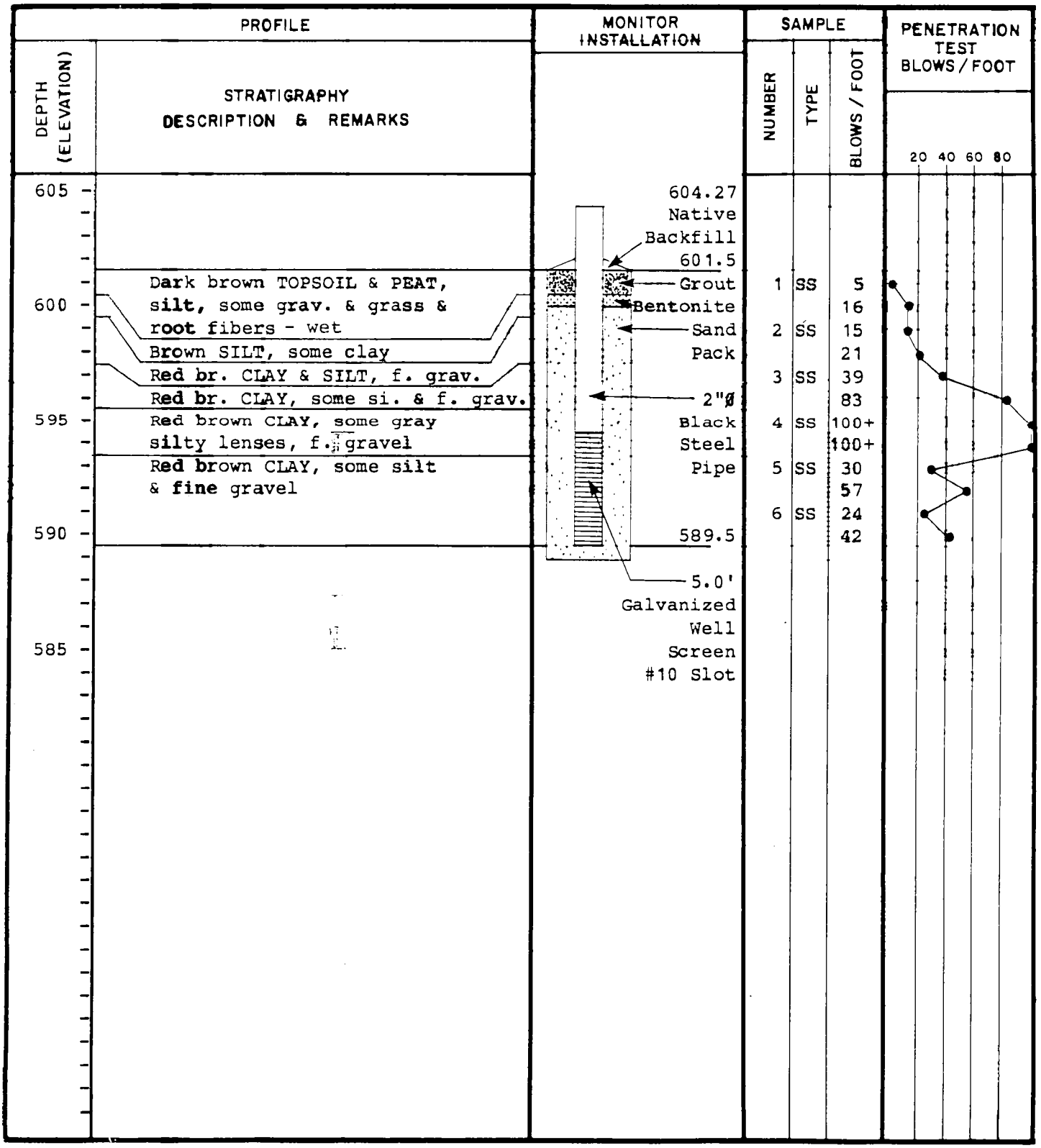
PROJECT NAME: DUNLOP - BUFFALO PLANT
HOLE Nº: OMW-2
JOB Nº: 9-1135
DATE COMPLETED: DECEMBER 10, 1982
CLIENT: DUNLOP TIRE CORPORATION
GEOLOGIST/ENGINEER: D. MILLARD
HOLE TYPE: 6"Ø HOLLOW STEM AUGER
GROUND ELEVATION: 585.9
LOCATION: DUNLOP PROPERTY - NORTHWEST SECTOR
TOP OF PIPE ELEVATION: 589.22

PROFILE		MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT
DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT	20 40 60 80
590		589.22 Native Backfill				
585	FILL - TOPSOIL RED brown CLAY, silt, f. grav. FILL-Red brown SILT, black clay, wood chips	585.9 Grout Bentonite				
580	Red brown CLAY, silt Red brown SILT, clay, fine gravel	2"Ø Black Steel Pipe Sand Pack				
575	NOTE: STRATIGRAPHIC DATA FROM BMW-1 LOG	575.6 5.0' Galvanized Well Screen #10 Slot				
570						

○ GRAIN SIZE ANALYSIS ▼ WATER FOUND ▽ STATIC WATER LEVEL

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME : DUNLOP - BUFFALO PLANT
HOLE Nº: OMW-3
JOB Nº : 9-1135
DATE COMPLETED: DECEMBER 17, 1982
CLIENT : DUNLOP TIRE CORPORATION
GEOLOGIST/ENGINEER: D. MILLARD
HOLE TYPE : 6"Ø HOLLOW STEM AUGER
GROUND ELEVATION: 601.5
LOCATION : DUNLOP PROPERTY - SOUTHEAST SECTOR
TOP OF PIPE ELEVATION: 604.27



