Volume 1

LTV-1989-5-122-1

MARILLA STREET LANDFILL
BUFFALO, NEW YORK
BOF DUST AREA
CLOSURE PLAN

LTV Steel Company
Cleveland, Ohio

Revised
January 1989
Project: 0848-10-1

MALCOLM PIRNIE

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1.0 FACILITY DESCRIPTION

The following information is submitted in accordance with the requirements for a general description of the facility as contained in 6NYCRR Part 373-1.5 (a)(2)(i) and 40 CFR 270.14(b)(1) and applicable 6NYCRR 373 and 40 CFR 265 subparts. LTV Steel Company's Marilla Street Landfill has not received hazardous wastes since suspension of steel-making operations at the Buffalo District Plant in June/July 1981. Since hazardous wastes are not currently generated at the Buffalo District Plant and the landfill is not currently receiving hazardous waste, LTV Steel Company is not required to obtain a Part B permit for current operations at the Buffalo District Plant. Furthermore, since only the Basic Oxygen Furnace (BOF) Dust Disposal Area has received a regulated hazardous waste, as is discussed in Section 1.2 of this Closure Plan, only that area of the site will be closed under the applicable State and Federal hazardous waste regulations. The remaining fill areas are being closed in accordance with Part 360 of Title 6 of the New York Code of Rules and Regulations (6NYCRR). All information presented herein is submitted for use by State and Federal regulatory agencies in evaluating the proposed closure of the BOF Dust Area of LTV Steel Company's Marilla Street Landfill.

1.1 GENERAL DESCRIPTION

On December 19, 1984, Jones & Laughlin Steel Incorporated (including the Jones & Laughlin Steel Corporation Division) was merged into Republic Steel Corporation in New Jersey. The name of the surviving corporation was changed to LTV Steel Company, Inc.

LTV Steel Company is the current owner of the Marilla Street Landfill. Steel-making operations were suspended at the Buffalo District Plant with subsequent suspension of BOF Dust landfilling at the Marilla Street landfill in June/July 1981.

The address of the LTV Steel Company is:

LTV Steel Building
Post Office Box 6778
800 LTV Steel Building
25 West Prospect Street
Cleveland, Ohio 44115

The contact and party responsible for hazardous waste management activities at the Marilla Street Landfill is:

MR. D. G. NEMEC
LTV Steel Company, Inc.
1175 South Park Avenue
Buffalo, New York 14220

1.1.1 Site Description

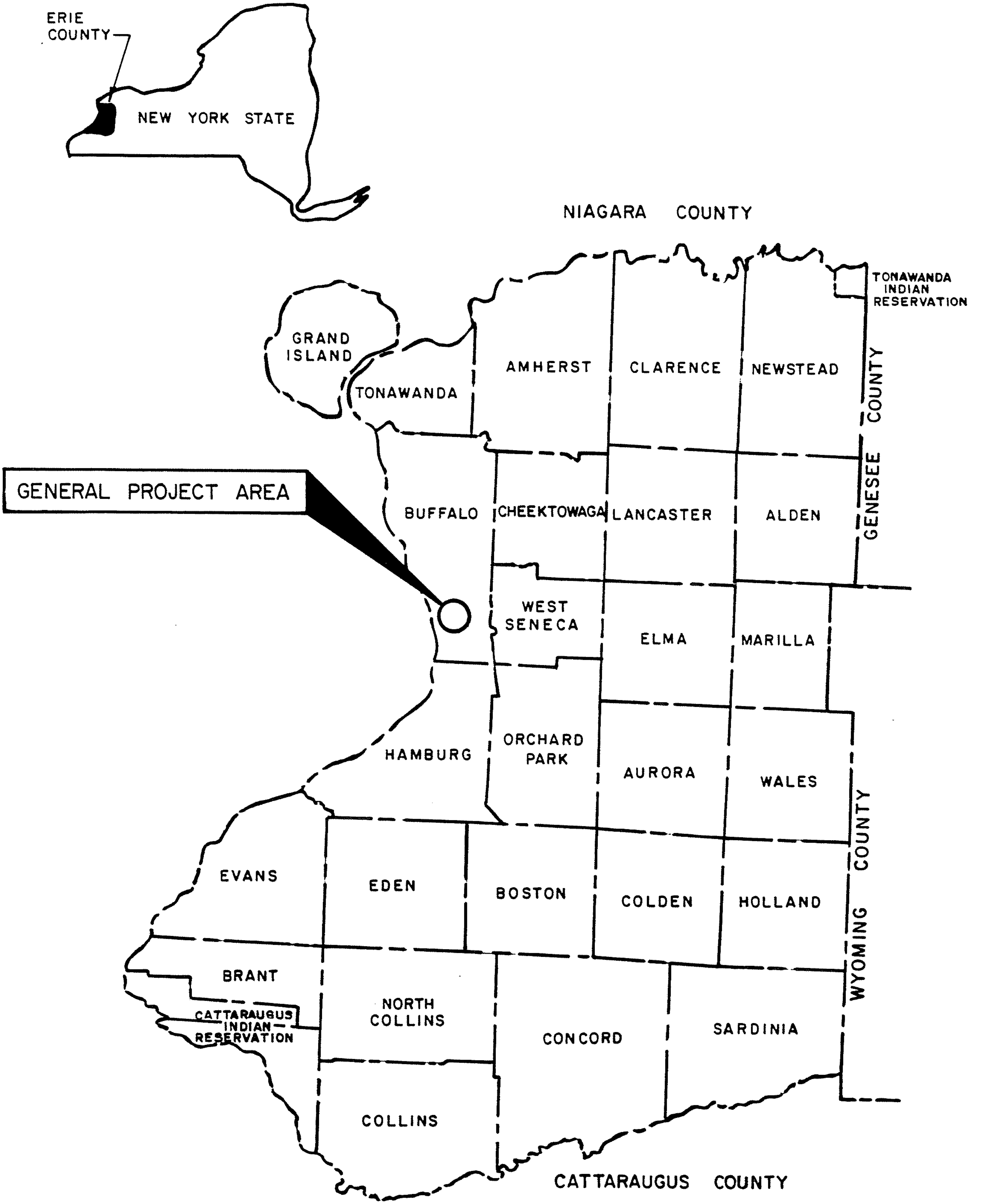
The Marilla Street Landfill site, which is currently owned by LTV Steel Company, has been in operation since approximately 1930. Regional and Vicinity maps illustrating the location of the approximately 100-acre parcel (approximately 80 acres of which have been used as a landfill) are presented as Figures 1-1 and 1-2, respectively. The site is bordered on the south by the South Park Recreational Facilities, on the west by the Penn-Central Railroad and on the north and east by the Baltimore and Ohio Railroad. Hopkins Street, Marilla Street and the South Buffalo Railroad segregate the site into several fill areas.

1.1.2 Site Background

In November 1980, a Part A Permit Application was filed for the BOF Dust Area. At that time, the BOF Dust Area was incorrectly identified as a waste pile. A revised Part A Application to include the proper classification as a landfill was included with the Closure Plan submitted in November 1985. Therefore, the BOF Area is a landfill and closure information presented herein addresses the requirements for closure as a landfill.

A variety of wastes have been disposed of at the site including: slag, precipitator dust, clarifier sludge, railroad ties, checker bricks, scrap wood, tool scale, blast furnace dust, BOF brick and construction debris. The landfill was operated as an above-grade fill operation with minimal segregation of wastes prior to the effective date (viz. November 1980) of the Resource Conservation and Recovery Act (RCRA). In November 1980, Basic Oxygen Furnace (BOF) precipitator dust generated at the Buffalo District Plant was classified as an "EP toxic" hazardous waste due to lead leachability, and therefore, was

FIGURE I-I



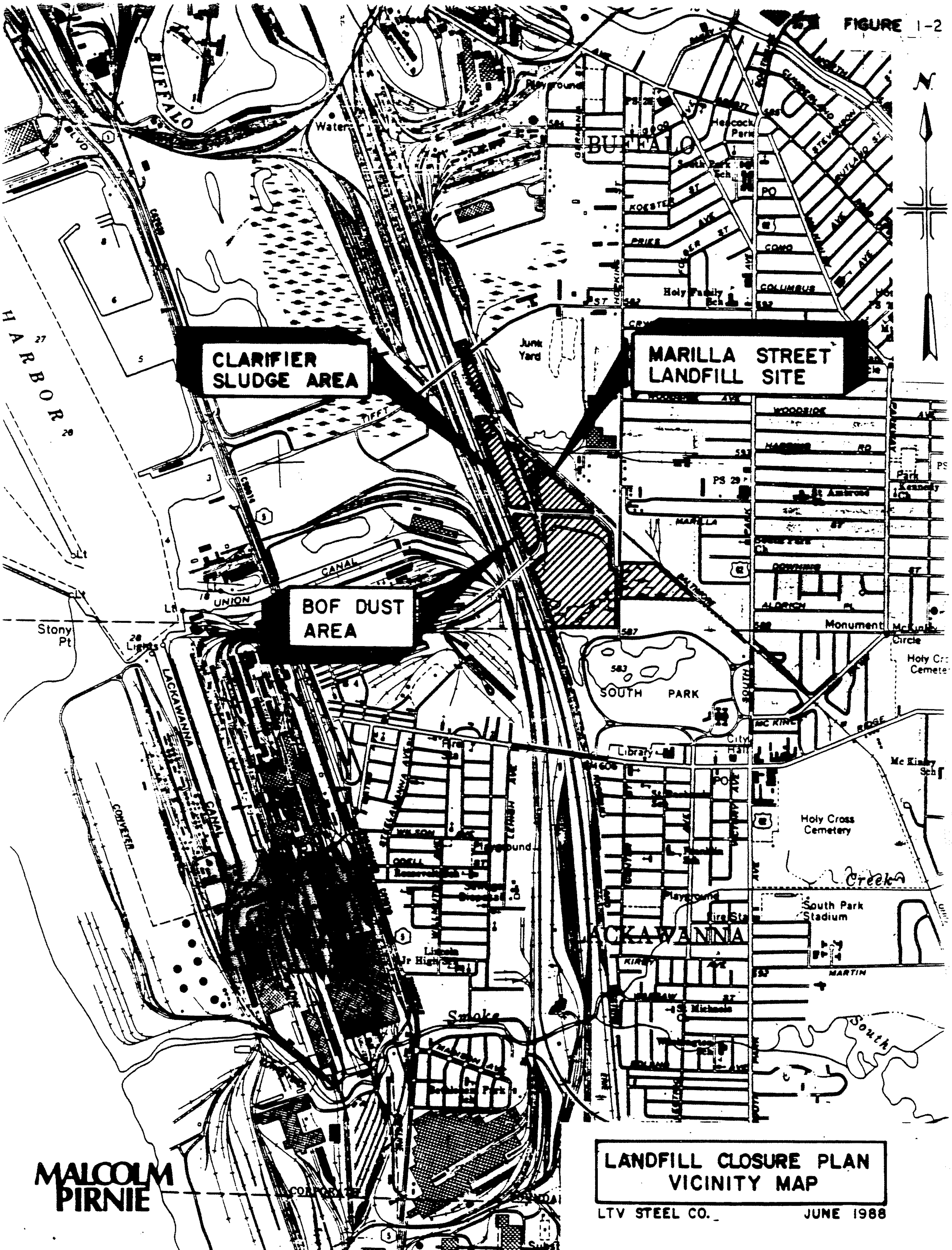
LANDFILL CLOSURE PLAN

REGIONAL MAP

LTV STEEL JUNE, 1988

MALCOLM PIRNIE

FIGURE 1-2



LANDFILL CLOSURE PLAN
VICINITY MAP

LTV STEEL CO. JUNE 1988

placed in a segregated fill area (see Figure 1-2 for location) from November 1980 through June/July 1981. A RCRA Part A permit application was filed for the BOF Dust Area in mid-November 1980 and a revised Part A was filed in November 1985 (see Appendix A).

The landfill site has been used primarily for material reclamation and disposal of construction debris since the plant shutdown. All wastes disposed of at the landfill site since November 1980 have been kept segregated.

1.2 FILL CHARACTERISTICS

The landfill site has been segregated into five (5) fill areas based on information obtained from borings and conversations with LTV personnel familiar with previous landfill operations. The five areas are shown on Sheet 7 and discussed below:

- BOF Dust Area - The BOF (Basic Oxygen Furnace) Dust Area consists of a mixture of BOF dust and BOF slag. The slag was used to prevent the dust particles from being dispersed by the wind. LTV personnel estimate that approximately 6000 tons of BOF dust, which is considered an "EP toxic" characteristic hazardous waste, were disposed of in the BOF Dust Area from November 1980 until June/July 1981. As indicated on Sheet 7, the total volume of wastes (slag and dust) in the BOF Dust Area has been estimated to be 136,600 cubic yards. The area also contains approximately 33,300 cubic yards of rubble/slag used in the construction of the railroad berm and the western retaining berm.

- Clarifier Sludge Area - The Clarifier Sludge Area consists primarily of a mixture of clarifier sludge (viz. sludge generated by the plant's wastewater treatment system), BOF slag and blast furnace slag. The slag was used to prevent the sludge from being dispersed by the wind. As indicated on Sheet 7, the total volume of waste in the Clarifier Sludge Area has been estimated to be 531,000 cubic yards, which includes the rubble/slag used in the construction of the railroad berm.

- Miscellaneous Debris and Fine Refuse Area - The Miscellaneous Debris and Fine Refuse Area consists primarily of a mixture of plant construction debris, railroad ties, bricks, minus minus fines (viz. BOF slag less than 1/4-inch in size), minus fines (viz. BOF slag 1/4-inch to 5/8-inch in size), BOF slag, and blast furnace slag. As indicated on Sheet 7, the volume of waste in this area has been estimated to be 1,550,000 cubic yards.

- Fine Refuse Area - The Fine Refuse Area consists primarily of a mixture of minus minus fines, minus fines, BOF slag and blast furnace slag. As indicated on Sheet 7, the volume of waste in this area was estimated to be 712,000 cubic yards in 1985. A substantial amount of material has been mined and removed since that time.

- Railroad Fill Area - The Railroad Fill Area consists primarily of slag deposited during construction of a railroad on the east side of Hopkins Road. As indicated on Sheet 7, the volume of waste in this area has been estimated to be 14,500 cubic yards.

1.3 BOF WASTE CHARACTERISTICS

The basic oxygen furnace (BOF) is the major reactor for producing steel from hot metal (Environmental and Resource Conservation Considerations of Steel Industry Solid Waste, U.S. Environmental Protection Agency, EPA-600/2-79-074, SW-740, April 1979). During steel making, the furnace is charged with up to 30 percent scrap metal. The balance of material is hot metal from the blast furnace with some fluxing materials, as necessary. A lance is lowered to just above the surface of the metal and oxygen is blown at supersonic velocities. Eventually (12 min. to an hour, depending on furnace design) carbon, sulfur and silicon are burned out of the hot metal and steel is formed. Dust-laden air (viz. BOF dust), a consequence of this process, is collected in hoods and removed via electrostatic precipitators for ultimate disposal.

BOF Dust is not normally an EP toxic characteristic hazardous waste. However, leaded steel scrap was utilized by the Buffalo District Plant as a source of scrap steel to the Basic Oxygen Furnace. It is this lead source that is believed to have caused the BOF Dust to exhibit the EP toxic characteristic for lead.

In June of 1981, eight BOF Dust samples were obtained and analyzed for EP Toxicity. The results of these analyses are included in Appendix B. Examination of these results (testing was performed in accordance with Federal Register Vol. 45, No.98, May 1980) indicated the presence of lead in all of the extracts at concentrations in excess of the EP Toxicity maximum concentration limit of 5 mg/l.

Three composite samples of the in-place fill materials (i.e. slag and dust) were taken from the BOF Dust Area in July 1985 for EP toxicity testing (heavy metals only). These samples consisted of vertical composites of fill sampled at 5-foot intervals throughout the depth of the boring. One of the composites was split and analyzed by two independent laboratories. One lab reported extract levels of lead and chromium for all three composites in excess of the respective maximum concentration limits; however, the remaining lab did not detect lead or chromium in the duplicate extract. In order to clarify the discrepancy, two of the composites were re-analyzed by both labs. The second set of results were consistent, with both labs indicating that the composite fill material in the BOF Dust Area would not be considered an EP toxic characteristic hazardous waste. Furthermore, these results indicate that significant amounts of lead, chromium and other heavy metals will not leach from the BOF Dust Area provided that the buffering capacity of the fill material is not depleted. The laboratory reports for the four EP Toxicity tests are included in Appendix B.

1.4 TOPOGRAPHIC MAP

Sheet 1 is a topographic map for the entire landfill site with existing contours, site boundary lines, drainage, and the 100-year floodplain. Figure 1-1 is a regional location map showing land use and topography in the area of LTV Steel and the Marilla Street Landfill. Figure 1-2 is a vicinity map which shows the surrounding land use and topography on a larger scale and with greater detail. Figure 1-3 is an aerial photograph of the landfill site and vicinity.

A wind rose (Figure 1-4) of the prevailing winds at the Buffalo International Airport was provided by the National Weather Service (NWS). The NWS indicated that this wind rose would be applicable to any site, including the Marilla Street landfill site in the western New York State Region.

1.5 FACILITY LOCATION INFORMATION

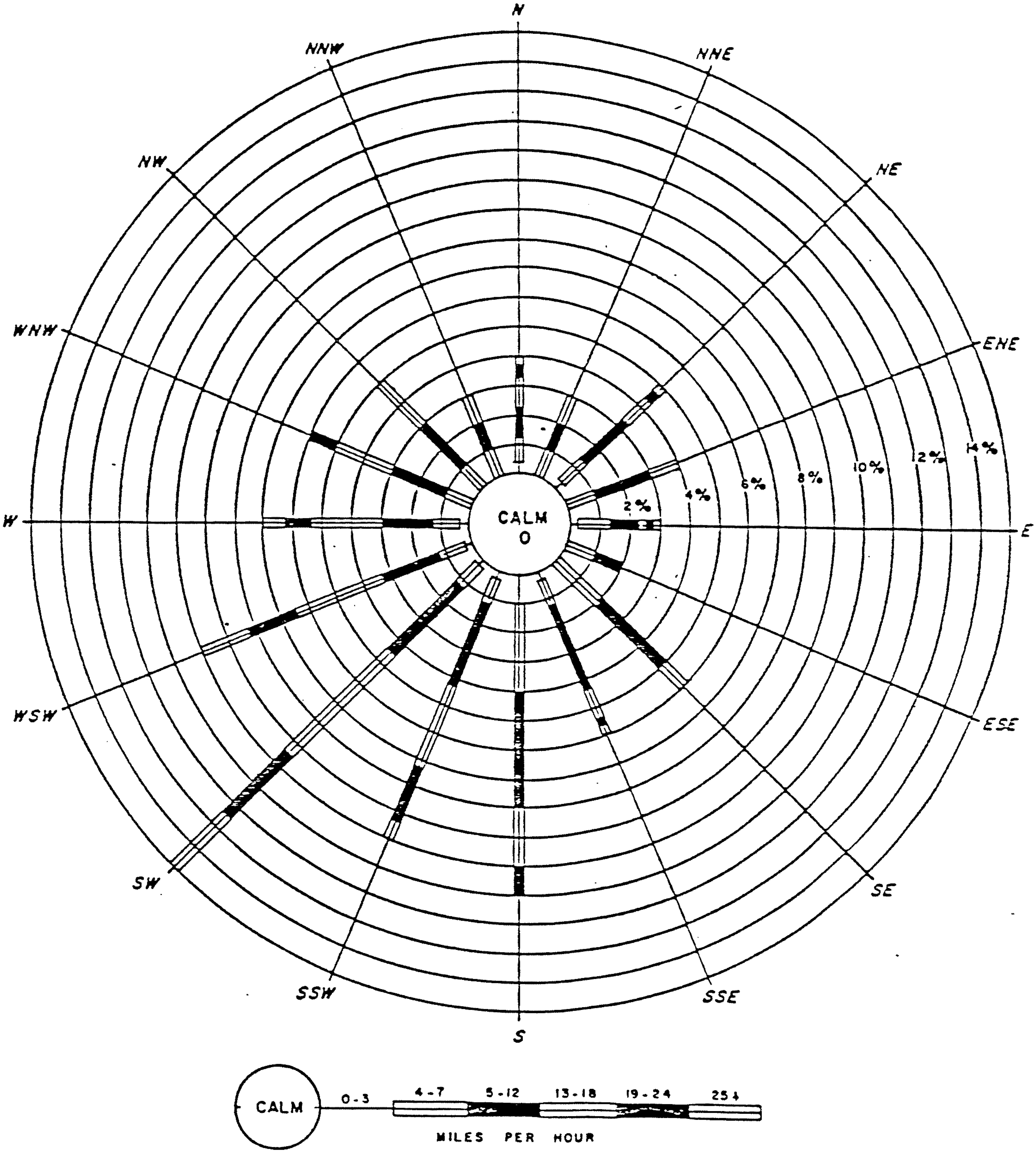
1.5.1 Seismic Standard

Because this is an existing rather than a new facility, the seismic standard of 40 CFR Part 270 does not apply. In addition, the facility is not located in a political jurisdiction listed in Appendix VI of Part 264.

FIGURE 1-3

AERIAL PHOTOGRAPH OF
MARILLA STREET LANDFILL SITE

LTV STEEL COMPANY SEPTEMBER 1985



MEAN SPEED: 12 MPH

PREVAILING
DIRECTION: SOUTHWEST

MAXIMUM SPEED: 91 MPH

DATA SOURCE: NOAA, DECENNIAL CENSUS OF UNITED STATES CLIMATE, SUMMARY OF HOURLY OBSERVATIONS, BUFFALO.

MARILLA STREET LANDFILL
BOF DUST AREA
CLOSURE PLAN
ANNUAL WINDROSE

LTV STEEL JUNE 1988

1.5.2 Floodplain Standard

The limits of the floodplain shown on Sheet 1 were developed from the Federal Insurance Administration (FIA) floodmap for the City of Buffalo, New York (Community Panel Numbers 360230-0020B and 360230-0010B, Effective date: November 18, 1981). Review of Sheet 1 indicates that the BOF Dust Area lies between the upper limits of the 100-year flood elevation and the lower limits of the 500-year flood elevation.

1.5.3 Demonstration of Compliance (w/Floodplain Standard)

As discussed above, the entire landfill site is above the 100-year flood elevation. Therefore, no flooding and no release of hazardous waste would occur during a 100-year storm.

1.5.4 Plan for Future Compliance (w/Floodplain Standard)

LTV Steel Company believes that no hazardous wastes/constituents would be released during a 100-year flood. Therefore, no additional flood prevention work is considered necessary to comply with state and federal regulations.

1.6 TRAFFIC PATTERNS

The BOF Dust Area will be restricted to vehicular traffic to prevent damage to the cap from utility vehicles. Authorized personnel will be able to access the BOF Dust Area of the site by using the Marilla Street Approach. As can be seen from Sheet 1, Marilla Street bisects the landfill site from east to west. Marilla Street will be widened and improved. Marilla Street will facilitate access to the groundwater monitoring wells and surface runoff monitoring sites in the BOF Dust Area. A locked access gate with appropriate warning signs, as discussed in Section 1.7 of this closure plan, will be installed as an entrance point to the BOF Dust Area. The Marilla Street access roadway will also allow for maintenance of the cap and gas venting system in the BOF Dust Area.

1.7 RESTRICTION OF ACCESS

In order to restrict access to the BOF Dust Area, a 6-foot high aluminized steel chain-link fence will be installed around the periphery of the area (see Sheet 3). The fence will run just inside the existing railroad berms which are described in Section 3.2 (viz. Site Preparation). The fence will be provided with three strands of barbed wire located along the top rail. Warning signs will be provided and located at all access points and at approximately 50-foot intervals along straight runs. Warning signs will be legible from 25 feet, and contain the wording "Danger - Unauthorized Personnel Keep Out".

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2.0 GROUND WATER

2.1 GENERAL

As discussed in Section 1.1.1, the BOF Dust Area was incorrectly identified as a waste pile regulated under 6NYCRR Part 373-3.6 and 40 CFR Part 265, Subpart L in the Part A Permit Application filed in 1980. Under Interim Status, the ground water monitoring guidelines of 6NYCRR Part 373-3.6 and 40 CFR Part 265, Subpart F only apply to surface impoundments, landfills and land treatment facilities. Therefore, an Interim Status ground water monitoring program was thought not required for the BOF Dust Area.

The Part A application has been revised designating the BOF Dust Area as a landfill. As a landfill, the facility is subject to the Interim Status ground water monitoring standards. A program complying with the requirements of 6NYCRR Part 373-3.6 and 40 CFR 265, Subpart E was initiated in 1985 for the BOF Dust Area. This section of the closure/post-closure plan details the ground water monitoring system developed for this facility.

Installation of a ground water monitoring system for the entire Marilla Street Landfill site, including the BOF Dust Area, has been completed. The system is composed of six (6) deep (designated by the suffix "A") and seventeen (17) shallow (designated by the suffix "B") ground water monitoring wells as shown on Sheet 5. With the exception of Well No. 3A, the deep wells extend approximately 20 feet into the original soil. In Well No. 3A, the well was completed at bedrock which was encountered at 14 feet. The shallow wells extend into the uppermost saturated zone at or near the fill/original soil interface. For the BOF Dust Area, Well No. 6B is currently used as the upgradient monitoring well and Wells No. 4B, 7A, 7B, 9B, 13B and 14B serve as the downgradient monitoring points.

2.2 HYDROGEOLOGY

Based upon site investigations, the general geology of the Marilla Street Landfill has been determined. The site geology, including the BOF Dust Area, from the surface to bedrock is as follows:

- Fill: 0' to greater than 20'
- Topsoil: 0' to 2'
- Sandy-silt: 0' to 15'
- Clayey-silt: 7' to greater than 18'
- Glacial till: 1' to 2'
- Shale bedrock

Depths to bedrock range from over 25 feet on the east side of the site to less than 14 feet at the northwest corner of the site. A geologic fence diagram illustrating site geology is attached as Sheet 6.

A total of 34 borings have been completed on and in the vicinity of the site. Twenty-three of these borings were completed as monitoring wells; however, four of these wells were abandoned due to vandalism. The boring logs which include details of the monitoring well constructions are presented in Appendix D. Each of the wells is constructed of two-inch diameter PVC casing with a two-foot length of machine-slotted PVC well screen.

Since cover material has not been applied to the site, the permeability of the surface material is a function of the type of material deposited and the degree of compaction. Five in-situ permeability tests (i.e. field percolation tests) were performed on the surface fill material including one in the BOF Dust Area. The results of these tests indicate that the permeability of the landfill surface ranges from 1.60×10^{-3} to 1.19×10^{-4} cm/sec and averages 4.85×10^{-4} cm/sec.

Bailer permeability tests were performed on monitoring wells 2A, 3A, 6A, 2B and 6B. The results of these tests are summarized in Table 2-1. As indicated in Table 2-1, the permeability of the deep saturated zone ranges between 5.16×10^{-6} and 7.8×10^{-5} cm/sec and the permeability of the shallow saturated zone ranges between 3.16×10^{-5} and 6.68×10^{-5} cm/sec. Bailer permeability tests performed on wells 4A and 5B were unsuccessful due to the rapid recovery of the wells.

Ground water at the landfill site exists in both perched and semi-confined conditions. The perched ground water system occurs in the sandy-silt deposits and/or the topsoil and fill materials which overlie the clayey-silt

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TABLE 2-1

LTV STEEL COMPANY
MARILLA STREET LANDFILL

BAILER PERMEABILITY TEST RESULTS

WELL NO.	PERMEABILITY[1] (cm/sec)
2A	1.69×10^{-5}
3A	7.80×10^{-5}
4A	ND[2]
6A	5.16×10^{-5}
2B	6.86×10^{-5}
5B	ND[2]
6B	3.17×10^{-5}

NOTES:

(1) Based on bailer permeability tests performed in field on 8/23/84.

(2) No Data. Wells recovered too quickly to complete bailer permeability test.

layer. Based on bailer permeability tests conducted on monitoring wells 2B and 6B, the permeability of the saturated zone is between 3.17 x 10^{-5} and 6.86 x 10^{-5} cm/sec. Many of the shallow ground water monitoring wells were installed to determine whether a radial direction of ground water flow existed. A ground water isopotential map illustrating the general direction of ground water flow in both the deep and shallow ground water systems based on average ground water elevations is attached as Sheet 5. The general direction of flow in the shallow ground water system for the entire site appears to be toward the west pond, with South Park Lake acting as the recharge area.

The semi-confined ground water system occurs in the bedrock and to a lesser extent in the immediate overburden beneath the site. Bailer permeability tests performed on wells completed in the immediate overburden indicate that the permeability of this clayey-silt layer ranges between 5.16 x 10^{-6} and 7.80 x 10^{-5} cm/sec. These permeabilities suggest that wells completed in the overburden would not yield sufficient quantities of water to be considered a source of drinking water.

Direction of ground water flow in the semi-confined ground water system is normal to isopotential contours and moves from points of higher elevation to points of lower elevation. As illustrated on Sheet 5, the general direction of ground water flow in the semi-confined ground water system in the vicinity of the site is toward Lake Erie to the west.

2.3 SUMMARY OF INTERIM GROUND WATER MONITORING DATA

Ground water monitoring data for the entire Marilla Street Landfill is summarized below. This information is intended to provide an overview of site ground water quality.

In order to assess possible impacts of the Marilla Street Landfill on the quality of ground and surface water in the vicinity of the site, several sets of water samples have been collected and analyzed since July 1979. The results of the water quality analyses are attached in Appendix C and summarized in Tables 2-2 (viz. background parameters) and 2-3 (viz. routine parameters). EPA interim primary drinking water limits and New York State DEC

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TABLE 2-2

LTV STEEL COMPANY
MARILLA STREET LANDFILL

BACKGROUND GROUNDWATER QUALITY(1)

Well No.(2): Sampling Date(3)	2A (5-4-82)	2A (5-18-82)	3A (8-2-79)	3A (8-13-79)	4A (5-4-82)	4A (5-18-82)
Ammonia (as N)	0.06	0.14	0.98	0.52	0.45	1.12
Nitrate (as N)	0.11	0.07	0.13	0.05	0.18	0.09
TKN (as N)	0.07	0.18	1.92	1.36	0.48	1.20
Biochemical Oxygen Demand (BOD_5)	3.7	4.0	1	5	4.1	4.8
Chemical Oxygen Demand	36	20	25.1	30.3	30	20
Aluminum	0.2	0.1	0.8	0.5	0.6	0.6
Arsenic	<0.005	<0.005	0.0099	0.0098	<0.005	<0.005
Chromium (HEX)	<0.02	<0.02	<0.03	<0.03	<0.02	<0.02
Cadmium	<0.005	<0.005	-	-	<0.005	<0.005
Zinc	0.017	0.015	-	-	0.023	0.010
Selenium	<0.005	<0.005	-	-	<0.005	<0.005
Copper	<0.01	<0.01	<0.04	<0.04	<0.01	<0.01
Mercury	<0.001	<0.001	<0.0003	<0.0003	<0.001	<0.001
Sodium	36	58	54	56	43	66
MBAS	0.082	0.34	0.094	0.025	0.86	1.4
Calcium	80	36	231	188	140	61
Silver	<0.005	<0.005	<0.03	<0.03	<0.005	<0.005
Manganese	0.025	0.020	-	-	0.020	0.010
Nickel	<0.02	<0.02	-	-	<0.02	<0.02
Total Solids	-	-	1114	975	-	-
Color (4)	20	10	30	40	35	15
Alkalinity	52	87	500	517.4	93	128
Hardness	115	148	665	680	185	175
Odor (Threshold)	1 (detergent)	1 (detergent)	-	-	4 (musty)	4 (musty)
E Coli (#/100 ml)	40	<2	>2000	25,000	<2	<2

NOTES:
(1) All units mg/l except where noted.
(2) A - designates deep well, B - designates shallow well
(3) 1979 samples collected by URS; 1982 samples collected by MPI
(4) 1979 samples measured in APHA-True units; 1982 samples measured in Pt-Co units

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TABLE 2-2 (cont.)

LTV STEEL COMPANY
MARILLA STREET LANDFILL

BACKGROUND GROUNDWATER QUALITY[1]

Well No.[2]: Sampling Date[3]	5A (8-2-79)	5A (8-13-79)	2B (7-31-79)	2B (8-13-79)	POND (7-31-79)	POND (8-13-79)
Ammonia (as N)	0.33	0.35	12.60	4.10	1.64	1.19
Nitrate (as N)	0.25	0.05	0.74	0.28	0.17	0.15
TKN (as N)	1.44	1.83	18.48	15.30	1.64	2.01
Biochemical Oxygen Demand (BOD_5)	11	15	84	9	2	9
Chemical Oxygen Demand	48.7	52.2	83.1	252	34.7	46.1
Aluminum	<0.5	0.5	3.4	1.4	<0.5	0.5
Arsenic	0.0121	0.0056	0.084	0.0268	<0.0005	0.0011
Chromium (HEX)	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Cadmium	-	-	-	-	-	-
Zinc	-	-	-	-	-	-
Selenium	-	-	-	-	-	-
Copper	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Mercury	0.0004	<0.0003	0.0004	0.0003	<0.0003	<0.0013
Sodium	109	123	431	432	201	214
MBAS	<0.025	0.025	0.04	0.60	0.30	0.08
Calcium	99	95	67	61	64	68
Silver	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Manganese	-	-	-	-	-	-
Nickel	-	-	-	-	-	-
Total Solids	945	1036	1728	1602	956	994
Color (4)	15	20	>70	-	20	20
Alkalinity	368.5	374.1	436.8	421.2	17.9	20.2
Hardness	600	620	115	160	175	165
Odor (Threshold)	-	-	-	-	-	-
E Coli (#/100 ml)	>2000	7700	<1	800	>2000	16,000

NOTES: (1) All units mg/l except where noted.
(2) A - designates deep well, B - designates shallow well
(3) 1979 samples collected by URS; 1982 samples collected by MPI
(4) 1979 samples measured in APHA-True units; 1982 samples measured in Pt-Co units

TABLE 2-3

LTV STEEL COMPANY
MARILLA STREET LANDFILL
SUMMARY OF ANALYTICAL RESULTS
FOR ROUTINE WATER QUALITY PARAMETERS*

PARAMETER	pH	CONDUCTIVITY	TOTAL ORGANIC CARBON	TOTAL DISSOLVED SOLIDS	IRON	CHLORIDES	SULFATES	PHENOLS	TOTAL LEAD	SOLUBLE LEAD	TOTAL CHROMIUM
	(units)	umhos/cm)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(ug/l)	(mg/l)	(mg/l)	(mg/l)
Well 2A											
5-04-82	8.9	520	10	393	0.07	175	70	12	<0.02	NA	0.02
5-18-82	8.8	625	10	497	0.43	128	88	39	<0.02	NA	0.02
6-15-82	NA	NA	NA	NA	NA	NA	NA	8	NA	NA	NA
6-30-82	NA	NA	NA	NA	NA	NA	NA	11	NA	NA	NA
8-24-84	8.1	800	5	373	1.57	131	6	67	NA	NA	NA
4-23-85	8.3	825	5.0	418	2.30	172	4	BDL/50	NA	NA	NA
7-23-85	8.8	990	2.4	633	0.48	98.2	6.8	124	NA	NA	NA
Well 3A											
8-02-79	7.3	1340	6	NA	1.63	64.9	115	1	0.10	NA	<0.05
8-13-79	7.1	1360	10	NA	1.79	65.0	130	47	<0.10	NA	<0.05
5-04-82	NA	NA	NA	NA	NA	NA	NA	<5	NA	NA	NA
5-18-82	NA	NA	NA	NA	NA	NA	NA	<2	NA	NA	NA
8-24-84	6.8	1010	4	757	2.26	70	242	28	NA	NA	NA
4-23-85	7.0	1360	NA	NA	NA	NA	NA	NA	NA	NA	NA
7-23-85	7.7	1380	2.5	8132	1.85	3.5	198.6	224	NA	NA	NA
Well 4A											
5-04-82	10.8	950	20	624	0.03	95	620	15	<0.02	NA	<0.02
5-18-82	11.0	1000	15	521	0.14	45	640	4	<0.02	NA	<0.02
8-24-84	7.9	640	7	306	1.82	39	72	35	NA	NA	NA
4-23-85	6.4	675	9.2	352	2.20	67	66	110	NA	NA	NA
7-23-85	7.6	700	3.1	364	0.49	35	121.1	112	NA	NA	NA

TABLE 2-3 (continued)

LTV STEEL COMPANY
MARILLA STREET LANDFILL
SUMMARY OF ANALYTICAL RESULTS
FOR ROUTINE WATER QUALITY PARAMETERS*

PARAMETER	pH (units)	CONDUCTIVITY umhos/cm)	TOTAL ORGANIC CARBON (mg/l)	TOTAL DISSOLVED SOLIDS (mg/l)	IRON (mg/l)	CHLORIDES (mg/l)	SULFATES (mg/l)	PHENOLS (ug/l)	TOTAL LEAD (mg/l)	SOLUBLE LEAD (mg/l)	TOTAL CHROMIUM (mg/l)
Well 5A											
8-02-79	7.3	1430	5	NA	0.35	47.5	330	10	0.10	NA	(0.05
8-13-79	7.1	1360	15	NA	0.16	42.5	305	5	(0.10	NA	(0.05
5-04-82	7.5	950	2	719	0.23	78	NA	10	NA	NA	NA
5-18-82	7.7	1100	2	749	0.33	42	NA	5	NA	NA	NA
6-15-82	NA	NA	NA	NA	NA	NA	NA	(2	NA	NA	NA
8-24-84	7.5	780	8	571	1.33	39	133	37	NA	NA	NA
4-23-85	7.3	1200	4.9	845	3.20	73	184	BDL/50	NA	NA	NA
7-23-85	7.4	995	1.7	677	0.78	6.5	162.7	115	NA	NA	NA
Well 6A											
8-24-84	7.6	1440	10	950	0.73	58	433	68	NA	NA	NA
4-23-85	7.5	1125	5.3	6483	5.40	89	144	BDL/50	NA	NA	NA
7-23-85	7.2	1240	1.9	3640	BDL/0.3	34.6	225.3	126	NA	NA	NA
Well 2B											
7-31-79	11.5	2110	53	NA	4.90	217.4	125	8	0.10	NA	(0.05
8-13-69	11.2	2600	20	NA	1.20	174.9	190	184	(0.10	NA	(0.05
5-04-82	NA	NA	NA	NA	NA	NA	NA	110	NA	NA	NA
5-18-82	NA	NA	NA	NA	NA	NA	NA	270	NA	NA	NA
6-15-82	NA	NA	NA	NA	NA	NA	NA	129	NA	NA	NA
6-30-82	NA	NA	NA	NA	NA	NA	NA	143	NA	NA	NA
4-23-85	11.6	1975	31.1	661	3.20	45	48	120	NA	NA	NA
7-23-85	8.4	2000	11.3	746	BDL/0.3	123	79.2	162	NA	NA	NA

TABLE 2-3 (continued)

LTV STEEL COMPANY
MARILLA STREET LANDFILL
SUMMARY OF ANALYTICAL RESULTS
FOR ROUTINE WATER QUALITY PARAMETERS*

PARAMETER	pH (units)	CONDUCTIVITY umhos/cm)	TOTAL ORGANIC CARBON (mg/l)	TOTAL DISSOLVED SOLIDS (mg/l)	IRON (mg/l)	CHLORIDES (mg/l)	SULFATES (mg/l)	PHENOLS (ug/l)	TOTAL LEAD (mg/l)	SOLUBLE LEAD (mg/l)	TOTAL CHROMIUM (mg/l)
West Pond											
7-31-79	7.9	1430	7	NA	4.00	244.9	140	100	<0.10	NA	<0.05
8-13-79	7.3	1140	9	NA	2.90	244.9	255	24	<0.10	NA	<0.05
5/04-82	NA	NA	NA	NA	NA	NA	NA	5	NA	NA	NA
5-18-82	NA	NA	NA	NA	NA	NA	NA	10	NA	NA	NA
6-15-82	NA	NA	NA	NA	NA	NA	NA	2	NA	NA	NA
8-24-84	9.1	960	12	503	1.77	126.5	120	77	NA	NA	NA
4-23-85	9.1	1100	10.4	569	4.20	237	124	BDL/50	NA	NA	NA
7-23-85	8.1	1430	7.5	930	0.60	141	345.3	133	NA	NA	NA
Well 5B											
5-04-82	9.3	1050	2	735	0.19	250	NA	<5	NA	NA	NA
5-18-82	8.8	1100	8	559	0.35	175	NA	3	NA	NA	NA
4-23-85	7.0	2300	15.0	1527	27.70	409	258	BDL/50	NA	NA	NA
7-23-85	6.9	2950	8.7	2679	20.15	7.8	719.1	127	NA	NA	NA
Well 6B											
8-24-84	7.2	2250	13	2020	12.10	74.5	1004	44	NA	NA	NA
4-23-85	7.1	2300	12.2	2148	39.9	65	709	BDL/50	NA	NA	NA
7-23-85	6.6	2400	2.9	2176	2.26	7.0	1230	133	NA	NA	NA
East Pond											
4-23-85	7.6	725	15.6	417	BDL/0.3	75	111	180	NA	NA	NA
7-23-85	7.6	750	8.3	318	1.02	28.1	75.9	142	NA	NA	NA

TABLE 2-3 (continued)

LTV STEEL COMPANY
MARILLA STREET LANDFILL
SUMMARY OF ANALYTICAL RESULTS
FOR ROUTINE WATER QUALITY PARAMETERS*

PARAMETER	pH (units)	CONDUCTIVITY umhos/cm)	TOTAL ORGANIC CARBON (mg/l)	TOTAL DISSOLVED SOLIDS (mg/l)	IRON (mg/l)	CHLORIDES (mg/l)	SULFATES (mg/l)	PHENOLS (ug/l)	TOTAL LEAD (mg/l)	SOLUBLE LEAD (mg/l)	TOTAL CHROMIUM (mg/l)
West Drainage Ditch											
7-23-85	7.8	2600	7.3	2924	2.59	144.9	299.5	139	0.83	NA	0.017
8-21-85	NA	NA	11.6	989	0.35	190	211	BDL/5	BDL/.005	BDL/.005	0.008
Well 7A											
7-23-85	7.8	1060	6.5	521	2.03	77.8	112.6	204	.037	NA	BDL/.005
8-21-85	NA	NA	6.7	625	25.2	68.3	53	BDL/5	0.114	BDL/.005	0.032

NOTES: NA - not analyzed
BDL/50 - Below Detection Limit of 50
A - designates deep well; B designates shallow well
* The parameters analyzed on each sample occasion varied primarily due to:
- changes in the list of routine parameters required for analysis by NYSDEC; and
- changes in NYSDEC policy regarding analysis of total versus soluble metals.

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TABLE 2-4
GROUNDWATER QUALITY STANDARDS

Substance	New York State Water Quality Standards For Class "GA" Water	Interim Primary Drinking Water Standards
	Maximum Concentration (mg/l)[1]	
Arsenic	0.025	0.05
Barium	1.00	1.00
Cadmium	0.01	0.01
Chloride	250.00	-
Chromium	0.05[2]	0.05[3]
Copper	1.00	-
Cyanide	0.20	-
Flouride	1.50	-
Foaming Agents (MBAS)	0.50	-
Iron[4]	0.30	-
Lead	0.025	0.05
Manganese[4]	0.30	-
Mercury	0.002	0.002
Nitrate (as N)	10.00	10.00
Phenols	0.001	-
Selenium	0.02	0.01
Silver	0.05	0.05
Sulfate	250.00	-
Zinc	5.00	-
pH Range	6.5-8.5	-
Endrin	N.D.	0.0002
Lindane	N.D.	0.004
Methoxychlor	0.035	0.10
Toxaphene	N.D.	0.005
2, 4-D	0.0044	0.10
2,4, 5-TP (Silvex)	0.00026	0.01
Radium 226 and 228	-	5.00[6]
Gross Alpha Activity	-	15.00[6]
Coliform Bacteria[7]	-	4.00
Other[5]	(See Appendix)	-

NOTES:

- \- Not specified
- N.D. Not Detectable
1. Except where exceeded due to natural conditions
2. Hexavalent chromium
3. Total chromium
4. Combined concentration of iron and manganese shall not exceed 0.3 mg/l
5. Specific organic substances as specified in Appendix B.
6. pCi/l
7. 1/100 ml. arithmetic mean not to exceed 1 per 100 ml.

ground water quality standards are presented in Table 2-4. Comparison of the background analytical results (in Table 2-2) to the State and Federal guidelines (in Table 2-4) indicates the following:

- Arsenic concentrations exceeded EPA drinking water and DEC ground water standards in only shallow well No. 2B.
- MBAS (Foaming Agents) were detected in the ground water samples taken from shallow well No. 2B and deep well No. 4A at concentrations in excess of ground water standard. The source of the MBAS is not known.
- Fecal coliform (E. Coli) has been detected in the samples collected from all the wells with the exception of deep well No. 4A. The fecal coliform is probably a result of contamination during well installation, which is a common phenomenon. However, this cause has not been confirmed.

Examination of the analytical results for the routine water quality parameters summarized in Table 2-3 indicates the following:

- The Marilla Street Landfill appears to be contributing to an increase in the pH of ground water monitored by both the shallow and deep wells.
- Conductivity, total dissolved solids (TDS), and total organic carbon (TOC) levels in ground water do not appear to be significantly affected by the landfill.
- Lead was detected at 0.10 mg/l in the ground water sample collected from shallow well Nos. 2B and 5B during the initial sampling performed in 1979. However, these values are probably false positives which occurred as a result of the high detection limit (i.e. 0.10 mg/l) utilized during sample analysis. This conclusion is supported by the fact that lead was not detected in the samples collected from these wells two weeks later. Lead was sampled in monitoring well 7A and the west drainage ditch on 7/23/85. Both samples showed total lead concentrations in excess of the ground water quality standards of 0.025 mg/l. Monitoring well 7A and the west drainage ditch were resampled on 8/21/85. Total lead was detected in monitoring well 7A in excess of the ground water quality standard; however, lead was not detected in the west drainage ditch in either total or soluble form, and soluble lead was not detected in monitoring well 7A. Therefore, the lead detected in well 7A may be the result of sediment contamination during installation. Since monitoring well 7A is

a relatively new well, it has not been flushed on enough occasions to insure that all of the contaminated sediment (which entered the well during installation) has been removed.

- In general, iron concentrations, although displaying variability between sampling episodes, exceeded the NYSDEC ground water quality standards.

- Chloride concentrations exceeded the Class "GA" ground water quality standard on only one occasion (viz. April 23, 1985).

- Sulfate levels in deep wells 4A and 5A and shallow wells 5B and 6B exceeded Class "GA" ground water standards.

- Phenols were detected in all wells in excess of the Class "GA" ground water quality standards. However, the levels of phenol in upgradient deep well No. 6A and shallow well 2B were comparable to downgradient concentrations. Therefore, an off-site upgradient source of phenols is suggested. The potential off-site source(s) is not known.

Background ground water to comply with the guidelines of 6NYCRR Part 373-3.6(c)(1) 40 CFR Part 265.92, quarterly monitoring was conducted for one year beginning in early November 1985. The ground water quality monitoring data collected since November 1985 is summarized in the June 1987 Annual Report (see Appendix I), the January 1988 Quarterly Monitoring Report (see Appendix J), the February 1988 Annual Ground Water Monitoring Report (see Appendix K), and the March 1988 Quarterly Monitoring Report (see Appendix L).

2.4 POINT OF COMPLIANCE

The following information can be determined by examining the topographic maps (see Sheets 2 and 5):

- Location of the BOF Dust Area including bordering properties

- The "point of compliance" (viz. one downgradient shallow ground water monitoring well).

- The "points of monitoring" (viz. the downgradient shallow ground water monitoring wells).

- The location and elevation of all existing ground water monitoring wells

- The general direction of ground water flow in both the shallow and deep ground water systems

2.5 CONTAMINATION PLUME

The January 1988 Quarterly Ground Water Monitoring Report indicated that statistically significant changes for pH and specific conductance had occurred (see Appendix J). As required in 6NYCRR Part 373-3.6(d)(1)(ii) and 40 CFR Part 265.93(d)(2), a Ground Water Quality Assessment Program Plan has been submitted to the NYSDEC. The plan will be initiated once it is approved by the NYSDEC. A determination of whether a plume of contamination is migrating from the BOF Dust Area will be made once the Ground Water Quality Assessment is completed.

2.6 GROUND WATER MONITORING SYSTEM

Title 6, NYCRR Part 373-3.6(b)(1) and 40 CFR Part 265.91 specify that a minimum of one upgradient and three downgradient monitoring wells be utilized to monitor the uppermost ground water system in the vicinity of the BOF Dust Area. At this time, monitoring wells 6B (viz. upgradient) and 4B, 7B, 9B, 13B and 14B (viz. downgradient) are proposed to comply with this requirement. The adequacy of the proposed ground water monitoring system will be reviewed following completion of the Ground Water Quality Assessment Program. All of the monitoring wells on and in the vicinity of the Marilla Street Landfill site will be monitored for ground water elevations to establish ground water flow directions in both ground water systems.

The Sampling and Analysis Plan presented in Appendix E outlines the procedures and techniques which will be utilized for:

- Sample collection
- Sample preservation and treatment
- Analytical procedures
- Chain of Custody Control

2.7 DETECTION MONITORING PROGRAM

The detection monitoring proram proposed in this section should be considered preliminary. The list of parameters to be analyzed, the frequency of sampling and analysis, and the proposed statistical evaluation procedures will be reviewed for adequacy following completion of the Ground Water Quality Assessment Program.

Monitoring Wells No. 4B, 6B, 7B, 9B, 13B and 14B will be utilized to monitor the ground water quality impacts of the BOF Dust Area. Ground water samples will be collected semi-annually from these wells and analyzed for the following parameters (see Table 2 for Analytical Methods):

- pH
- Conductivity
- Lead
- Phenol
- Sulfate
- Iron
- Cadmium
- Total Suspended Solids
- Chromium

Each analysis will consist of four replicate measurements. Ground water elevation data will be collected from all of the monitoring wells on and in the vicinity of the Marilla Street Landfill site prior to each sample collection (viz. before evacuating the wells) in order to determine the direction of ground water flow in both ground water systems. In addition, samples will be collected from Monitoring Well 9B (viz. the point-of-compliance) on an annual basis for analysis of the full list of 40 CFR Part 261 Appendix IX (most recent update) or the 6NYCRR Part 371 equivalent. The frequency of ground water sampling and analysis will continue throughout the post-closure period. The ground water quality established during the interim ground water monitoring period (see Section 2.2) will be utilized as background ground water quality. It is estimated that 45 days per sampling event will be required to complete all of the sample analyses.

The Cochran's Approximation to the Behrens-Fisher Students t-test will be utilized at the 0.05 level of significance to statistically evaluate the results of ground water monitoring. If a significant change in ground water quality is determined, the Comprehensive Ground Water Quality Assessment Program as outlined in Appendix F will be implemented.

The aquifer flow rate will be determined for the shallow ground water system in the vicinity of the BOF Dust Area annually using the following modification of Darcy's Law:

$$v = \frac{k\ dh/dl}{\theta}$$

where: v = average velocity (i.e. rate of migration)

k = hydraulic conductivity

dh/dl = slope of potentiometric or piezometric surface in direction of ground water flow

θ = effective porosity of the soil

The effective porosity of the sandy-silt soils which predominate at the site will be assumed to be 0.45 (D.K.Todd; "Groundwater Hydrology", 2nd Edition, John Wiley & Sons, C1980, pg.28.). The hydraulic conductivity of the soils beneath the facility will be measured annually utilizing the existing ground water monitoring wells. Either the falling-head method or the well-recharge method will be utilized to determine hydraulic conductivity depending upon the ground water elevations.

3.0 SITE CLOSURE PLAN

3.1 GENERAL

The following information is submitted in accordance with the requirements for landfill closure as contained in 6NYCRR Part 373-1.5(a)(2)(1)(xiii), 40 CFR 270.14(b)(13) and applicable 6NYCRR 373-3 and 40 CFR 265 Subparts. A discussion of existing site topography is presented in Section 1.4 of this Closure Plan. The site closure plans with sections and details of the cap, drainage ditches, gas vents, and other design features are presented as Sheets 3 and 4.

Two copies of the Closure Plan for the Marilla Street Landfill will be kept on file at LTV Steel Co., Buffalo District Office.

The procedure for updating the closure plan will be as follows:

- Submit proposed changes to the Closure Plan to the appropriate regulatory agencies for review and approval.
- Implement proposed changes following regulatory review and approval.

3.2 SITE PREPARATION

The BOF Dust Area of the Marilla Street Landfill is relatively flat at the top and surrounded on three (3) sides by berms (viz. south, east and west). The berms to the south and the east are railroad berms and are constructed with fill. The west berm is a containment berm and is constructed from slag and construction/demolition rubble. The north side of the site has a downward surface slope of about 10% and is not contained by a berm. The site is well drained and has little to no vegetative cover.

The BOF dust area will be extensively regraded (see Sheet 1) to promote surface water runoff. The regraded surface will have surface slopes not greater than 3 horizontal to 1 vertical. For every 20-foot vertical rise, a 10-foot terrace will be constructed to minimize erosion due to surface runoff. Approximately 24,000 cubic yards of fill material (viz. slag and dust) will have to be regraded to accomplish the proposed grading plan (see Appendix P). Dust will be controlled by spreading water as necessary. Differential settlement of the regraded BOF Dust Area is not considered a potential problem due to the nature of the fill material. Greater than ninety (90) percent of the fill material in the BOF Dust Area is slag and rubble (see Section 1.2) which is commonly used in road bed construction to provide improved drainage and structural integrity.

3.3 EQUIPMENT DECONTAMINATION

The equipment used to accomplish the proposed regrading of the BOF Dust Area will contact the BOF Dust. Therefore, decontamination of the equipment will be required following completion of the regrading activities. The equipment will be decontaminated on top of the BOF Dust Area prior to the placement of cover materials. All large solids adhering to the equipment will be removed manually with shovels. The equipment will then be washed using low volume, high pressure water sprays. The small amount of water expected to result from the washing (less than 500 gallons) will be captured for off-site treatment and disposal at a permitted TSDF. A temporary decontamination station will be constructed on-site to facilitate capture of the wash water.

3.4 SITE DRAINAGE

During the regrading procedure, drainage ditches will be constructed around the periphery of the BOF Dust Area as shown on Sheet 3. Drainage ditches will be constructed with a minimum of 2% bottom slope. All drainage ditches will have a liner system and final cover which is continuous with the regraded site as described in Section 3.5 of this Closure Plan. A vegetative cover, as described in Section 3.5 of this Closure Plan, will be established in the drainage ditches to help prevent surface soil erosion and ditch washout. In addition, all ditches will be lined with a synthetic anti-erosion matting as an aid to turf establishment and to prevent soil and vegetative washout during periods of high rainfall. The drainage system is designed for a 25-year, 24-hour storm (see Appendix H). Due to the topography of the site and the existing periphery drainage ditches (which convey surface water away from the site), run-on will not be a problem and has not been addressed.

3.5 FINAL COVER

Options for grading the BOF Dust Area to establish a subgrade for placement of the final cover were limited due to the physical constraints of the site. The 6NYCRR Part 373 regulations do not provide for relocation of fill materials from hazardous waste sites unless the material is placed in a permitted Treatment, Storage Disposal Facility (TSDF). Since the volume (approximately 137,000 cy) of material relocation from the BOF Dust Area to a permitted TSDF is impractical, the grading plan was designed to maintain the fill material within the designated boundaries of the BOF Dust Area (see Sheet 2) as well as property boundaries. This required the use of 1:3 (rise/run) side slopes on the western and northern area boundaries.

The regraded surface of the BOF Dust Area with slopes of 1:3 will be covered by a 24-inch thick recompacted soil layer (permeability $<1x10^{-7}$ cm/sec) followed by 12 inches of a sand drainage layer, approximately 24 inches of silty-sand, and 6 inches of topsoil. Where the slope is less than or equal to 5 percent, the cap will consist of a 24-inch recompacted soil layer, a 6-inch sand protective layer or geotextile, a 30 ml PVC synthetic membrane liner, a 12-inch sand drainage layer, a geotextile, a 24-inch silty sand protective layer and 6-inches of topsoil. Details of the proposed cover are presented on Sheets 4 and 5. An evaluation of the slope stability for this cover system at 1:3 slopes using GEOSLOPE, a computer program designed to determine factors of safety for potential failure surfaces, indicated a minimum factor of safety of greater than 1.5 for both circular and noncircular surfaces under non-load conditions (see Appendix Q). A minimum safety factor of 1.5 for slope stability is well accepted by the USEPA, Corps of Engineers and the Mine Safety and Health Administration (Reference 6). Using conservative H-10 loading and partially saturated flow conditions (which are not likely to occur at the same time), the minimum factor of safety was determined to be approximately 1.2 (see Appendix Q).

Consideration was given to inclusion of a synthetic membrane liner as part of the cap design at the 1:3 slopes; however, we have concerns regarding the stability of the cover system above the synthetic liner at a 1:3 (rise/run) slope. Conversations with membrane liner manufacturers have not indicated any short-term, let alone long-term, experience with membrane liners constructed as part of a cover system at 1:3 side slopes. Since grading and capping of the BOF Dust Area requires use of 1:3 side slopes, as discussed above, a synthetic liner was not included in the cover system designfor 1:3 side slopes. The benefits of including a synthetic liner in the cover system are also in question since it has been estimated that the proposed cover system will reduce infiltration by approximately 99.9 percent as discussed below.

The 24 inches of silty-sand and 12 inches of drainage sand layer over the recompacted soil layer should be sufficient to prevent root penetration. The 6 inches of topsoil and 24 inches of silty-sand was considered adequate to provide protection against frost penetration in the Buffalo area which is typically in excess of three (3) feet (USEPA, Evaluating Cover Systems for Solid and Hazardous Waste, SW-867, September 1982 (Reference 2). An evaluation of the effectiveness of the proposed cover system relative to the existing landfill surface indicates that the proposed cover system will reduce infiltration by approximately 99.9 percent (see Appendix M). Erosion calculations for the capped area are presented in Appendix N.

The entire surface of the BOF Dust area will be seeded with 150 lbs/acre of seed conforming to the following mix (by weight):

- Creeping Red Fescue - 40%
- Perennial Rye Grass - 40%
- Crown Vetch - 20%

This mixture was chosen to control erosion and minimize long-term maintenance. Red fescue is a fine textured, short grass. Perennial rye grass is a medium height, bunch growth, short-lived grass. Crown vetch is an easily maintained perennial legume (Reference 2). This seed mix has been used on a number of landfills in Western New York with no apparent erosion or maintenance problems. In addition, the following species will be sowed specifically in the drainage ditches to help prevent ditch erosion:

- Tall Fescue (Kentucky 31)	20	lbs/acre
- Creeping Red Fescue	20	" "
- Red Top	4	" "
- Empire Birdsfoot Trefoil	8	" "
- Garrison Creeping Foxtail	10	" "

This mixture was chosen due to the tolerance to wetness, adaptability to climate and resistance to erosion of the species, as recommended in Reference 2. The selected species have a continuous rather than a clump sod form of growth. Birdsfoot Trefoil is a legume, a plant which fixes nitrogen and helps the grasses thrive. Garrison Foxtail is especially adapted for vigorous growth in wet and seepage areas.

In addition to the seed mixtures listed above, one bushel per acre of oats or rye seed will be sowed over the entire area, including drainage ditches, to provide a quick shade cover and to prevent erosion during turf establishment. As an aid to turf establishment, seeded areas will be fertilized with 20 pounds per 1000 square feet of 10-10-10 fertilizer and covered with a hay or straw mulch to prevent erosion during initial establishment.

Following regrading and capping procedures, the BOF Dust Area will occupy approximately 225,000 square feet and have a peak elevation of approximately 620 feet above mean sea level.

A Health and Safety Plan will be prepared for the site prior to any regrading of material. The plan will address procedures to be followed during decontamination of equipment and personnel. It will also address safety procedures and use of safety equipment. Recommended safety equipment will include disposable coveralls, boots, hard hats, dust masks and safety glasses. All equipment or material which comes into contact with waste material during excavation, hauling or placing activities will be decontaminated or disposed of in a permitted treatment, storage, disposal facility.

3.6 Earth Materials Quality Assurance

3.6.1 General

The final cover system for the Marilla Street Landfill, BOF Dust Area is designed to provide long-term minimization of liquid migration and leachate formation in the closed landfill by limiting the infiltration of surface water into the facility for the post-closure period. The final cover system will be constructed so that it functions with minimum maintenance, promotes drainage and minimizes erosion of the cover, accommodates settlement and subsidence so that the cover's integrity is maintained.

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TABLE 3-1

LTV STEEL COMPANY
MARILLA STREET LANDFILL
BOF DUST AREA
FINAL CAP CONSTRUCTION
GRADATION GUIDES*

SILTY SAND PROTECTIVE LAYER

Gradation

Sieve Size Designation	Percent Minimum Passing By Weight
3 inches	100
No. 4	75
No. 200	45
.002 mm	10

SAND DRAINAGE LAYER & PROTECTIVE SAND LAYER

Gradation

Sieve Size Designation	Percent Minimum Passing By Weight
3/8 inch	100
No. 4	90-100
No. 8	50-100
No. 16	20-100
No. 50	0-30
No. 200	0-5

Falling Head Permeability

1.0×10^{-3} cm/sec

RECOMPACTED SOIL/BARRIER LAYER

Gradation

Sieve Size Designation	Percent Minimum Passing By Weight
1 inch	100
No. 4	70
No. 200	40
3 inch	100
No. 4	75
No. 200	45
.002 mm	10

Falling Head Permeability

1.0×10^{-7} cm/sec

* Sieve size designation will be used as guidance only.
Permeability as determined by the Soils Testing Laboratory will be used as criteria for acceptance or rejection.

Assurance that the earth materials of the final cover system for the BOF Dust Area of the Marilla St. Landfill are constructed in accordance with the project closure plans and specifications and/or NYSDEC requirements shall be accomplished by the judicious use of quality assurance testing. Prior to construction, a Quality Assurance (QA) Plan and project specifications will be prepared by a registered Professional Engineer for review by the NYSDEC. The QA plan will address earth materials and synthetic materials which will be incorporated into the cover system. Sections 3.6 and 3.7 will be the basis of the Quality Assurance Plan. All construction activities will be monitored under the supervision of a registered Professional Engineer. A construction monitoring report will be prepared by a registered Professional Engineer and submitted to the NYSDEC following completion of cover system construction activities in order to document that the cover system was constructed as designed.

3.6.2 Quality Control

Specific quality control testing for the individual final cover layers shall consist of the following: Material Evaluation; and Construction Quality Evaluation. Each is discussed in more detail below.

3.6.2.1 Material Evaluation

Material evaluations shall be performed on soil to ascertain its acceptability as construction material and compliance with the closure plans and specifications.

Gradation and permeability criteria to be used for determination of acceptability are defined in Table 3-2. The testing frequency protocols are discussed in Section 3.6.4.

The following tests will be performed to facilitate material evaluations:

Test	ASTM Standard No.
- Water (Moisture) Content of Soil and Soil Aggregate	D2216-80
- Gradation Analysis of Soils (Sieve and Hydrometer)	D422-63
- Atterberg Limits	D4318-83
- Moisture Density Relationships of Soil and Soil Aggregate Mixtures Using 10-lb. Hammer and 18-in. Drop (Modified Proctor)	D1557-78

- Laboratory Hydraulic Conductivity Testing at 90 Percent of the Modified Proctor Density on the Wet Side of Optimum Moisture Density Relations of Soil and Soil Aggregate Mixtures Using 10-lb. Hammer and 18-inch Drop (Modified Proctor) — D1557-78

a. Water Content

This test will be used to determine whether soil is wet or dry of the optimum water content.

b. Gradation

Soil material shall conform to the gradation requirements set forth in Table 3-1. Soil material which does not meet these gradations may be rejected as final cover construction material depending on permeability testing results.

c. Atterberg Limits

Although Atterberg Limits will be monitored, they will not be used as criteria for rejection or acceptance of the soil material. Atterberg limits will help to classify the various soils encountered and, in correlation with other soil properties, will help to define the soil's behavior (such as permeability and compactability).

d. Moisture-Density Relationships

The moisture density relationships determined during materials evaluation testing will be used as a basis for determining whether optimal moisture content and compaction is achieved during the construction quality evaluation. The QA inspector will program the nuclear densitometer with the optimum moisture content and maximum dry density representative for the soil being placed.

e. Recompacted Hydraulic Conductivity (Permeability)

Recompacted permeability of the soil being tested for the 24-inch barrier or compacted soil layer shall have a maximum value of 1.0×10^{-7} cm/sec. Soils which do not meet this requirement will be rejected.

3.6.2.2 Construction Quality Evaluation

Construction quality evaluations will be performed on all components of the final cover construction as part of the certification program. Criteria to be used for determination of acceptability of the construction work will be as identified in the project specifications.

Construction evaluation testing will consist of visual observations of the work, in-place soil density/moisture content checks, in-situ or undisturbed hydraulic conductivity (permeability) testing, survey of as-built conditions, and a visual assessment of the adequacy of layer bonding.

a. Moisture Control

The QA inspector will check the moisture content of the final cover material using the nuclear densitometer programmed for the soil being placed. The final cover material moisture content shall be greater than optimum prior to compaction. Final cover material shall not be placed unless the moisture content of the previous lift or subgrade is between optimum and four percent (4%) greater than optimum. When necessary, moisture will be added using approved sprinkling equipment. Construction personnel shall add sufficient water during rolling and tamping to assure complete compaction of material. If the material is too wet for satisfactory compaction, construction personnel shall temporarily stop work and the material will be allowed to dry. The placement or compaction of material will not be permitted during or immediately following rainfall. Construction of the final cover system shall be conducted in such manner that a minimum of rain water will be retained thereon. Compacted material that is damaged by washing shall be replaced by construction personnel in an acceptable manner. The construction personnel will not be permitted to proceed with in-place soil compaction until the moisture content of the soil is approved by the QA personnel.

b. In-Place Soil Density Control

Each layer of the final cover system will be compacted in pounds per cubic foot, as determined by the Modified Proctor Compaction Test, ASTM D-1557-78. Construction personnel shall select equipment which is capable of providing the minimum densities required by the specifications and shall submit a description of the type of equipment proposed for use to the QA personnel for approval. Lift thicknesses, water content (of the material), compactor weight and the number of passes of the compacting equipment will be adjusted as required to obtain the minimum specified density. Evaluation of the construction work will include the following:

- Observations of the water content and other physical properties of the soil during processing, placement and compaction;
- Observations of the thickness of lifts as loosely placed and compacted (max. 8-inch compacted lift);
- Observation of the use of proper equipment for the construction and effective use of same to properly prepare materials;
- Observations of the action of the compaction and heavy hauling equipment on the construction surface (sheepsfoot penetration, pumping, cracking, etc.); and
- Observation of the average number of passes used to compact each lift.

Determination of in-place soil moisture and density will be performed in accordance with the following methods:

Test	ASTM Standard No.
- Moisture and density of soil and soil aggregate, in-place, by Nuclear Methods	D2922-81 D3017-78

The QA personnel will perform field tests to measure the dry density and moisture content of the compacted soil layer using nuclear moisture/density gauges. These measurements will be performed with the gauge in direct transmission mode with the depth probe typically extended 6 inches. The gauges will be standardized daily. The QA inspector will program the nuclear densitometer with the maximum dry density of the soil actually being placed (viz. based on material evaluation of soil being placed). The construction personnel will not be permitted to proceed with hydraulic conductivity measurements until the in-place soil density is approved by the QA personnel.

c. In-Situ and Undisturbed Hydraulic Conductivity (Permeability) Measurements

In-situ and undisturbed laboratory permeability measurements will be performed on samples (in-situ and Shelby-Tube, respectively) of the completed recompacted soil layer. A maximum hydraulic conductivity of 1.0 x 10^{-7} cm/sec will be used for determination of acceptability. The QA Engineer shall have the option of using in-situ hydraulic conductivity testing or collecting Shelby-Tube samples for laboratory hydraulic conductivity testing. If in-situ hydraulic conductivity testing is performed, supplementary Shelby-Tube samples will be collected for laboratory hydraulic conductivity testing at minimum frequency of 1 per 4 acres per 1 ft. Supplementary Shelby-Tube testing will not be required if Shelby-Tube samples are collected/tested in lieu of in-situ hydraulic conductivity testing.

The following test methods will be utilized:

Test	ASTM Standard No.
- Undisturbed Shelby Tube Hydraulic Conductivity Test (saturated backpressure triaxial)	None
- In-situ Hydraulic Conductivity Test	None

d. Thickness Verification

The existing landfill surface cover will be stripped of all vegetation, graded to a uniform slope, and compacted prior to placement of the final cover system material. Construction personnel will obtain the approval of the subgrade from QA personnel before beginning the final cover system construction. After approval of the subgrade, a licensed land surveyor will perform a topographic survey of the site using a 50' x 50' grid interval over the entire area to be capped. The survey will be referenced to a horizontal grid system and vertical control on site. The top of subgrade will be scarified, unless otherwise directed by the QA Engineer, prior to final cover system construction.

The minimum soil layer thicknesses will be confirmed by contracting with a licensed land surveyor for the performance of a topographic survey of the site following completion of the barrier layer construction. The licensed land surveyor will utilize the same grid system as the survey completed before final cover system construction. Construction personnel will obtain the approval of the QA Engineer for minimum cap thickness before placement of topsoil.

3.6.3 Topsoil Layer

The topsoil layer is the uppermost component of the cover system. Its functions are to protect the underlying layers from mechanical damage, and (in conjunction with a vegetative cover) to protect against erosion.

Preconstruction inspection activities will include checking topsoil properties against the design specifications and ensuring that deleterious materials are not included. The foundation for the topsoil layer will be the 24-inch silty sand layer. The 24-inch silty layer should be checked to ensure that it has been constructed to meet or exceed the specified design, that any specified penetrations are intact and properly oriented and that the integrity has not been impacted by erosion and/or desiccation cracking.

Construction personnel will use grade stakes to establish the appropriate depth of the topsoil layer. During construction of the topsoil layer, QA inspection personnel will monitor the uniformity of the application process, observe the placement procedure to ensure that the soil is not overly compacted, and measure the thickness and slope of the topsoil layer. QA inspection personnel should also ensure that care is taken in the vicinity of vents or other protrusions to prevent damage by construction equipment.

Topsoil placement, preparation for seeding, and the seeding will take place in a more or less continuous operation. The application rate of additives will be monitored to confirm that it is as specified in the design. QA inspection personnel will verify that all vents and standpipes or any other penetrations through the cover are not damaged by additive application processes.

QA inspection personnel will ensure that the application equipment is appropriate for the job. The rate of seed and mulch application, amount and uniformity of coverage, and watering instructions, will be as specified. Perimeter areas will be examined to ensure that bare spots are not left inadvertently.

Timing of seeding is important, particularly for grasses. QA inspection personnel will ensure that it occurs during the designated period and that the weather is favorable. (For example, seeding will not take place during high wind or rain or when the soil is frozen.)

3.6.4 Quality Assurance (QA) Testing Frequency

Testing frequencies for each of the QA testing categories identified in Section 3.6.1 have been summarized in Table 3-2. All QA testing is related to the construction sequence. To facilitate the QA program, the following definitions are presented:

- A layer is defined as a compacted stratum composed of several lifts constructed without construction joints.
- A lift is defined as a constructed segment of a layer composed of soil materials placed in a maximum eight (8) inch compacted thickness.

All quality assurance testing will be conducted in accordance with the project specifications or as specified herein. Where there are discrepancies between the design plans/specifications and QA Plan, it shall be the Contractor's responsibility to bring the discrepancy to the attention of the QA Engineer or Project Manager for written clarification. All applicable testing methods as previously identified will be observed.

Construction testing will be conducted on samples taken from the material during the course of the work. QA testing will consist of material evaluation tests and construction quality evaluation tests as described in Sections 3.6.2.1 and 3.6.2.2, respectively.

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TABLE 3-2

LTV STEEL COMPANY
MARILLA STREET LANDFILL

BOF DUST AREA
FINAL CAP CONSTRUCTION
QUALITY ASSURANCE

TESTING FREQUENCIES

TEST	FREQUENCY
MATERIALS EVALUATION:	
Water Content (ASTM D 2216-80)	1 per 1000 cu. yd.
Gradation Analysis (ASTM D422, D421)	1 per 1000 cu. yd.
Atterberg Limits (ASTM D4318-83)	1 per 5000 cu. yd.
Moisture-Density Relationship (ASTM D1557-78)	1 per 5000 cu. yd.
Recompacted Permeability (Current Literature)	1 per 5000 cu. yd.
CONSTRUCTION QUALITY EVALUATION:	
In-Place Moisture-Density Test (including moisture content) (ASTM D2922-81, D3017-78)	Minimum of 9 per lift per acre of barrier layer and protective layer placed
In-Situ Hydraulic Conductivity or Undisturbed Shelby-Tube Hydraulic Conductivity	1 per acre per lift of barrier layer placed
Supplementary Undisturbed Shelby-Tube Hydraulic* Conductivity	1 per 2 acres per lift of barrier layer place

* If undisturbed Shelby-Tube hydraulic conductivity samples are collected for testing in lieu of in-situ hydraulic conductivity testing, supplementary Shelby-Tube samples will not be required.

3.6.5 Soil Layer Perforations

All soil layer perforations will be completed in accordance with the testing frequencies identified in the above mentioned sections.

All perforations (viz. nuclear density test probe locations, in-situ permeability sampling locations, and Shelby tube sampling locations) will be backfilled with a dry soil-bentonite (50 percent/50 percent) mixture by QA personnel. The mixture will be compacted in place with a tamping rod or hand tamper, depending on the size of the perforation.

3.7 Synthetic Liner Quality Assurance

3.7.1 General

The cover system along slopes less than or equal to five percent (5%) at the BOF Dust area of the Marilla Street Landfill will include a PVC synthetic membrane liner (hereinafter referred to as PVC liner). The PVC liner selected for use will comply with the requirements of the design plans and specifications.

Assurance that construction of the liner system, used along the slopes less than or equal to five percent (5%) at the Marilla Street Landfill BOF Dust Area is in accordance with the design plans and specifications and/or NYSDEC requirements will be accomplished by the judicious use of quality assurance testing. As discussed previously, a Quality Assurance (QA) Plan and project specifications will be prepared by a registered Professional Engineer for review by the NYSDEC. The QA plan will address all earth materials and synthetic materials (viz. liners and geotextiles) which will be incorporated into the cover. Sections 3.6 and 3.7 will be used as the basis for this plan. All construction activities will be monitored under the supervision of a registered Professional Engineer. A construction monitoring report will be prepared by a registered Professional Engineer and submitted to the NYSDEC following completion of cover system construction in order to document that the cover system was constructed as designed.

3.7.2 PVC Synthetic Membrane Liner (PVC Liner)

The PVC liner material will be selected for use by the Contractor in accordance with the design plans and specifications. The contract documents will define the required quality assurance testing of the PVC liner installation.

3.7.2.1 Material Evaluation

Quality assurance evaluation of the synthetic PVC liner material will begin with the testing of the resin used to produce the liner. Prior to shipping the resin to the sheet manufacturer, the following tests will be performed by the resin manufacturer:

- Melt index
- Density

All incoming raw materials will be sampled by the sheet manufacturer to ensure compliance with the requirements for the PVC liner, and to further verify the resin quality. All properties determined in these tests shall be completed in the final sheet certificate from the PVC liner manufacturer and included in the construction monitoring report.

The PVC liner material proposed will be manufactured in accordance with the American Society for Testing Materials standards stated in the specifications and so certified, by affidavit, from the PVC liner manufacturer to the installation contractor. This affidavit will be included in the construction monitoring report

Upon delivery at the site, the Manufacturer or Installation Contractor and the QA inspector will conduct a surface inspection of all rolls or blankets for defects and for damage. This inspection will be conducted without unrolling rolls or unfolding blankets unless defects or damages are found or suspected. The QA Engineer will note all:

- rolls or blankets, or portions thereof, which should be rejected and removed from the site because they have severe flaws; and

- rolls or blankets which include minor repairable flaws.