○ GRAIN SIZE ANALYSIS ▼ WATER FOUND ▽ STATIC WATER LEVEL

STRATIGRAPHIC AND INSTRUMENTATION LOG

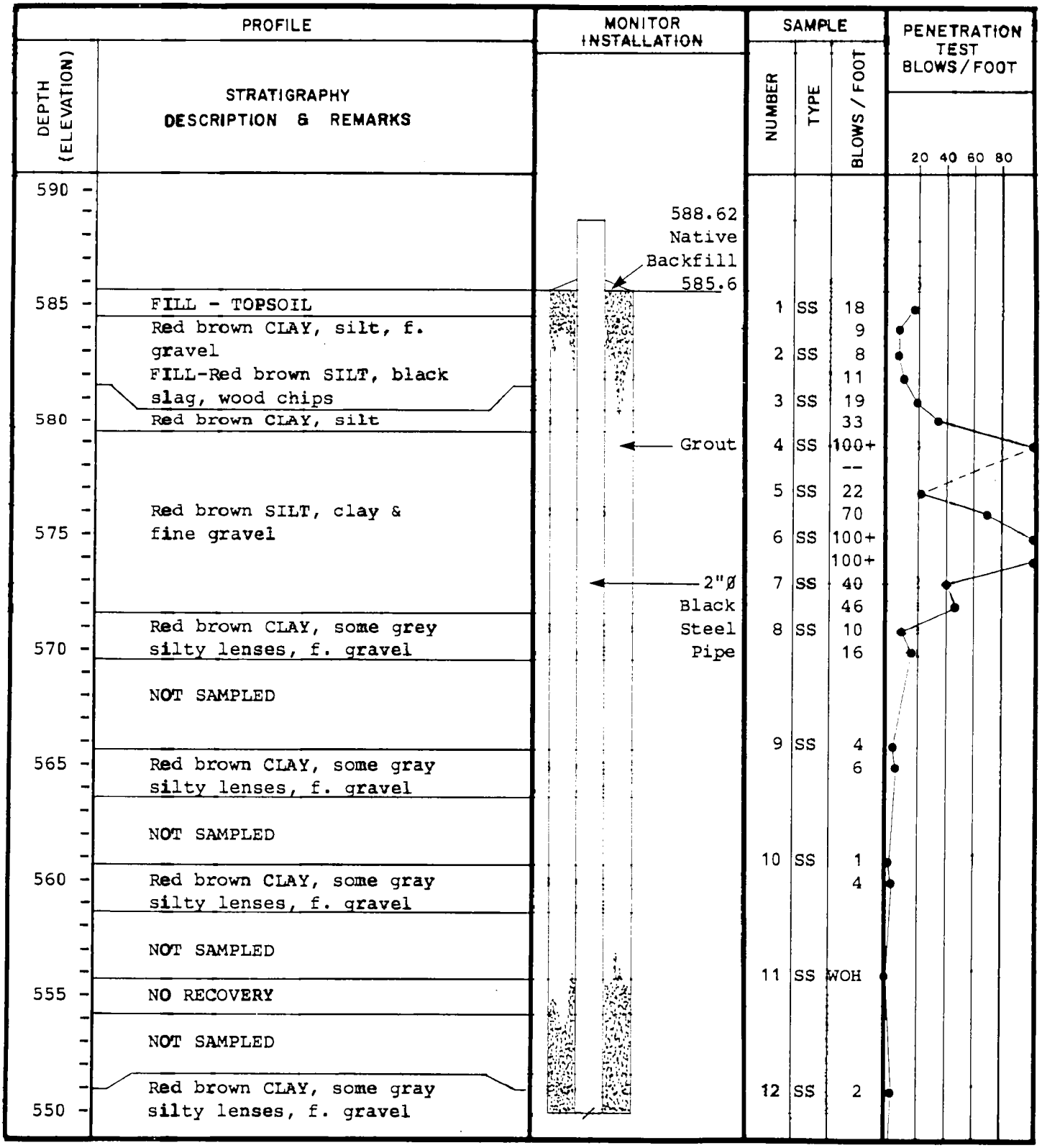
PROJECT NAME: DUNLOP - BUFFALO PLANT
HOLE Nº: OMW-4
JOB Nº: 9-1135
DATE COMPLETED: DECEMBER 14, 1982
CLIENT: DUNLOP TIRE CORPORATION
GEOLOGIST/ENGINEER: D. MILLARD
HOLE TYPE: 6"Ø HOLLOW STEM AUGER
GROUND ELEVATION: 608.2
LOCATION: NE SECTOR OF PLANT-ON DISPOSAL AREA
TOP OF PIPE ELEVATION: 610.36

PROFILE		MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT
DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT	20 40 60 80
610		610.36 Native Backfill 608.2 Grout Bentonite 2"Ø Black Steel Pipe Sand Pack 599.2 5.0" Johnson Galvanized Well Screen # 10 Slot				
	FILL black FLY ASH, silt, some clay, rubber, sand & wood - moist - wet					
605						
	Mottled black & green brown SILT, root matter					
	Red brown SILT, clay					
600	Red brown CLAY, SILT, some f. gravel					
595	NOTE: STRATIGRAPHIC DATA FROM BMW-2 LOG					
590						

○ GRAIN SIZE ANALYSIS ▼ WATER FOUND ▽ STATIC WATER LEVEL

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME : DUNLOP - BUFFALO PLANT
HOLE Nº: BMW-1 Page 1 of 2
JOB Nº : 9-1135
DATE COMPLETED: DECEMBER 10, 1982
CLIENT : DUNLOP TIRE CORPORATION
GEOLOGIST/ENGINEER : D. MILLARD
HOLE TYPE : 10"Ø HOLLLOW STEM AUGER
GROUND ELEVATION: 585.6
LOCATION : DUNLOP PROPERTY - NORTHWEST SECTOR
TOP OF PIPE ELEVATION: 588.62



○ GRAIN SIZE ANALYSIS ▼ WATER FOUND ▽ STATIC WATER LEVEL

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME : DUNLOP - BUFFALO PLANT
HOLE Nº: BMW-1 Page 2 of 2
JOB Nº : 9-1135
DATE COMPLETED: DECEMBER 10, 1982
CLIENT : DUNLOP TIRE CORPORATION
GEOLOGIST/ENGINEER: D. MILLARD
HOLE TYPE : 10"Ø HOLLLOW STEM AUGER
GROUND ELEVATION: 585.6
LOCATION : DUNLOP PROPERTY - NORTHWEST SECTOR
TOP OF PIPE ELEVATION: 588.62

PROFILE		MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS/FOOT
DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT	20 40 60 80
550	Red brown CLAY, some gray silty lenses, f. gravel	Grout	12	SS	2	
	NOT SAMPLED					
	Red brown CLAY, some gray					
545	silty lenses		13	SS	1	
	NOT SAMPLED	2"Ø Black Steel Pipe				
540	Red brown CLAY, some gray silty lenses		14	SS	WOH	
	NOT SAMPLED					
535	Red brown CLAY, some gray silty lenses		15	SS	WOH	
	NOT SAMPLED	10"				
530	Brown fine SAND & SILT, fine gravel TILL - wet		16	SS	53	
	NOT SAMPLED	Bentonite Plug				
525	Brown fine SAND & SILT, grey shattered rock fragments TILL - wet	523.1	17	SS	100+	
	AUGER REFUSAL					
	2.0'-5-3/4"Ø ROLLER BIT -	Steel Flange	BMW	NX		
520	NO RECOVERY		1			
	Very thin bedded gray aphanitic DOLOMITE & white GYPSUM	3"Ø NX	ROCK CORE			
	Thin bedded gray aphanitic	516.1 CORE HOLE				
515	DOLOMITE					

○ GRAIN SIZE ANALYSIS ▼ WATER FOUND ▽ STATIC WATER LEVEL

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME : DUNLOP - BUFFALO PLANT
HOLE Nº: BMW-2
JOB Nº : 9-1135
DATE COMPLETED: DECEMBER 17, 1982
CLIENT : DUNLOP TIRE CORPORATION
GEOLOGIST/ENGINEER: D. MILLARD
HOLE TYPE : 10"Ø HOLLLOW STEM AUGER
GROUND ELEVATION: 607.6
LOCATION : NE SECTOR OF PLANT-ON DISPOSAL AREA
TOP OF PIPE ELEVATION: 610.62

DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS	NUMBER	TYPE	BLOWS / FOOT
610				
		1	SS	4
	FILL-Black FLY ASH, silt, some clay, rubber, sand &			6
		2	SS	4
605	wood - moist-wet			5
		3	SS	14
				5
		4	SS	6
	Mottled black & green brown			12
600	SILT, root matter	5	SS	15
	Red brown SILT, clay			35
	Red brown CLAY, silt,	6	SS	19
	fine gravel			26
		7	SS	47
595				100+
		8	SS	62
				100+
		9	SS	100+
				100+
590				
	NOT SAMPLED			
		10	SS	21
	NO RECOVERY			
585				
	NOT SAMPLED			
		11	SS	35
	Red brown CLAY, some silt & fine gravel			
580	NOT SAMPLED			
		12	SS	19
	NO RECOVERY			
575				
	NOT SAMPLED			
	Red brown CLAY, some silt	13	SS	6
	lenses			
570	NOT SAMPLED			

MONITOR INSTALLATION: 610.62 Native Backfill 607.6; 2"Ø Black Steel Pipe; Grout

PENETRATION TEST BLOWS / FOOT: 20 40 60 80

○ GRAIN SIZE ANALYSIS ▼ WATER FOUND ▽ STATIC WATER LEVEL

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: DUNLOP - BUFFALO PLANT
HOLE Nº: BMW-2 Page 2 of 3
JOB Nº: 9-1135
DATE COMPLETED: DECEMBER 17, 1982
CLIENT: DUNLOP TIRE CORPORATION
GEOLOGIST/ENGINEER: D. MILLARD
HOLE TYPE: 10"Ø HOLLLOW STEM AUGER
GROUND ELEVATION: 607.6
LOCATION: NE SECTOR OF PLANT-ON DISPOSAL AREA
TOP OF PIPE ELEVATION: 610.62