The PVC liner will be stored under the responsibility of the Manufacturer or Installation Contractor. The area designated for storage of the PVC liner will be protected from ultraviolet light exposure, precipitation or other inundation, theft vandalism, mud, dirt, dust, puncture, cutting or other damaging or deleterious conditions. The QA Engineer will verify that storage of the PVC liner ensures adequate protection.

The surface to be lined will be compacted to minimum percent compaction of maximum density as determined by Modified Proctor (ASTM D1557-78), and will be free from stones, sticks, sharp objects, holes and discontinuities in grade. PVC liner installation will not commence until the QA Engineer approves the subgrade surface and installation conditions.

3.7.2.2 Construction Quality Evaluation

The quality assurance of the PVC liner installation will be divided into the following segments:

- Visual Inspection
- Destructive Material Testing
- Non-Destructive Testing

A panel is the unit area of PVC liner which is to be seamed in the field. It can be either an entire roll or a portion of roll.

Each panel will be given an "identification code" (number or letter-number) consistent with the layout plan. This identification code will be agreed upon by the QA Engineer and Manufacturer or Installation Contractor. This identification code will be as simple and logical as possible. (Note that roll numbers and blanket numbers established in the manufacturing plant and fabrication factory are usually cumbersome and are not related to location in the field.)

The Manufacturer or Installation Contractor will establish a table or chart showing correspondence between roll numbers/blanket numbers and identification codes. The panel identification code will be used for all quality assurance records.

The Manufacturer will verify that the PVC liner thickness is in conformance with the specifications. Thickness readings will be taken during manufacturing at appropriate intervals across the panel width and periodically along the panel length. Readings will be taken across the width at any point where the panel has been cut.

The QA inspector will record on his daily report the panel identification and panel location and date installation of each panel.

a. Visual Inspection

The PVC liner Manufacturer or Installation Contractor will document in writing that the surface on which the geomembrane will be installed is acceptable. This documentation will be given to the QA Engineer prior to commencement of PVC liner installation.

Care will be taken to avoid dessication cracking of the soil surface supporting the geomembrane.

- The Contractor will comply with all specifications regarding maximum allowable crack depth and width and the procedure for repairing cracks.

- The earthwork contractor, as directed by the QA Engineer, will be required to prevent dessication by using a temporary synthetic cover (10-mil thick plastic sheets with one-foot overlaps secured with sand bags or reclaimed tires) on the protective layer as soon as placement and compaction is completed in an area, or by other suitable means.

- The temporary plastic will be removed immediately before installation of the designed synthetic liner.

- Immediately prior to installation of the synthetic liner, the protective layer surface will be observed by the QA Engineer and the Manufacturer or Installation Contractor, the decision to make repairs, if any, or to commence placement of the PVC liner will then be made by the QA Engineer.

A visual inspection will be conducted by the QA personnel of each panel as it is being placed. This is necessary to ensure that the PVC liner material is free from transport and unloading damage, pinholes, pores or other detrimental defects. The QA personnel will mark each defect for future Contractor repair. The amount of PVC liner unrolled will be limited to the amount of liner that can be properly seamed during a given day. As the PVC liner is being unrolled, the edge of each sheet will be ballast with sand bags. Field seams will be made by overlapping adjacent sheets a minimum of six (6) inches. QA personnel will spot check overlap and cleanliness of adjacent sheets prior to beginning of the weld.

Prior to beginning a solvent seam, the Contractor will clean the surfaces to be seamed. No seaming will take place when the ambient air temperature is below 45°F or above 90°F. The air temperature will be monitored by the QA personnel and the Manufacturer or Installation Contractor.

b. Destructive Material Testing

There are two types of destructive tests to be used by the PVC liner installer to determine the strength of a liner seam:

- peel
- shear

Destructive peel and shear tests will be conducted in the field on samples selected randomly by the QA inspector during each seaming day. For each test, a representative sample will be cut into one inch wide strips vertically across the weld and inserted into a tensile testing machine.

For peel testing, one end of the test strip and the closest edge of the adjacent piece are clamped and pulled, placing the seam in tension (ASTM D3083). In shear testing, a sample weld is clamped and then pulled apart, placing the seam in shear (ASTM D413).

Test seams will be made on fragment pieces of PVC liner to verify that seaming conditions are adequate. Such test seams will be made at the beginning of each seaming period, at the Engineer's discretion, and at least once each four hours. Also, each seamer will make at least one test seam each day.

The test seam sample will be at least 2 feet long by 1 foot wide with the seam centered lengthwise. Two adjoining specimens a minimum of 1 inch wide each will be cut from the test seam sample by the Manufacturer or Installation Contractor. These specimens will be tested in the field by hand or tensometer, and will not fail in the seam. If a test seam fails, the entire operation will be repeated. If the additional test seam fails, the seamer will not be accepted and will not be used for seaming until the deficiencies are corrected and two consecutive successful full test seams are achieved.

The QA inspector will observe all test seam procedures. The remainder of the successful test seam sample will be assigned a number and marked accordingly by the QA inspector and Manufacturer or Installation Contractor, who will also log the date, hour, ambient temperature, number of seaming unit, name of seamer, and pass or fail description. The seam itself will be retained in the OWNER's archives.

Destructive test samples will be packaged and shipped under the responsibility of the Manufacturer or Installation Contractor in a manner which will not damage the test sample. The QA inspector will verify that packaging and shipping conditions are acceptable. The QA inspector will be responsible for packaging and storing the archive samples.

The QA personnel will review independent laboratory test results as soon as they become available.

All test results from the Manufacturer's or Installation Contractor's laboratory will be submitted to the QA Engineer as soon as they become available.

One sample seam per day will be sent to a laboratory to determine the bonded seam strength. The results will be included in the construction monitoring report.

c. Non-Destructive Testing

The following test will be performed along the entire length of all field seams and any repair seams. The purpose of this test is to check the continuity/water tightness of seams. It does not provide any information on seam strength. Testing will be done as the seaming work progresses, not at the completion of all field seams.

1) Vacuum Testing is a non-destructive test to locate any possible leak in the seam by using soapy solution and a clear-view glass top suction chamber attached to a vacuum pump. The procedure is as follows:

a) Thoroughly soap (one oz. soap to one gallon water) a seam section and center the suction chamber, typically 3 feet long, over the seam. The rubber gasket on the bottom of the chamber must fit snugly against the liner. As 3-5 inches of vacuum is drawn, the chamber will automatically seal itself to the liner.

b) As proper vacuum is achieved, soap bubbles will appear in any unbonded areas. Dwell time is usually 10-15 seconds per seam section.

c) Should a pinhole or unbonded section be discovered, the questionable area will be properly marked for future repair, and retested.

Should it not be feasible to vacuum test a seam, ultrasonic testing will be utilized as the alternate non-destructive test method.

2) Ultrasonic (High Frequency) Pulse Echo Testing is done by the liner installer to test seam soundness by passing a high frequency sound wave through the seam overlap to detect discontinuities in the welded seam which may not be visible. Again any discontinuity will be marked, documented, repaired and retested.

All incoming raw materials will be sampled by the PVC liner manufacturers to ensure compliance with the requirements for the synthetic liner, and to further verify the resin quality. All properties determined in these tests will be included in the final PVC synthetic liner membrane certificates from the manufacturers and included in the final construction monitoring report.

3.8 GAS VENTING SYSTEM

The decomposition of the solid wastes contained in a sanitary landfill produces various gases, methane being the gas of most concern. The build-up and migration of methane gas must be controlled to prevent fire and explosion hazards. Gas control is typically accomplished through the installation of a gas venting system. Due to the inert nature of the waste materials disposed in the BOF Dust Area, a gas venting system is not considered necessary; however, the gas venting system is being proposed in response to NYSDEC requests.

A passive gas venting system consisting of five (5) PVC pipes (approximately 6 inches in diameter) will be installed to facilitate gas migration through the final cap. The gas vents will be installed during placement of the final cover. The locations of the gas vents are shown on Sheet 3, and a detail is presented on Sheet 4. The vent pipes will be installed vertically in the cap extending 2'-0" below the cap and protruding 3'-0" above final grade at 400-foot spacing across the site. Gas vents will be terminated with a 180 degree return bend and a bird and insect screen. The pipes will be filled with gravel and will be perforated to allow gas to move freely into the pipe and vent to atmosphere. In addition, the gas vents will be installed in a crushed stone envelope to minimize soil migration which could block the vents and render them ineffective. Gas vents will be interconnected with gravel trenches to facilitate gas migration into the vents. The trenches will be placed during the intermediate cover installation.

3.9 LEACHATE COLLECTION/TREATMENT

A leachate collection/treatment system, per se, will not be developed for the site for the following reasons:

- The quantity of leachate generated by the BOF Dust Area due to infiltration after the surface has been covered will be greatly reduced (see Appendix M).
- The BOF Dust Area has not been determined to be significantly impacting the ground water quality in the vicinity of the site.
- There are several other solid waste disposal sites in the vicinity of the Marilla Street Landfill which may be affecting both ground water systems present beneath the BOF Dust Area.
- There are no known drinking water wells located between the BOF Dust Area and Lake Erie. Furthermore, the existence of public water supplies and the poor overall ground water quality of the area indicate that ground water in the area will not be a future source of drinking water.

3.10 SCHEDULE FOR CLOSURE

Closure of the BOF Dust Area will be initiated upon approval of closure/post-closure plans by the required regulatory agencies. As shown in Table 3-3, it is estimated that approximately nine (9) months will be required for closure. Assuming that the regulatory agencies provide prompt review and approval of the closure/post-closure plans, the BOF Dust Area should be closed in 1989; however, delays in regulatory approval could delay completion of closure until the 1990 construction season.

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TABLE 3-3

LTV STEEL COMPANY
MARILLA STREET LANDFILL

BOF DUST AREA
CLOSURE SCHEDULE

MILESTONE	Estimated Number of Months to Accomplish Milestone
Regulatory Approval of Closure/ Post-Closure Plan	-
Preparation of Bid Documents/ Specifications	2
Solicit Bids	2
Selection of Contractor	0.5
Execute Contract	0.5
Complete Construction*	4
TOTAL	9

* Construction can only be accomplished during the construction season when climatic conditions are favorable.

4.0 POST-CLOSURE CARE AND MONITORING

This information is submitted to comply with 40 CFR 270.14(b)(13) and 6NYCRR 373-1.5(a)(2)(xiii) and related Subparts.

4.1 POST-CLOSURE PERIOD

Post-closure activities for the Marilla Street Landfill-BOF Dust Area will extend over a 30-year period.

4.2 INSPECTION AND MAINTENANCE

4.2.1 Site Inspections

LTV Steel Company will be responsible for site inspection and maintenance. The site will be inspected on a quarterly basis throughout the entire post-closure period. The landfill site will be inspected for:

- Integrity of structures;
- Visible debris, litter and waste;
- Loss of vegetative cover or growth of undesirable species;
- Integrity of drainage ditches including:
  - sediment build-up,
  - pooling or ponding,
  - slope integrity, and
  - overall adequacy of surface runoff collection system;
- Integrity of gas venting system;
- Integrity of access roads, gates and fences;
- Integrity of ground water monitoring system;
- Integrity of landfill cap including:
  - erosion or settling of cap material,
  - leachate breakthroughs; and
- Maintenance of existing benchmarks.

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All records on frequency of inspection, maintenance, detection monitoring and maintenance of bench marks will be submitted to the NYSDEC Region 9 Office, Attention: Regional Solid and Hazardous Waste Engineer, on an annual basis.

4.2.2 Cover Maintenance

Cover maintenance will be performed as necessary over the entire post-closure care period. Any signs of erosion, settling, cracking or other site maintenance problems detected during routine site inspections will be corrected as soon as possible. All eroded areas will be brought back to original grade according to the procedures described for constructing the final cover. Settling which results in ponding of water will be regraded and revegetated as necessary to eliminate the ponding. All bare spots in the final cover will be reseeded and fertilized as necessary, but no less than once every year. Seed and fertilizer will be of the same type and quality as specified in Section 3.0. Vegetative growth will be mowed as necessary. Any undesirable species (i.e. large tree growth) will be removed if their presence is suspected to have the potential to deteriorate the integrity of the final cover.

The need for cover repairs due to subsidence and/or settling will be determined based on an evaluation of whether the functions of the final cover in the affected area has been impaired. Those areas where the function has been impaired or will be impaired will be repaired to ensure that the integrity of the final cover is maintained. These repair actions may include, but will not be limited to:

- strip and stockpile topsoil from the affected area;
- regrade the affected area in accordance with the grading plan;
- using clay or a bentonite-soil admixture, fill cracks and reestablish the recompacted low permeability soil layer to a depth of six inches at a maximum permeability of $1x10^{-5}$ cm/sec plus 18 inches at a maximum permeability of $1x10^{-7}$ cm/s, and;
- replace topsoil and revegetate affected area in accordance with Section 3.5.

4.2.3 Maintenance of Site Structures

Maintenance of structures for surface water control and ground water monitoring will be performed by LTV Steel as necessary during the post-closure period.

All eroded areas in the drainage ditches will be repaired and regraded. Reseeding will be carried out using the recommended seed mixture given in Section 3.5. Sediment build-up in the ditches will be removed if it restricts flow in the ditches. Any other areas in the ditches where the cross-section or slope has been altered to the extent that flow does not occur as desired will be reworked and regraded as necessary.

Gas vents will be repaired or rebuilt to restore them to the original design configuration.

Monitoring wells which sustain damage or cannot provide representable ground water samples will be examined to determine whether the problem can be corrected. In particular, attention will be given to:

- Signs of encrustation and corrosion;
- An exceptional increase in solids content (due to the breakdown of the screening arrangement); or
- An appreciable decrease in ground water elevation.

Remedial actions will be determined by the expected impact of the loss of data on the overall monitoring program.

The access road to the landfill site and BOF Dust Area will be maintained in good condition so that routine inspections and required maintenance activities can be carried out. Gates will be kept in good repair to prevent unauthorized access onto the landfill site and BOF Dust Area.

4.2.4 Contingency Plans

The objective of the contingency plan is to address events which occur outside the scope of the routine maintenance program. The contingency plan will be implemented following the discovery of a condition at the landfill which is not covered by the routine maintenance plan.

Natural occurrences such as storms, drought and subsidence should be considered as "expected occurrences" and are addressed in the maintenance program and are not addressed in this contingency plan. Certain problems which cannot be reasonably expected to occur, such as earthquakes or war, are also not addressed in this contingency plan.

The following problems may not be reasonably expected to occur, yet may be discovered during a routine post-closure inspection and monitoring program:

- Leachate impacting ground or surface water quality;
- Failure of the final cover integrity which may be a result of or indicated by:
  - waste protruding through the final cover,
  - soil erosion or other drainage problems, and/or
  - uncontrolled burrowing by pests; and
- Vegetative cover missing despite repeated efforts at revegetation.

The following guidelines are offered to determine when the contingency plan should be implemented and to determine possible corrective actions when responding to a contingency. All corrective actions, where appropriate, will be executed in a timely fashion after notifying the appropriate regulatory agencies.

4.2.4.1 Leachate Breakout Repair Procedure

Leachate breakouts through the landfill cap will be discovered during regularly scheduled site inspections. Should such a breakout occur, the damage will be repaired as quickly as possible. Repairs will be made with materials and methods as specified in previous sections of the closure plan. Areas where leachate breakouts have occurred will receive additional cover material which shall be compacted and overlaid with topsoil for vegetative growth.

If LTV Steel believes a substantial threat of water pollution exists as a result of leachate draining from the site, LTV Steel will prepare a work plan to determine appropriate response efforts including:

- whether leachate should be contained and treated on-site;
- whether leachate should be collected and transported to an off-site treatment facility; and
- actions to control, minimize or eliminate the conditions which are contributing to leachate production.

4.2.4.2 Fire

A fire at the landfill will be immediately reported to the local fire department. Appropriate response measures, including personnel safety, will be the responsibility of the fire department. Underground fires will be controlled as necessary. Above ground fires will be quenched according to approved fire department protocol. Damage to the surface drainage system or final cover will be repaired where these systems have been compromised.

4.2.4.3 Vandalism

Vandalism will be reported to the local enforcement authorities. If vandals have gained entry to the landfill, appropriate measures will be taken to eliminate or restrict future access. Vandalism to monitoring wells will be repaired as appropriate. Damage caused by off-road vehicles will be repaired, where the damage is determined to have compromised the integrity of the final cover or the functions of the gas vents or surface drainage system.

4.2.4.4 Air Contamination

Methane gas venting to the atmosphere should not present a risk to human health due to the inert nature of the fill material. It is conceivable although highly unlikely that a build-up of gas within the landfill may occur.

Should it be suspected that methane gas generation may be presenting an explosion or other hazard, LTV Steel will notify the NYSDEC and New York State Department of Health (NYSDOH). If it is determined that such a hazard is present, a work plan will be developed to determine if the venting system is functioning properly and to determine the appropriate response actions. Possible response actions include replacing portions of the venting system, adding new vents, or installing an active gas withdrawal system. Any proposed remedial actions would be approved through the NYSDEC prior to implementation.

4.2.4.5 Unauthorized Dumping or Disposal

Unauthorized dumping or waste disposal by other parties will be reported to the NYSDEC, and local enforcement officials. In the event that such disposal occurs, efforts will be taken to eliminate further dumping and to restrict subsequent entry to the site. LTV Steel will assist the NYSDEC and/or USEPA in the prosecution of persons found in the act of illegal dumping and in seeking reimbursement from the responsible party for all costs incurred in the removal and disposal of the waste.

4.2.5 Quality Assurance/Quality Control

To assure the performance of site inspection and maintenance, a reporting procedure has been established. A site inspection checklist and maintenance schedule is provided in Appendix O. The site inspection checklist was developed in accordance with the parameters identified in Section 4.2. The maintenance schedule will be completed after regularly scheduled site inspections and will be submitted to the NYSDEC on an annual basis.

LTV Steel personnel responsible for performing site inspections and supervising maintenance operations will be fully qualified to perform the work. The site inspection checklist and maintenance schedule will be signed by authorized personnel. Maintenance and repair work shall conform to the requirements set forth in Section 4.0 of this report.

4.3 NEED FOR CORRECTIVE ACTION

Ground and surface water quality data collected to date indicates that the BOF Dust Area may be having a significant impact on the ground and surface water quality in the vicinity of the site. However, during the most recent sampling events, downgradient monitoring wells have shown statistically significant changes for pH and specific conductance (see Section 2.5). As required in 6NYCRR Part 373-3.6(d)(1)(ii) and 40 CFR Part 265.93(d)(2), a Ground Water Quality Assessment Program Plan has been submitted to NYSDEC. The plan will be initiated once it is approved by the NYSDEC. A determination of the need for corrective action(s) and/or a compliance monitoring program will be made once the Ground Water Quality Assessment is complete.

4.4 MAINTENANCE OF BENCHMARKS

A permanent benchmark will be established on-site by a licensed land surveyor prior to initiation of closure activities. This benchmark will be maintained throughout the closure/post-closure care period.

4.5 NOTICE TO COUNTY CLERK

A survey plat indicating the location and dimension of landfill disposal areas with respect to permanent survey benchmarks will be submitted within 60 days after closure is completed to the offices of the Erie County Clerk and the Commissioner of the NYSDEC.

4.6 SITE SECURITY

Following site closure, the property will not be used for any purpose that may jeopardize the integrity of the cap, venting system or monitoring system. Site access will be restricted except for those vehicles and personnel necessary to provide routine inspection and maintenance as described in Sections 4.1 and 4.2 of this Closure Plan. Unauthorized access to the site will be discouraged by virtue of the proposed fence. The natural drainage ditch on the west should be sufficient to restrict unauthorized access which might lead to potential damage of the closure appurtenances of the site from this direction.

4.7 POST-CLOSURE NOTICES

A notice will be submitted to the offices of the Erie County Clerk and the NYSDEC Region 9 office, Attention: Regional Solid and Hazardous Waste Engineer within 60 days after certification of closure indicating the type, location and quantity of hazardous waste disposed of in the BOF Dust Area of the Marilla Street Landfill. This information will reflect all known records and information maintained by LTV Steel. A copy of the Modified Deed as well as evidence that it has been properly filed will be submitted under separate cover prior to approval of the Closure/Post-Closure Plan. The modified deed will include a notice that the landfill has been used to manage hazardous wastes, that the subject use of the property is restricted, and that details of the landfill operation were filed with the local zoning authority, the Regional Administrator of the USEPA and the Commissioner of the NYSDEC.

5.0 CLOSURE AND POST-CLOSURE COST AND FINANCIAL ASSURANCE

5.1 CLOSURE AND POST-CLOSURE COST ESTIMATES

Closure costs developed in accordance with Section 3 of this Closure/Post-Closure Plan are presented in Table 5-1. Post-closure costs associated with ground and surface water monitoring and site maintenance as described in Section 4 of the Closure/Post-Closure Plan are presented in Table 5-2. The closure activities are scheduled for completion in 1989. The post-closure cost estimate will be adjusted annually for inflation and will be revised whenever a change in the plans increase costs.

Several assumptions were used when compiling these cost estimates, including:

- clay and topsoil will be obtained from sources within 45 miles of the site;
- contractor overhead and profit is included in the unit costs; and,
- the volume of clay to be purchased and handled at the landfill is 25% greater than the final compacted volume, and is recorded as such in the cost estimate.

The actual construction cost for the landfill closure will not be known until the work is competitively bid. The present cost estimate for the final cover is very sensitive to the unit price for the off-site soil material. The unit price for delivery of off-site clay to the landfill has been estimated to be $10.00/c.y., however, each $1.00/c.y. increase or decrease in the unit price will increase or decrease the cost for the final cap by approximately $85,000.

5.2 FINANCIAL ASSURANCE

As required by 40 CFR 264.143(f) and 6 NYCRR 373-2.8(g), documentation that LTV Steel meets the requirements for financial assurance for both closure and post-closure periods will be submitted under separate cover, subject to the approval of, and such conditions that may be imposed by, the United States Bankruptcy Court for the Southern District of New York.

5.3 LIABILITY COVERAGE

As required by 40 CFR 264.147(a)(2) and 264.147(b)(2), documentation that LTV Steel meets the requirements for liability coverage will be submitted under separate cover, subject to the approval of, and such conditions that may be imposed by, the United States Bankruptcy Court for the Southern District of New York.

MALCOLM PIRNIE

TABLE 5-1

LTV STEEL COMPANY
MARILLA STREET LANDFILL
BOF DUST AREA

CLOSURE COST

ITEM/MATERIAL	UNITS	QUANTITY	UNIT COST	TOTAL MATERIAL COST
SITE PREPARATION				
- Rough Grading	CY	24,000	$ 5.00	$120,000
- Fine Grading	ACRES	6	2,100.00	12,600
RECOMPACTED SOIL:				
- Furnish and Deliver	CY	25,000(1)	10.00	250,000
- On-site Hauling	CY	25,000(1)	2.00	50,000
- Place and Compact	CY	25,000(1)	5.00	125,000
- Fine Grade	ACRES	6	2,100.00	12,600
- Soil Testing & Cap Certification	ACRES	6	3,500.00	21,000
- On-site Inspection	LS	-	30,000.00	30,000
PROTECTIVE SAND LAYER:				
- Purchase and Deliver	CY	2,300	10.00	23,000
- On-site Hauling	CY	2,300	2.00	4,600
- Place and Grade	CY	2,300	3.00	6,900
SYNTHETIC LINER:				
- Furnish and Install	SQ FT	125,000	0.60	75,000
- On-site Inspection	LS	-	-	5,000
SILTY SAND LAYER:				
- Furnish and Deliver	CY	25,000(1)	10.00	250,000
- On-site Hauling	CY	25,000(1)	2.00	50,000
- Place and Grade	CY	25,000(1)	3.00	75,000
DRAINAGE LAYER:				
- Purchase and Deliver	CY	10,000	12.00	120,000
- On-site Hauling	CY	10,000	2.00	20,000
- Place and Grade	CY	10,000	3.00	30,000
- Filter Fabric	SQ FT	261,000	0.20	52,200
TOPSOIL:				
- Furnish and Deliver	CY	5,000	15.00	75,000
- On-site Hauling	CY	5,000	2.00	10,000
- Place and Grade	CY	5,000	3.00	15,000
- Seed and Mulch	ACRES	6	5,600.00	33,600

(1) Quantity assumes 25% compaction.

MALCOLM PIRNIE

TABLE 5-1 (Continued)

LTV STEEL COMPANY
MARILLA STREET LANDFILL
BOF DUST AREA

CLOSURE COST

ITEM/MATERIAL	UNITS	QUANTITY	UNIT COST	TOTAL MATERIAL COST
TERRACES:				
- Furnish and Deliver	CY	1,000	10.00	10,000
- Hauling	CY	1,000	2.00	2,000
- Place and Compact	CY	1,000	5.00	5,000
- Riprap	CY	130	25.00	3,250
GAS VENTILATION SYSTEM:				
- Gas Vents	EACH	5	200.00	1,000
ACCESS ROAD:				
- Subgrade Preparation	SY	900	$ 5.00	$ 4,500
- Filter Fabric	SY	1,100	2.00	2,200
- Crushed Stone	CY	300	30.00	9,000
- Riprap	CY	60	25.00	1,500
SURFACE WATER DRAINAGE SYSTEM:				
- Side Slope Drainage Ditches	FT	1,250	3.00	3,750
- Riprap	CY	100	25.00	2,500
PERIMETER KEY	FT	1,650	5.00	8,250
EQUIPMENT MOBILIZATION & DEMOBILIZATION	LS		$20,000.00	$20,000
EQUIPMENT DECONTAMINATION	LS		$50,000.00	$50,000
			SUB-TOTAL	$1,589,450
ENGINEERING				$ 120,000
CONTINGENCIES @ 10%				$ 158,945
			TOTAL	$1,868,395

TABLE 5-2

LTV STEEL COMPANY
MARILLA STREET LANDFILL
BOF DUST AREA

POST-CLOSURE COSTS[5]

ITEM	UNITS	QUANTITY	UNIT COST ($)	TOTAL COST ($)
LABORATORY TEST.[1][7] (QUART. SAMPLING)	SAMPLE OCCASION	120	12,000	1,440,000
LABORATORY TEST.[1][6] (ANNUAL SAMPLING)	SAMPLE OCCASION	30	3,000	90,000
SAMPLE COLLECTION[2]	MANHOURS	3840	40	153,600
DATA EVALUATION[3] & REPORTS	MANHOURS	3120	50	156,000
SITE INSPECTION[4]	MANHOURS	960	50	48,000
SITE MAINTENANCE[8]	YEARS	30	2,500	75,000
	SUB-TOTAL			$1,962,600
	CONTINGENCIES @ 10%			196,400
	TOTAL POST-CLOSURE COST			$2,159,000
	ANNUAL COST FOR 30 YEARS			72,000

NOTES:

1. Laboratory testing based on 30-year post-closure period.
2. Sample collection based on 2 people for 8 days per year = 128 manhours per year times 30 years = 3,840 manhours
3. Data evaluation and reports based on 104 hours per year for 30 years.
4. Site inspection based on one person for 4 days per year = 32 manhours per year times 30 years = 960 manhours.
5. Costs are based on 1988 dollars; actual costs may vary depending on cost inflation.
6. Annual sampling assumes 1 well per sample occasion at a laboratory cost of $3,000 per sample.
7. Quarterly sampling assumes 6 wells plus two QA/QC = 8 samples per sample occasion at a laboratory cost of $2,000 per sample.
8. We have assumed a lump sum unit cost for site maintenance because the scope of work is not known.

Facility Name LTV STEEL COMPANY
ID No. NYD000813402
Date Part B Received
Date Completeness Review Due

6.0 CHECKLIST

RCRA POST-CLOSURE PERMIT APPLICATION CHECKLIST

		Provided (Y/N)	Adequate (Y/N)	Not Applicable	PAGE	Comments
PART A APPLICATION		Y				REVISED PART A APPLICATION IS ATTACHED AS PART OF THE COVER LETTER TO THIS DOCUMENT
FACILITY DESCRIPTION						
B-1	General description	Y			1-1	
B-2	Topographic map	Y			1-5	
B-2a	General requirements	Y			PLATE 1	
B-2b	Additional requirements for land disposal facilities	Y			ALL PLATES	
B-3	Floodplain standard	Y			1-5	
B-3a	Flood proofing and flood protection measures			NA	1-5	
B-3b	Waiver			NA		
WASTE CHARACTERISTICS						
C-1	Chemical and physical analyses, including sampling/analysis methods	Y			1-4	
C-2	Waste analysis plan			NA		

		Provided (Y/N)	Adequate (Y/N)	Not Applicable	PAGE	Comments
. PROCESS INFORMATION						
D-1	Waste piles					
D-1a	List of wastes			NA		
D-1b	Run-on control system			NA		
D-1c	Run-off control system			NA		
D-1d	Control of wind dispersal			NA		
D-2	Surface impoundments					
D-2a	List of wastes			NA		
D-2b	Liner system description			NA		
D-2b(1)	Liner system foundation description			NA		
D-2b(2)	Leachate collection/detection system operation and design			NA		
D-3	Landfills					
D-3a	List of wastes	Y			1-3	
D-3b	Liner system description			NA		
D-3b(1)	Liner system foundation description	Y			3-2	
D-3b(2)	Leachate collection/detection system operation and design			NA		
D-3c	Run-on control system			NA		
D-3d	Run-off control system	Y			3-2	
D-3e	Control of wind dispersal	Y			3-2	FINAL COVER SHOULD CONTROL WIND DISPERSAL

		Provided (Y/N)	Acequate (Y/N)	Not Applicable	PAGE	Comments
D-4	Land treatment					
D-4a	Land treatment program			NA		
D-4a(1)	List of wastes			NA		
D-4a(2)	Operating procedures			NA		
D-4b	Unsaturated zone monitoring plan					
D-4b(1)	Sampling location			NA		
D-4b(2)	Sampling schedule			NA		
D-4b(3)	Sampling equipment and procedures			NA		
D-4b(4)	Background values			NA		
D-4b(5)	Statistical methods			NA		
D-4b(6)	Monitoring of Principle Hazardous Constituents			NA		
D-4c	Treatment zone description			NA		
D-4d	Surface water control plans			NA		
D-4e	Collection and control of run-off			NA		
D-4f	Control of wind dispersal			NA		
GROUNDWATER MONITORING						
E-1	Interim status period ground-water monitoring data	Y			2-3	
E-2	Aquifer identification	Y			2-7	

		Provided (Y/N)	Adequate (Y/N)	Not Applicable	PAGE	Comments
E-3	Contaminant plume description	Y			2-6	
E-4	Detection monitoring program	Y			2-6	
E-4a	Indicator parameters, waste constituents, reaction products to be monitored				2-6	
E-4a(1)	Hazardous waste characterization	Y			1-4	
E-4a(2)	Behavior of constituents	Y			1-4	
E-4a(3)	Detectability	Y			1-4	
E-4b	Groundwater monitoring program					
E-4b(1)	Description of wells	Y			2-6	
E-4b(2)	Representative samples	Y			2-6	
E-4b(3)	Locations of background groundwater monitoring wells that are not upgradient	Y			2-6	
E-4c	Background values					
E-4c(1)	Data currently available					
E-4c(1)(a)	Background groundwater quality data	Y			2-3	DEVELOPMENT OF
E-4c(1)(b)	Sampling frequency					BACKGROUND QUALITY
E-4c(1)(c)	Sampling quantity					DATA HAS BEEN INITIATED
E-4c(1)(d)	Background values					
E-4c(2)	Plan for establishing groundwater quality data	Y			2 6	

		Provided (Y/N)	Adequate (Y/N)	Not Applicable	PAGE	Comments
E-4c(2)(a)	Well location	Y			2-7	
E-4c(2)(b)	Sampling frequency	Y			2-7	
E-4c(2)(c)	Sampling quantity	Y			2-7	
E-4c(2)(d)	Background values	Y			2-7	
E-4d	Sampling, analysis and statistical procedures				2-7	
E-4d(1)	Sample collection	Y			2-7	
E-4d(2)	Sample preservation and shipment	Y			APPENDIX E	
E-4d(3)	Analytical procedure				APPENDIX E	
E-4d(4)	Chain of custody				APPENDIX E	
E-4d(5)	Additional requirements for compliance point monitoring					
E-4d(5)(a)	Sampling frequency			NA		
E-4d(5)(b)	Compliance point groundwater quality values			NA		
E-4d(6)	Annual determination			NA		
E-4d(7)	Statistical determination					
E-4d(7)(a)	Statistical procedure			NA		
E-4d(7)(b)	Results			NA		
E-5	Compliance monitoring program					
E-5a	Waste description			NA		
E-5b	Characterization of contaminated groundwater			NA		

		Provided (Y/N)	Adequate (Y/N)	Not Applicable	PAGE	Comments
E-5c	Hazardous constituents to be monitored			NA		
E-5d	Concentration limits			NA		
E-5e	Alternate concentration limits					
E-5e(1)	Adverse effects on groundwater quality			NA		
E-5e(2)	Potential adverse effects			NA		
E-5f	Groundwater monitoring system					
E-5f(1)	Description of wells			NA		
E-5f(2)	Representative samples			NA		
E-5f(3)	Locations of background groundwater monitoring wells that are not upgradient			NA		
E-5f(3)(a)	Inability to determine upgradient			NA		
E-5f(3)(b)	Representative samples of background groundwater quality			NA		
E-5g	Background values			NA		
E-5g(1)	Data currently available					
E-5g(1)(a)	Background groundwater quality data			NA		
E-5g(1)(b)	Sampling frequency			NA		
E-5g(1)(c)	Sampling quantity			NA		
E-5g(1)(d)	Background values			NA		
E-5g(2)	Plan for establishing groundwater quality data					

		Provided (Y/N)	Adequate (Y/N)	Not Applicable	PAGE	Comments
E-5g(2)(a)	Background data			NA		
E-5g(2)(b)	Well location			NA		
E-5g(2)(c)	Sampling frequency			NA		
E-5g(2)(d)	Sampling quantity			NA		
E-5g(2)(e)	Background values			NA		
E-5h	Sampling, analysis and statistical procedures					
E-5h(1)	Sample collection			NA		
E-5h(2)	Sample preservation and shipment			NA		
E-5h(3)	Analytical procedure			NA		
E-5h(4)	Chain of custody			NA		
E-5h(5)	Additional requirements for compliance point monitoring					
E-5h(5)(a)	Sampling frequency			NA		
E-5h(5)(b)	Testing for Appendix VIII hazardous constituents			NA		
E-5h(5)(c)	Compliance point groundwater quality values			NA		
E-5h(6)	Annual determination			NA		
E-5h(7)	Statistical determination					
E-5h(7)(a)	Statistical procedure			NA		
E-5h(7)(b)	Results			NA		
E-6	Corrective action program					

		Provided (Y/N)	Adequate Y/N)	Not Applicable	PAGE	Comments
E-6a	Characterization of contaminated groundwater			NA		
E-6b	Concentration limits			NA		
E-6c	Alternate concentration limits					
E-6c(1)	Adverse effects on groundwater quality			NA		
E-6c(2)	Potential adverse effects			NA		
E-6d	Corrective action plan					
E-6d(1)	Location			NA		
E-6d(2)	Construction detail			NA		
E-6d(3)	Plans for removing wastes			NA		
E-6d(4)	Treatment technologies			NA		
E-6d(5)	Effectiveness of correction program			NA		
E-6d(6)	Reinjection system			NA		
E-6d(7)	Additional hydrogeologic data			NA		
E-6d(8)	Operation and maintenance			NA		
E-6d(9)	Closure and post-closure plans			NA		
E-6e	Groundwater monitoring program					
E-6e(1)	Description of wells			NA		
E-6e(2)	Representative samples			NA		
E-6e(3)	Locations of background groundwater monitoring wells that are not upgradient			NA		

		Provided (Y/N)	Adequate (Y/N)	Not Applicable	PAGE	Comments
E-6f	Background values					
E-6f(1)	Data currently available					
E-6f(1)(a)	Background groundwater quality data			NA		
E-6f(1)(b)	Sampling frequency			NA		
E-6f(1)(c)	Sampling quantity			NA		
E-6f(1)(d)	Background values			NA		
E-6f(2)	Plan for establishing ground-water quality data					
E-6f(2)(a)	Background data			NA		
E-6f(2)(b)	Well location			NA		
E-6f(2)(c)	Sampling frequency			NA		
E-6f(2)(d)	Sampling quantity			NA		
E-6f(2)(e)	Background values			NA		
E-6g	Sampling, analysis and statistical procedures					
E-6g(1)	Sample collection			NA		
E-6g(2)	Sample preservation and shipment			NA		
E-6g(3)	Analytical procedure			NA		
E-6g(4)	Chain of custody			NA		
E-6g(5)	Additional requirements for compliance point monitoring					
E-6g(5)(a)	Sampling frequency			NA		

		Provided (Y/N)	Adequate (Y/N)	Not Applicable	PAGE	Comments
E-6g(5)(b)	Testing for Appendix VIII hazardous constituents			NA		
E-6g(5)(c)	Compliance point groundwater quality values			NA		
E-6g(6)	Annual determination			NA		
E-6g(7)	Statistical determination			NA		
E-6g(7)(a)	Statistical procedure			NA		
E-6g(7)(b)	Results			NA		
F. CLOSURE AND POST-CLOSURE REQUIREMENTS						
F-1	Closure plans					
F-1a	Closure performance standard	Y			3-1	
F-1b	Inventory removal, disposal or decontamination of equipment	Y			3-2	
F-1b(1)	Waste pile closure activities			NA		
F-1b(2)	Surface impoundment closure activities			NA		
F-1b(3)	Closure of land treatment facilities					
F-1b(3)(a)	Continuance of treatment			NA		
F-1b(3)(b)	Land treatment unit cover			NA		
F-1b(3)(b)(1)	Cover characteristics			NA		
F-1b(3)(b)(2)	Drainage and erosion			NA		
F-1b(3)(b)(3)	Maintenance needs			NA		

		Provided (Y/N)	Adequate (Y/N)	Not Applicable	PAGE	Comments
F-1b(3)(c)	Exemption from vegetative cover requirements			NA		
F-1c	Closure of disposal units					
F-1c(1)	Disposal impoundments			NA		
F-1c(1)(a)	Elimination of liquids			NA		
F-1c(1)(b)	Waste stabilization			NA		
F-1c(2)	Cover design	Y			3-2	
F-1c(3)	Minimization of liquid migration	Y			3-3	
F-1c(4)	Maintenance needs	Y			4-1	
F-1c(5)	Drainage and erosion	Y			3-3	
F-1c(6)	Settlement, subsidence, and displacement	Y			4-1	
F-1c(7)	Freeze/thaw effects	Y			3-3	
F-1d	Schedule for closure	Y			3-5	
F-1e	Extensions for closure time			NA		
F-1f	Certification of closure	Y			3-5	
F-2	Post-closure plan					
F-2a	Post-closure contact	Y			4-1	
F-2b	Post-closure security	Y			4-1	
F-2c	System design description					
F-2c(1)	Leachate collection/detection system	Y			3-5	

		Provided (Y/N)	Adequate (Y/N)	Not Applicable	PAGE	Comments
F-2c(2)	Gas venting system	Y			3-4	
F-2d	Inspection plan	Y			4-1	
F-2e	Monitoring plan	Y			2-6	
F-2f	Maintenance plan	Y			4-1	
F-2g	Special waste management plan					
F-2g(1)	Waste description			NA		
F-2g(2)	Soil description			NA		
F-2g(3)	Mobilizing properties			NA		
F-2g(4)	Additional monitoring techniques			NA		
F-2h(1)	Land treatment			NA		
F-2h(2)	Exemption from land treatment post-closure care requirements					
F-2h(2)(a)	Background and hazardous constituent values			NA		
F-2h(2)(b)	Sampling methods			NA		
F-2h(2)(c)	Statistical methods			NA		
F-2h(3)	Exemption from groundwater monitoring requirements			NA		
F-2i	Personnel training			NA		
F-3	Notice to local land authority			NA		
F-4	Notice in deed			NA		
F-5	Closure cost estimate	Y			5-1	

		Provided (Y/N)	Adequate (Y/N)	Not Applicable	PAGE	Comments
F-6	* Financial assurance mechanism for closure					* Financial assurance mechanism is established in the cover letter to this closure Plan
F-6a	Closure trust fund					
F-6b	Surety bond					
F-6b(1)	Surety bond guaranteeing payment into a closure fund					
F-6b(2)	Surety bond guaranteeing performance of closure					
F-6c	Closure letter of credit					
F-6d	Closure insurance					
F-6e	Financial test and corporate guarantee for closure					
F-6f	Use of multiple financial mechanisms					
F-6g	Use of financial mechanism for multiple facilities					
F-7	Post-closure cost estimate	Y		5-1		
F-8	* Financial assurance mechanism for post-closure care					* See note above
F-8a	Post-closure trust fund					
F-8b	Surety bond					
F-8b(1)	Surety bond guaranteeing payment into a post-closure trust fund					
F-8b(2)	Surety bond guaranteeing performance of post-closure care					
F-8c	Post-closure letter of credit					

		Provided (Y/N)	Adequate (Y/N)	Not Applicable	PAGE	Comments
F-8d	Post-closure insurance					
F-8e	Financial test and corporate guarantee for post-closure care					
F-8f	Use of multiple financial mechanisms					
F-8g	Use of a financial mechanism for multiple facilities					
F-9	* Liability requirements					* Liability requirements a[re]
F-9a	Coverage for sudden accidental occurrences					addressed in the cover
F-9a(1)	Endorsement or certification					letter to this closure
F-9a(2)	Financial test for liability coverage					Plan
F-9a(3)	Use of multiple insurance mechanisms					
F-9b	Coverage for nonsudden accidental occurrences					
F-9b(1)	Endorsement or certification					
F-9b(2)	Financial test for liability coverage					
F-9b(3)	Use of multiple insurance mechanisms					
F-9c	Request for variance					
F-10	State mechanisms					
F-10a	Use of state-required mechanism			NA		
F-10b	State assumption of responsibility			NA		

		Provided (Y/N)	Adequate (Y/N)	Not Applicable	PAGE	Comments
G. CORRECTIVE ACTION FOR SOLID WASTE MANAGEMENT UNITS						
G-1	Solid waste management units			NA		
G-1a	Characterize the solid waste management unit			NA		
G-1b	No solid waste management units			NA		
G-2	Releases					
G-2a	Characterize releases			NA		
G-2b	No releases			NA		
H. OTHER FEDERAL LAWS				NA		
I. PART B CERTIFICATION		Y				PART B CERTIFICATION IS ATTACHED AS PART OF THE COVER LETTER TO THIS DOCUMENT

REFERENCES

1. Engineering Report for LTV Steel Company, "Marilla Street Landfill Investigation, Phase 1 - Hydrogeologic Investigation Update, Malcolm Pirnie, Inc., September 1984

2. Environmental and Resource Conservation Considerations of Steel Industry Solid Waste, U.S. EPA, (EPA-600/2-79-074, SW-740, April 1979.