PROFILE		MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT
DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT	20 40 60 80
570	NOT SAMPLED					
	Red brown CLAY, silt, fine gravel lenses	Grout	14	SS	3	
565	NOT SAMPLED		15	SS	4	
	Red brown CLAY, silt, fine gravel lenses	2"Ø Black Pipe				
560	NOT SAMPLED		16	SS	4	
	Red brown CLAY, silt, fine gravel lenses					
555	NOT SAMPLED		17	SS	3	
	Red brown CLAY, silt, fine gravel lenses					
550	NOT SAMPLED		18	SS	13	
	Red brown CLAY, silt lenses, fine gravel					
545	Red brown SAND & SILT, rock fragments & gravel, some clay TILL		19	SS	77	
	NOT SAMPLED					
	Red brown SAND & SILT, rock fragments, some clay, TILL - wet					
540						
535						

○ GRAIN SIZE ANALYSIS ▼ WATER FOUND ▽ STATIC WATER LEVEL

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME : DUNLOP - BUFFALO PLANT
HOLE Nº: BMW-2 Page 3 of 3
JOB Nº : 9-1135
DATE COMPLETED: DECEMBER 17, 1982
CLIENT : DUNLOP TIRE CORPORATION
GEOLOGIST/ENGINEER: D. MILLARD
HOLE TYPE : 10"Ø HOLLLOW STEM AUGER
GROUND ELEVATION: 607.6
LOCATION : NE SECTOR OF PLANT-ON DISPOSAL AREA
TOP OF PIPE ELEVATION: 610.62

PROFILE		MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS/FOOT
DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS/FOOT	20 40 60 80
540	NOT SAMPLED	2"Ø BLACK STEEL PIPE				
	AUGER REFUSAL	BENTONITE PELLETS 533.4				
	3'-5-3/4"Ø ROLLER BIT MINIMAL RESISTANCE CONTINUED TO AUGER REFUSAL 2.5'-of 5-3/4"Ø ROLLER BIT					
535						
530	Very thin bedded gray aphanitic DOLOMITE, & white gypsum	STEEL FLANGE 3"Ø NX CORE HOLE 525.9	BMW 2	NX ROCK CORE		
525						
520						

○ GRAIN SIZE ANALYSIS ▼ WATER FOUND ▽ STATIC WATER LEVEL

APPENDIX E

PREVIOUS DRILLING INFORMATION

CIRCA 1950's

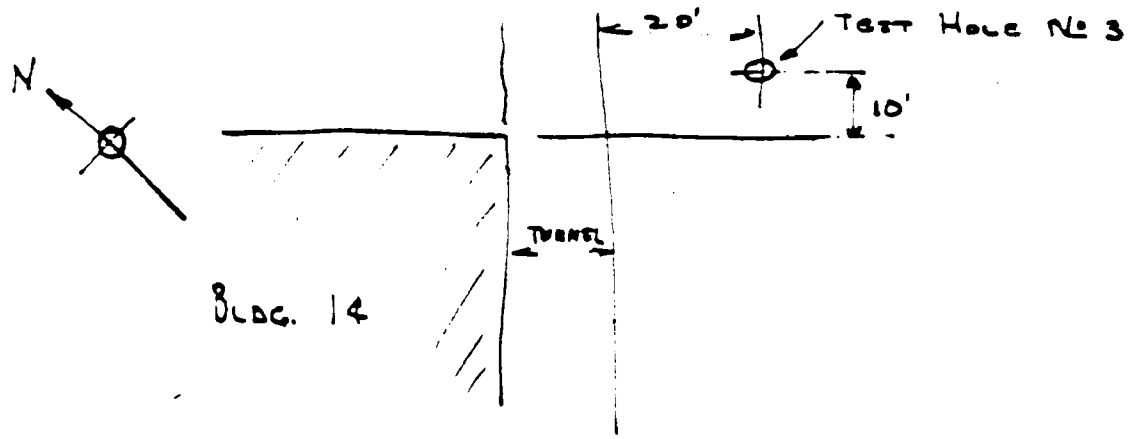
JTR-1003-01 WELL WATER

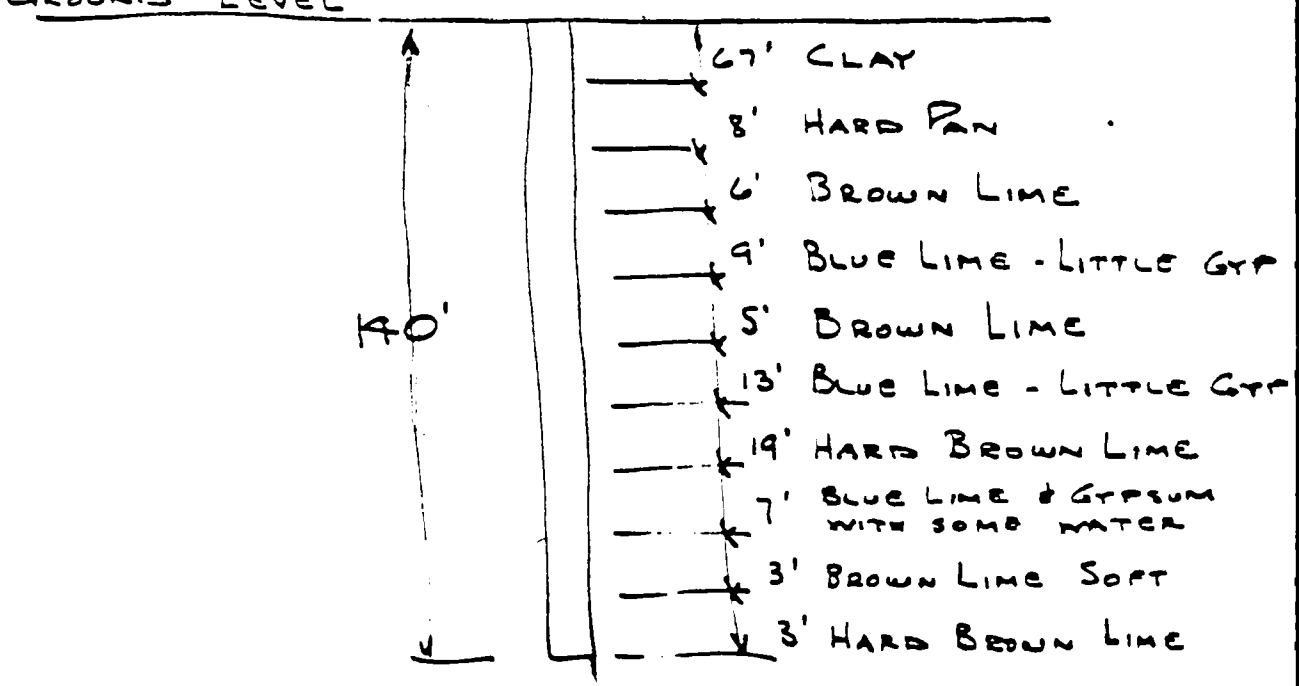
REF. ON DTR DRWG 50-14279 AS "WELL WATER TEST HOLE"

10/14/52
E.A.E.

DRILLING

TEST HOLE NO: 3 S.E. OF BLOC. # 14.





NOTE: WATER AT 127/134' · SMALL AMOUNT 1/8 GAL./MIN.
STOPPED DRILLING IN BROWN LIME

REF. ON DTR DRWG #50-14279

WATER WELL No 3

11-20-53
HFS

WELL DRILLING STRATIFICATION

NO DATE AVAILABLE

DTR-0854-01

DATA OBTAINED
OM SAMPLES OF
OCK TAKEN AT
ME OF DRILLING
ND STORED IN
RADUATED
YLINDER UNTIL
1-20-53

68

69 TOP OF ROCK

70 LIME ROCK
LIME ROCK MIXED WITH CEILING ROCK
GYP ROCK SOFT & WHITE
LIGHT COLOR LIME AND GYP ROCK

75 DARKER COLOR LIME & GYP ROCK

80

85 DARK COLOR LIME & GYP ROCK

90 LIGHTER COLOR LIME & GYP ROCK

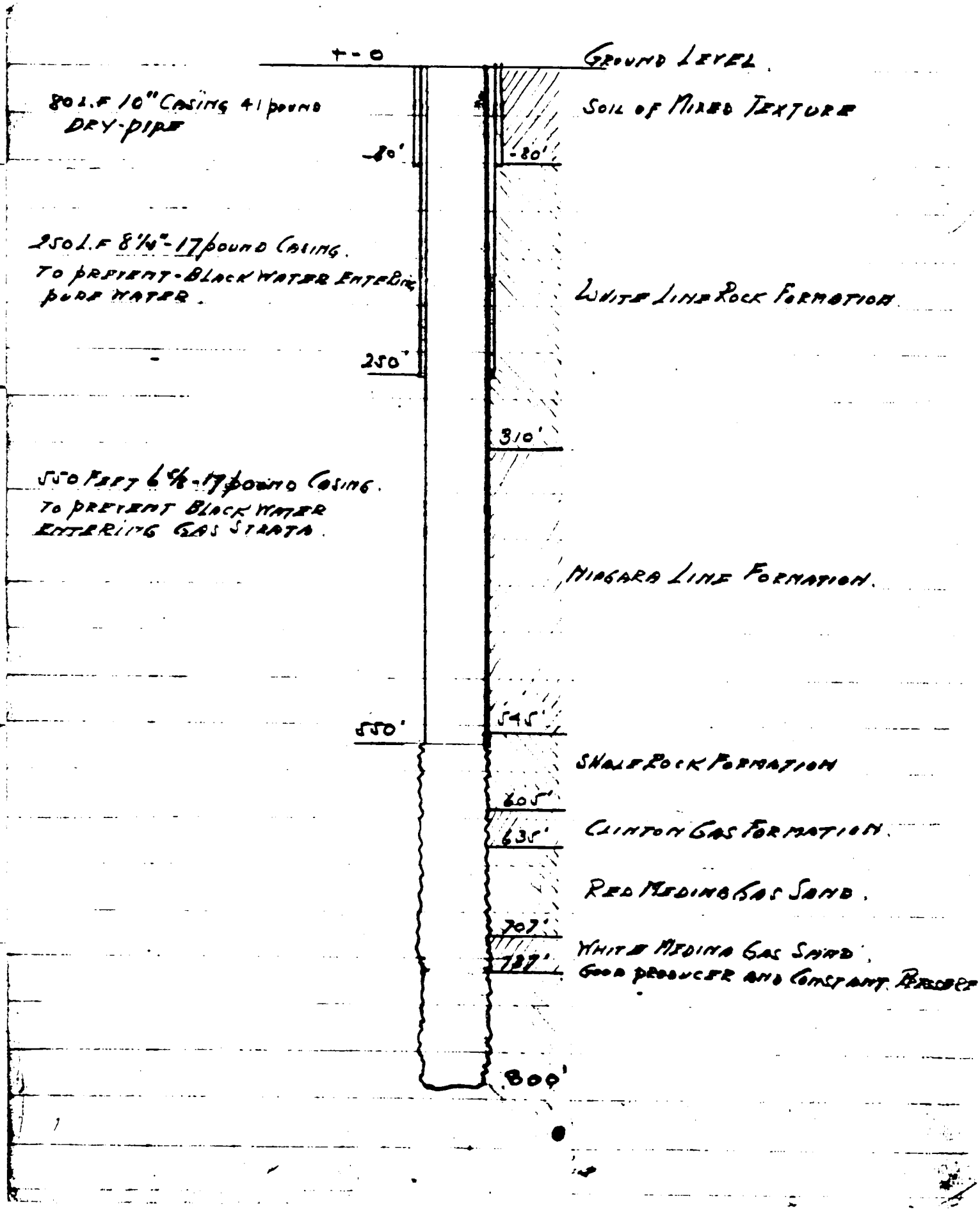
95

100 DARKER COLOR LIME & GYP ROCK

105 HARD LIME & FLINT ROCK NO GYP

106-0 FINAL DRILLING

THE ONLY INFO AVAILABLE REGARDING GAS WELLS
DO NOT KNOW WHICH OF FIVE WELLS THIS SKETCH PERTAINS



APPENDIX F

ANALYTICAL RESULTS AND QUALITY ASSURANCE DOCUMENTATION

ANALYSIS OF FOUR SOIL SAMPLES FOR TOTAL VOLATILE HALOGENATED ORGANICS, TOTAL KJELDAHL (TKN) NITROGEN, AND PHENOL

Report Prepared For

DUNLOP TIRE & RUBBER CORPORATION

by

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

Prepared by:

September 14, 1982

AES - Report XJ

Diane M. Costantino

Diane M. Costantino
GC Chemist

SCOPE OF WORK

As requested by Mr. John Sardina of Dunlop Tire & Rubber Corporation, Advanced Environmental Systems (AES) has completed analysis of four (4) samples for Total Volatile Halogenated Organics, TKN Nitrogen, and Phenol.

SAMPLE COLLECTION AND CHAIN OF CUSTODY

The samples were collected on July 13, 1982 and delivered to the AES laboratories by AES personnel. Chain of custody was immediately transferred to Mrs. Judy McDougall, Document Control Officer of AES.

METHODOLOGY

The samples were analyzed for Total Volatile Halogenated Organics (TVHO) in accordance with "Interim Methods for the Sampling and Analysis of Priority Pollutants in Sediments and Fish Tissues", U.S. EPA Monitoring and Support Laboratory, Cincinnati, Ohio. This analysis was performed on a Varian 3700 Gas Chromatograph equipped with a halogen specific Hall Detector. Phenol and TKN were analyzed according to "Standard Methods for the Examination of Water and Wastewater, 14th Edition.

RESULTS