3. USEPA Evaluating Cover Systems for Solid and Hazardous Waste; SW-867, September 1982.

4. USEPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods; SW-846.

5. "Groundwater Hydrology" 1nd Edition, by Todd, D.K., John Wiley & Sons, C1980.

APPENDIX A

ORIGINAL RCRA PART A PERMIT APPLICATION
November 1980
Revised 1985

(fill–in areas are spaced for elite type, i.e., 12 characters/inch).

Form Approved OMB No. 158-S80004

FORM 3 RCRA

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY

HAZARDOUS WASTE PERMIT APPLICATION

Consolidated Permits Program

(This information is required under Section 3005 of RCRA.)

I. EPA I.D. NUMBER

F N Y D 0 0 0 8 1 3 4 0 2

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (yr., mo., & day)	COMMENTS

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below *(mark one box only)* to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA I.D. Number, or if this is a revised application, enter your facility's EPA I.D. Number in Item I above.

A. FIRST APPLICATION *(place an "X" below and provide the appropriate date)*

[X] 1. EXISTING FACILITY *(See instructions for definition of "existing" facility. Complete item below.)*

YR.	MO.	DAY
80	11	19

FOR EXISTING FACILITIES, PROVIDE THE DATE *(yr., mo., & day)* OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED *(use the boxes to the left)*

[ ] 2. NEW FACILITY *(Complete item below.)*

YR.	MO.	DAY

FOR NEW FACILITIES, PROVIDE THE DATE *(yr., mo., & day)* OPERATION BEGAN OR IS EXPECTED TO BEGIN

B. REVISED APPLICATION *(place an "X" below and complete Item I above)*

[ ] 1. FACILITY HAS INTERIM STATUS

[ ] 2. FACILITY HAS A RCRA PERMIT

III. PROCESSES – CODES AND DESIGN CAPACITIES

A. PROCESS CODE – Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process *(including its design capacity)* in the space provided on the form *(Item III-C)*.

B. PROCESS DESIGN CAPACITY – For each code entered in column A enter the capacity of the process.
1. AMOUNT – Enter the amount.
2. UNIT OF MEASURE – For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER *(barrel, drum, etc.)*	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D79	GALLONS OR LITERS
LANDFILL	D80	ACRE-FEET *(the volume that would cover one acre to a depth of one foot)* OR HECTARE-METER
LAND APPLICATION	D81	ACRES OR HECTARES
OCEAN DISPOSAL	D82	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D83	GALLONS OR LITERS
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER *(Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Item III-C.)*	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
LITERS	L
CUBIC YARDS	Y
CUBIC METERS	C
GALLONS PER DAY	U
LITERS PER DAY	V
TONS PER HOUR	D
METRIC TONS PER HOUR	W
GALLONS PER HOUR	E
LITERS PER HOUR	H
ACRE-FEET	A
HECTARE-METER	F
ACRES	B
HECTARES	Q

EXAMPLE FOR COMPLETING ITEM III *(shown in line numbers X-1 and X-2 below)*: A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

DUP | T/A | C: 1

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT	2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY
X-1	S 0 2	600	G		5				
X-2	T 0 3	20	E		6				
1	S 0 3	60,000	Y		7				
2					8				
3					9				
4					10				

ontinued from the front.

I. PROCESSES *(continued)*

. SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESSES *(code "T04")*. FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN CAPACITY.

V. DESCRIPTION OF HAZARDOUS WASTES

. EPA HAZARDOUS WASTE NUMBER – Enter the four–digit number from 40 CFR, Subpart D for each listed hazardous waste you will handle. If you handle hazardous wastes which are not listed in 40 CFR, Subpart D, enter the four–digit number*(s)* from 40 CFR, Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.

. ESTIMATED ANNUAL QUANTITY – For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non–listed waste*(s)* that will be handled which possess that characteristic or contaminant.

. UNIT OF MEASURE – For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

). PROCESSES

1. PROCESS CODES:

   For listed hazardous waste: For each listed hazardous waste entered in column A select the code*(s)* from the list of process codes contained in Item III to indicate how the waste will be stored, treated, and/or disposed of at the facility.

   For non–listed hazardous wastes: For each characteristic or toxic contaminant entered in column A, select the code*(s)* from the list of process codes contained in Item III to indicate all the processes that will be used to store, treat, and/or dispose of all the non–listed hazardous wastes that possess that characteristic or toxic contaminant.

   Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code*(s)*.

2. PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER – Hazardous wastes that can be described by more than one EPA Hazardous Waste Number shall be described on the form as follows:

1. Select one of the EPA Hazardous Waste Numbers and enter it in column A. On the same line complete columns B,C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In column D(2) on that line enter "included with above" and make no other entries on that line.
3. Repeat step 2 for each other EPA Hazardous Waste Number that can be used to describe the hazardous waste.

EXAMPLE FOR COMPLETING ITEM IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* – A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non–listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

LINE NO.	A. EPA HAZARD. WASTE NO *(enter code)*	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE *(enter code)*	D. PROCESSES 1. PROCESS CODES *(enter)*	D. PROCESSES 2. PROCESS DESCRIPTION *(if a code is not entered in D(1))*
X-1	K 0 5 4	900	P	T 0 3 D 8 0	
:	D 0 0 2	400	P	T 0 3 D 8 0	
X-3	D 0 0 1	100	P	T 0 3 D 8 0	
X-4	D 0 0 2				included with above

Please print or type in the unshaded areas only (fill—in areas are spaced for elite type, i.e., 12 characters/inch).

Form Approved OMB No. 158-R0175

FORM 1 GENERAL

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY

GENERAL INFORMATION

Consolidated Permits Program

(Read the "General Instructions" before starting.)

I. EPA I.D. NUMBER

F NYD000813402 D

LABEL ITEMS

I. EPA I.D. NUMBER

III. FACILITY NAME

V. FACILITY MAILING ADDRESS

VI. FACILITY LOCATION

PLEASE PLACE LABEL IN THIS SPACE

GENERAL INSTRUCTIONS

If a preprinted label has been provided, affix it in the designated space. Review the information carefully; if any of it is incorrect, cross through it and enter the correct data in the appropriate fill—in area below. Also, if any of the preprinted data is absent *(the area to the left of the label space lists the information that should appear)*, please provide it in the proper fill—in area(s) below. If the label is complete and correct, you need not complete Items I, III, V, and VI *(except VI-B which must be completed regardless)*. Complete all items if no label has been provided. Refer to the instructions for detailed item descriptions and for the legal authorizations under which this data is collected.

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold—faced terms.

SPECIFIC QUESTIONS	YES	NO	FORM ATTACHED
A. Is this facility a publicly owned treatment works which results in a discharge to waters of the U.S.? (FORM 2A)		X	
B. Does or will this facility *(either existing or proposed)* include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to waters of the U.S.? (FORM 2B)		X	
C. Is this a facility which currently results in discharges to waters of the U.S. other than those described in A or B above? (FORM 2C)		X	
D. Is this a proposed facility *(other than those described in A or B above)* which will result in a discharge to waters of the U.S.? (FORM 2D)		X	
E. Does or will this facility treat, store, or dispose of hazardous wastes? (FORM 3)	X		X
F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)		X	
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)		X	
H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)		X	
I. Is this facility a proposed stationary source which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	
J. Is this facility a proposed stationary source which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	

III. NAME OF FACILITY

1 SKIP REPUBLIC STEEL BUFFALO DISTRICT

IV. FACILITY CONTACT

A. NAME & TITLE (last, first, & title)	B. PHONE (area code & no.)
2 POTWORA JOHN SUPT ENVIR CONT	716 821 5410

V. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX

3 PO BOX 6

B. CITY OR TOWN	C. STATE	D. ZIP CODE
4 BUFFALO	NY	14240

VI. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER

5 HOPKINS AND MARILLA STREETS

B. COUNTY NAME

ERIE

C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE (if known)
6 BUFFALO	NY	14220	

NTINUED FROM THE FRONT

I. SIC CODES (4-digit, in order of priority)

A. FIRST		B. SECOND	
3312	(specify) IRON AND STEEL PLANT	7	(specify)

C. THIRD		D. FOURTH	
	(specify)	7	(specify)

II. OPERATOR INFORMATION

A. NAME: CLARENCE A HACKETT INC

B. Is the name listed in Item VIII-A also the owner? ☐ YES ☒ NO

C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box; if "Other", specify.)

F = FEDERAL
S = STATE
P = PRIVATE
M = PUBLIC (other than federal or state)
O = OTHER (specify)

P (specify)

D. PHONE (area code & no.): A 716 692 8300

E. STREET OR P.O. BOX: O BOX 130

F. CITY OR TOWN	G. STATE	H. ZIP CODE
TONAWANDA	NY	14150

IX. INDIAN LAND

Is the facility located on Indian lands? ☐ YES ☒ NO

EXISTING ENVIRONMENTAL PERMITS

A. NPDES (Discharges to Surface Water)	D. PSD (Air Emissions from Proposed Sources)	
N	9 P	

B. UIC (Underground Injection of Fluids)	E. OTHER (specify)	
U	9 DEC #915010212	(specify) NY DEC Permit Application for Solid Waste Mgmt Facility

C. RCRA (Hazardous Wastes)	E. OTHER (specify)	
	9	(specify)

I. MAP

Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

II. NATURE OF BUSINESS (provide a brief description)

Republic Steel's Buffalo District utilizes the facilities at the Hopkins and Marilla Streets site as a reclamation site for by-products of the steel making process. These items include dewatered sludge from waste water treatment, refractory brick, mill scale and blast furnace dust. These items are all sold or reclaimed.

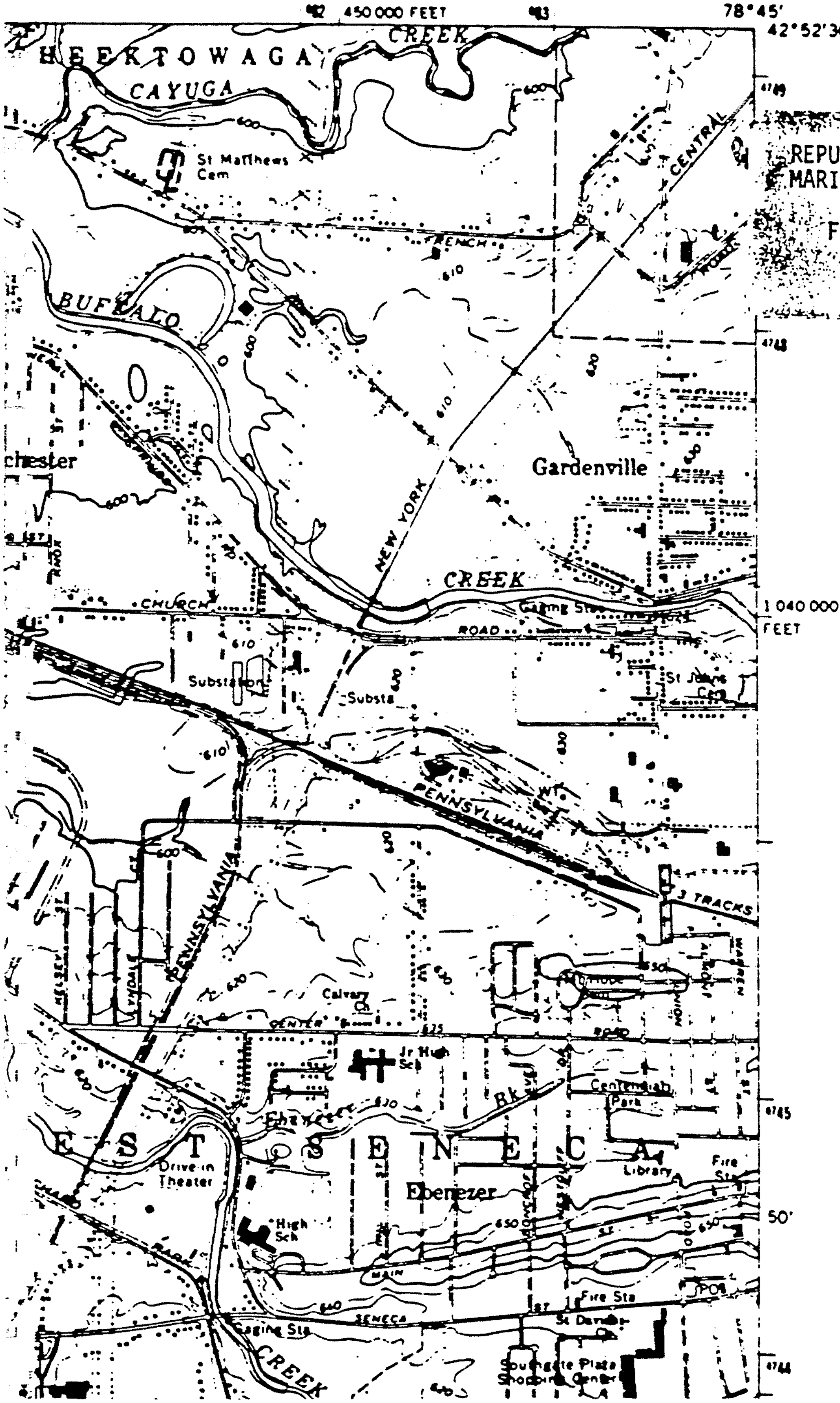
III. CERTIFICATION (see instructions)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE (type or print)	B. SIGNATURE	C. DATE SIGNED
P. N. WIGTON, Vice President Steel Operations	P. N. Wigton	11-17-80

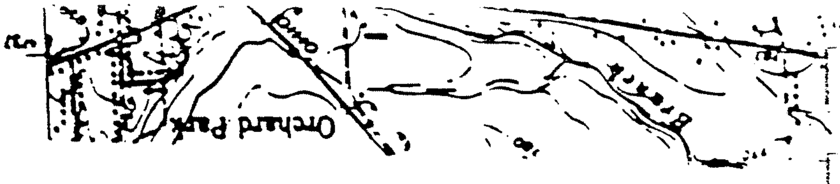
OMMENTS FOR OFFICIAL USE ONLY

BUFFALO SE QUADRANGLE
NEW YORK – ERIE CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
SE/4 BUFFALO 15 QUADRANGLE

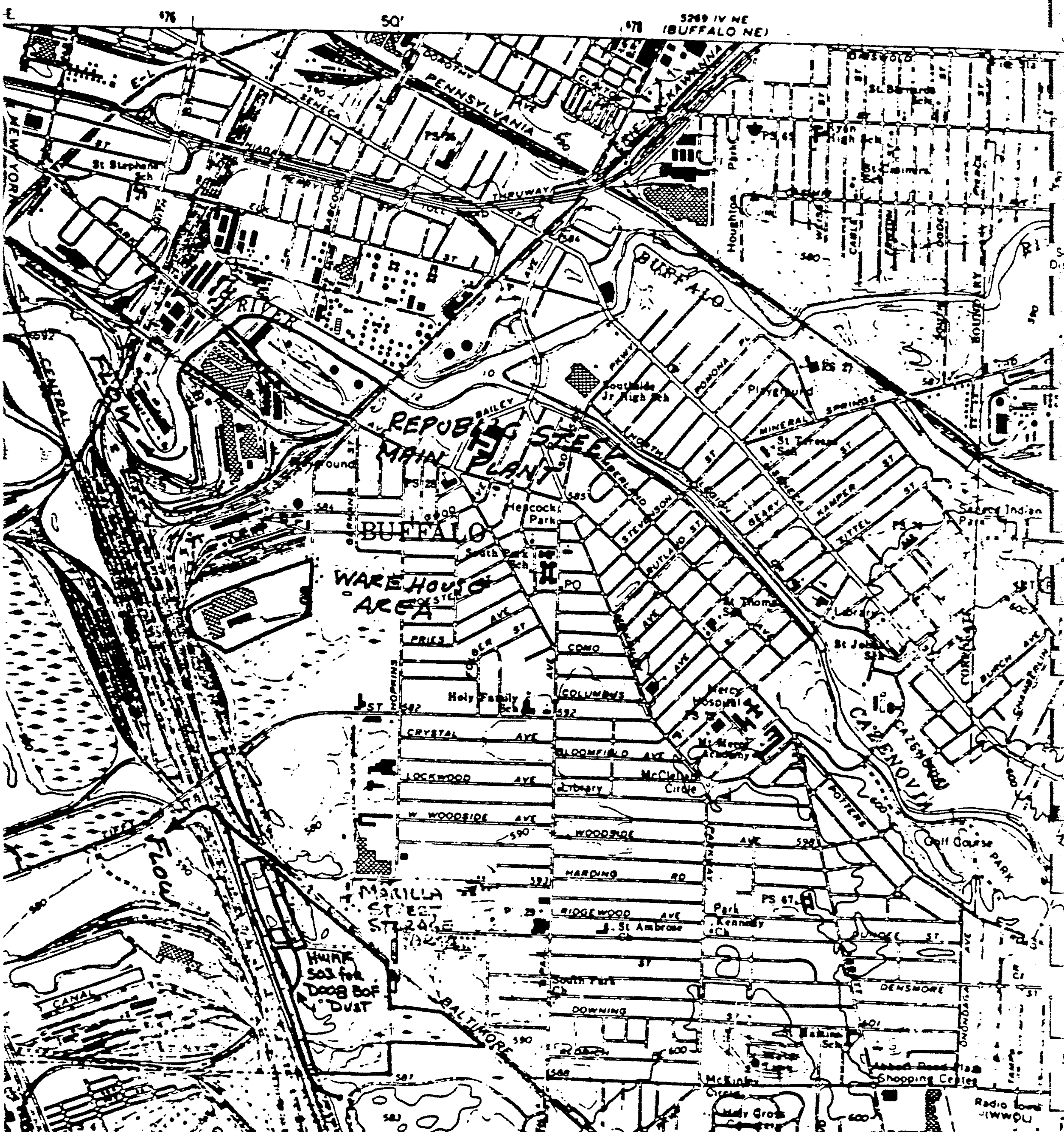


REPUBLIC STEEL BUFFALO DISTRICT
MARILLA STREET STORAGE AREA

FORM 1 ITEM XI 1 of 1



OR



5269 IV NE (BUFFALO NE)
REPUBLIC STEEL MAIN PLANT
BUFFALO
WAREHOUSE AREA
FLOW
HWMF 503 for D008 BOF DUST
PENNSYLVANIA
THRUWAY
CENTRAL
BUFFALO RIVER
Southside Jr High Sch
Playground
MINERAL SPRINGS
Mercy Hospital
CAZENOVIA
Golf Course PARK
CRYSTAL AVE
LOCKWOOD AVE
W WOODSIDE AVE
WOODSIDE AVE
HARDING RD
RIDGEWOOD AVE
DENSMORE
DOWNING
BALTIMORE
CANAL
Holy Family Sch
McClellan Circle
South Park Ch
Abbott Road Plaza Shopping Center

Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1): N Y D 0 0 0 8 1 3 4 0 2 | T/A | C: 1

FOR OFFICIAL USE ONLY: W | DUP | T/A | C: 2 | DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	D008	~11,000	T	S03	BOF Dust Storage Pile
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

EPA Form 3510-3 (6-80)

CONTINUE ON REVERSE

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V. DESCRIPTION OF HAZARDOUS WASTES *(continued)*

E. USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM ITEM D(1) ON PAGE 3.

EPA I.D. NO. *(enter from page 1)*

												T/A	C
N	Y	D	0	0	0	8	1	3	4	0	2		6

V. FACILITY DRAWING

All existing facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail).*

VI. PHOTOGRAPHS

All existing facilities must include photographs *(aerial or ground–level)* that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas *(see instructions for more detail).*

VII. FACILITY GEOGRAPHIC LOCATION

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*
42 50 020	078 50 000

VIII. FACILITY OWNER

☐ A. If the facility owner is also the facility operator as listed in Section VIII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VIII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no.)*
REPUBLIC STEEL CORPORATION	216-622-5000

3. STREET OR P.O. BOX	C	4. CITY OR TOWN	5. ST.	6. ZIP CODE
P.O. BOX 6778	G	CLEVELAND	OH	44101

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

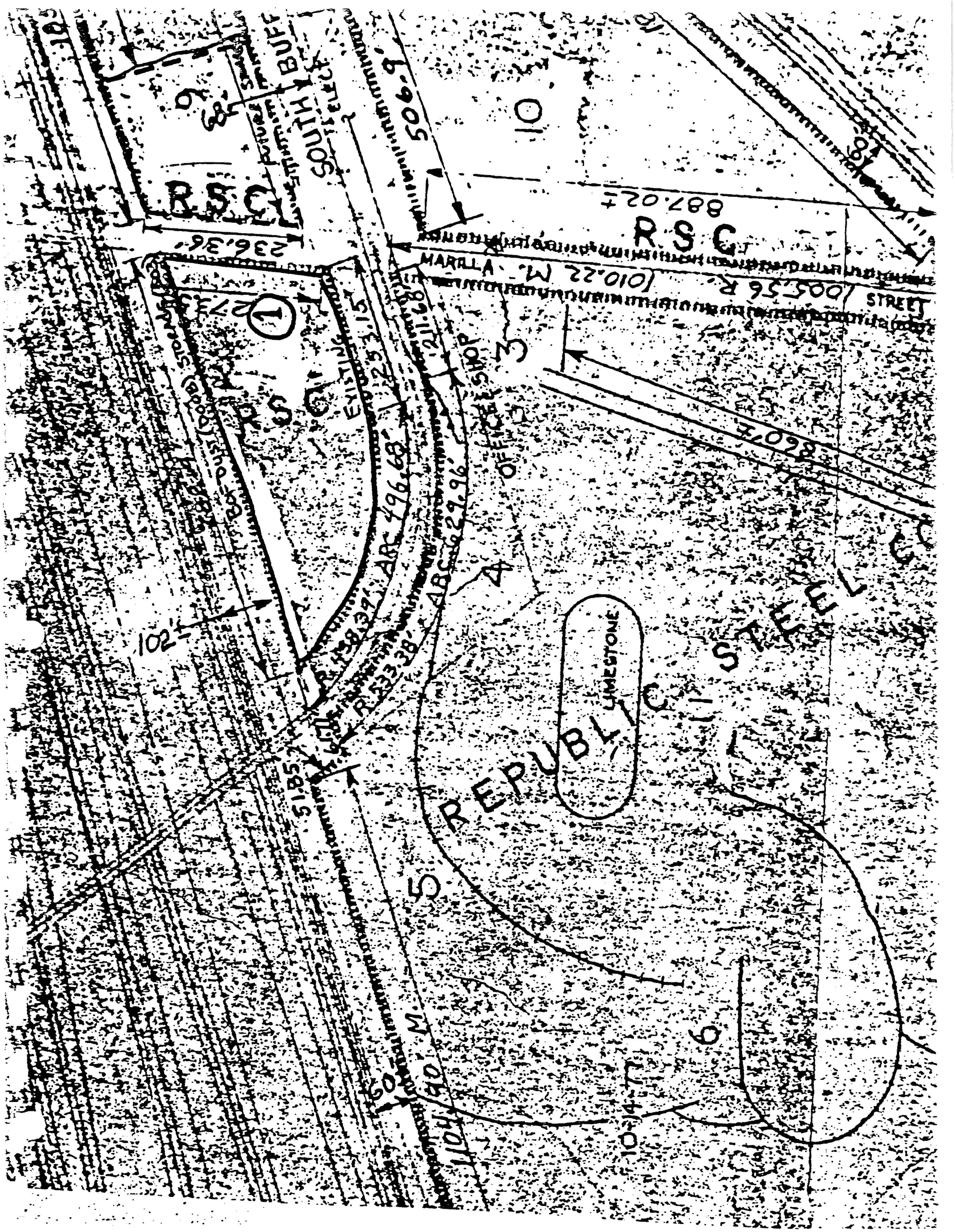
A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED
P.N. WIGTON, Vice President Steel Operations	[signature]	11-17-80

X. OPERATOR CERTIFICATION

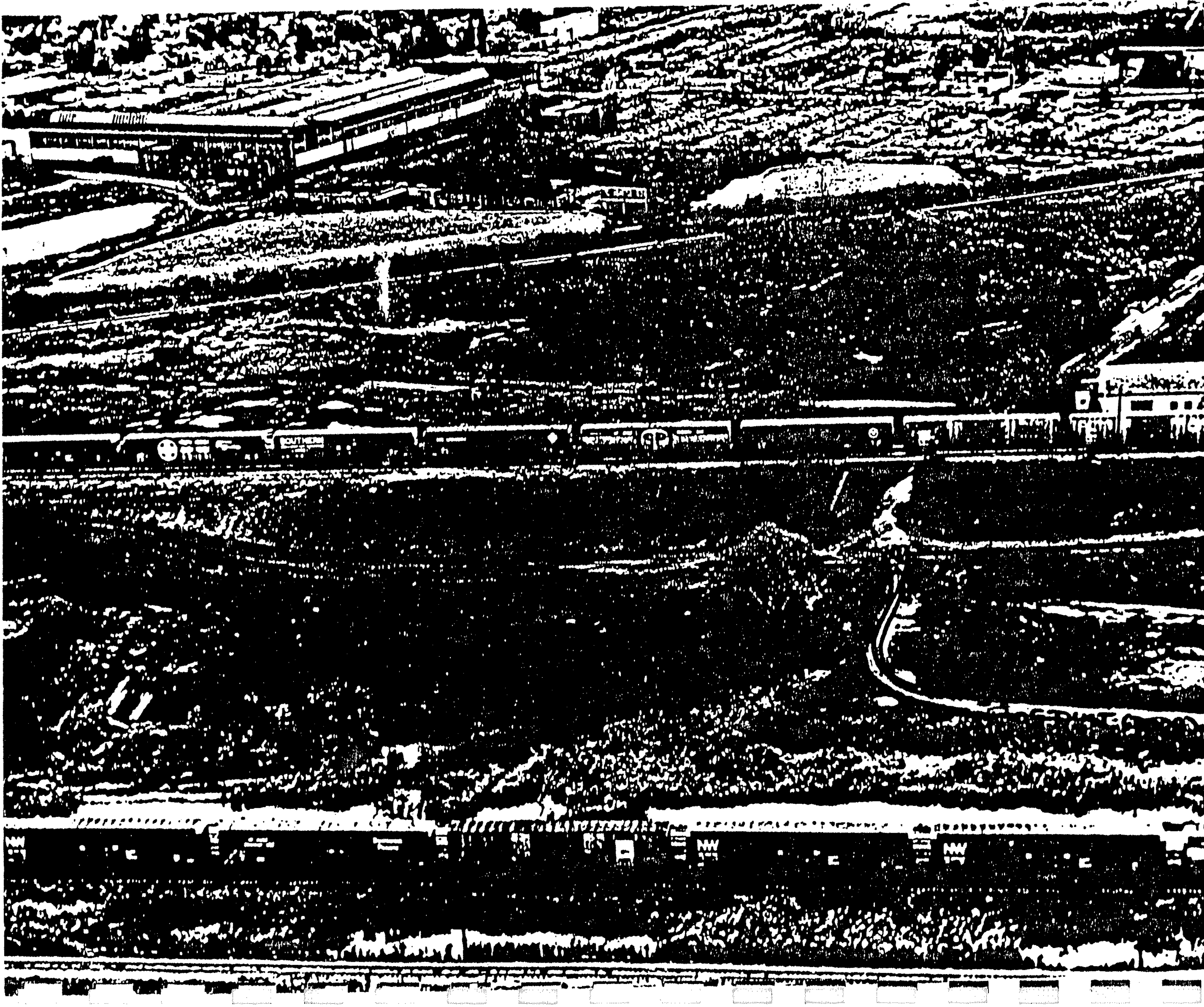
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

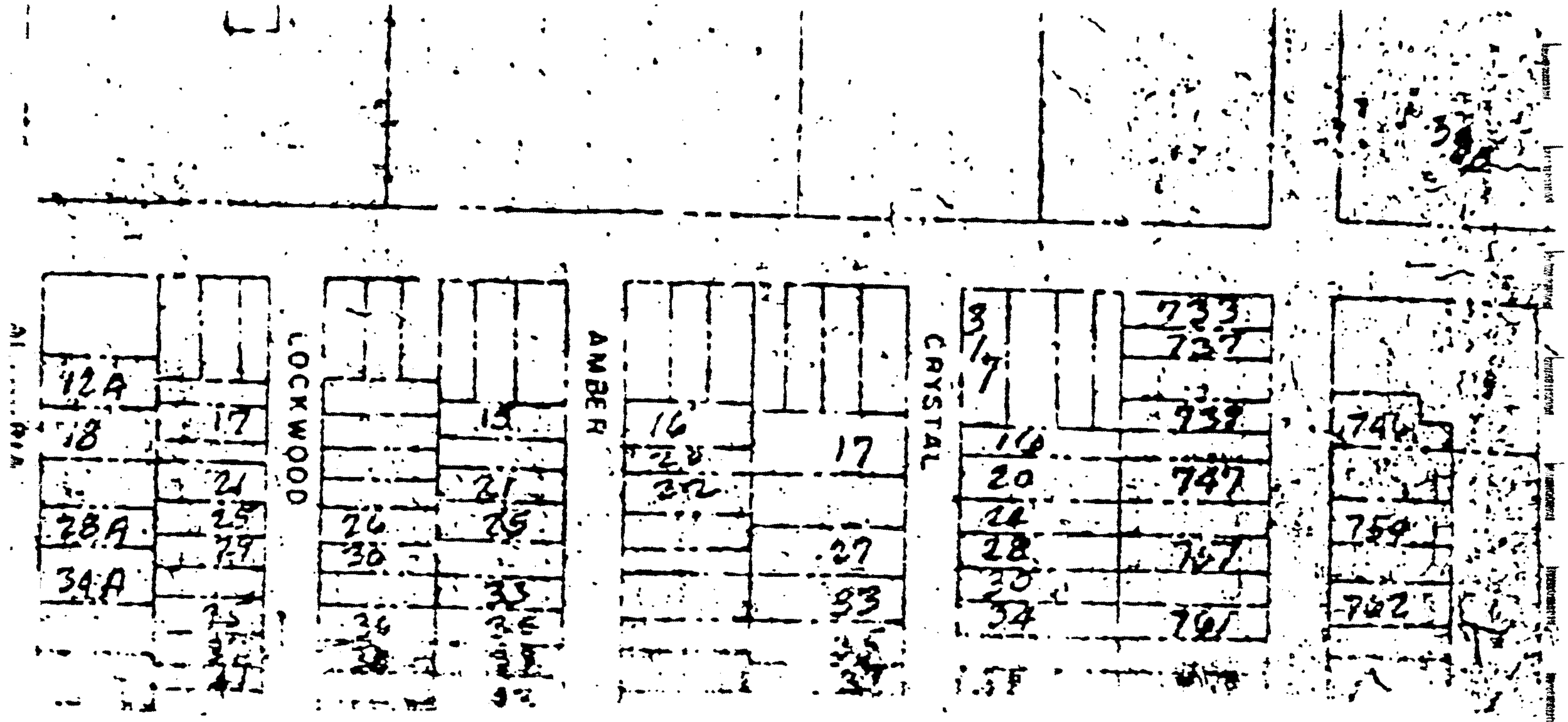
William C Haslett (Pres.)

A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED
WALTER BECKWITH, CHIEF ENGINEER	Walter Beckwith	Nov 6 1980


RSC
SOUTH
BUFF
236.36'
506.9'
887.02±
RSC
MARILLA
1010.22 M.
1005.56 R.
STREET
RSC
EXISTING
OFFICE SHOP
ARC 496.68'
R. 458.39'
R. 533.38'
ARC 529.96'
102'
LIMESTONE
REPUBLIC STEEL

REPUBLIC STEEL - BUFFALO DOCK
MARILLA STREET STORAGE AREA - FROM B





REPUBLIC STEEL - BUFFALO
MARILLA STREET STORAGE AREA
FORM 3 Item V 1 of 1

ENG-715 5/76 **ENGINEERING DRAWING COMPUTER INPUT**

DRAWING NUMBER			SEARCH ARGUMENT				
ALPHA	NUMERIC	ISSUE	DIST	CAT	DEPT	ITEM	DOC TYPE
A	3343	2	5	2	230	22	274

DRAWING TITLE

MARILLA STORAGE AREAS

ISSUE OR REVISION		
No.	DATE	BY
1	5/11/78	MSJ
2	4-2-79	MSJ
3		
4		
5		
6		
7		

ENSIONS

REPUBLIC STEEL CORPORATION

DISTRICT. DIVISION BUFFALO PLANT. WORKS BUFFALO, N. Y.

DEPARTMENT GENERAL PLANT

ITEM MARILLA STREET STORAGE AREA

PROPERTY LINE DESCRIPTION

DESIGNATED STORAGE AREAS

LOCATED MAPS

SCALE

DRAWN G.C.M. DATE 10/27/77

CHECKED DATE

CHECKED SAFETY DATE

A-3343

Continued from page 4.

. FACILITY DRAWING (see page 4)

SEE ATTACHMENTS.

Certification Statement

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to be the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

11/6/85
Date

LTV Steel Company, Inc.
Buffalo, New York BOF Dust Area
Facility

J.T. Anderson
Signature of Executive Officer

Vice President Bar Division
Title

1301a

...ease print or type in the unshaded areas only
...ll-in areas are spaced for elite type, i.e., 12 characters/inch).