Table 1. Analysis of Four Soil Samples
(Expressed as micrograms per gram, or ppm)

Sample Identification	TVHO Concen.	TKN Concen.	Phenol Concen.
Hole #1 (1.8 ft.)	1.070	1,680.	0.188
Hole #2	0.351	708.	0.219
Hole #3	0.448	747.	0.194
Hole #4	0.082	673.	0.196

QUALITY ASSURANCE

I. Precision

Table 2. Results of Duplicate Analysis
(Expressed as micrograms per gram, or ppm)

Analysis	Sample I.D.	Run I	Run II	Average
TVHO	Hole #1 (1.8 ft.)	1.013	1.126	1.070
TKN	Hole #3	648.	846.	747.
Phenol	Hole #4	0.235	0.156	0.196

QUALITY ASSURANCE

II. Accuracy

Table 3. Analysis of Spiked Samples and EPA Known Samples
(Expressed as micrograms per gram, or ppm)

Analysis	Type	Original Concen.	Added Concen.	Expected Concen.	Reported Concen.	Percent Recovery
TVHO	Hole #3 Spike	0.448	0.183	0.631	0.617	97.8%
Phenol	EPA	20.0	0.00	20.0	18.5	92.5%

ANALYSIS OF SPLIT SPOON SAMPLES FOR PHENOL, CHLOROFORM, CARBON TETRACHLORIDE, TRICHLOROETHYLENE AND TETRACHLOROETHYLENE

Report Prepared For

DUNLOP TIRE & RUBBER CORPORATION

by

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

Prepared by:

January 17, 1983

AES - Report 148

Michael J. Coulton
GC Technician

SCOPE OF WORK

These are the data for Work Item (4) of the Investigation of Inactive Waste Disposal Sites - October 8, 1982 proposal.

The split-spoon soil samples were collected by the Project Engineer, Mr. David Millard during the installation of monitoring wells on December 8-17, 1982. The samples were transported directly to the AES laboratory where chain of custody requirements were fulfilled.

ANALYTICAL METHODOLOGIES

Phenols were analyzed in accordance with Method 510B (Chloroform Extraction Method) in "Standard Methods for the Examination of Water & Wastewater, 15th Edition, 1980.

The volatile organics in soil were analyzed in accordance with the procedure "Analysis of Sediment for Volatile Organics by Head Space Analysis" stated in "Interim Methods for the Sampling and Analysis of Priority Pollutans in Sediments and Fish Tissues", U.S. EPA Environmental Monitoring and Support Laboratory, Cincinnati, Ohio, August 1977.

Volatile organics in water samples were analyzed according to the Federal Register, Vol. 44, No. 233, Monday, December 3, 1979; Method 601.