Form Approved OMB No. 158-R0175

FORM 1 GENERAL — EPA — U.S. ENVIRONMENTAL PROTECTION AGENCY

GENERAL INFORMATION

Consolidated Permits Program
(Read the "General Instructions" before starting.)

I. EPA I.D. NUMBER

F NYD000813402 D

LABEL ITEMS

- EPA I.D. NUMBER
- FACILITY NAME
- FACILITY MAILING ADDRESS
- FACILITY LOCATION

PLEASE PLACE LABEL IN THIS SPACE

GENERAL INSTRUCTIONS

If a preprinted label has been provided, affix it in the designated space. Review the information carefully; if any of it is incorrect, cross through it and enter the correct data in the appropriate fill—in area below. Also, if any of the preprinted data is absent *(the area to the left of the label space lists the information that should appear)*, please provide it in the proper fill—in area(s) below. If the label is complete and correct, you need not complete Items I, III, V, and VI *(except VI-B which must be completed regardless)*. Complete all items if no label has been provided. Refer to the instructions for detailed item descriptions and for the legal authorizations under which this data is collected.

POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold—faced terms.

SPECIFIC QUESTIONS	YES	NO	FORM ATTACHED
A. Is this facility a publicly owned treatment works which results in a discharge to waters of the U.S.? (FORM 2A)		X	
B. Does or will this facility *(either existing or proposed)* include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to waters of the U.S.? (FORM 2B)		X	
C. Is this a facility which currently results in discharges to waters of the U.S. other than those described in A or B above? (FORM 2C)		X	
D. Is this a proposed facility *(other than those described in A or B above)* which will result in a discharge to waters of the U.S.? (FORM 2D)		X	
E. Does or will this facility treat, store, or dispose of hazardous wastes? (FORM 3)	X		X
F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)		X	
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)		X	
H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)		X	
I. Is this facility a proposed stationary source which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	
J. Is this facility a proposed stationary source which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	

NAME OF FACILITY

SKIP LTV STEEL CO., INC. BUFFALO DISTRICT

FACILITY CONTACT

A. NAME & TITLE *(last, first, & title)*	B. PHONE *(area code & no.)*
ZUHAY LAWRENCE, MGR ENV. CONTROL	216 429 6475

FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX

3100 EAST 45TH STREET

B. CITY OR TOWN	C. STATE	D. ZIP CODE
CLEVELAND	OH	44127

FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER

HOPKINS AND MARILLA STREETS

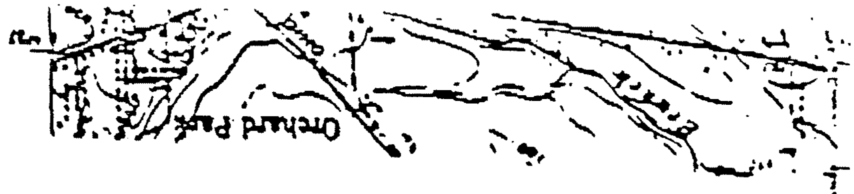
B. COUNTY NAME

ERIE

C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE *(if known)*
BUFFALO	NY	14220	

Form 3510-1 (6-80)

CONTINUE ON REVERSE


Orchard Park


50'
(BUFFALO NE)
PENNSYLVANIA
BUFFALO
RIVER
REPUBLIC STEEL MAIN PLANT
BUFFALO
WAREHOUSE AREA
Southside Jr High Sch
POMONA
PITTSBURG
MINERAL SPRINGS
STEVENSON
COMO
PRIES
COLUMBUS
Holy Family
CRYSTAL AVE
BLOOMFIELD AVE
LOCKWOOD AVE
W WOODSIDE AVE
WOODSIDE
HARDING RD
RIDGEWOOD AVE
Mercy Hospital
Mt Mercy Academy
CAZENOVIA
Golf Course
PARK
FLOW
BALTIMORE
DOWNING
DENMORE
Shopping Center

Please print or type in the unshaded areas only
(fill-in areas are spaced for elite type, i.e., 12 characters/inch).

Form Approved OMB No. 158-S80004

FORM 3 RCRA

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY

HAZARDOUS WASTE PERMIT APPLICATION

Consolidated Permits Program

(This information is required under Section 3005 of RCRA.)

I. EPA I.D. NUMBER

F N Y D 0 0 0 8 1 3 4 0 2 1

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (yr., mo., & day)	COMMENTS

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below (*mark one box only*) to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA I.D. Number, or if this is a revised application, enter your facility's EPA I.D. Number in Item I above.

A. FIRST APPLICATION *(place an "X" below and provide the appropriate date)*

☐ 1. EXISTING FACILITY *(See instructions for definition of "existing" facility. Complete item below.)*

8 | YR. | MO. | DAY | FOR EXISTING FACILITIES, PROVIDE THE DATE (yr., mo., & day) OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED (use the boxes to the left)

☐ 2. NEW FACILITY *(Complete item below.)*

YR. | MO. | DAY | FOR NEW FACILITIES, PROVIDE THE DATE (yr., mo., & day) OPERATION BEGAN OR IS EXPECTED TO BEGIN

B. REVISED APPLICATION *(place an "X" below and complete Item I above)*

☒ 1. FACILITY HAS INTERIM STATUS

☐ 2. FACILITY HAS A RCRA PERMIT

III. PROCESSES – CODES AND DESIGN CAPACITIES

A. PROCESS CODE – Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process *(including its design capacity)* in the space provided on the form *(Item III-C)*.

B. PROCESS DESIGN CAPACITY – For each code entered in column A enter the capacity of the process.
1. AMOUNT – Enter the amount.
2. UNIT OF MEASURE – For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER *(barrel, drum, etc.)*	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D79	GALLONS OR LITERS
LANDFILL	D80	ACRE-FEET *(the volume that would cover one acre to a depth of one foot)* OR HECTARE-METER
LAND APPLICATION	D81	ACRES OR HECTARES
OCEAN DISPOSAL	D82	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D83	GALLONS OR LITERS
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER *(Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Item III-C.)*	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
LITERS	L
CUBIC YARDS	Y
CUBIC METERS	C
GALLONS PER DAY	U
LITERS PER DAY	V
TONS PER HOUR	D
METRIC TONS PER HOUR	W
GALLONS PER HOUR	E
LITERS PER HOUR	H
ACRE-FEET	A
HECTARE-METER	F
ACRES	B
HECTARES	Q

EXAMPLE FOR COMPLETING ITEM III *(shown in line numbers X-1 and X-2 below)*: A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

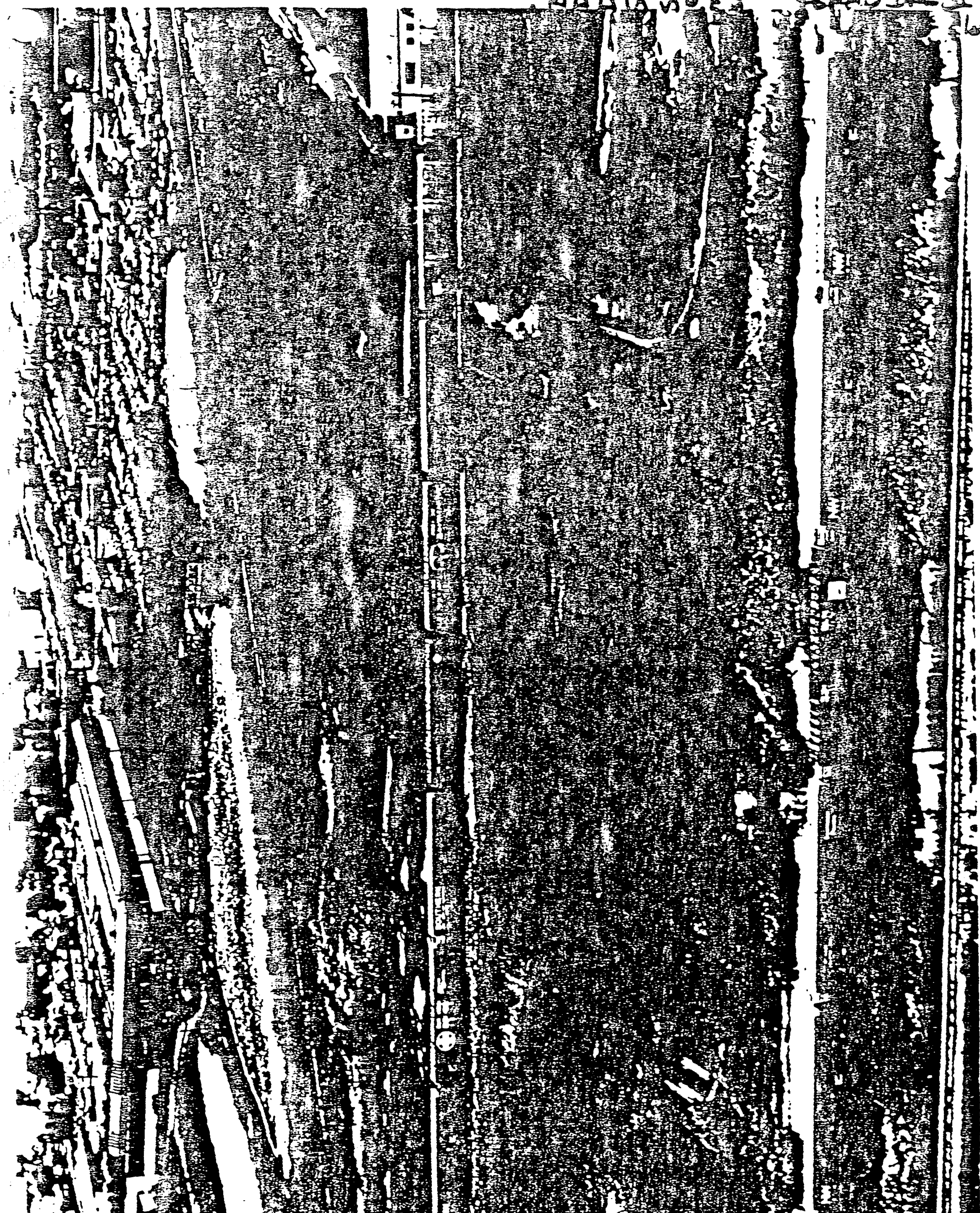
DUP | T/A | C | 1

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY
X-1	S 0 2	600	G	
X-2	T 0 3	20	E	
1	D 8 0	84.7	A	
2				
3				
4				
5				
6				
7				
8				
9				
10				

EPA Form 3510-3 (6-80)

CONTINUE ON REVERSE

Form 3 Ia II



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CODES (4-digit, in order of priority)

A. FIRST		B. SECOND	
3 1 2	(specify) IRON AND STEEL PLANT	7	(specify)
C. THIRD		**D. FOURTH**	
	(specify)	7	(specify)

ERATOR INFORMATION

A. NAME

T V S T E E L C O., I N C.

B. Is the name listed in Item VIII-A also the owner? ☒ YES ☐ NO

C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box; if "Other", specify.)

F = FEDERAL, S = STATE, P = PRIVATE, M = PUBLIC (other than federal or state), O = OTHER (specify)

P (specify)

D. PHONE (area code & no.) A 216 622 5000

E. STREET OR P.O. BOX

B O X 6 7 7 8

F. CITY OR TOWN	G. STATE	H. ZIP CODE
L E V E L A N D	O H	4 4 1 0 1

IX. INDIAN LAND

Is the facility located on Indian lands? ☐ YES ☒ NO

TING ENVIRONMENTAL PERMITS

A. NPDES (Discharges to Surface Water)	D. PSD (Air Emissions from Proposed Sources)	
	9 P	
B. UIC (Underground Injection of Fluids)	**E. OTHER (specify)**	
	9 DEC 9 1 5 0 1 0 2 1 2	(specify) NY DEC Permit Application for Solid Waste Mgmnt Facility
C. RCRA (Hazardous Wastes)	**E. OTHER (specify)**	
	9	(specify)

ach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste nt, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface odies in the map area. See instructions for precise requirements.

NATURE OF BUSINESS (provide a brief description)

LTV STEEL Buffalo District utilizes a portion of the facilities at the Hopkins and Marilla Streets site as a reclamation site for by-products of the steel making process. These items include iron and steel making slags, refractory brick, mill scale and blast furnace dust. These items are all sold or reclaimed.

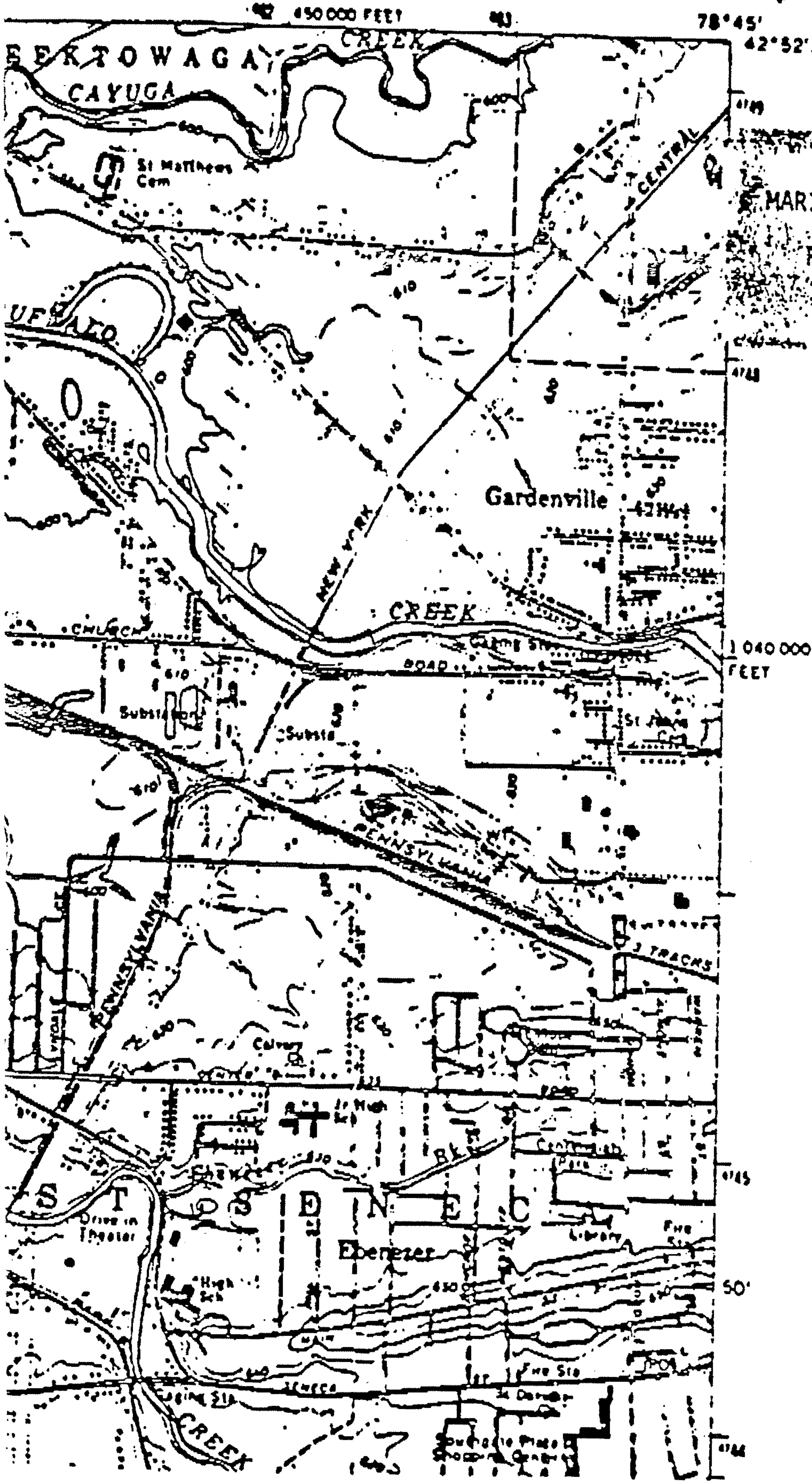
CERTIFICATION (see instructions)

tify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all ments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the tion, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting information, including the possibility of fine and imprisonment.

E & OFFICIAL TITLE (type or print)	B. SIGNATURE	C. DATE SIGNED
T. Anderson Vice President Bar Division	A.T. Anderson	11/6/85

ENTS FOR OFFICIAL USE ONLY

BUFFALO SE QUADRANGLE
NEW YORK–ERIE CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
SE/4 BUFFALO 15 QUADRANGLE



LTV STEEL BUFFALO DISTRICT
MARILLA STREET STORAGE AREA
FORM 1 ITEM XI 1 of 1

·inued from the front.

ROCESSES (continued)

CE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESSES (code "T04"). FOR EACH PROCESS ENTERED HERE
INCLUDE DESIGN CAPACITY.

SCRIPTION OF HAZARDOUS WASTES

HAZARDOUS WASTE NUMBER — Enter the four-digit number from 40 CFR, Subpart D for each listed hazardous waste you will handle. If you
andle hazardous wastes which are not listed in 40 CFR, Subpart D, enter the four-digit number(s) from 40 CFR, Subpart C that describes the characteris-
ics and/or the toxic contaminants of those hazardous wastes.

MATED ANNUAL QUANTITY — For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual
. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non-listed waste(s) that will be handled
hich possess that characteristic or contaminant.

IT OF MEASURE — For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate
s are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

ility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into
unt the appropriate density or specific gravity of the waste.

OCESSES

PROCESS CODES:

r listed hazardous waste: For each listed hazardous waste entered in column A select the code(s) from the list of process codes contained in Item III
indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non-listed hazardous wastes: For each characteristic or toxic contaminant entered in column A, select the code(s) from the list of process codes
contained in Item III to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed hazardous wastes that possess
that characteristic or toxic contaminant.

ote: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the
treme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code(s).

PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER — Hazardous wastes that can be described by
n one EPA Hazardous Waste Number shall be described on the form as follows:

elect one of the EPA Hazardous Waste Numbers and enter it in column A. On the same line complete columns B, C, and D by estimating the total annual
quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.

In column A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In column D(2) on that line enter
ncluded with above" and make no other entries on that line.

epeat step 2 for each other EPA Hazardous Waste Number that can be used to describe the hazardous waste.

PLE FOR COMPLETING ITEM IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* — A facility will treat and dispose of an estimated 900 pounds
er of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes
ive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated
ds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

A. EPA HAZARD. WASTE NO (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
0 5 4	900	P	T 0 3	D 8 0			
0 0 2	400	P	T 0 3	D 8 0			
D 0 0 1	100	P	T 0 3	D 8 0			
0 0 2							included with above

rm 3510-3 (6-80)

CONTINUE ON PAGE 3

ntinued from page 2.
TE: Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	T/A C	FOR OFFICIAL USE ONLY		T/A C	
N Y D 0 0 0 8 1 3 4 0 2	1	W	DUP	2	DUP

V. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	D 0 0 8	0		D 8 0	The BOF Dust and slag landfill is at capacity and the wastes are no longer generated.
2					
3					
4					
5					
6					
7					
8					
9					
0					
1					
2					
3					
4					
5					
6					
7					
8					
9					
0					
1					
2					
3					
4					
5					
6					

A Form 3510-3 (6-80)

CONTINUE ON REVERSE

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DESCRIPTION OF HAZARDOUS WASTES *(continued)*

USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM ITEM D(1) ON PAGE 3.

EPA I.D. NO. *(enter from page 1)*

Y	D	0	0	0	8	1	3	4	0	2		6

FACILITY DRAWING

Existing facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail).*

PHOTOGRAPHS

Existing facilities must include photographs *(aerial or ground–level)* that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas *(see instructions for more detail).*

FACILITY GEOGRAPHIC LOCATION

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*
42 50 020	073 50 000

FACILITY OWNER

A. If the facility owner is also the facility operator as listed in Section VIII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VIII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no.)*
	– –

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE
	G		

OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED
J. T. Anderson	J.T. Anderson	11/6/85

OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED

 CONTINUE ON PAGE 5

SEE ATTACHMENTS.

See Figure 1-1 through Figure 1-3 of attached closure plan.

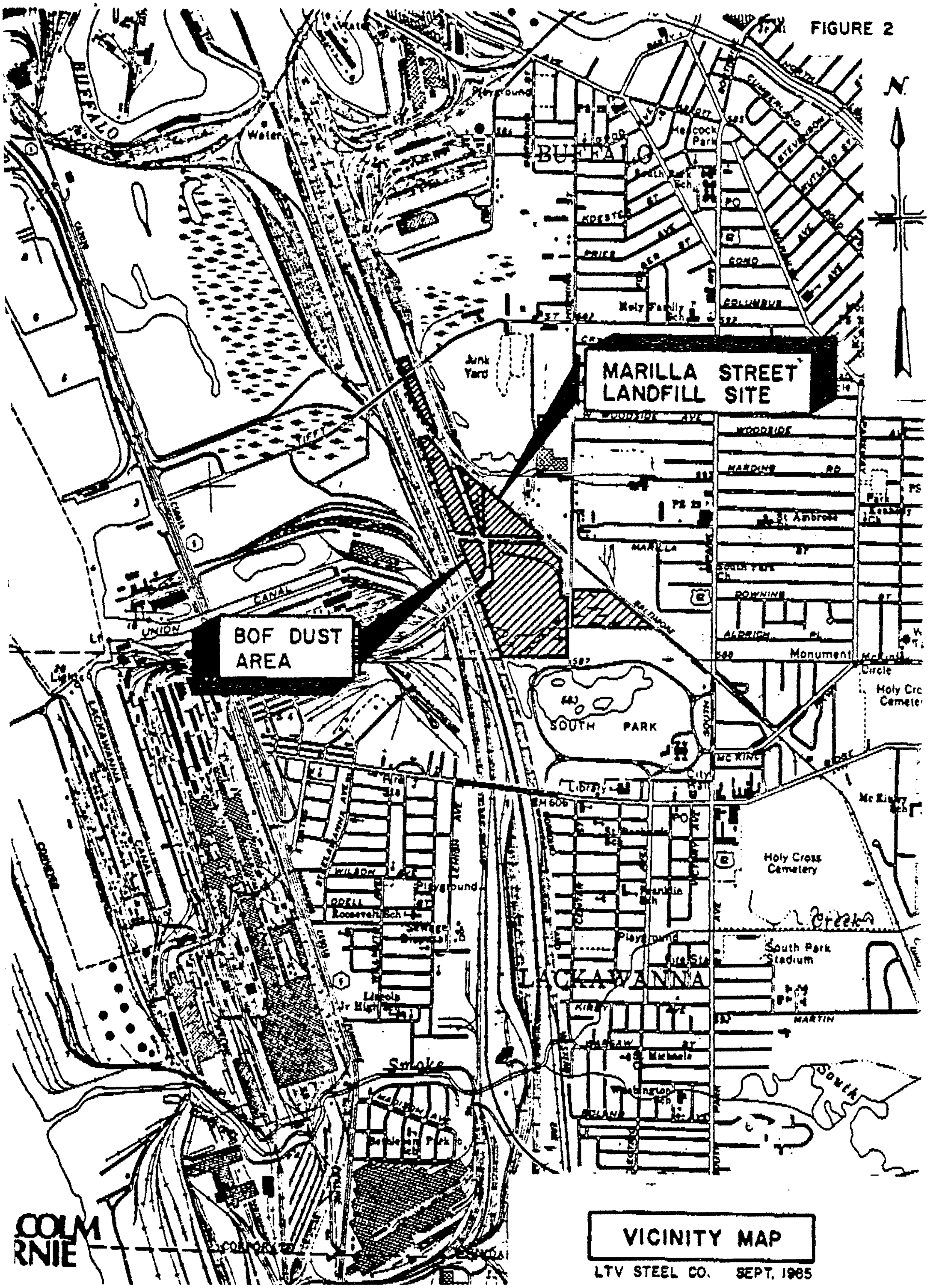
FIGURE 2
MARILLA STREET LANDFILL SITE
BOF DUST AREA
BUFFALO
LACKAWANNA
SOUTH PARK
Holy Cross Cemetery
South Park Stadium
Junk Yard
UNION CANAL
VICINITY MAP
LTV STEEL CO. SEPT. 1985

APPENDIX B

BOF DUST AREA LABORATORY RESULTS
EP TOXICITY TESTING

GD-680—4-70

Republicsteel

General Office
District-Division-Subsidiary

Interoffice Correspondence

Environmental Control
Office

Mr. J. M. Potwora
Superintendent, Environmental Control
Buffalo District

June 22, 1981

Subject: Buffalo BOF Dust -
Hazardous Waste Toxicity Test Results

Attached are outside laboratory results of the U.S. EPA toxicity test (leachate test) for a representative sample of Buffalo District generated BOF dust. The eight(8) samples analyzed were from the set of sixteen(16) samples that were drawn for metallurgical analysis under AFE #7976, "Buffalo BOF Dust Pelletizer".

Each one of the eight(8) BOF dust samples failed the EPA toxicity limit for lead (Pb), which is five ppm. The lead concentrations analyzed in the leachate for the eight(8) samples are summarized below:

Buffalo Sample No.	Concentration of Lead (Pb) (ppm) in the Leachate
1	8.4
5	16.4
6	12.2
7	8.1
13	31.3
14	21.4
15	17.8
16	16.8

The individual laboratory certificates are attached.

Please contact this office for assistance in developing a proposal to comply with interim status standards.

Dave

D. M. Gubanc
Solid Waste Management Engineer

DMG/dh

Attachments

cc: W. L. West (w/o att.)
D. E. Papajcik "
J. A. McKinney "
W. B. Bredbeck "
D. Stroud "
J. R. Berens (w/o att.)
D. Nemec "
G. Seiner "
I. Shetler "

Buffalo BOF Du.

CERTIFICATE OF ANALYSIS

WADSWORTH TESTING LABORATORIES, INC.

P.O. Box 208 • 1600 Fourth St. S.E. • Canton, Ohio 44701 • (216) 454-5809

CHEMISTS • METALLURGISTS • ENGINEERS

ESTABLISHED 1938

Republic Steel Corp.
Box 6778
Cleveland, Ohio 44101

DATE 6/12/81

Subject: Leachate testing in accordance with Federal Register Vol 45, #98, May 19, 1980

Sample Identification: Sample #16

Arsenic ------------Less than .005 mg/L
Barium -------------.40 mg/L
CAdmium ------------.80 mg/L
Chromium -----------.03 mg/L
Lead ---------------16.8 mg/L
Mercury ------------Less than .001 mg/L
Selenium -----------Less than .005 mg/L
Silver -------------.01 mg/L
Hex Cr -------------Less than .02 mg/L

WADSWORTH TESTING LABORATORIES, INC.

Marvin Stephens, Ph.D.

CERTIFICATE OF ANALYSIS
WADSWORTH TESTING LABORATORIES, INC.
P.O. Box 208 • 1600 Fourth St. S.E. • Canton, Ohio 44701 • (216) 454-5809
CHEMISTS • METALLURGISTS • ENGINEERS
ESTABLISHED 1938

Republic Steel Corp.
Box 6778
Cleveland, Ohio 44101

DATE 6/12/81

Subject: Leachate testing in accordance with Federal Register Vol 45, #98, May 19, 1980

Sample Identification: Sample #15

Arsenic ------------Less than .005 mg/L
Barium -------------.43 mg/L
CAdmium ------------.92 mg/L
Chromium -----------.04 mg/L
Lead ---------------17.8 mg/L
Mercury ------------.004 mg/L
Selenium -----------Less than .005 mg/L
Silver -------------.01 mg/L
Hex Cr -------------Less than .02 mg/L

WADSWORTH TESTING LABORATORIES, INC.
Marvin Stephens, Ph.D

CERTIFICATE OF ANALYSIS
WADSWORTH TESTING LABORATORIES, INC.
P.O. Box 208 • 1600 Fourth St. S.E. • Canton, Ohio 44701 • (216) 454-5809
CHEMISTS • METALLURGISTS • ENGINEERS
ESTABLISHED 1938

Republic Steel Corp.
Box 6778
Cleveland, Ohio 44101

DATE 6/12/81

Subject: Leachate testing in accordance with Federal Register Vol 45, #98, May 19, 1980

Sample Identification: Sample #14

Arsenic ------------Less than .005 mg/L
Barium -------------.31 mg/L
CAdmium ------------.62 mg/L
Chromium -----------Less than .02 mg/L
Lead ---------------21.4 mg/L
Mercury ------------Less than .001 mg/L
Selenium -----------Less than .005 mg/L
Silver -------------.01 mg /L

Hex Cr -------------Less than .02 mg/L

WADSWORTH TESTING LABORATORIES, INC.
Marvin Stephens, Jr.

CERTIFICATE OF ANALYSIS

WADSWORTH TESTING LABORATORIES, INC.

P.O. Box 208 • 1600 Fourth St. S.E. • Canton, Ohio 44701 • (216) 454-5809

CHEMISTS • METALLURGISTS • ENGINEERS

ESTABLISHED 1938

Republic Steel Corp.
Box 6778
Cleveland, Ohio 44101

DATE 6/12/81

Subject: Leachate testing in accordance with Federal Register Vol 45, #98, May 19, 1980

Sample Identification: Sample #13

Arsenic ------------Less than .005 mg/L
Barium -------------.45 mg/L
CAdmium ------------.65 mg/L
Chromium -----------Less than .02 mg/L
Lead ---------------31.3 mg/L
Mercury ------------Less than .001 mg/L
Selenium -----------Less than .005 mg/L
Silver -------------.01 mg/L
Hex Cr -------------Less than .02 mg/L

WADSWORTH TESTING LABORATORIES, INC.

Marvin Stephens

CERTIFICATE OF ANALYSIS

WADSWORTH TESTING LABORATORIES, INC.

P.O. Box 208 • 1600 Fourth St. S.E. • Canton, Ohio 44701 • (216) 454-5809

ESTABLISHED 1938

CHEMISTS • METALLURGISTS • ENGINEERS

Republic Steel Corp.
Box 6778
Cleveland, Ohio 44101

DATE 6/12/81

Subject: Leachate testing in accordance with Federal Register Vol 45, #98, May 19, 1980

Sample Identification: Sample #7

Arsenic -------------Less than .005 mg/L
Barium --------------.39 mg/L
CAdmium -------------.62 mg/L
Chromium ------------Less than .02 mg/L
Lead ----------------8.1 mg/L
Mercury -------------Less than .001 mg/L
Selenium ------------Less than .005 mg/L
Silver --------------Less than .01 mg/L
Hex Cr --------------Less than .02 mg/L

WADSWORTH TESTING LABORATORIES, INC.

Marvin Stephens, Ph.D

CERTIFICATE OF ANALYSIS

WADSWORTH TESTING LABORATORIES, INC.

P.O. Box 208 • 1600 Fourth St. S.E. • Canton, Ohio 44701 • (216) 454-5809

CHEMISTS • METALLURGISTS • ENGINEERS

ESTABLISHED 1938

Republic Steel Corp.
Box 6778
Cleveland, Ohio 44101

DATE 6/12/81

Subject: Leachate testing in accordance with Federal Register Vol 45, #98, May 19, 1980

Sample Identification: Sample #6

Arsenic ------------Less than .005 mg/L
Barium -------------.28 mg/L
CAdmium ------------.70 mg/L
Chromium -----------Less than .02 mg/L
Lead ---------------12.2 mg/L
Mercury ------------Less than .001 mg/L
Selenium -----------Less than .005 mg/L
Silver -------------Less than .01 mg/L
Hex Cr -------------Less than .02 mg/L

WADSWORTH TESTING LABORATORIES, INC.

Marvin Stephens, Ph.D.

CERTIFICATE OF ANALYSIS
WADSWORTH TESTING LABORATORIES, INC.
P.O. Box 208 • 1600 Fourth St. S.E. • Canton, Ohio 44701 • (216) 454-5809
CHEMISTS • METALLURGISTS • ENGINEERS
ESTABLISHED 1938

Republic Steel Corp.
Box 6778
Cleveland, Ohio 44101

DATE 6/12/81

Subject: Leachate testing in accordance with Federal Register Vol 45, #98, May 19, 1980

Sample Identification: Sample #5

Arsenic ------------Less than .005 mg/L
Barium -------------.39 mg/L
CAdmium ------------.72 mg/L
Chromium -----------.06 mg/L
Lead ---------------16.4 mg/L
Mercury ------------Less than .001 mg/L
Selenium -----------Less than .005 mg/L
Silver -------------Less than.01 mg/L
Hex Cr -------------Less than .02 mg/L

WADSWORTH TESTING LABORATORIES, INC.
Marvin Stephens, Ph.D.

CERTIFICATE OF ANALYSIS
WADSWORTH TESTING LABORATORIES, INC.
P.O. Box 208 • 1600 Fourth St. S.E. • Canton, Ohio 44701 • (216) 454-5809
CHEMISTS • METALLURGISTS • ENGINEERS
ESTABLISHED 1938

Republic Steel Corp.
Box 6778
Cleveland, Ohio 44101

DATE 6/12/81

Subject: Leachate testing in accordance with Federal Register Vol 45, #98, May 19, 1980

Sample Identification: Sample #1

RECEIVED
JUN 16 1980
ENVIRONMENTAL CONTROL

Arsenic ------------Less than .005 mg/L
Barium -------------.41 mg/L
CAdmium ------------.62 mg/L
Chromium -----------Less than .02 mg/L
Lead ---------------8.4 mg/L
Mercury ------------.001 mg/L
Selenium -----------Less than .005 mg/L
Silver -------------Less than .01 mg/L
Hex Cr -------------Less than .02 mg/L

WADSWORTH TESTING LABORATORIES, INC.
Marvin Stephens Ph.D.

ANALYSIS OF THREE (3) SOIL SAMPLES
FOR EP TOXICITY METALS

Report Prepared For

MALCOLM-PIRNIE, INC.

By

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

NOTE: Reanalysis of referenced composites indicate date presented in this report to be suspect (see page 1-6 of Closure Plan)

MALCOLM PIRNIE
October 30, 1985

W. Joseph McDougall for
Leonard Borzynski
Technical Evaluation

August 7, 1985
AES Report AXQ

SCOPE OF WORK

Under the direction of Mr. John Whitney, this work was performed to fulfill an analytical requirement for Malcolm-Pirnie, Inc.'s. Niagara Falls, New York office.

RECEIPT OF SAMPLES

On Thursday, July 11, 1985, Mr. John Whitney delivered three (3) composite soils samples to the Advanced Environmental Systems, Inc. laboratory.

EXTRACTION PROCEDURE (E.P.) TOXICITY - METALS
ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

Type of Analysis: Metals
Client: MALCOLM-PIRNIE   A.E.S. Job Code AXQ

(All results are in mg/l)

Analysis	Method No.	Ref No.	Maximum Conc. (mg/l)	Det. Limits	Analysis Date	1790 MV-7A 6-18-85 COMP.	1791 B-2 6-10-85 COMP.	1792 B-3 6-11-85 COMP.
					A.E.S. Lab No.- / Sample ID -			
Arsenic	7060	5	5.0	0.005	7-30-85	0.081	0.097	0.091
Barium	7080	5	100.0	1.0	7-31-85	BDL	BDL	BDL
Cadmium	7130	5	1.0	0.05	7-26-85	BDL	0.05	BDL
Chromium	7190	5	5.0	0.50	7-26-85	8.8	9.5	7.7
Lead	7420	5	5.0	1.0	7-31-85	25.0	13.0	13.0
Mercury	7471	5	0.2	0.001	7-31-85	0.004	0.002	0.006
Selenium	7740	5	1.0	0.005	7-30-85	0.028	0.040	0.037
Silver	7760	5	5.0	0.1	7-26-85	0.1	0.3	0.2

NOTE: Reanalysis of referenced composites indicate data presented in this report to be suspect (see page 1-6 of Closure Plan)
MALCOLM PIRNIE
October 30, 1985

Janette L. Bingert
JANETTE L. BINGERT
METALS DIVISION SUPERVISOR

ADVANCED ENVIRONMENTAL SYSTEMS

STANDARD ADDITIONS DATA SHEET

CUSTOMER: MALCOLM-PIRNIE
JOB CODE: AXQ

UNITS: MILLIGRAMS/LITER, OR PPM

S.#	ELEMENT	0/ABS.	1 SPK/1 ABS	2 SPK/2 ABS	3 SPK/3 ABS	FIN CONC	r*
790	MERCURY 1	10	0.5/ 16	2.5/ 22	5.0/ 37	0.004	.987
791	MERCURY 1	7	0.5/ 14	1.0/ 16	2.0/ 25	0.002	.987
792	MERCURY 1	10	0.5/ 10	2.5/ 18	5.0/ 26	0.006	.996
790	SILVER	0.002	0.5/0.020	1.0/0.040	2.0/0.074	0.1	.999
791	SILVER	0.004	0.5/0.025	1.0/0.040	2.0/0.073	0.3	.998
792	SILVER	0.001	0.5/0.021	1.0/0.041	2.0/0.071	0.2	.997
790	CADMIUM	0.001	0.125/0.013	0.25/0.027	0.5/0.059	BDL **	.999
791	CADMIUM	0.003	0.125/0.018	0.25/0.032	0.5/0.063	0.05	.999
792	CADMIUM	0.000	0.125/0.014	0.25/0.028	0.5/0.059	BDL	.999
790	LEAD	0.050	2.5/0.064	5.0/0.074	10.0/0.092	25.3	.994
791	LEAD	0.026	2.5/0.036	5.0//0.046	10.0/0.066	13.0	1.0
792	LEAD	0.028	2.5/0.042	5.0/0.049	10.0/0.079	13.0	.996
790	CHROMIUM	0.019	1.25/0.025	2.5/0.030	5.0/0.041	8.8	.999
791	CHROMIUM	0.028	1.25/0.039	2.5/0.046	5.0/0.060	9.5	.994
792	CHROMIUM	0.019	1.25/0.027	2.5/0.032	5.0/0.045	7.7	.998
790	ARSENIC	0.094	0.0125/0.135	0.025/0.155	0.050/0.220	0.087	.996
791	ARSENIC	0.092	0.0125/0.119	0.025/0.143	0.050/0.189	0.097	.999

*"r" is the correlation coefficient.

+/- correlation coefficient is outside of control window of 0.995

1 - Mercury measured in Peak Height (mm).

**Below determinable limits.

ADVANCED ENVIRONMENTAL SYSTEMS
==============================
STANDARD ADDITIONS DATA SHEET

CUSTOMER: MALCOLM-PIRNIE
JOB CODE: 02AXQ

UNITS: MILLIGRAMS/LITER, OR PPM

S.#	ELEMENT	0/ABS.	1 SPK/1 ABS	2 SPK/2 ABS	3 SPK/3 ABS	FIN CONC	r*
792	ARSENIC	0.094	0.0125/0.115	0.025/0.139	0.050/0.194	0.091	.998
790	SELENIUM	0.011	0.0125/0.017	0.025/0.026	0.050/0.045	0.028	.996
791	SELENIUM	0.010	0.0125/0.017	0.025/0.024	0.050/0.036	0.040	.999
792	SELENIUM	0.010	0.0125/0.016	0.025/0.022	0.050/0.036	0.037	.999
790	BARIUM	0.001	0.5/0.003	5.0/0.016	10.0/0.020	BDL*	.998
791	BARIUM	0.000	2.5/0.003	5.0/0.009	10.0/0.016	BDL	.997
792	BARIUM	0.000	2.5/0.004	5.0/0.010	10.0/0.023	BDL	.996
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*"r" is the correlation coefficient.

+/- correlation coefficient is outside of control window of 0.995

**Below determinable limits.

ANALYTICAL METHODOLOGIES REFERENCE LIST

Routine Analyses are Performed in Accordance with Protocols Found in the Following Numbered Sources. These Numbers Correspond to those Listed in the Laboratory Report Under the Reference ("REF") Column.

1 - EPA 600/D-80-021, "Guidelines Establishing Test Procedures for the Analysis of Pollutants; Proposed Regulations", Federal Register 44(233), December 3, 1979.

2 - EPA 600/D-80-022, "Guidelines Establishing Test Procedures for the Analysis of Pollutants; Proposed Regulations, Correction", Federal Register 44(244), December 18, 1979.

3 - EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes", (1983)

4 - EPA 600/4-79-057, "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", (1982)

5 - EPA-SW-846, "Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods", second edition (1982)

6 - "Standard Methods for the Examination of Water and Wastewater", 15th Edition, (1980)

7 - New York State Institute of Toxicology Analytical Handbook, October 1982

8 - NIOSH Manual of Analytical Methods, second edition 1977

9 - "The Analysis of Polychlorinated Biphenyls in Transformer Fluid and Waste Oil", EPA Environmental Monitoring and Support Laboratory, draft, June 24, 1980

10 - "Approved Analytical Procedures for Determining the Content of Constituents Banned from Landburial" (New York State D. E. C., Division of Solid and Hazardous Waste), Jan. 1985.

LTV Steel Company

September 17, 1985

Mr. Paul Werthman
Malcolm Pirnie, Inc.
3619 Packard Road
Niagara Falls, NY 14303

Dear Paul,

Per our discussion of today, attached is one copy of NUS Analysis for monitoring Well 7A soil sample at the Buffalo dump.

Very truly yours,

M. S. Wilcox

M. S. Wilcox
Development Engineer
Engineering Department

MSW/cep(04701)

Attachment

cc: L. Szuhay

NUS CORPORATION

Laboratory Services Division
5350 Campbells Run Road
Pittsburgh, PA 15205

REMIT TO:
Park West Two
Cliff Mine Road
Pittsburgh, PA 15275
412-788-1080

LAB ANALYSIS REPORT

CLIENT NAME: LTV STEEL COMPANY
ADDRESS: 3100 EAST 45TH STREET
CLEVELAND OH 44127

NUS CLIENT NO: [illegible]
NUS SAMPLE NO: [illegible]
VENDOR NO: [illegible]
WORK ORDER NO: [illegible]
DATE RECEIVED: 08/16/85

REPORT DATE: 09/09/85

ATTENTION: MR DONALD L. HANEY

SAMPLE IDENTIFICATION: MW-7A COMPSITE LEACH

TEST	DETERMINATION	RESULTS	UNITS
1275	EP TOXICITY PACKAGE		
[illegible]	Arsenic, leachable (As)	< 0.001	mg/l
[illegible]	Barium, leachable (Ba)	4.9	mg/l
[illegible]	Cadmium, leachable (Cd)	0.026	mg/l
[illegible]	Chromium, leachable (Cr)	0.08	mg/l
[illegible]	Lead, leachable (Pb)	< 0.03	mg/l
[illegible]	Mercury, leachable (Hg)	< 0.0002	mg/l
[illegible]	Selenium, leachable (Se)	< 0.004	mg/l
[illegible]	Silver, leachable (Ag)	0.02	mg/l
3907	Initial pH of leachate	11.7	
3905	Final pH of leachate	11.5	
[illegible]	Acid Required/100 gm	400	ml
3910	EP Toxicity Extraction		

COMMENTS:

Analyzed and approved by: [illegible]

NUS CORPORATION

Laboratory Services Division
5350 Campbells Run Road
Pittsburgh, PA 15205

REMIT TO:
Park West Two
Cliff Mine Road
Pittsburgh, PA 15275
412-788-1080

LAB ANALYSIS REPORT

CLIENT NAME: LTV STEEL COMPANY
ADDRESS: 3100 EAST 45TH STREET
CLEVELAND, OH 44127
ATTENTION: DR. [illegible] L. HANEY

REPORT DATE: 09/09/85

NUS CLIENT NO: [illegible]
NUS SAMPLE NO. [illegible]
VENDOR NO: [illegible]
WORK [illegible]
DATE RECEIVED: 06/16/85

SAMPLE IDENTIFICATION: [illegible] COMPOSITE [illegible]

TEST	DETERMINATION	RESULTS	UNITS
[illegible]	Lead (Pb)	430	mg/kg
[illegible]	Acid Digestion		

COMMENTS:

Reviewed [illegible]

A Halliburton Company

CLIENT DUPLICATE

ANALYSIS OF TWO (2) SOIL SAMPLES FOR TOTAL LEAD, AND EP TOXICITY METALS WITH STANDARD ADDITIONS.

Report Prepared For

MALCOLM-PIRNIE, INC.

By

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

Leonard Borzynski

Leonard Borzynski
Technical Evaluation

October 8, 1985
AES Report BJQ

SAMPLE PREPARATION

At the request of Mr. John Whitney of Malcom-Pirnie, 2 sets (7A - 5 bottles at different depths and B^2 - 7 bottles at different depths) of samples were delivered to Advanced Environmental Systems, Inc. to be composited into 2 samples 7A and B^2. Then from these 2 samples, 2 more samples are to be split off with a total of 4 samples; 2 bottles for 7A and 2 bottles for B^2. From each set of samples Total Lead is to be run on a composite of a small aliquot of each set. Then EP Toxicity Metals run on one sample bottle of set 7A and B^2 separately. Leaving one sample of each set to send back to Malcolm-Pirnie on September 20, 1985.

The soil samples for Total Lead were digested by Method 3010, SW-846, prior to analysis.

The extraction for EP Toxicity Metals was performed according to Method 1310, SW-846.

The composition of the sample sets were:

7A - S1-0-2', S2-4.5'-6.5', S3-9.5'-11', S5-19.5'-20.1', S6-Top.

B^2 - S1-0-2', S2-4.5'-6.5', S3-9.5'-11.5', S4-14.5'-16.5', S5-19.5'-21.5', S6-24.5'-26.5', S7-Top.

ANALYTICAL METHODOLOGIES

The method numbers for each procedure are listed in the second column of the tabulated results. The source for each method is listed as a reference number in the third column. The source(s) for the Analytical Methodologies are:

1 - EPA 600/D-80-021, "Guidelines Establishing Test Procedures for the Analysis of Pollutants; Proposed Regulations", Federal Register 44(233), December 3, 1979.

2 - EPA 600/D-80-022, "Guidelines Establishing Test Procedures for the Analysis of Pollutants; Proposed Regulations, Correction", Federal Register 44(244), December 18, 1979.

3 - EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes", (1983)

4 - EPA 600/4-79-057, "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", (1982)

5 - EPA-SW-846, "Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods", second edition (1982)

6 - "Standard Methods for the Examination of Water and Wastewater", 15th Edition, (1980)

7 - New York State Institute of Toxicology Analytical Handbook, October 1982

8 - NIOSH Manual of Analytical Methods, second edition 1977

9 - "The Analysis of Polychlorinated Biphenyls in Transformer Fluid and Waste Oil", EPA Environmental Monitoring and Support Laboratory, draft, June 24, 1980

10 - "Approved Analytical Procedures for Determining the Content of Constituents Banned from Landburial" (New York State D.E.C., Division of Solid and Hazardous Waste), Jan. 1985.

11 - EPA 600/4-81-055, "Interim Methods for the Sampling and Analysis of Priority Pollutants in Sediments and Fish Tissue", Revised Jan. 7, 1983

12 - "Determination of Formaldehyde in the Atmosphere", Environmental Health Center, Div. of Laboratories and Research, N.Y.S. Dept. of Health APC-29

13 - "Chemical Soil Tests", Cornell University Agricultural Experiment Station, N.Y.S. College of Agriculture, Ithaca, N. Y. Bulletin 960, Revised Oct. 1965.

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: RESULTS - METALS
UNITS OF MEASURE: MILLIGRAMS/ KILOGRAM, OR PPM
CLIENT: MALCOLM-PIRNIE   A.E.S. JOB CODE BJQ

ANALYSIS	METHOD	REF	DETERMINABLE LIMITS	SAMPLE IDENTIFICATION	
				2688 7A 9/20/85 TOTAL	2689 B2 9/20/85 TOTAL
LEAD	7420	5	100.	800	2,000

Janette Bingert
JANETTE L. BINGERT
METALS SUPERVISOR

EXTRACTION PROCEDURE (E.P.) TOXICITY - METALS
ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

Type of Analysis: Metals
Client: MALCOLM PERNIE   A.E.S. Job Code 01BJQ

(All results are in mg/l)

alysis	Method No.	Ref No.	Maximum Conc. (mg/l)	Det. Limits	Analysis Date	2688	2689
					Sample ID	7A	B2
						9/20/85	9/20/85
senic	7060	5	5.0	0.005	10/2	BDL	BDL *
rium	7080	5	100.0	1.0	9/27	1.0	BDL
dmium	7130	5	1.0	0.05	9/25	BDL	BDL
romium	7190	5	5.0	0.5	9/25	BDL	BDL
ad	7420	5	5.0	1.0	9/25	BDL	BDL
rcury	7471	5	0.2	0.001	10/3	BDL	BDL
lenium	7740	5	1.0	0.005	10/1	BDL	BDL
lver	7760	5	5.0	0.1	9/26	BDL	BDL

Below determinable limits.

Janette Bingert
JANETTE L. BINGERT
METALS DIVISION SUPERVISOR

ADVANCED ENVIRONMENTAL SYSTEMS

STANDARD ADDITIONS DATA SHEET

CUSTOMER: MALCOLM PERNIE
JOB CODE: 01BJQ

UNITS: MILLIGRAMS/LITER, OR PPM

S.#	ELEMENT	0/ABS.	1 SPK/1 ABS	2 SPK/2 ABS	3 SPK/3 ABS	FIN CONC	r*
688	CADMIUM	0.001	0.125-0.024	0.25-0.052	0.5-0.109	BDL **	.999
689	CADMIUM	0.000	0.125-0.026	0.25-0.052	0.5-0.109	BDL	.999
688	CHROMIUM	0.000	1.25-0.010	2.5-0.020	5.0-0.042	BDL	.999
689	CHROMIUM	0.000	1.25-0.010	2.5-0.020	5.0-0.041	BDL	.9999
688	LEAD	0.000	1.25-0.010	2.5-0.020	5.0-0.042	BDL	.999
689	LEAD	0.000	1.25-0.010	2.5-0.020	5.0-0.040	BDL	1.00
688	SILVER	0.002	0.5-0.055	1.0-0.111	2.0-0.218	BDL	.9999
689	SILVER	0.002	0.5-0.056	1.0-0.107	2.0-0.213	BDL	.9999
688	BARIUM	0.001	2.5-0.014	5.0-0.029	10.0-0.047	1.0	.993
689	BARIUM	0.000	2.5-0.009	5.0-0.017	10.0-0.043	BDL	.993
688	SELENIUM	0.000	0.0125-0.008	0.025-0.019	0.050-0.046	BDL	.995
689	SELENIUM	0.000	0.0125-0.007	0.025-0.019	0.050-0.042	BDL	.996
688	ARSENIC	0.001	0.00625-0.012	0.125-0.023	0.025-0.045	BDL	1.00
689	ARSENIC	0.001	0.00625-0.009	0.0125-0.020	0.025-0.042	BDL	.998
688	MERCURY	0.002	0.001-0.010	0.002-0.022	0.004-0.035	BDL	.992
689	MERCURY	0.000	0.001-0.005	0.0025-0.017	0.004-0.027	BDL	.998

*"r" is the correlation coefficient.

+/- correlation coefficient is outside of control window of 0.995

**Below determinable limits.

NUS CORPORATION

Laboratory Services Division
5350 Campbells Run Road
Pittsburgh, PA 15205

REMIT TO:
Park West Two
Cliff Mine Road
Pittsburgh, PA 15275
412-788-1080

LAB ANALYSIS REPORT

CLIENT NAME: LTV STEEL COMPANY
ADDRESS: 3100 EAST 45TH STREET
CLEVELAND, OH 44127

REPORT DATE: 10/18/85

ATTENTION: MR. SOREN HANSON

NUS CLIENT NO: 330129
NUS SAMPLE NO: 15092195
VENDOR NO:
WORK ORDER NO: 55830
DATE RECEIVED: 09/30/85

SAMPLE IDENTIFICATION: #2688 TA II 09/20 LEACH

TEST	DETERMINATION	RESULTS	UNITS
M036	Arsenic by Std Add (As)	< 0.01	mg/l
M046	Barium by Std Add (Ba)	< 0.1	mg/l
M096	Cadmium by Std Add (Cd)	< 0.005	mg/l
M146	Chromium by Std Add (Cr)	0.11	mg/l
M206	Lead by Std Add (Pb)	< 0.03	mg/l
M256	Mercury by Std Add (Hg)	< 0.0002	mg/l
M296	Selenium by Std Add (Se)	< 0.04	mg/l
M306	Silver by Std Add (Ag)	0.02	mg/l
S910	EP Toxicity Extraction		

COMMENTS:

Reviewed and Approved by: JMC

NUS CORPORATION

Laboratory Services Division
5350 Campbells Run Road
Pittsburgh, PA 15205
412-788-1080

REMIT TO:
Park West Two
Cliff Mine Road
Pittsburgh, PA 15275

LAB ANALYSIS REPORT

CLIENT NAME: LTV STEEL COMPANY
ADDRESS: 3100 EAST 45TH STREET
CLEVELAND, OH 44127
REPORT DATE: 10/18/85
ATTENTION: MR. SOREN HANSON

NUS CLIENT NO: 330129
NUS SAMPLE NO: 15092196L
VENDOR NO:
WORK ORDER NO: 55830
DATE RECEIVED: 09/30/85

SAMPLE IDENTIFICATION: #2689 B2 II 09/20

TEST	DETERMINATION	RESULTS	UNITS
M036	Arsenic by Std Add (As)	0.06	mg/l
M046	Barium by Std Add (Ba)	0.2	mg/l
M096	Cadmium by Std Add (Cd)	< 0.005	mg/l
M146	Chromium by Std Add (Cr)	0.09	mg/l
M206	Lead by Std Add (Pb)	< 0.03	mg/l
M256	Mercury by Std Add (Hg)	< 0.0002	mg/l
M296	Selenium by Std Add (Se)	< 0.04	mg/l
M306	Silver by Std Add (Ag)	0.02	mg/l
S910	EP Toxicity Extraction		

COMMENTS:

Reviewed and Approved by: JMC

A Halliburton Company

APPENDIX C

RESULTS OF WATER QUALITY ANALYSES

URS

AN INTERNATIONAL PROFESSIONAL SERVICES ORGANIZATION

McPHEE, SMITH, ROSENSTEIN ENGINEERS, P.C. --- IN AFFILIATION WITH --- GENERAL TESTINC CORPORAT

Subsidiary of URS/MADIGAN-PRAEGER

ANALYTICAL SERV

883-5525

625 DELAWARE AVENUE
BUFFALO, NEW YORK 14202

883-

REPORT OF ANALYTICAL TESTING

Date of Report: August 23, 1979 Requested By: Republic Steel

Code Number: R1209 Raymond Zeuner

Parameter mg/l	Analytical Results			
Well Location	#2B Shallow	#3B Pond	#3A Deep	#5A Deep
Date Sampled	7/31/79	7/31/79	8/2/79	8/2/79
Date Received	7/31/79	7/31/79	8/2/79	8/2/79
Time	12:15 PM	9:30 AM	9:00 AM	9:30 AM
pH	11.5	7.9	7.3	7.3
Alkalinity, Total as $CaCO_3$	436.8	17.9	499.5	368.5
BOD_5	84	2	lt 1	11
Chlorides	217.4	244.9	64.9	47.5
COD	83.1	34.7	25.1	48.7
Coliform, Total MF*	lt 1	gt 2000	gt 2000	gt 2000
Color (APHA-True)	gt 70	20	30	15
Conductivity, Specific	2,110	1,430	1,340	1,430
Hardness, EPTA	115.0	175.0	665	600
Nitrogen, Ammonia as N	12.6	1.64	0.98	0.33
Nitrogen, Kjeldahl as N	18.48	1.64	1.92	1.44
Nitrogen, Nitrate as N	0.74	0.17	0.13	0.25
Nitrogen, Nitrite as N	0.46	0.06	lt 0.01	lt 0.01
Phenolics	0.008	0.100	0.001	0.023

* Coliform, Total MF are expressed in units of org./100 ml.

gt: greater than; lt: less than

URS
AN INTERNATIONAL PROFESSIONAL SERVICES ORGANIZATION

McPHEE, SMITH, ROSENSTEIN ENGINEERS, P.C. — IN AFFILIATION WITH — GENERAL TESTING CORPORAT
Subsidiary of URS/MADIGAN-PRAEGER
ANALYTICAL SERV

883-5525

625 DELAWARE AVENUE
BUFFALO, NEW YORK 14202

883-4

Parameter mg/l	Analytical Results			
Well Location	#2B Shallow	#3B Pond	#3A Deep	#5A Deep
Date Sampled	7/31/79	7/31/79	8/2/79	8/2/79
Phosphate Total as P	0.36	0.06	0.13	lt 0.05
Solids, Total	1,728	956	1,114	945
Sulfates	125.0	140.0	115.0	330.0
Surfactant	0.400	0.300	0.094	lt 0.025
TOC	53	7	6	5
Aluminum	3.4	lt 0.5	0.8	lt 0.5
Arsenic	0.084	lt 0.0005	0.0099	0.0121
Calcium	67	64	231	99
Chromium, Total	lt 0.05	lt 0.05	lt 0.05	lt 0.05
Chromium, Hex	lt 0.03	lt 0.03	lt 0.03	lt 0.03
Copper	lt 0.04	lt 0.04	lt 0.04	lt 0.04
Iron	4.90	4.00	1.63	0.35
Lead	0.10	lt 0.10	0.10	0.10
Mercury	0.0004	lt 0.0003	lt 0.0003	0.0004
Potassium	42.0	12.5	19.0	4.1
Silver	lt 0.03	lt 0.03	lt 0.03	lt 0.03
Sodium	431	201	54	109

URS
AN INTERNATIONAL PROFESSIONAL SERVICES ORGANIZATION

McPHEE, SMITH, ROSENSTEIN ENGINEERS, P.C. —— IN AFFILIATION WITH —— GENERAL TESTING CORPORAT
Subsidiary of URS/MADIGAN-PRAEGER ANALYTICAL SERV

883-5525 625 DELAWARE AVENUE BUFFALO, NEW YORK 14202 883-

Code Number: B1209

Parameter mg/l	Analytical Results			
Well Location	#2B Shallow	#3B Pond	#3A Deep	#5A Deep
Date Sampled	8/13/79	8/13/79	8/13/79	8/13/79
Date Received	8/13/79	8/ 13/79	8/13/79	8/13/79
Time	11:00 AM	1:45 PM	2:00 PM	1:00 PM
pH	11.2	7.3	7.1	7.1
Alkalinity, Total as $CaCO_3$	421.2	20.2	517.4	374.1
BOD_5	9	9	5	15
Chlorides	174.9	244.9	65.0	42.5
COD	252	46.1	30.3	52.2
Coliform, Total MF*	800	1,600	25,000	7,700
Color (APHA-True)	Pink	20	40	20
Conductivity, Specific	2,600	1,140	1,360	1,360
Hardness, EDTA	160	165	680	620
Nitrogen, Ammonia as N	4.10	1.19	0.52	0.35
Nitrogen, Kjeldahl as N	15.30	2.01	1.36	1.83
Nitrogen, Nitrate as N	0.28	0.15	lt 0.05	lt 0.05
Nitrogen, Nitrite as N	0.02	0.04	lt 0.01	lt 0.01
[redacted]	0.184	0.024	0.047	0.119
Phosphate, Total as P	0.20	lt 0.05	0.10	0.05
Solids, Total	1,602	994	975	1,036

*Coliform, Total MF are expressed in units of org./100 ml.

URS
AN INTERNATIONAL PROFESSIONAL SERVICES ORGANIZATION
McPHEE, SMITH, ROSENSTEIN ENGINEERS, P.C. —— IN AFFILIATION WITH —— GENERAL TESTING CORPORATI
Subsidiary of URS/MADIGAN-PRAEGER
ANALYTICAL SER\
883-5525
625 DELAWARE AVENUE
BUFFALO, NEW YORK 14202
883-4

Parameter mg/l	Analytical Results			
Well Location	#2B Shallow	#3B Pond	#3A Deep	#5A Deep
Date Sampled	8/13/79	8/13/79	8/13/79	8/13/79
Sulfates	190	255	130	305
Surfactant	0.60	0.08	lt 0.025	lt 0.025
TOC	20	9	10	15
Aluminum	1.4	lt 0.5	lt 0.5	lt 0.5
Arsenic	0.0268	0.0011	0.0098	0.0056
Calcium	61	68	188	95
Chromium, Total	lt 0.05	lt 0.05	lt 0.05	lt 0.05
Chromium, Hex	lt 0.03	lt 0.03	lt 0.03	lt 0.03
Copper	lt 0.04	lt 0.04	lt 0.04	lt 0.04
Iron	1.20	2.90	1.79	0.16
Lead	lt 0.10	lt 0.10	lt 0.10	lt 0.10
Mercury	0.0003	0.0013	lt 0.0003	lt 0.0003
Potassium	44	118	17	4.2
Silver	lt 0.03	lt 0.03	lt 0.03	lt 0.03
Sodium	432	214	56	123

The analytical procedures are in accordance with "Methods for Chemical Analysis of Water and Wastes", 1974, EPA, and "Standard Methods for the Examination of Water and Wastewater", 14th edition.

Alfred C. Feuz

Alfred C. Feuz
Laboratory Manager

ARVIN/CALSPAN
ADVANCED TECHNOLOGY CENTER

June 1, 1982
JGM:bjs 788-015

Mr. Kent McManus
Malcolm Pirnie, Inc.
P. O. Box 1938
Buffalo, New York 14219

Dear Mr. McManus:

Attached are the results of analyses on the well samples collected by you and submitted to our laboratory on the dates indicated.

If you have any questions regarding the results or method of analysis please contact me.

Sincerely,

John G. Michalovic

John G. Michalovic
Head, Chemical Analysis Section
Environmental Sciences Department

enc

MALCOLM PIRNIE INC.
(Results in mg/l unless noted)

	2A (5-5-82)	2A (5-18-82)	4A (5-5-82)	4A (5-18-82)
Ammonia	0.06	0.14	0.45	1.12
Nitrate	0.11	0.07	0.18	0.09
TKN	0.07	0.18	0.48	1.20
BOD_5	3.7	4.0	4.1	4.8
COD	36	20	30	25
Sulfate	70	88	620	640
Aluminum	0.2	< 0.1	0.6	0.6
Arsenic	< 0.005	< 0.005	< 0.005	< 0.005
Chromium (Hex)	< 0.02	< 0.02	< 0.02	< 0.02
Chromium (T)	< 0.02	< 0.02	< 0.02	< 0.02
Cadmium	< 0.005	< 0.005	< 0.005	< 0.005
Zinc	0.017	0.015	0.023	0.010
Selenium	< 0.005	< 0.005	< 0.005	< 0.005
Copper	< 0.01	< 0.01	< 0.01	< 0.01
Lead	< 0.02	< 0.02	< 0.02	< 0.02
Mercury	< 0.001	< 0.001	< 0.001	< 0.001
Sodium	36	58	43	66
MBAS	0.082	0.34	0.86	1.4
Calcium	80	36	140	61
Silver	< 0.005	< 0.005	< 0.005	< 0.005
Manganese	0.025	0.020	0.020	< 0.010
Iron	0.07	0.43	0.03	0.14
Nickel	< 0.02	< 0.02	< 0.02	< 0.02
TDS	393	407	624	521
Color (Pt-Co)	20	10	35	15
Chloride	178	125	95	45
Alkalinity	52	87	93	128
Hardness	115	148	185	175
Cond (umhos)	520	625	950	1000
TOC	10	10	20	15
pH (units)	8.90	8.80	10.80	11.0
Odor (Threshold)	1-(detergent)	1-(detergent)	4-(musty)	4-(musty)
E Coli (#/100 ml)	40	< 2	< 2	< 2

MALCOLM PIRNIE INC.
(Results in mg/1 unless indicated)

	#5A (5-5-82)	5A (5-18-82)	#3B (5-5-82)	3B (5-18-82)
pH (units)	7.45	7.70	9.30	8.80
Conductivity (umhos)	950	1100	1050	1100
TOC	< 2	< 2	< 2	< 8
Chloride	78	42	250	175
Iron	0.23	0.33	0.19	0.35
T DS	719	749	735	559

MALCOLM-PIRNIE INC.

(Results in ug/l)

Sample No.	Phenol (5-5-82)	Phenol (5-18-82)
2A	12	270
2B	110	39
3A	< 5	< 2
3B	< 5	10
4	15	4
5A	10	5
5B	< 5	3

ANALYSIS OF MARILLA STREET
LANDFILL MONITORING WELLS
REPUBLIC STEEL CORPORATION

Report Prepared For

MALCOLM PIRNIE

BY

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

September 14,1984

AES Job AKX

Prepared by:

Kathleen A. Martin

Kathleen A. Martin
Wet Chemistry Division

David P. Mix

David P. Mix
Metals Division

W. Joseph McDougall

W. Joseph McDougall, Ph.D.
Quality Control Verification

SCOPE OF WORK

This analysis was performed for Malcolm Pirnie to fulfill a requirement in their monitoring of the Republic Steel Corporation's Marilla Street Landfill.

Collection and Receipt of Samples

Samples were collected by Malcolm Pirnie personnel and delivered to the Advanced Environmental Systems, Inc. Laboratory on August 24, 1984. Samples were relinquished by Mr. Kent McManus and Received by Judith McDougall. Appropriate collection information is contained in Chain of Custody Records (Attachment A).

Analytical Methodology

Total Organic Carbon (TOC)	EPA 415.1[1]
Chloride	SM 407C[2]
Total Iron	EPA 236.1
Total Dissolved Solids	EPA 160.1
Sulfate	SM 426C
Total Recoverable Phneols	EPA 421.1

Note: pH and specific conductance were tested in the field by Malcolm Pirnie personnel, therefore, they are not included in this report.

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[1] EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes", (1983)

[2] "Standard Methods for the Examination of Water and Wastewater", 15th Edition, 1980

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

RESULTS OF ANALYSIS

TABLE NO. 1

TYPE OF ANALYSIS: Classical Chemistry

Parameters & Total Iron

UNIT OF MEASURE: milligrams/liter, or ppm

CLIENT: Malcolm Pirnie (AKX)

ANALYSIS	SAMPLE IDENTIFICATION					
	8/24/84 2A	8/24/84 5B,2B	8/24/84 3A	8/24/84 4A	8/24/84 5A	8/24/84 6A
TOC	4.54	22.19	4.29	7.39	7.52	10.43
TDS	372.5	1010.4	757.1	306.3	571.2	949.9
Chloride	130.96	244.92	69.98	38.99	38.99	57.98
Total Recoverable Phenols	0.067	0.059	0.028	0.035	0.037	0.068
Sulfates	5.6	308.0	242.0	72.0	133.0	433.0
Iron	1.57	19.6	2.26	1.82	1.33	0.73

COMMENTS:

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

RESULTS OF ANALYSIS TABLE NO. 2

TYPE OF ANALYSIS: Classical Chemistry

Parameters & Total Iron Cont'd

UNIT OF MEASURE: milligrams/liter, or ppm

CLIENT: Malcolm Pirnie (AKX)

ANALYSIS	SAMPLE IDENTIFICATION					
	8/24/84 6B	8/24/84 Pond				
TOC	13.05	12.37				
TDS	2020.4	502.5				
Chloride	74.48	126.46				
Total Recoverable Phenols	0.044	0.077				
Sulfates	1004.0	119.5				
Iron	12.1	1.77				

COMMENTS:

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

QUALITY ASSURANCE - Accuracy

TABLE NO. 3

TYPE OF ANALYSIS: Test Controls - Classical Chemistry Parameters & Iron

UNITS OF MEASURE: milligrams/liter, or ppm

CLIENT: Malcolm Pirnie (AKX)

ANALYSIS	TYPE	ORIGINAL CONCEN.	ADDED CONCEN.	EXPECTED CONCEN.	REPORTED CONCEN.	PERCENT RECOVERY	95% CONFID. INTERVAL
Chlorides	EPA	85.3	--	85.3	93.47	109.6	--
Sulfates	EPA	93.8	--	93.8	95.2	101.5	--
Sulfates	5A Spike	13.3	5.0	18.3	18.2	99.4	--
TOC	EPA	4.1	--	4.1	4.44	108.3	2.52-6.13
TOC	5B,2A Spike	11.09	5.0	16.09	15.75	97.9	--
TOC	Std.	10.0	--	10.0	10.035	100.4	--
Phenols	6A Spike	68.1	600	668.1	722	108.1	--
Iron	EPA	0.796	--	0.796	0.786	98.7	0.695-0.881
Iron	Pond Spike	0.89	2.00	2.89	2.63	91.0	--

Comments:

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

QUALITY ASSURANCE - Precision

TABLE NO. 4

TYPE OF ANALYSIS: Duplicates - Classical Chemistry Parameters & Iron

UNITS OF MEASURE: milligrams/liter, or ppm

CLIENT: Malcolm Pirnie (AKX)

ANALYSIS	SAMPLE	ORIGINAL CONCEN.	DUPLICATE CONCEN.	AVERAGE CONCEN.	RANGE	REL. % DIFFER.
Chloride	Pond	125.46	127.46	126.46	2.0	1.58
Sulfates	"	121.0	118.0	119.5	3.0	2.51
TOC	"	12.51	12.22	12.37	0.29	2.35
Phenols	3A	0.027	0.028	0.028	0.001	3.6
TDS	"	743.7	770.5	757.1	26.8	3.5
Iron	2A	1.57	1.42	1.50	0.15	10.0

COMMENTS:

ATTACHMENT A

CHAIN OF CUSTODY RECORDS

CHAIN OF CUSTODY RECORD

Client Name: REPUBLIC STEEL CORP.
Address: MARILLA STREET LANDFILL

Monitoring Well No: 2A

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested By: Date:
1 LITER GLASS AMBER BOTTLE	K. McMANUS 8/24/84 11:30	HAND BAILOR	4'3" 3.7' FROM TOP OF PVC	TOTAL PHENOLS	$CuSO_4$ H_3PO_4	Judy McDougall 8-24-84	9/5/84 K.H. Martin
1 LITER GLASS AMBER BOTTLE	K. McMANUS 8/24/84 "	HAND BAILOR	" "	CHLORIDES TOTAL DISSOLVED SOLIDS SULFATES		Judy McDougall 8-24-84	8/27/84 9/6/84 8/27/84 K.A. Martin
100 ML. AMBER GLASS BOTTLE	K. McMANUS 8/24/84 "	HAND BAILOR	" "	TOTAL ORGANIC CARBON	H_2SO_4	Judy McDougall 8-24-84	8/30/84 K.H. Martin
500 ML. PLASTIC BOTTLE	K. McMANUS 8/24/84 "	HAND BAILOR	" "	TOTAL IRON	HNO_3	Judy McDougall 8-24-84	

Laboratory: ADVANCED ENVIRONMENTAL SYSTEMS, INC.
Address: 4626 ROYAL AVENUE, NIA. FALLS

Laboratory Identification No: ____________

Comments: PH AND SPECIFIC CONDUCTANCE WERE MEASURED IN THE FIELD

CHAIN OF CUSTODY RECORD

Client Name: REPUBLIC STEEL CORP.
Address: MARILLA STREET LANDFILL

Monitoring Well No: COMP. 2B + 5B

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested By: Date:
1 LITER GLASS AMBER BOTTLE	K. McMANUS 8/24/84 10:00 11:30	HAND BAILOR	2B - 2'9" 5B - 5.5' 2B - 3.6' FROM TOP OF PVC 5B - 5.5' FROM TOP OF PVC	TOTAL PHENOLS	$CuSO_4$ H_3PO_4	Judy McDougall 8-24-84	9/5/84 M.A. Martin
1 LITER GLASS AMBER BOTTLE	K. McMANUS 8/24/84 " "	HAND BAILOR	" " " "	CHLORIDES TOTAL DISSOLVED SOLIDS SULFATES		Judy McDougall 8-24-84	8/27/84 9/6/84 8/27/84 M.A. Martin
100 ML. AMBER GLASS BOTTLE	K. McMANUS 8/24/84 " "	HAND BAILOR	" " " "	TOTAL ORGANIC CARBON	H_2SO_4	Judy McDougall 8-24-84	8/30/84 K.A. Martin
500 ML. PLASTIC BOTTLE	K. McMANUS 8/24/84 " "	HAND BAILOR	" " " "	TOTAL IRON	HNO_3	Judy McDougall 8-24-84	

Laboratory: ADVANCED ENVIRONMENTAL SYSTEMS, INC.
Address: 4626 ROYAL AVENUE, NIA. FALLS

Laboratory Identification No: ___

Comments: PH AND SPECIFIC CONDUCTANCE WERE MEASURED IN THE FIELD

CHAIN OF CUSTODY RECORD

Client Name: REPUBLIC STEEL CORP.
Address: MARILLA STREET LANDFILL

Monitoring Well No: 3A

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested By: Date:
1 LITER GLASS AMBER BOTTLE	K. McMANUS 8/24/84 10:30	HAND BAILOR	2'9" 2.7' FROM TOP OF PVC	TOTAL PHENOLS	$CuSO_4$ H_3PO_4	Judy McDougall 8-24-84	9/3/84 M.A. Martin
1 LITER GLASS AMBER BOTTLE	K. McMANUS 8/24/84 "	HAND BAILOR	2'9" "	CHLORIDES TOTAL DISSOLVED SOLIDS SULFATES		Judy McDougall 8-24-84	8/27/84 9/6/84 8/27/84 M.A. Martin
100 ML. AMBER GLASS BOTTLE	K. McMANUS 8/24/84 "	HAND BAILOR	" "	TOTAL ORGANIC CARBON	H_2SO_4	Judy McDougall 8-24-84	8/30/84 M.A. Martin
500 ML. PLASTIC BOTTLE	K. McMANUS 8/24/84 "	HAND BAILOR	" "	TOTAL IRON	HNO_3	Judy McDougall 8-24-84	[illegible]

Laboratory: ADVANCED ENVIRONMENTAL SYSTEMS, INC.
Address: 4626 ROYAL AVENUE, NIA. FALLS

Laboratory Identification No: ________

Comments: PH AND SPECIFIC CONDUCTANCE WERE MEASURED IN THE FIELD

CHAIN OF CUSTODY RECORD

Client Name: REPUBLIC STEEL CORP.
Address: MARILLA STREET LANDFILL

Monitoring Well No: 4A

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested By Date:
LITER GLASS MBER BOTTLE	K. McMANUS 8/24/84 11:00	HAND BAILOR	6.4' 6.4' FROM TOP OF PVC	TOTAL PHENOLS	$CuSO_4$ H_3PO_4	Judy McDougall 8-24-84	9/5/84 KH. Martin
LITER GLASS MBER BOTTLE	K. McMANUS 8/24/84 "	HAND BAILOR	" "	CHLORIDES TOTAL DISSOLVED SOLIDS SULFATES		Judy McDougall 8-24-84	8/27/84 9/6/84 8/27/84 KH. Martin
00 ML. MBER GLASS BOTTLE	K. McMANUS 8/24/84 "	HAND BAILOR	" "	TOTAL ORGANIC CARBON	H_2SO_4	Judy McDougall 8-24-84	8/30/84 KH. Martin
00 ML. LASTIC BOTTLE	K. McMANUS 8/24/84 "	HAND BAILOR	" "	TOTAL IRON	HNO_3	Judy McDougall 8-24-84	

Laboratory: ADVANCED ENVIRONMENTAL SYSTEMS, INC.
Address: 4626 ROYAL AVENUE, NIA. FALLS

Laboratory Identification No:

Comments: PH AND SPECIFIC CONDUCTANCE WERE MEASURED IN THE FIELD

CHAIN OF CUSTODY RECORD

Client Name: REPUBLIC STEEL CORP.
Address: MARILLA STREET LANDFILL

Monitoring Well No: 5A

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested By: Date:
LITER GLASS AMBER BOTTLE	K. McMANUS 8/24/84 9:45	HAND BAILOR	7'1" 2.4' FROM TOP OF PVC	TOTAL PHENOLS	$CuSO_4$ H_3PO_4	Judy McDougall 8-24-84	9/5/84 AH Martin
LITER GLASS AMBER BOTTLE	K. McMANUS 8/24/84 "	HAND BAILOR	" "	CHLORIDES TOTAL DISSOLVED SOLIDS SULFATES		Judy McDougall 8-24-84	8/27/84 9/6/84 8/27/84 AH Martin
00 ML. AMBER GLASS BOTTLE	K. McMANUS 8/24/84 "	HAND BAILOR	" "	TOTAL ORGANIC CARBON	H_2SO_4	Judy McDougall 8-24-84	8/30/84 AH Martin
00 ML. PLASTIC BOTTLE	K. McMANUS 8/24/84 "	HAND BAILOR	" "	TOTAL IRON	HNO_3	Judy McDougall 8-24-84	

Laboratory: ADVANCED ENVIRONMENTAL SYSTEMS, INC.
Address: 4626 ROYAL AVENUE, NIA. FALLS

Laboratory Identification No: ______

Comments: PH AND SPECIFIC CONDUCTANCE WERE MEASURED IN THE FIELD

CHAIN OF CUSTODY RECORD

Client Name: REPUBLIC STEEL CORP.
Address: MARILLA STREET LANDFILL

Monitoring Well No: 6A

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested By: Date:
LITER GLASS MBER BOTTLE	K. McMANUS 8/24/84 9:00	HAND BAILOR	8'-10½" 8.5' FROM TOP OF PVC	TOTAL PHENOLS	$CuSO_4$ H_3PO_4	Judy McDougall 8-24-84	9/5/84 M. Martin
LITER GLASS MBER BOTTLE	K. McMANUS 8/24/84 "	HAND BAILOR	" "	CHLORIDES TOTAL DISSOLVED SOLIDS SULFATES		Judy McDougall 8-24-84	8/27/84 9/6/84 8/27/84 M. Martin
00 ML. MBER GLASS BOTTLE	K. McMANUS 8/24/84 "	HAND BAILOR	" "	TOTAL ORGANIC CARBON	H_2SO_4	Judy McDougall 8-24-84	8/30/84 M. Martin
00 ML. LASTIC BOTTLE	K. McMANUS 8/24/84 "	HAND BAILOR	" "	TOTAL IRON	HNO_3	Judy McDougall 8-24-84	

Laboratory: ADVANCED ENVIRONMENTAL SYSTEMS, INC.
Address: 4626 ROYAL AVENUE, NIA. FALLS

Laboratory Identification No: ___ ___

Comments: PH AND SPECIFIC CONDUCTANCE WERE MEASURED IN THE FIELD

CHAIN OF CUSTODY RECORD

Client Name: REPUBLIC STEEL CORP.
Address: MARILLA STREET LANDFILL

Monitoring Well No: 6B

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested By Date:
1 LITER GLASS AMBER BOTTLE	K. McMANUS 8/24/84 9:15	HAND BAILOR	9.0' 2" 9.0' FROM TOP OF PVC	TOTAL PHENOLS	$CuSO_4$ H_3PO_4	Judy McDougall 8-24-84	9/5/84 KA Mc...
LITER GLASS AMBER BOTTLE	K. McMANUS 8/24/84 "	HAND BAILOR	" "	CHLORIDES TOTAL DISSOLVED SOLIDS SULFATES		Judy McDougall 8-24-84	8/27/84 9/6/84 8/27/84 KA Mc...
100 ML. AMBER GLASS BOTTLE	K. McMANUS 8/24/84 "	HAND BAILOR	" "	TOTAL ORGANIC CARBON	H_2SO_4	Judy McDougall 8-24-84	8/30/84 KA Mc...
500 ML. PLASTIC BOTTLE	K. McMANUS 8/24/84 "	HAND BAILOR	" "	TOTAL IRON	HNO_3	Judy McDougall 8-24-84	[illegible]

Laboratory: ADVANCED ENVIRONMENTAL SYSTEMS, INC.
Address: 4626 ROYAL AVENUE, NIA. FALLS

Laboratory Identification No: ____

Comments: PH AND SPECIFIC CONDUCTANCE WERE MEASURED IN THE FIELD

CHAIN OF CUSTODY RECORD

Client Name: REPUBLIC STEEL CORP.
Address: MARILLA STREET LANDFILL

Monitoring Well No: POND

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested By Date:
LITER GLASS AMBER BOTTLE	K. McMANUS 8/24/84 10:30	HAND BAILOR	N/A N/A	TOTAL PHENOLS	$CuSO_4$ H_3PO_4	Judy McDougall 8-24-84	9/5/84 K.H. Martin
LITER GLASS AMBER BOTTLE	K. McMANUS 8/24/84 "	HAND BAILOR	" N/A	CHLORIDES TOTAL DISSOLVED SOLIDS SULFATES		Judy McDougall 8-24-84	8/27/84 9/6/84 8/27/84 K.H. Martin
00 ML. AMBER GLASS BOTTLE	K. McMANUS 8/24/84 "	HAND BAILOR	" N/A	TOTAL ORGANIC CARBON	H_2SO_4	Judy McDougall 8-24-84	8/30/84 K.H. Martin
00 ML. PLASTIC BOTTLE	K. McMANUS 8/24/84 "	HAND BAILOR	" N/A	TOTAL IRON	HNO_3	Judy McDougall 8-24-84	

Laboratory: ADVANCED ENVIRONMENTAL SYSTEMS, INC.
Address: 4626 ROYAL AVENUE, NIA. FALLS

Laboratory Identification No: ___ ___

Comments: PH AND SPECIFIC CONDUCTANCE WERE MEASURED IN THE FIELD

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.