RESULTS

Table 1. Analysis for Phenol and Volatile Organics
(Phenol expressed as ppm; Volatiles expressed as ppb)[1]

Sample Identification	Phenol (ppm)	Chloroform (ppb)	Carbon Tetrachloride (ppb)	Trichloroethylene (ppb)	Tetrachloroethylene (ppb)
BMW #1 0-2'	0.11	20.6	<0.20[2]	5.5	7.4
BMW #1 14'-16'	0.03	18.2	<0.10	3.4	2.6
BMW #1 60'-61.5'	0.08	6.9	<0.10	1.5	2.6
BMW #2 0-2'	0.35	18.6	<0.10	12.6	30.9
BMW #2 16'-18'	0.09	13.5	<0.10	3.5	2.9
BMW #2 65'-66'	0.32	4.4	<0.10	0.9	1.1
OMW #1 0-2'	0.32	14.5	<0.09	6.3	18.4
OMW #1 8'-10'	0.15	1.5	<0.09	0.5	1.4
OMW #3 0-2'	0.30	38.9	<0.17	7.3	9.2
OMW #3 6'-8'	0.14	9.5	<0.13	1.7	3.0

[1] Phenol in soil expressed as micrograms per gram and phenol in water expressed as milligrams per liter (ppm). Volatiles in soil expressed as nanograms per gram and volatiles in water given as micrograms per liter (ppb).
[2] (<) less than equals the limits of detection.

QUALITY ASSURANCE

Table 2. Results of Duplicate Analysis

Sample Identification	Analysis	Unit of Measure	Run I	Run II	Average
BMW #2 0-2'	Phenol	ppm	0.35	0.31	0.33
Dunlop 3	Chloroform	ppb	4.7	5.5	5.1
Dunlop 3	Carbon Tetrachloride	ppb	<0.10	<0.10	<0.10
Dunlop 3	Trichloroethylene	ppb	0.8	1.1	0.95
Dunlop 3	Tetrachloroethylene	ppb	3.5	3.2	3.35

Table 3. Accuracy as Indicated by Test Control Sample
(Expressed as parts per billion)

Analysis	Type	Original Concen.	Added Concen.	Expected Concen.	Reported Concen.	Percent Recovery
Phenol	EPA	12.0	-	12.0	11.0	91.7%
Chloroform	EPA	45.6	-	45.6	43.5	95.4%
Chloroform	Spike	18.6	14.7	33.3	31.6	94.9%
Carbon Tetrachloride	EPA	9.4	-	9.4	9.4	100%
Trichloroethylene	EPA	13.0	-	13.0	10.8	83.1%
Trichloroethylene	Spike	12.6	13.1	25.7	25.1	97.7%
Tetrachloroethylene	EPA	5.6	-	5.6	5.4	96.4%

ANALYSIS FOR PHENOL, CHLOROFORM, CARBON TETRACHLORIDE, TRICHLOROETHYLENE AND TETRACHLOROETHYLENE ON WATER SAMPLES IN DUPLICATE

Report Prepared For

DUNLOP TIRE & RUBBER CORPORATION

by

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

Prepared by:

Diane M. Costantino

Diane M. Costantino
GC Technician

January 24, 1983

AES - Report AAB

SCOPE OF WORK

As requested by Mr. Daniel Pyanowski of Dunlop Tire & Rubber Corporation, Advanced Environmental Systems (AES) has completed the analysis of two (2) water samples in duplicate for phenol, chloroform, carbon tetrachloride, trichloroethylene, and tetrachloroethylene.

SAMPLE METHODOLOGY

Prior to the initiation of groundwater sampling, monitoring wells OMW1, OMW2, OMW3, OMW4, BMW1, and BMW2 were monitored for groundwater elevations. Once stable water elevations were observed, the well purge operation for sampling was initiated.

Those wells which contained groundwater were purged to obtain fresh groundwater for sampling. Each well (BMW1 & 2 contained groundwater) was bailed using individual 6" copper bailers. Five (5) well volumes were bailed on three separate occasions from each well (12/24/82, 1/10/83, and 1/12/83).

After the wells had recharged to sufficient volume, they were sampled using individual 36" copper samplers. Samples for phenols were collected in duplicate in 1 liter glass bottles preserved with $CUSO_4$ and H_3PO_4. Samples for volatile organics were collected in duplicate in unpreserved 40 ml glass vials, with open caps lined with teflon coated septa. Blanks accompanied each sample.

All sampling and sample preservation adhered strictly to the methodologies described in "Handbook for Sampling and Sample Preservation of Water and Wastewater". U.S. EPA 600/4-82-079, September 1982.

The samples were collected and delivered to the AES laboratories by Mr. Albert Zaepfel, Field Operations Supervisor of AES, on January 13, 1983. Chain of custody was immediately transferred to Mrs. Judy McDougall, Document Control Officer of AES.

Samples collected and delivered by:

Albert C. Zaepfel

Albert C. Zaepfel
Field Operations Supervisor

METHODOLOGY

Phenols were analyzed in accordance with Method 510B (Chloroform Extraction Method) in "Standard Methods for the Examination of Water and Wastewater", 15th Edition, 1980.

Volatile Organics were analyzed according to the Federal Register, Vol. 44, No. 233, Monday, December 3, 1979; Method 601. A Varian 3700 Gas Chromatograph equipped with a Hall 700A Electrolytic Conductivity detector was used. A Tekmar ALS Purge and Trap Liquid Sample Concentrator was used in conjunction with the gas chrometograph.