BY KRM DATE 8/24/84 SHEET NO. 1 OF 1

CHKD. BY .... DATE .... JOB NO. 496-02-1

SUBJECT ....

REPUBLIC STEEL CORPORATION

MARILLA STREET LANDFILL

FIELD MEASUREMENT OF pH AND SPECIFIC CONDUCTANCE
BY KENT MCMANUS ON 8/24/84

WELL NO.	pH	SPECIFIC CONDUCTANCE (µmhos/cm)
6A	7.6	1440
6B	7.2	2250
5A	7.5	780
5B ALONE	7.1	2000
2B + 5B COMP.	8.2	1940
3A	6.8	1010
POND	9.1	960
4A	7.9	640
2A	8.1	800

ANALYSIS OF LTV STEEL COMPANY SAMPLES
COLLECTED APRIL 23, 1985

Report Prepared For

MALCOLM-PIRNIE

By

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

Leonard Borzynski

Leonard Borzynski
Technical Evaluation

May 28, 1985
AES Report ATH

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: RESULTS - WET CHEMISTRY
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM PIRNIE A.E.S. JOB CODE 01ATH

ANALYSIS	METHOD	REF	SAMPLE IDENTIFICATION DETERMINABLE LIMITS	980 6S 4/23/85	981 6D 4/23/85	982 EAST BOND 4/23/85	983 2S 4/23/85
HENOLS	420.1	3	0.05	BDL	BDL	0.18	0.12
HLORIDES	407B	6	1	65	89	75	45
DS	160.1	3	1	·2,148	6,483	417	661
ULFATES	426C	6	1	709	144	111	48
OC	415.1	3	1	12.2	5.3	15.6	31.1

Marlene C. Moyer

MARLENE C. MOYER
WET CHEMISTRY DIVISION

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: RESULTS - WET CHEMISTRY
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM PIRNIE A.E.S. JOB CODE 02ATH

ANALYSIS	METHOD	REF	SAMPLE IDENTIFICATION DETERMINABLE LIMITS	984 2D 4/23/85	985 5S 4/23/85	986 5D 4/23/85	987 4D 4/23/85
HENOLS	420.1	3	0.05	BDL	BDL	BDL	0.11
HLORIDES	407B	6	1	172	409	73	67
DS	160.1	3	1	418	1,527	845	352
ULFATES	426C	6	1	4	258	184	66
OC	415.1	3	1	5.0	15.0	4.9	9.2

MARLENE C. MOYER
WET CHEMISTRY DIVISION

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: RESULTS - WET CHEMISTRY
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM PIRNIE   A.E.S. JOB CODE 03ATH

ANALYSIS	METHOD	REF	DETERMINABLE LIMITS	SAMPLE IDENTIFICATION 989 WEST POND 4/23/85
PHENOLS	420.1	3	0.05	BDL
CHLORIDES	407B	6	1	237
TDS	160.1	3	1	569
SULFATES	426C	6	1	124
TOC	415.1	3	1	10.4

Marlene C. Moyer

MARLENE C. MOYER
WET CHEMISTRY DIVISION

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: WET CHEMISTRY DUPLICATE
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM PIRNIE A.E.S. JOB CODE 01ATH

ANALYSIS	SAMPLE	ORIGINAL CONC.	DUPL. CONC.	AVERAGE CONC.	RANGE	REL. % DIFF.
HENOLS	982	200	180	190	20	10.5
HLORIDE	985	404.1	413.8	409.0	9.7	2.4
DS	987	350.6	354.1	352.4	3.5	1.0
ULFATE	982	119.9	102.1	111	17.8	16.0
OC	980	12.07	12.30	12.19	0.23	1.9

Relative Percent Difference =
Range/Average X 100

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: TEST CONTROL WET CHEMISTRY
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM PIRNIE A.E.S. JOB CODE 01ATH

ANALYSIS	TYPE	ORIGINAL CONC.	ADDED CONC.	EXPECTED CONC.	REPORTED CONC.	PERCENT RECOVERY	95% CONFIDENCE INTERVAL
HENOLS 989	LABSPK	BDL	0.6	0.6	0.709	118.0	N/A
OC	STD	10.0	-	10.0	9.756	97.6	N/A
ULFATES 982	LABSPK	11.1	5.0	16.1	16.7	103.9	N/A

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: RESULTS - METALS
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM-PIRNIE   A.E.S. JOB CODE 02ATH

ANALYSIS	METHOD	REF	SAMPLE IDENTIFICATION				
			DETERMINABLE LIMITS	984 2D 4-23-85	985 5S 4-23-85	986 5D 4-23-85	987 4D 4-23-85
IRON	236.1	3	0.30	2.30	27.70	3.20	2.20

MICHAEL J. SIMPSON
METALS DIVISION

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: RESULTS - METALS
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM-PIRNIE A.E.S. JOB CODE 02ATH

ANALYSIS	METHOD	REF	SAMPLE IDENTIFICATION DETERMINABLE LIMITS	989 WEST 4-23-85
IRON	236.1	3	0.30	4.20

Michael J. Simpson

MICHAEL J. SIMPSON
METALS DIVISION

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: METALS DUPLICATE
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM-PIRNIE A.E.S. JOB CODE 01ATH

ANALYSIS	SAMPLE	ORIGINAL CONC.	DUPL. CONC.	AVERAGE CONC.	RANGE	REL. % DIFF.
IRON	990	9.70	9.60	9.65	0.1	0.10

Relative Percent Difference =
Range/Average X 100

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: TEST CONTROL METALS
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM-PIRNIE A.E.S. JOB CODE 01ATH

ANALYSIS	TYPE	ORIGINAL CONC.	ADDED CONC.	EXPECTED CONC.	REPORTED CONC.	PERCENT RECOVERY	95% CONFIDENCE INTERVAL
IRON	SPK	5.10	50.0	55.1	60.6	109.9	NA

CHAIN OF CUSTODY RECORD

Client Name: LTV STEEL COMPANY
Address: MARILLA STREET LANDFILL

Monitoring Well No: 6S & 6D

ample escription	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested By Date:
LITER LASS BOTTLE R EACH WEL	K MCMANUS J. SKURA J. DETA 4/23/85	HAND BAILER	6S 9' 7/10" From top of PVC 6D 9' "	TOTAL PHENOLS	$CuSO_4$ H_3PO_4	[signature] 4/23/85	
LITER LASS BOTTLE FOR EACH WELL	"	"	" "	CHLORIDES TOTAL DISSOLVED SOLIDS SULFATES		"	
00 ML GLASS BOTTLE FOR EACH WELL	"	"	" "	TOTAL ORGANIC CARBON	H_2SO_4	"	
00 ML PLASTIC BOTTLE OR EACH WELL	"	"	" "	TOTAL IRON	HNO_3	"	

aboratory: ADVANCED ENVIRONMENTAL SYSTEMS, INC
ddress: 4626 ROYAL AVENUE, NIA FALLS, N.Y.

Comments: pH AND SPECIFIC CONDUCTANCE WERE MEASURED IN THE FIELD

CHAIN OF CUSTODY RECORD

Client Name: LTV STEEL COMPANY
Address: MARILLA STREET LANDFILL

Monitoring Well No: EAST POND

ample escription	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested By Date:
LITER LASS BOTTLE	K MCMANUS J. SKURA J. DETA 4/23/85	HAND BAILER	NA	TOTAL PHENOLS	$CuSO_4$ H_3PO_4	"	
LITER LASS BOTTLE	"	"	"	CHLORIDES TOTAL DISSOLVED SOLIDS SULFATES		"	
00 ML GLASS BOTTLE	"	"	"	TOTAL ORGANIC CARBON	H_2SO_4	"	
00 ML LASTIC BOTTLE	"	"	"	TOTAL IRON	HNO_3	"	

aboratory: ADVANCED ENVIRONMENTAL SYSTEMS, INC
d s: 36 VAL [illegible] SAU N.Y.

Comments: pH AND SPECIFIC CONDUCTANCE
[illegible]

CHAIN OF CUSTODY RECORD

Client Name: LTV STEEL COMPANY
Address: MARILLA STREET LANDFILL

Monitoring Well No: 25 & 2D

ample escription	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table FROM TOP PVC	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested By Date:
LITER LASS BOTTLE R EACH WELL	K MCMANUS J. SKURA J. DETH 4/23/85	HAND BAILER	25 - 3.8' 2D - 5.3'	TOTAL PHENOLS	$CuSO_4$ H_3PO_4		
LITER LASS BOTTLE FOR EACH WELL	"	"	"	CHLORIDES TOTAL DISSOLVED SOLIDS SULFATES		"	
0 ML GLASS BOTTLE FOR EACH WELL	"	"	"	TOTAL ORGANIC CARBON	H_2SO_4	"	
00 ML LASTIC BOTTLE FOR EACH WELL	"	"	"	TOTAL IRON	HNO_3	"	

aboratory: ADVANCED ENVIRONMENTAL SYSTEMS, INC
ddress: 4626 ROYAL AVENUE, NIA FALLS, N.Y.

Comments: pH AND SPECIFIC CONDUCTANCE WERE MEASURED IN THE FIELD

CHAIN OF CUSTODY RECORD

Client Name: LTV STEEL COMPANY
Address: MARILLA STREET LANDFILL

Monitoring Well No: SS & SD

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table FROM TOP OF PVC	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested By Date:
LITER GLASS BOTTLE	K. MCMANUS J. SKURA J. DETA 4/23/85	HAND BAILER	SS – 6.7' / SD – 8.5'	TOTAL PHENOLS	$CuSO_4$ H_3PO_4	"	
LITER GLASS BOTTLE	"	"	" / "	CHLORIDES TOTAL DISSOLVED SOLIDS SULFATES		"	
00 ML GLASS BOTTLE	"	"	" / "	TOTAL ORGANIC CARBON	H_2SO_4	"	
200 ML PLASTIC BOTTLE	"	"	" / "	TOTAL IRON	HNO_3	"	

Laboratory: ADVANCED ENVIRONMENTAL SYSTEMS INC
Address: 4626 ROYAL AVENUE, NIA FALLS N.Y.

Comments: pH AND SPECIFIC CONDUCTANCE WERE MEASURED IN THE FIELD

CHAIN OF CUSTODY RECORD

Client Name: LTV STEEL COMPANY
Address: MARILLA STREET LANDFILL

Monitoring Well No: 4D

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested By Date:
LITER GLASS BOTTLE	K. MCMANUS J. SKURA J. DETH 4/23/85	HAND BAILER	6.9' FROM TOP OF PVC	TOTAL PHENOLS	$CuSO_4$ H_3PO_4	"	
LITER GLASS BOTTLE	"	"	"	CHLORIDES TOTAL DISSOLVED SOLIDS SULFATES		"	
100 ML GLASS BOTTLE	"	"	"	TOTAL ORGANIC CARBON	H_2SO_4	"	
200 ML PLASTIC BOTTLE	"	"	"	TOTAL IRON	HNO_3	"	

Laboratory: ADVANCED ENVIRONMENTAL SYSTEMS, INC
Address: 4626 ROYAL AVENUE, NIA FALLS, N.Y.

Laboratory Identification No:

Comments: pH AND SPECIFIC CONDUCTANCE WERE MEASURED IN THE FIELD

CHAIN OF CUSTODY RECORD

Client Name: LTV STEEL COMPANY
Address: MARILLA STREET LANDFILL

Monitoring Well No: 3D

ample escription	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested By: Date:
LITER LASS BOTTLE	K MCMANUS J. SKURA J. DETH 4/23/85	HAND BAILER	2.6' FROM TOP OF PVC	TOTAL PHENOLS	$CuSO_4$ H_3PO_4	"	
LITER LASS BOTTLE	"	"	"	CHLORIDES TOTAL DISSOLVED SOLIDS SULFATES		"	
00 ML GLASS BOTTLE	"	"	"	TOTAL ORGANIC CARBON	H_2SO_4	"	
00 ML PLASTIC BOTTLE	"	"	"	TOTAL IRON	HNO_3	"	

aboratory: ADVANCED ENVIRONMENTAL SYSTEMS, INC
ddress: [illegible] ROYAL AVENUE, [illegible] FALLS N.Y

Comments: pH AND SPECIFIC CONDUCTANCE WERE MEASURED IN THE FIELD

CHAIN OF CUSTODY RECORD

Client Name: LTV STEEL COMPANY
Address: MARILLA STREET LANDFILL

Monitoring Well No: WEST POND

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested By: Date:
1 LITER GLASS BOTTLE	K MCMANUS J. SKURA J. DETH 4/23/85	HAND BAILER	NA	TOTAL PHENOLS	$CuSO_4$ H_3PO_4	"	
1 LITER GLASS BOTTLE	"	"	NA	CHLORIDES TOTAL DISSOLVED SOLIDS SULFATES		"	
100 ML GLASS BOTTLE	"	"	NA	TOTAL ORGANIC CARBON	H_2SO_4	"	
200 ML PLASTIC BOTTLE	"	"	NA	TOTAL IRON	HNO_3	"	

Laboratory: ADVANCED ENVIRONMENTAL SYSTEMS, INC
Address: 4626 ROYAL AVENUE, NIA FALLS, N.Y.

Comments: pH AND SPECIFIC CONDUCTANCE WERE MEASURED IN THE FIELD [illegible]

ANALYTICAL METHODOLOGIES REFERENCE LIST

Routine Analyses are Performed in Accordance with Protocols Found in the Following Numbered Sources. These Numbers Correspond to those Listed in the Laboratory Report Under the Reference ("REF") Column.

1 - EPA 600/D-80-021, "Guidelines Establishing Test Procedures for the Analysis of Pollutants; Proposed Regulations", Federal Register 44(233), December 3, 1979.

2 - EPA 600/D-80-022, "Guidelines Establishing Test Procedures for the Analysis of Pollutants; Proposed Regulations, Correction", Federal Register 44(244), December 18, 1979.

3 - EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes", (1983)

4 - EPA 600/4-79-057, "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", (1982)

5 - EPA-SW-846, "Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods", second edition (1982)

6 - "Standard Methods for the Examination of Water and Wastewater", 15th Edition, (1980)

7 - New York State Institute of Toxicology Analytical Handbook, October 1982

8 - NIOSH Manual of Analytical Methods, second edition 1977

9 - "The Analysis of Polychlorinated Biphenyls in Transformer Fluid and Waste Oil", EPA Environmental Monitoring and Support Laboratory, draft, June 24, 1980

ANALYSIS OF TWELVE (12) WATER SAMPLES

Report Prepared For

MALCOLM-PIRNIE, INC.

By

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

W. Joseph McDougall

August 9, 1985
AES Report AXY

SCOPE OF WORK

Under the direction of Mr. John Whitney, this subject work was performed to fulfill an analytical requirement for Malcolm-Pirnie, Inc.'s client, LTV Steel.

RECEIPT OF SAMPLE

On Tuesday, July 23, 1985, Malcolm-Pirnie personnel delivered twelve (12) water samples to the Advanced Environmental Systems, Inc. laboratory. At that time, Chain of Custody Documentation was received by Mr. David Kelly of Advanced Environmental Systems, Inc. (Appendix A).

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: RESULTS - METALS
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM-PIRNIE   A.E.S. JOB CODE AXY

ANALYSIS	METHOD	REF	DETERMINABLE LIMITS	SAMPLE IDENTIFICATION			
				1941 2A 7\23\85	1942 2B 7\23\85	1943 3A 7\23\85	1944 4A 7\23\85
IRON	236.1	3	0.3	0.48	BDL*	1.85	0.49

*Below determinable limits.

Janette L. Bingert
JANETTE L. BINGERT
METALS DIVISION SUPERVISOR

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: RESULTS - METALS
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM-PIRNIE   A.E.S. JOB CODE AXY

ANALYSIS	METHOD	REF	DETERMINABLE LIMITS	SAMPLE IDENTIFICATION			
				1945 5A 7\23\85	1946 5B 7\23\85	1947 6A 7\23\85	1948 6B 7\23\85
IRON	236.1	3	0.3	0.78	20.15	BDL *	2.26

*Below determinable limits.

Janette L. Bingert
JANETTE L. BINGERT
MET[illegible] D[illegible]

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: RESULTS - METALS
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM-PIRNIE   A.E.S. JOB CODE AXY

ANALYSIS	METHOD	REF	DETERMINABLE LIMITS	SAMPLE IDENTIFICATION	
				1949 WEST 7-23-85	1950 EAST 7-23-85
ꞃON	236.1	3	0.3	0.60	1.02

JANETTE L. BINGERT
METALS DIVISION SUPERVISOR

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: TEST CONTROL METALS
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM-PIRNIE A.E.S. JOB CODE AXY

ANALYSIS	TYPE	ORIGINAL CONC.	ADDED CONC.	EXPECTED CONC.	REPORTED CONC.	PERCENT RECOVERY	95% CONFIDENCE INTERVAL
ON	1943	1.85	5.0	6.85	6.90	100	* NA

ot applicable/not available.

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: METALS DUPLICATE
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM-PIRNIE A.E.S. JOB CODE AXY

ANALYSIS	SAMPLE	ORIGINAL CONC.	DUPL. CONC.	AVERAGE CONC.	RANGE	REL. % DIFF.
ON	1941	0.45	0.52	0.48	0.07	14.4

lative Percent Difference =
nge/Average X 100

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: RESULTS - WET CHEMISTRY
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM-PIRNIE   A.E.S. JOB CODE 01AXY

ANALYSIS	METHOD	REF	DETERMINABLE LIMITS	SAMPLE IDENTIFICATION			
				1941 2A 7\23\85	1942 2B 7\23\85	1943 MW-3A 7\23\85	1944 MW-4A 7\23\85
SULFATES	426C	6	1	6.8	79.2	198.6	121.1
TDS	160.1	3	1	633	746	8,132	364
PHENOLS	512B	6	0.005	0.124	0.162	0.224	0.112
TOC	415.1	3	0.1	2.4	11.3	2.5	3.1
CHLORIDES	407B	6	1	98.2	123	3.5	35

Marlene C. Moyer
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WET CHEMISTRY DIVISION

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: RESULTS - WET CHEMISTRY
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM-PIRNIE   A.E.S. JOB CODE 02AXY

ANALYSIS	METHOD	REF	DETERMINABLE LIMITS	SAMPLE IDENTIFICATION			
				1945 MW-5A 7\23\85	1946 MW-5B 7\23\85	1947 MW-6A 7\23\85	1948 MW-6B 7\23\85
ULFATES	426C	6	1	162.7	719.1	225.3	1,230
DS	160.1	3	1	677	2,679	3,640	2,176
HENOLS	512B	6	0.005	0.115	0.127	0.126	0.133
OC	415.1	3	0.1	1.7	8.7	1.9	2.9
HLORIDES	407B	6	1	6.5	7.8	34.6	7.0

Marlene C. Moyer

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WET CHEMISTRY DIVISION

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: RESULTS - WET CHEMISTRY
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM-PIRNIE   A.E.S. JOB CODE 03AXY

ANALYSIS	METHOD	REF	DETERMINABLE LIMITS	SAMPLE IDENTIFICATION 1949 WEST 7\23\85	1950 EAST POND 7\23\85
ULFATES	426C	6	1	345.3	75.9
DS	160.1	3	1	930	318
HENOLS	512B	6	0.005	0.133	0.142
OC	415.1	3	0.1	7.5	8.3
HLORIDES	407B	6	1	141	28.1

MARLENE C. MOYER
WET CHEMISTRY DIVISION

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: WET CHEMISTRY DUPLICATE
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM-PIRNIE A.E.S. JOB CODE AXY

ANALYSIS	SAMPLE	ORIGINAL CONC.	DUPL. CONC.	AVERAGE CONC.	RANGE	REL. % DIFF.
ULFATES	1941	6.6	6.9	6.8	0.3	4.9
ULFATES	1945	159.3	166.0	162.7	6.7	4.1
'DS	1942	757	735	746	22	3.0
:HLORIDES	1948	7.4	6.5	7.0	0.9	12.9
'OC	1941	2.4	2.5	2.4	0.1	4.2
'HENOLS*	1941	130.7	117.3	124.0	13.4	10.8

Relative Percent Difference =
Range/Average X 100
'Reported in µg/l, or ppb.

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: TEST CONTROL WET CHEMISTRY
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM-PIRNIE A.E.S. JOB CODE AXY

ANALYSIS	TYPE	ORIGINAL CONC.	ADDED CONC.	EXPECTED CONC.	REPORTED CONC.	PERCENT RECOVERY	95% CONFIDENCE INTERVAL
SULFATES	EPA	93.8	NONE	93.8	97.1	103.5	81.9-102.
SULFATES	SPK	3.38	40.0	13.38	14.93	111.6	* N\
SULFATES	SPK	16.27	5.0	21.27	20.60	96.9	NA
PHENOLS **	SPK	27.87	300	327.9	108.8	33.2	N\
CHLORIDES	EPA	85.3	NONE	85.3	84.9	99.5	80.2-91.
CHLORIDES	BLANK	N\A	N\A	N\A	0.008	N\A	N\
TOC	SPIKE	1.2	5.0	6.2	6.3	101.6	N\
TOC	STD	10.0	-	10.0	10.4	104	N\

*Not available/not applicable.
**Reported in µg/l or ppb.

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: RESULTS - METALS
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM-PIRNIE   A.E.S. JOB CODE AXY

ANALYSIS	METHOD	REF	DETERMINABLE LIMITS	SAMPLE IDENTIFICATION	
				1951 DRAINAGE WEST 7\23\85	1952 MW7A 7\23\85
IRON	236.1	3	0.3	2.59	2.03
CHROMIUM	218.2	3	0.005	0.017	BDL*
LEAD	239.2	3	0.005	0.083	0.037

*Below determinable limits.

Janette L. Bingert
JANETTE L. BINGERT
METALS DIVISION SUPERVISOR

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: RESULTS - WET CHEMISTRY
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM-PIRNIE A.E.S. JOB CODE 03AXY

ANALYSIS	METHOD	REF	DETERMINABLE LIMITS	SAMPLE IDENTIFICATION 1951 DRAINAGE DITCH WEST 7/23/85	1952 MW-7A 7/23/85
SULFATES	426C	6	1	299.5	112.6
TDS	160.1	3	1	2,924	521
PHENOLS	512B	6	0.005	0.139	0.204
TOC	415.1	3	0.1	7.3	6.5
CHLORIDES	407B	6	1	144.9	77.8

Marlene Cheryl Moyer
MARLENE C. MOYER
WET CHEM[illegible]

APPENDIX A

CHAIN OF CUSTODY

CHAIN OF CUSTODY RECORD

Client Name: LTV Steel Company
Address: Marilla Street Landfill

Monitoring Well No: 5B

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table FROM EDGE OF PVC	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested Date:
200 ML Plastic Bottle	JCW/SPS 7-23-85 10.05 AM	Teflon Hand Bailer	5.85'	Iron	HNO_3 (cooled)	[signature] 7/23/85	
00 ML Glass Bottle	JCW/SPS 7-23-85 10.05 AM	" " "		TOC	H_2SO_4 (cooled)	"	
1 ~~[illegible]~~ Glass Bottle	JCW/SPS 7-23-85 10.05 AM	" " "		Phenols	H_2SO_4 (cooled)	"	
QT Glass Bottle	JCW/SPS 7-23-85 10.05 AM	" " "		TDS, Sulfate Chloride	(cooled)	"	

Laboratory: AES
Address:
Laboratory Identification No:

Comments: pH 6.85
Specific Conductivity 2950 MU/CM

CHAIN OF CUSTODY RECORD

Client Name: LTV Steel Company
Address: Marilla Street Landfill

Monitoring Well No: 3A

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table From Edge of PVC	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested Date:
200 ML Plastic Bottle	JCW/SPS 7-23-85 10:25 AM	Teflon Hand Bailer	2.96'	Iron	HNO_3 (cooled)	[signature] 7/23/85	
00 ML Glass Bottle	JCW/SPS 7-23-85 10:25 AM	" " "		TOC	H_2SO_4 (cooled)	"	
1 ~~[illegible]~~ Glass Bottle	JCW/SPS 7-23-85 10:25 AM	" " "		Phenols	H_2SO_4 (cooled)	"	
QT Glass Bottle	JCW/SPS 7-23-85 10:25 AM	" " "		TDS, Sulfate Chloride	(cooled)	"	

Laboratory: AES
Address:

Laboratory Identification No:

Comments: pH 7.65
Specific Conductivity 1380
[illegible]

CHAIN OF CUSTODY RECORD

Client Name: LTV STEEL COMPANY
Address: MARILLA STREET LANDFILL

~~Monitoring Well~~ No: WEST POND

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested Date:
200 ML PLASTIC BOTTLE	JCW/SPS 7-23-85 10:20 AM	TEFLON HAND BAILER	SURFACE	IRON	HNO_3 (cooled)	[signature] 7/23/85	
100 ML GLASS BOTTLE	JCW/SPS 7-23-85 10:20 AM	" " "	SURFACE	TOC	H_2SO_4 (cooled)	"	
1 ~~qt bottle~~ GLASS BOTTLE	JCW/SPS 7-23-85 10:20 AM	" " "	SURFACE	PHENOLS	H_2SO_4 (cooled)	"	
1 QT GLASS BOTTLE	JCW/SPS 7-23-85 10:20 AM	" " "	SURFACE	TDS, SULFATE CHLORIDE	(cooled)	"	

Laboratory: AES
Address:

Laboratory Identification No:

Comments: PH - 8.05
SPECIFIC CONDUCTIVITY 1430 micromhos/cm

CHAIN OF CUSTODY RECORD

Client Name: LTV Steel Company
Address: Marilla Street Landfill

Monitoring Well No: 4A

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table FROM EDGE OF PVC	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested Date:
200 ML Plastic Bottle	JCW/SPS 7-23-85 10:55 AM	Teflon Hand Bailer	6.65'	Iron	HNO_3 (cooled)	[signature] 7/23/85	
00 ML Glass Bottle	JCW/SPS 7-23-85 10:55 AM	" " "		TOC	H_2SO_4 (cooled)	"	
1 ~~QT Liter~~ Glass Bottle	JCW/SPS 7-23-85 10:55 AM	" " "		Phenols	H_2SO_4 (cooled)	"	
QT Glass Bottle	JCW/SPS 7-23-85 10:55 AM	" " "		TDS, Sulfate Chloride	(cooled)	"	

Laboratory: AES
Address:
Laboratory Identification No:

Comments: pH 7.55
Specific Conductivity 700 MU/CM

CHAIN OF CUSTODY RECORD

Client Name: LTV Steel Company
Address: Marilla Street Landfill

~~Monitoring Well~~ No: East Pond

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested Date:
200 ML Plastic Bottle	JCW/SPS 7-23-85 1:00 PM	Teflon Hand Bailer	Surface	Iron	HNO_3 (Cooled)	[signature] 7/23/85	
100 ML Glass Bottle	JCW/SPS 7-23-85 1:00 PM	" " "		TOC	H_2SO_4 (Cooled)	"	
1 ~~qt Large~~ Glass Bottle	JCW/SPS 7-23-85 1:00 PM	" " "		Phenols	H_2SO_4 (Cooled)	"	
1 QT Glass Bottle	JCW/SPS 7-23-85 1:00 PM	" " "		TDS, Sulfate Chloride	(cooled)	"	

Laboratory: AES
Address:

Laboratory Identification No:

Comments: pH 7.602
Specific Conductivity 750 mU/c

CHAIN OF CUSTODY RECORD

Client Name: LTV Steel Company
Address: Marilla Street Landfill

Monitoring Well No: 6A

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tests Date:
200 ML Plastic Bottle	JCW/SPS 7-23-85 1:25 PM	Teflon Hand Bailer	10.84	Iron	HNO_3	[signature] 7/23/85	
100 ML Glass Bottle	JCW/SPS 7-23-85 1:25 PM	" " "		TOC	H_2SO_4	"	
1 ~~qt liter~~ Glass Bottle	JCW/SPS 7-23-85 1:25 PM	" " "		Phenols	H_2SO_4	"	
1 QT Glass Bottle	JCW/SPS 7-23-85 1:25 PM	" " "		TDS, Sulfate Chloride	(cooled)	"	

Laboratory: AES
Address:

Laboratory Identification No:

Comments: pH 7.230
Specific Conductivity 1240 mU/c

CHAIN OF CUSTODY RECORD

Cl[illegible] Name: LTV STEEL COMPANY
Address: MARILLA STREET LANDFILL

Monitoring Well No: 2B

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling ~~Depth of Water Table~~ FROM EDGE OF PVC	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested Date:
?00 ML PLASTIC BOTTLE	JCW/SPS 7-23-85 12²⁰-12²⁵ PM	TEFLON HAND BAILER	3.45'	IRON	HNO_3	[signature] 7/23/85	
100 ML GLASS BOTTLE	JCW/SPS 7-23-85 12²⁰-12²⁵ PM	" " "		TOC	H_2SO_4	"	
1 ~~[illegible]~~ GLASS BOTTLE	JCW/SPS 7-23-85 12²⁰-12²⁵ PM	" " "		PHENOLS	H_2SO_4	"	
1 QT GLASS BOTTLE	JCW/SPS 7-23-85 12²⁰-12²⁵ PM	" " "		TDS, SULFATE CHLORIDE	(cooled)	"	

Laboratory: AES
Address:

Laboratory Identification No:

Comments: pH ~~[illegible]~~ 8.40
SPECIFIC CONDUCTIVITY 2000 MHO/CM

CHAIN OF CUSTODY RECORD

Client Name: LTV Steel Company
Address: Marilla Street Landfill

Monitoring Well No: 2A

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table From edge of PVC	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested Date:
200 ML Plastic Bottle	JCW/SPS 7-23-85 12^{35}-12^{40} PM	Teflon Hand Bailer	4.54'	Iron	HNO_3 cooled	[signature] 7/23/85	
00 ML Glass Bottle	JCW/SPS 7-23-85 12^{35}-12^{40} PM	" " "		TOC	H_2SO_4 cooled	"	
1 ~~qt Large~~ Glass Bottle	JCW/SPS 7-23-85 12^{35}-12^{40} PM	" " "		Phenols	H_2SO_4 cooled	"	
1 QT Glass Bottle	JCW/SPS 7-23-85 12^{35}-12^{40} PM	" " "		TDS, Sulfate Chloride	(cooled) cooled	"	

Laboratory: AES
Address:

Comments: pH 8.75
Specific Conductivity 990 m℧/cm

I rat Id ification

CHAIN OF CUSTODY RECORD

Client Name: LTV Steel Company
Address: Marilla Street Landfill

Monitoring Well No: 7A

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling ~~Depth of Water Table~~ From edge of PVC	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested Date:
200 ml Plastic Bottle	JCW/SPS 7-23-85 11:15 AM	Teflon Hand Bailer	25.98'	Iron & Lead	HNO_3 (cooled)	[signature] 7/23/85	
100 ml Glass Bottle	JCW/SPS 7-23-85 11:15 AM	" " "		TOC	H_2SO_4 (cooled)	"	
1 ~~qt liter~~ Glass Bottle	JCW/SPS 7-23-85 11:15 AM	" " "		Phenols	H_2SO_4 (cooled)	"	
1 qt Glass Bottle	JCW/SPS 7-23-85 11:15 AM	" " "		TDS, Sulfate Chloride	(cooled)	"	

Laboratory: AES
Address:

Laboratory Identification No:

Comments: pH 7.82
Specific Conductivity 1060 mv/cm

CHAIN OF CUSTODY RECORD

Client Name: LTV Steel Company
Address: Marilla Street Landfill

~~Monitoring Well~~ No: Drainage Ditch West

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested Date:
200 ML Plastic Bottle	JCW/SPS 7-23-85 1155-1200	Teflon Hand Bailer	Samples taken from surface of Ditch using Bailer dropped from RR Bridge	Iron & Lead	HNO_3 (cooled)	[illegible signature] 7/23/85	
100 ML Glass Bottle	JCW/SPS 7-23-85 1155-1200	" " "		TOC	H_2SO_4 (cooled)	"	
1 ~~QT Liter~~ Glass Bottle	JCW/SPS 7-23-85 1155-1200	" " "		Phenols	H_2SO_4 (cooled)	"	
1 QT Glass Bottle	JCW/SPS 7-23-85 1155-1200	" " "		TDS, Sulfate Chloride	(cooled)	"	

Laboratory: AES
Address:
Laboratory Identification No:

Comments: pH 7.80
Specific Conductivity 2600 MV/cm

CHAIN OF CUSTODY RECORD

Client Name: LTV Steel Company
Address: Marilla Street Landfill

Monitoring Well No: 5A

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table FROM EDGE OF PVC	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested Date:
200 ML Plastic Bottle	JCW/SPS 7-23-85 9 45 AM	Teflon Hand Bailer	10.17'	Iron	HNO_3 (Cooled)	[signature] 7/23/85	
00 ML Glass Bottle	JCW/SPS 7-23-85 945 AM	" " "		TOC	H_2SO_4 (cooled)	"	
1 ~~qt Large~~ Glass Bottle	JCW/SPS 7-23-85 945AM	" " "		Phenols	H_2SO_4 (cooled)	"	
QT Glass Bottle	JCW/SPS 7-23-85 945 AM	" " "		TDS, Sulfate Chloride	(cooled)	"	

Laboratory: AES
Address:

Laboratory Identification No:

Comments: pH - 7.35
Specific Conductivity 995 mU/cm

ANALYTICAL METHODOLOGIES REFERENCE LIST

Routine Analyses are Performed in Accordance with Protocols Found in the Following Numbered Sources. These Numbers Correspond to those Listed in the Laboratory Report Under the Reference ("REF") Column.