RESULTS

Table 1. Analysis for Phenol and Volatile Organics
(Expressed as micrograms per liter, or ppb)

Sample Identification	Phenol	Carbon Tetrachloride	Chloroform	Trichloroethylene	Tetrachloroethylene
BMW #1	0.00	<0.10[1]	<0.10	<0.10	<0.40
BMW #1 (Duplicate)	0.00	<0.10	<0.10	<0.10	<0.10
BMW #2	0.00	<0.10	<0.10	<0.10	<0.10
BMW #2 (Duplicate)	0.00	<0.10	<0.10	<0.10	<0.10
Field Blank	0.00	<0.10	0.60	<0.10	<0.10

[1] (<) Less than equals the limits of detection.

QUALITY ASSURANCE

The results of duplicate analysis are shown in Table 1.

Table 2. Accuracy as Indicated by Test Control Samples
(Expressed as micrograms per liter, or ppb)

Analysis	Type	Original Concen.	Added Concen.	Expected Concen.	Reported Concen.	Percent Recovery
Phenol	EPA	12.0	-	12.0	10.5	87.5%
Phenol	Spike	0.00	16.0	16.0	14.25	89.1%
Chloroform	EPA	45.6	-	45.6	41.4	90.8%
Chloroform	Spike	<0.10	1.86	1.86	1.54	82.8%
Carbon Tetrachloride	EPA	9.4	-	9.4	9.4	100%
Carbon Tetrachloride	Spike	<0.10	2.52	2.52	1.74	69.0%
Trichloroethylene	EPA	13.0	-	13.0	9.6	73.8%
Trichloroethylene	Spike	<0.1	2.21	2.21	1.68	76.0%
Tetrachloroethylene	EPA	5.6	-	5.6	4.3	76.8
Tetrachloroethylene	Spike	<0.10	1.83	1.83	1.57	85.8%

ANALYSIS FOR PHENOL, CHLOROFORM, CARBON TETRACHLORIDE, TRICHLOROETHYLENE AND TETRACHLOROETHYLENE ON WATER SAMPLES IN DUPLICATE

Report Prepared For:

DUNLOP TIRE & RUBBER CORPORATION

by

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

Prepared by:

July 11, 1983

AES - Report AAB

Diane M. Costantino

Diane M. Costantino
GC Division

W. Joseph McDougall

W. Joseph McDougall
Quality Control Verification

SCOPE OF WORK

As requested by Mr. Daniel Pyanowski of Dunlop Tire & Rubber Corporation, Advanced Environmental Systems (AES) has completed the analysis of three (3) water samples in duplicate for phenol, chloroform, carbon tetrachloride, trichloroethylene, and tetrachloroethylene.

SAMPLE COLLECTION AND CHAIN OF CUSTODY

Samples were collected on June 27 and July 5, 1983 by AES personnel. Chain of custody was immediately transferred on both days to Mrs. Judy McDougall, Document Control Officer of AES.

METHODOLOGY

Phenols were analyzed in accordance with Method 510B (Chlorofrom Extraction Method) in "Standard Methods for the Examination of Water and Wastewater", 15th Edition, 1980.

Volatile Organics were aanlyzed according to the Federal Register, Vol. 44, No. 233, Monday, December 3, 1979; Method 601. A Varian 3700 Gas Chromatograph equipped with a Hall 700A Electrolytic Conductivity detector was used. A Tekmar ALS Purge and Trap Liquid Sample Concentrator was used in conjunction with the gas chromatograph.

RESULTS

Table 1. Analysis for Phenol and Volatile Organics
(Expressed as micrograms per liter, or ppb)

Sample Identification	Phenol	Carbon Tetrachloride	Chloroform	Trichloroethylene	Tetrachloroethylene
OMW #1	7.28	<0.20[1]	0.09	0.09	0.38
OMW #1 (Duplicate)	7.36	<0.20	0.08	0.10	0.12
OMW #2	4.76	<0.20	0.07	0.06	0.16
OMW #2 (Duplicate)	3.55	<0.20	0.04	0.06	0.09
OMW #3	7.18	<0.20	0.08	0.06	0.08
OMW #3 (Duplicate)	5.29	<0.20	0.10	0.04	0.13
Field Blank (6/27/83) #1	*	<0.20	0.13	0.05	0.22
Field Blank (6/27/83) #2	*	<0.20	0.16	0.07	0.22
Field Blank (7/5/83) #1	*	<0.20	0.60	0.14	0.13
Field Blank (7/5/83) #2	*	<0.20	0.31	<0.03	0.05

[1] (<) Less than equals the limits of detection.

* No Field Blank for Phenols

RESULTS (Cont'd)

There were no volatile organic parameters above the trace concentrations in the field blanks.

Total phenols were found in the range of 4-7 parts per billion (ppb).

QUALITY ASSURANCE

The results of duplicate analysis are shown in Table 1.

Table 2. Accuracy as Indicated by Test Control Samples
(Expressed as micrograms per liter, or ppb)

Analysis	Type	Expected Concen.	Reported Concen.	Percent Recovery
Phenol	EPA	12.0	12.5	104.2%
Chloroform	EPA	11.0	12.3	111.8%
Carbon Tetrachloride	EPA	2.3	2.2	95.7%
Trichloroethylene	EPA	2.6	2.6	100.0%
Tetrachloroethylene	EPA	1.1	1.1	100.0%