1 - EPA 600/D-80-021, "Guidelines Establishing Test Procedures for the Analysis of Pollutants; Proposed Regulations", Federal Register 44(233), December 3, 1979.

2 - EPA 600/D-80-022, "Guidelines Establishing Test Procedures for the Analysis of Pollutants; Proposed Regulations, Correction", Federal Register 44(244), December 18, 1979.

3 - EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes", (1983)

4 - EPA 600/4-79-057, "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", (1982)

5 - EPA-SW-846, "Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods", second edition (1982)

6 - "Standard Methods for the Examination of Water and Wastewater", 15th Edition, (1980)

7 - New York State Institute of Toxicology Analytical Handbook, October 1982

8 - NIOSH Manual of Analytical Methods, second edition 1977

9 - "The Analysis of Polychlorinated Biphenyls in Transformer Fluid and Waste Oil", EPA Environmental Monitoring and Support Laboratory, draft, June 24, 1980

10 - "Approved Analytical Procedures for Determining the Content of Constituents Banned from Landburial" (New York State D. E. C., Division of Solid and Hazardous Waste), Jan. 1985.

11 - EPA 600/4-81-055, "Interim Methods for the Sampling and Analysis of Priority Pollutants in Sediments and Fish Tissue", Revised Jan. 7, 1983

ANALYSIS OF TWO (2) GROUNDWATER SAMPLES
COLLECTED AUGUST 21, 1985

Report Prepared For

MALCOLM-PIRNIE, INC.

By

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

Leonard Borzynski
Technical Evaluation

September 18, 1985
AES Report AXY

ANALYTICAL METHODOLOGIES

The method numbers for each procedure are listed in the second column of the tabulated results. The source for each method is listed as a reference number in the third column. The source(s) for the Analytical Methodologies are:

1 - EPA 600/D-80-021, "Guidelines Establishing Test Procedures for the Analysis of Pollutants; Proposed Regulations", Federal Register 44(233), December 3, 1979.

2 - EPA 600/D-80-022, "Guidelines Establishing Test Procedures for the Analysis of Pollutants; Proposed Regulations, Correction", Federal Register 44(244), December 18, 1979.

3 - EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes", (1983)

4 - EPA 600/4-79-057, "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", (1982)

5 - EPA-SW-846, "Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods", second edition (1982)

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10 - "Approved Analytical Procedures for Determining the Content of Constituents Banned from Landburial" (New York State D.E. C., Division of Solid and Hazardous Waste), Jan. 1985.

11 - EPA 600/4-81-055, "Interim Methods for the Sampling and Analysis of Priority Pollutants in Sediments and Fish Tissue", Revised Jan. 7, 1983

12 - "Determination of Formaldehyde in the Atmosphere", Environmental Health Center, Div. of Laboratories and Research, N.Y.S. Dept. of Health APC-29

13 - "Chemical Soil Tests", Cornell University Agricultural Experiment Station, N.Y.S. College of Agriculture, Ithaca, N. Y. Bulletin 960, Revised Oct. 1965.

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: RESULTS - WET CHEMISTRY
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM_PIRNIE   A.E.S. JOB CODE 05AXY

ANALYSIS	METHOD	REF	DETERMINABLE LIMITS	SAMPLE IDENTIFICATION	
				2308 MW7A 8/21/85	2309 DRAINAGE DITCH WEST 8/21/85
TOTAL ORGANIC CARBON	415.1	3	1.0	6.7	11.6
PHENOLS	510B	6	0.005	BDL*	BDL
TOTAL DISSOLVED SOLIDS	160.1	3	1.0	625	989
SULFATES	426C	6	1.0	53	211
CHLORIDES	407B	6	1.0	68.3	190

*Below determinable limits.

Marlene C. Moyer
MARLENE C. MOYER
WET CHEMISTRY SUPERVISOR

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: RESULTS - METALS
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM-PIRNIE A.E.S. JOB CODE 01AXY

ANALYSIS	METHOD	REF	DETERMINABLE LIMITS	SAMPLE IDENTIFICATION	
				2308 MW7A 8/21/85	2309 DRAINAGE DITCH WEST 8/21/85
LEAD	239.2	3	0.005	0.114	BDL*
CHROMIUM	218.2	3	0.005	0.032	0.008
IRON	236.1	3	0.3	25.2	0.35

*Below determinable limits.

Janette L. Bingert
JANETTE L. BINGERT
METALS SUPERVISOR

ANALYSIS OF TWO (2) GROUNDWATER SAMPLES COLLECTED AUGUST 21, 1985

Report Prepared For

MALCOLM-PIRNIE, INC.

By

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

Leonard Borzynski
Technical Evaluation

September 18, 1985
AES Report AXY

Revised Report
September 20, 1985

ADVANCED ENVIRONMENTAL SYSTEMS, INC.
LABORATORY REPORT

TYPE OF ANALYSIS: RESULTS - METALS
UNITS OF MEASURE: MILLIGRAMS/LITER, OR PPM
CLIENT: MALCOLM-PIRNIE A.E.S. JOB CODE AXY

ANALYSIS	METHOD	REF	DETERMINABLE LIMITS	SAMPLE IDENTIFICATION	
				2308 SOLUBLE MW7A 8/21/85	2309 SOLUBLE DITCH WEST 8/21/85
CHROMIUM	218.2	3	0.005	BDL	BDL
LEAD	239.2	3	0.005	BDL	BDL
IRON	236.2	3	0.005	0.248	BDL

Janette L. Bingert
JANETTE L. BINGERT
METALS SUPERVISOR

APPENDIX D

BORING LOGS
MONITORING WELL CONSTRUCTION

NOTE: WELLS ABONDONED DUE TO VANDALISM

EARTH DIMENSIONS, INC.

Test Borings and Logs
797 Center Street • East Aurora, New York 14052 • (716) 655-1717

HOLE NO 1 SURF. ELEV. 586.77

4G79 PROJECT Republic Steel - Monitoring well installation South Buffalo, New York LOCATION See survey

CLIENT McPhee, Smith, Rosenstein Engineers, PC DATE STARTED 7/18/79 COMPLETED 7/18/

DEPTH (feet)	SAMPLE NO.	BLOWS ON SAMPLER				N	DESCRIPTION & CLASSIFICATION	WELL	WATER TABLE & REMARKS
	1	5	8	9	12	17	Slightly moist dark brown silt loam (SANDY-SILT) topsoil, granular 0.9		Sample #1 bridges con-tact.
							Moist distinctly [redacted] yellowish brown coarse [redacted] (SANDY-SILT), friable, [redacted]		2.0
							---- grades downward to ------- 3.0		3.0
	2	7	7	9		16	Moist to extre[redacted] medium consis-tance, slightly plastic		
5									5.0
							------ clear transition to ---- 6.5	Bentonite	2 wells installe both with 3 ft. sand followed by ft. of bentonite.
	3	8	12	15		27	Moist dark brownish gray silt loam (SANDY-SILT), firm, slightly plas-tic to nonplastic, massive structure	2 inch PVC pipe	Mostly silty lake sediments to end of boring.
10									
	4	8	22	20		42			
15									
							------ clear transition to --- 16.0		17.0
							Extremely moist dark gray silty clay (CLAYEY-SILT), soft, plastic and co-hesive	Well Screen / Sand Pack	18.0
20	5	3	4	4		8	20.0		[redacted]

Bore completed at 20.0 feet.

dew

N = NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLO

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4G79

HOLE NO. 2

SURF. ELEV. 582.8

PROJECT: Republic Steel - Monitoring well installation South Buffalo, New York

LOCATION: See survey (Southern bore

CLIENT: McPhee, Smith, Rosenstein Engineeers, PC

DATE STARTED: 7/16/79 COMPLETED: 7/1

DEPTH (feet)	SAMPLE NO.	BLOWS ON SAMPLER				N	DESCRIPTION & CLASSIFICATION	WELL	WATER TABLE & REMARKS
							Black extremely moist rubble and muck 0.4	Bentonite 2.0	2.0
							Hardened slag fill 3.9	Sand	3.0
	1	5	2	2		4			
5							Extremely moist to wet black silty muck soil, soft with stem and root matter 7.5	5.0	5.0
	2	2	5	15		20			Layer of hard slag appears underly pond southern side site.
	3	7	12	15		27			
	4	6	8	12		20	Moist to extremely moist highly mottled greenish brown to brown silty clay loam (CLAYEY-SILT) with vertical desiccation cracks and thin to medium size silt lenses, firm, plastic	2 inch PVC pipe; Bentonite	Solidified slag fill to 3.9 ft over wet muck 7.5 ft. over silty and clayey lake sediment 20.0 ft. over glacial till (t
10							--- clear transition to ---- 11.0		
	5	5	6	7		13	Extremely moist to wet dark brownish gray silty clay (CLAYEY-SILT), soft, plastic 20.0		
15									
							Wet dark grayish brown silty clay loam (CLAYEY-SILT) with 10% firm and medium subangular dolomitic gravel, soft, plastic to slightly plastic 22.5		Water 0.5 ft surface at completion.
20	6	4	3	3		6	Moist dark grayish brown heavy silt loam (CLAYEY-SILT) with 15% dolomitic gravel, very firm in place, slightly plastic	21.0; 21.5; Well Screen; Sand Pack	Boring completed at 2 ft.
	7	40	44			84		24.0	
25							Boring completed at 24.0 feet.		

dew

N = NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER

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4G79

HOLE NO. 3 SURF. ELEV. 580.64

PROJECT Republic Steel - Monitoring well installation South Buffalo, New York

LOCATION See survey (near southeast t of northern pond)

CLIENT McPhee, Smith, Rosenstein Engineers, PC DATE STARTED 7/20/79 COMPLETED 7/2(

DEPTH (feet)	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24		DESCRIPTION & CLASSIFICATION	WELL	WATER TABLE & REMARKS
							Wet mixed industrial fill including cindery flyash, slag and brick fragments, loose 3.5	2 inch PVC pipe; Bentonite	
							Wet black organic rich silt loam (SANDY-SILT), soft, nonplastic 4.5		Original surfa zone.
5	1	3	3	3		6	Wet greenish to yellowish brown coarse silt loam (SANDY-SILT), very friable, nonplastic 6.5		Industrial fi to 3.5 ft. ove silty lake sec ments to 12.0 over loamy der glacial till t 13.7 ft. over bedrock.
	2	5	7	9	12	16	Extremely moist to moist highly mottled grayish brown silty clay loam (CLAYEY-SILT) with finely laminated structure, medium to firm consistance, plastic		
10							------ grades downward to ----- 10.0		
	3	2	2	3	4	5	Extremely moist reddish to grayish brown silty clay (CLAYEY-SILT) with thin silt lenses, soft to medium consistance, plastic, cohesive 12.0	11.0	
								12.0	Auger resist noted at 12 ft.
	4	3	4	79/3			Wet dark brownish gray gravelly loam (CLAY-SAND-SILT) till with 20-25% fine & medium gravel, soft, slightly plastic 13.7	Well Screen; Sand Pack	
	5						Weathered gray fissile shale, thin bedded 14.0	14.0	
15							[redacted].		Water at surfa at completion

dew N = NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLC

NOTE: WELLS ABANDONED DUE TO VANDALISM

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Test Borings and Logs
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HOLE NO. 4 SURF. ELEV 584.6

4G79 PROJECT Republic Steel - Monitoring well installation South Buffalo, New York

LOCATION See survey (westward flowin[g] drainage ditch)

CLIENT McPhee, Smith, Rosenstein Engineers, PC DATE STARTED 7/7/79 COMPLETED 7/7/[79]

DEPTH (feet)	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	DESCRIPTION & CLASSIFICATION	WELL	WATER TABLE & REMARKS
	1	1	1	2	3	5	Extremely moist to wet black cindery flyash fill, loose 2.0		
	2	3	3	3		6	Extremely moist black organic silt loam (SANDY-SILT) topsoil, very friable, nonplastic 3.5		
							---- clear transition to ----		4.0
5							Extremely moist yellowish brown fine sandy loam (SILTY-SAND), very friable, nonplastic		5.0
							---- grades downward to ---- 6.0		
	3	11	11	11		22	[redacted] 9.5	2 inch PVC pipe; Bentonite	7.0; 7.5
10	4	5	6	7		13	Moist dark brownish gray silty clay loam (CLAYEY-SILT) with very thin silt lenses, medium to firm consistence, plastic		Industrial 2.0 ft. over water sorted sands at 9 ft. over si[lt] lake sedimen[ts] to 19.0 ft dense loam [gla]cial till to [end] of boring.
15							---- grades downward to ---- 15.0		
	5	2	2	3		5	Extremely moist dark brownish gray silty clay (CLAYEY-SILT), soft, plastic with occasional fine gravel fragments 19.0		[redacted] 19.0
20	6	2	15	56	42	71	Wet becoming moist downward dark grayish brown loam (CLAY-SAND-SILT) till with 15% fine and medium gravel, very firm in place, nonplastic 21.5	Well Screen; Sand Pack	20.0; 22.0
	7	59	47				Weathered shale bedrock, fissile, thin bedded 22.5		22.5
25							Boring completed at 22.5 feet.		

dew N = NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER

EARTH DIMENSIONS, INC.

Test Borings and Logs

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4G79

HOLE NO.	5	SURF. ELEV.	584.13
PROJECT	Republic Steel - Monitoring well installation South Buffalo, New York	LOCATION	See survey
CLIENT	McPhee, Smith, Rosenstein Engineers, PC	DATE STARTED	7/20/79
		COMPLETED	7/20

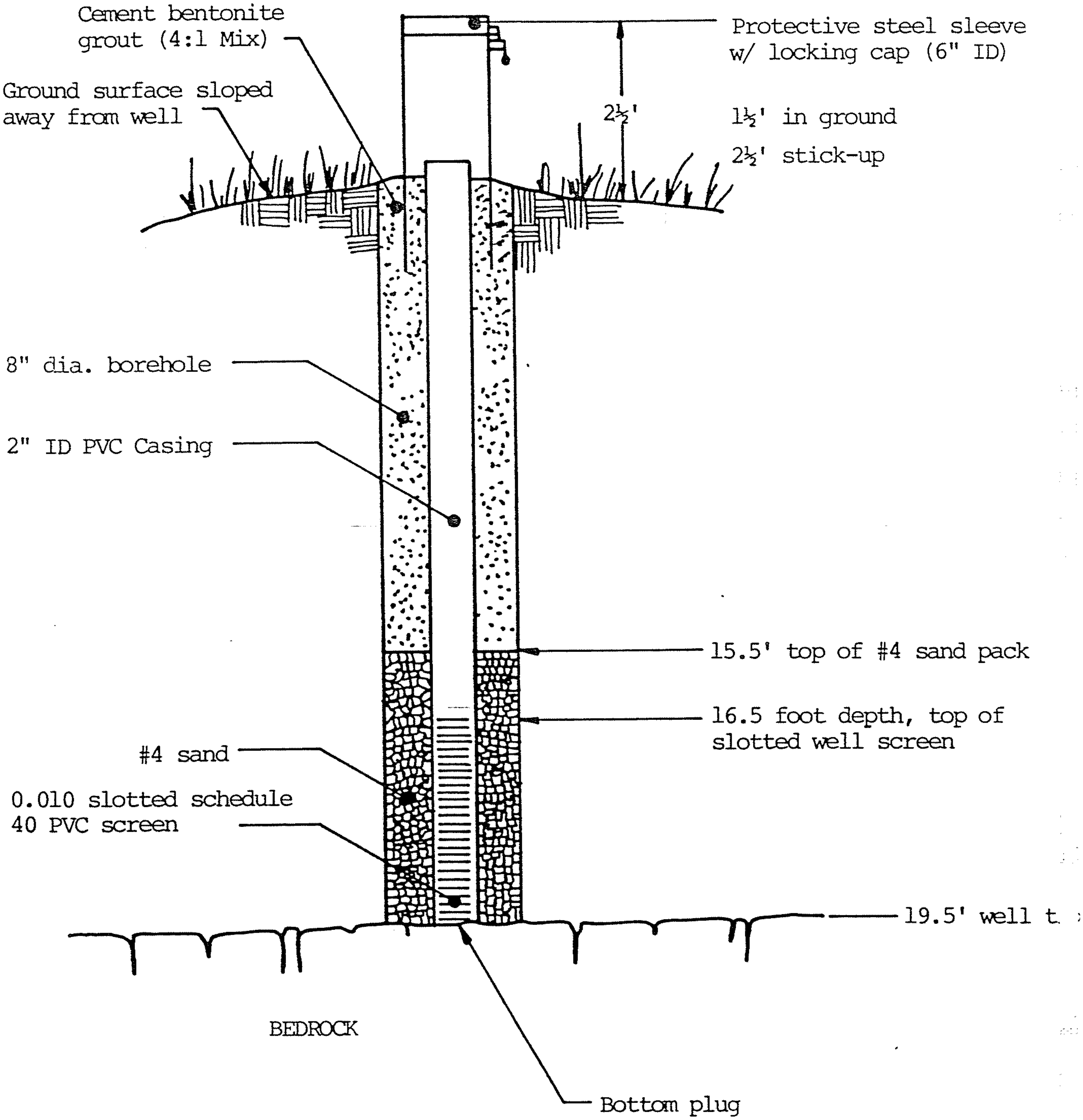
DEPTH (feet)	SAMPLE NO.	BLOWS ON SAMPLER				N	DESCRIPTION & CLASSIFICATION	WELL	WATER TABLE & REMARKS
	1	3	5	6	9	11	Extremely moist black organic rich silt loam (SANDY-SILT), granular 1.2	2 inch PVC pipe; Bentonite	
							Extremely moist highly mottled yellowish brown coarse silt loam (SANDY-SILT), very friable, nonplastic		2.0
	2	7	9	13		22	- - - - grades downward to - - - - 2.5		3.0
5							Moist to extremely moist distinctly mottled brown silty clay loam (CLAYEY-SILT), firm to medium consistance, slightly plastic, lamianted		5.0
							- - - - grades downward to - - - - - 6.5		
	3	8	12	14		26	Extremely moist grayish brown heavy silt loam (CLAYEY-SILT), massive structure, slightly plastic, medium consistance		Original surf on edge of d pressional a along Marilla Street. Silty lake s ments to the of bore.
10									
	4	5	6	8		14			
							- - - - grades downward to - - - - 13.0		
15							Extremely moist dark grayish brown silty clay loam (CLAYEY-SILT), soft, plastic, cohesive		15.0
								Well Screen; Sand Pack	16.0
									18.0
	5	2	3	3	4	6			
20							20.0		[redacted].

dew

Boring completed at 20.0 feet.

N = NUMBER OF BLOWS TO DRIVE - - - " SPOON - - - " WITH - - - lb. WT. FALLING - - - " PER BLC

LOGGED BY Duane R. Lenhardt, Geologist   SHEET 1 OF 1



MALCOLM PIRNIE

MONITORING WELL DETAIL FOR WELL NO. 4A

REPUBLIC STEEL SEPTEMBER 1984

EARTH DIMENSIONS, INC.

Test Borings and Logs
East Aurora, New York 14052 • (716) 655-1717

MONITORING WELLS 6A & 6B

SURF. ELEV. ________

PROJECT 4G79b: Monitoring well installation Republic Steel landfill, South Buffalo, N.Y.

LOCATION: Landfill area east side of Hopkins Road

CLIENT: Malcolm Pirnie, Inc.

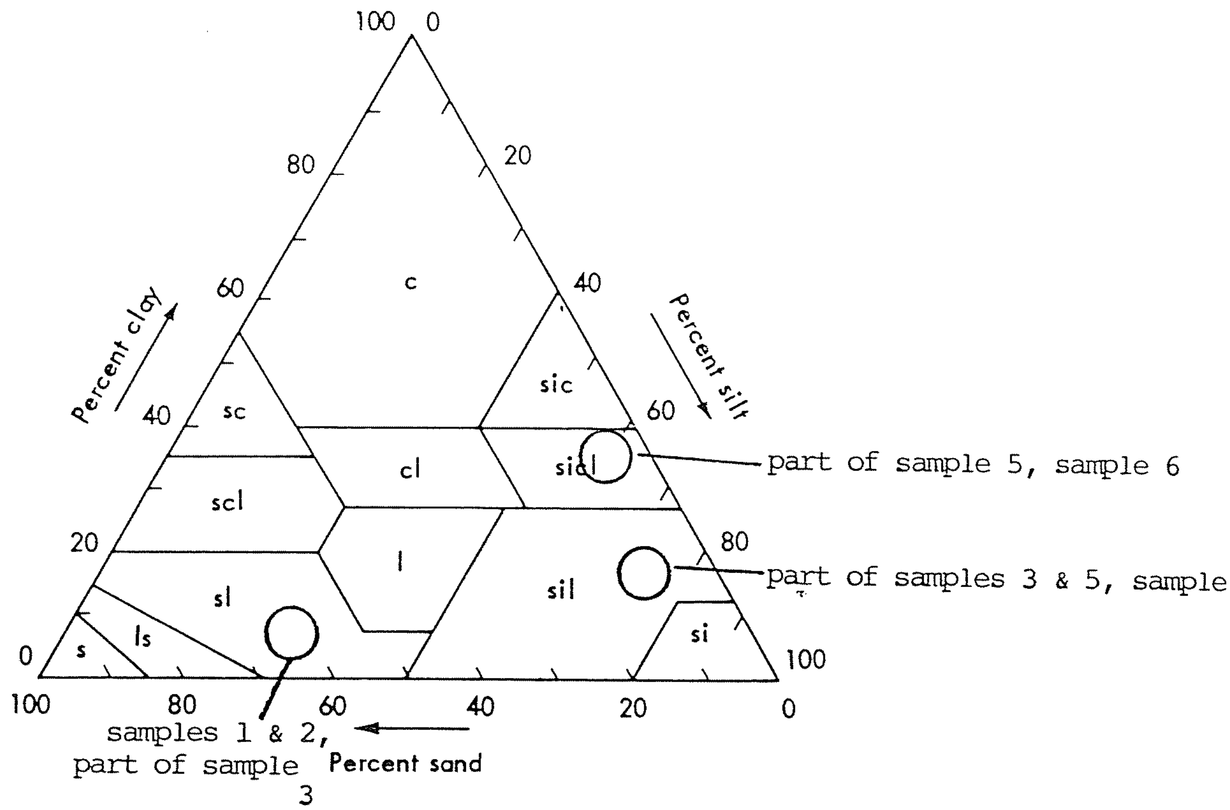
DATE STARTED: 8/16/84 COMPLETED: 8/16/84

DEPTH feet	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	DESCRIPTION & CLASSIFICATION	WELL 6A	WATER TABLE & REMARKS	WELL 6B
	1	12	22	70		92	Moist black gravelly sandy loam (SILTY-SAND) fill with 15 to 40% slag and cindery fill, very dense — 3.5	Two inch inside diameter PVC pipe; Cement/bentonite grout	Soil and slaggy fill to 7.0 feet over silty lake sediment to 12.0 feet over clayey lake sediment to end of boring.	
5	2	9	14	23	34	37	Extremely moist black gravelly sandy loam (SILTY-SAND) fill with 15 to 40% slag and cindery fill, dense — 7.0		(1) Granular bentonite	2 inch inside diameter PVC pipe
	3	9	12	6	5	18	Moist to extremely moist black silt loam (CLAYEY-SILT) original topsoil, compact — 9.0			8.5
10	4	6	11	17	20	28	Moist to extremely moist distinctly mottled olive brown silt loam (CLAYEY-SILT), very stiff, thinly laminated with coarse silt-fine sand interlayers ¼ to 2" thick — 12.0			9.5; 11.0
	5	2	9	16	23	25	- - - - - clear transition to - - - Extremely moist faintly mottled olive brown silty clay loam (CLAYEY-SILT), very stiff, thinly laminated with very thin coarse silt lenses — 13.0			Screen; 13.0
15	6	6	19	27	32	46	- - - clear transition to - - - Moist faintly mottled olive brown silty clay loam (CLAYEY-SILT), hard, thinly laminated with occasional very thin coarse silt lenses	15.2; (1); 16.2; #4 sand		

Cont. on sheet 2..

N = NUMBER OF BLOWS TO DRIVE 2" SPOON 12" WITH 140 lb. WT. FALLING 30" PER BLOW.

MONITORING WELLS 6A & 6B



c	Clay	scl	Sandy clay loam
si	Silt	sicl	Silty clay loam
s	Sand	cl	Clay loam
l	Loam	sil	Silt loam
sc	Sandy clay	sl	Sandy loam
sic	Silty clay	ls	Loamy sand

Textural triangle showing the percentages of clay (less than 0.002 mm), silt (0.002-0.05 mm), and sand (0.05-2.0 mm) in the basic soil textural classes (adapted from Soil Survey Staff, 1951).

ESTIMATED FIELD TEXTURES

EARTH DIMENSIONS, INC.

Test Borings and Logs
East Aurora, New York 14052 • (716) 655-1717

MONITORING WELLS 6A & 6B continued

SURF. ELEV. ____

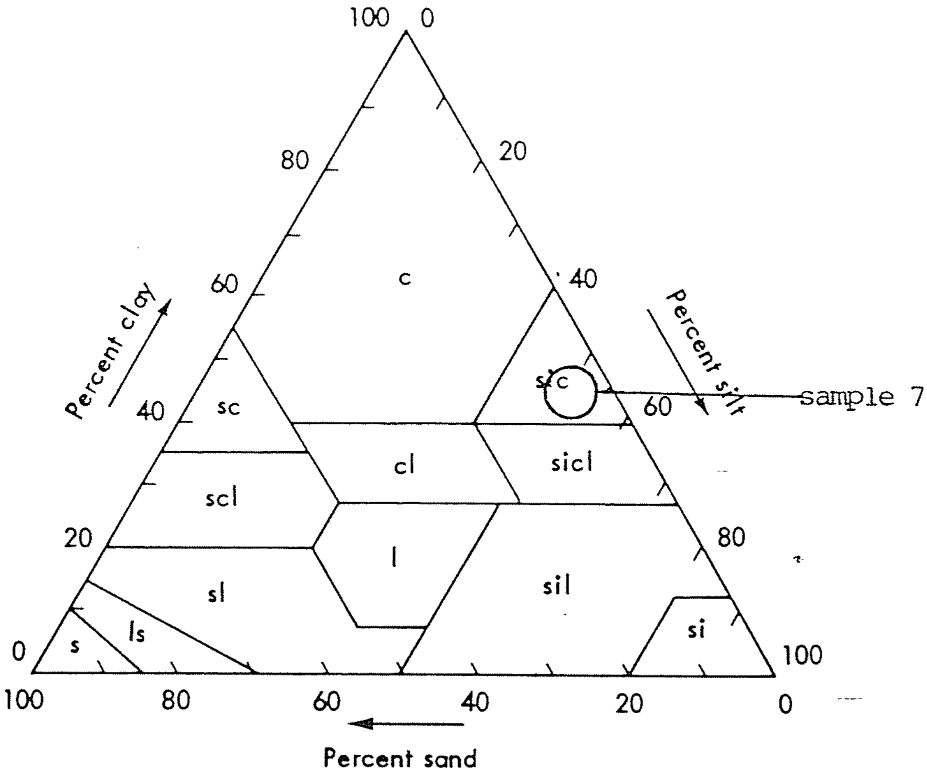
PROJECT Monitoring well installation
4G79b Republic Steel landfill, South Buffalo, N.Y.
CLIENT Malcolm Pirnie, Inc.

LOCATION Landfill area east side of Hopkins Road

DATE STARTED 8/16/84 COMPLETED 8/16/84

DEPTH feet	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	DESCRIPTION & CLASSIFICATION	WELL 6A	WATER TABLE & REMARKS
							Moist faintly mottled olive brown silty clay loam (CLAYEY-SILT), hard, thinly laminated with occasional very thin coarse silt lenses	2" ID PVC pipe	
							19.0 - - - - grades downward to - - - -		
20	7	WR	5	8	11	13	Wet dark gray silty clay (CLAYEY-SILT), stiff, thinly laminated	# 4 size sand; 21.5	WR - sampler penetration with weight o rods only.
								Screen; 23.5	
							24.5	Soil backfill; 24.5	
25							Sampling completed at 21.5 feet. Augered to 24.5 feet. Hole collapsed to 23.5 feet after pulling augers back to 10.0 feet. Augered well 6B to 13.0 feet.		No water at completion.
30									
35									

N = NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW.



c	Clay	scl	Sandy clay loam
si	Silt	sicl	Silty clay loam
s	Sand	cl	Clay loam
l	Loam	sil	Silt loam
sc	Sandy clay	sl	Sandy loam
sic	Silty clay	ls	Loamy sand

Textural triangle showing the percentages of clay (less than 0.002 mm), silt (0.002-0.05 mm), and sand (0.05-2.0 mm) in the basic soil textural classes (adapted from Soil Survey Staff, 1951).

ESTIMATED FIELD TEXTURES

BORING B-2

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-02-1
DATE: JUNE 10, 1985	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: EARTH DIMENSIONS	INSPECTOR: J. WHITNEY
DRILLING METHOD: 8" x 4 1/4" HOLLOW STEM AUGER	SAMPLING METHOD: 2" Ø SPLIT SPOON AT 5' INTERVALS
ELEVATION:	DATUM:

SAMPLE no.	SAMPLE depth	blows per 6"		DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN	WELL CONST.	REMARKS
S-1	0'-2'	6	6			MEDIUM DENSE DARK BROWN SAND AND GRAVEL SIZE FILL, DRY WITH REDDISH BROWN STAINING		
		10	5					
			9					
S-2	4.5-6.5	15	13	5		DENSE DARK BROWN SAND AND GRAVEL SIZE FILL, DRY WITH REDDISH BROWN STAINING		
		13						
S-3	9.5-11.5		2					
		5	5	10		MEDIUM DENSE BROWN SILT, SAND AND GRAVEL SIZE FILL, MOIST WITH REDDISH BROWN STAINING		
		36						
S-4	14.5-16.5		8					
		40	8	15		VERY DENSE GREY-BLACK GRAVEL SIZE FILL, WITH TRACE OF BROWN STAINING, DRY		
		20						
S-5	19.5-21.5		20					
		35	26	20		VERY DENSE DARK BROWN GRAVEL SIZE FILL WITH TRACE OF BROWN STAINING, DRY		
		32						
S-6	24.5-26.5		12					
		60	68	25		VERY DENSE REDDISH-BROWN SAND GRAVEL SIZE FILL WITH SOME SILT SIZE PARTICLES, WET		
		6						
			1					
S-7	29.5-31.5	4	4					
		4		30		TYPE SAME TO 29.9' SOFT BLACK SILT, WET (ORIGINAL POND BOTTOM) TO 30.5' LOOSE GREENISH BROWN VERY FINE TO FINE SAND, WET		
				35		BOTTOM OF BORING AT 31.5'		

NOTES:

MALCOLM

BORING B-3

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-02-1
DATE: JUNE 11, 1985	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: EARTH DIMENSIONS	INSPECTOR: J. WHITNEY
DRILLING METHOD: 8" x 4 1/4" HOLLOW STEM AUGER	SAMPLING METHOD: 2" ø SPLIT SPOON AT 5' INTERVALS
ELEVATION:	DATUM:

SAMPLE no.	depth	blows per 6"		DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN	WELL CONST.	REMARKS
S-1	0'-2'	7	14			MEDIUM DENSE GREY SAND AND GRAVEL SIZE FILL TO 1.5' TO MEDIUM DENSE BROWN STAINED SAND AND GRAVEL SIZE FILL TO 1.7' TO GREY TO 2.0'		
		16	17					
S-2	4.5-6.5		8					
		6	6	5		MEDIUM DENSE GREY COARSE SAND AND GRAVEL SIZE FILL WITH BROWN STAINING, MOIST TO 6.2' TO DRY AT 6.5'.		
		17						
S-3	9.5'-11.5		25					
		58	41	10		EXTREMELY DENSE LIGHT GREY TO BLACK COARSE SAND AND GRAVEL SIZE FILL W/ CEMENTED SLAG AND BRICK FRAGMENTS, DRY.		
		17						
				15		AUGER AND SAMPLER REFUSAL AT 13.0 - BOTTOM OF BORING		
				20				
				25				
				30				
				35				

NOTES:

BORING B-4

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-02-1
DATE: JUNE 12, 1985	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: EARTH DIMENSIONS	INSPECTOR: J. WHITNEY
DRILLING METHOD: 8" x 4 1/4" HOLLOW STEM AUGER	SAMPLING METHOD: 2" ⌀ SPLIT SPOON AT 5' INTERVALS
ELEVATION:	DATUM:

SAMPLE no.	SAMPLE depth	blows per 6"		DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN	WELL CONST.	REMARKS
S-1	0'-1.5'	10	21			DENSE BROWN SAND AND GRAVEL SIZE INDUSTRIAL FILL, DRY FRIABLE - AUGER REFUSAL @ 1.5'		STEEL MAKING SLAG
		100						
S-2	4.5'-6.5'		17					
		30	28	5		VERY DENSE BROWN AND BLACK SAND TO COARSE GRAVEL INDUST. FILL, DRY LOOSE WHEN DISTURBED SLAG.		STEEL MAKING SLAG
		32						
S-3	9.5'-11.5		14					
		38	54	10		VERY DENSE GREY AND BLACK SAND TO COARSE GRAVEL W/ 1" SLAG FRAGMENTS, INDUSTRIAL FILL TO 11', LIGHT GREY FRACTURED SLAG W/ SAND AND GRAVEL SIZE FILL TO 11.5'		STEEL MAKING SLAG AND LIME STONE.
		37						
				15		AUGER REFUSAL AT 12.5'		
				20				
				25				
				30				
				35				

NOTES: INFORMATION IN REMARKS COLUMN IS BASED ON EXAMINATION OF SAMPLES BY LTV PERSONNEL

BORING B-5

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-02-1
DATE: JUNE 11, 1985	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: EARTH DIMENSIONS	INSPECTOR: J. WHITNEY
DRILLING METHOD: 8" x 4 1/4" HOLLOW STEM AUGER	SAMPLING METHOD: 2" Ø SPLIT SPOON AT 5' INTERVALS
ELEVATION:	DATUM:

SAMPLE no.	depth	blows per 6"		DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN	WELL CONST.	REMARKS
S-1	0'-2'	9	15			VERY DENSE DARK BROWN MIXTURE OF GRAVEL AND SILT SIZE INDUSTRIAL FILL, DRY.		CLARIFIER SLUDGE AND STEEL MAKING SLAG
		25	15					
S-2	4.5'-6.5'		7	5		MEDIUM DENSE BROWN SAND AND GRAVEL SIZE FILL TO 5'.0' TO MED. DENSE BLACK GRAVEL, SAND & SILT SIZE INDUSTRIAL FILL, MOIST.		CLARIFIER SLUDGE
		4	8					
		7						
S-3	10'-12'	3	3	10		LOOSE BLACK FINE SAND AND SILT SIZE W/ SOME GRAVEL SIZE FILL (INDUS.) SOME BROWN STAINING, MOIST		CLARIFIER SLUDGE
		3	2					
S-4	15'-17'	1	1	15		SOFT BLACK SILT SIZE, SOME GRAVEL SIZE FILL TO 16.0', WET TO SOFT REDDISH BROWN SILT SIZE FILL, WET TO 16.33' TO SOFT BLACK SILT SIZE SOME GRAVEL TO 16.75', SOFT REDDISH BROWN SILT SIZE FILL @ 17.0'		BOF DUST
		2	3					
S-5	20'-22'	10	6	20		MEDIUM DENSE REDDISH BROWN SILT SIZE W/ SOME GRAVEL SIZE FILL TO 21.5' TO GREYISH BLACK SILT SIZE BRICK FRAGMENTS, MOIST.		CLARIFIER SLUDGE, STEEL MAKING SLAG AND BOF DUST
		8	16					
S-6	25'-27'	2	2	25		BRICK FRAGMENTS TO 25.5' TO SOFT BLACK SILT SIZE FILL, WET TO 26.5' TO LOOSE GREENISH BLUE FINE GRAVEL SIZE FILL, WET.		CLARIFIER SLUDGE AND STEEL MAKING SLAG
		3	9					
S-7	30'-32'	3	8	30		DENSE GREY ANNULAR CEMENTED SLAG FRAGMENTS WITH SOME GRAVEL AND SAND SIZE FILL, BROWN STAINING, WET.		STEEL MAKING SLAG AND BLAST FURNACE SLAG.
		5	4					
S-8	—	50/2"		35		SAMPLER REFUSAL AT 35'-2". WET GREY SILT AND FINE SAND W/ SHALE FRAGMENTS (FLOWED UP INTO SAMPLER) AUGER REFUSAL AT 35.4'.		

NOTES: INFORMATION IN REMARKS COLUMN IS BASED ON EXAMINATION OF SAMPLES BY LTV PERSONNEL.

MALCOLM

BORING B-6

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-02-1
DATE: JUNE 12, 1985	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: EARTH DIMENSIONS	INSPECTOR: J. WHITNEY
DRILLING METHOD: 8" x 4 1/4" HOLLOW STEM AUGER	SAMPLING METHOD: 2" ø SPLIT SPOON AT 5' INTERVALS
ELEVATION:	DATUM:

SAMPLE no.	SAMPLE depth	blows per 6"		DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN	WELL CONST.	REMARKS
S-1	0'-2'	25	23			DENSE GREY GRAVEL AND SAND SIZE FILL BROWN STAINING, DRY TO 1' TO GREY SOLID SLAG FRAGMENTS TO 1.25' TO GREY GRAVEL AND SAND SIZE FILL SOME BRICK FRAGMENTS TO 2'		STEEL MAKING SLAG AND BRICK
		17	9					
S-2	4.5'-6.5'		24					
		20	17	5		MINIMAL RECOVERY SAMPLE - S-2 GRAY SLAG FRAGMENTS; PUSHED A PIECE OF SLAG AHEAD OF SAMPLER		STEEL MAKING SLAG
		24						
S-3	9.5'-10.3'		34					
		100/4"		10		VERY DENSE DARK BROWN TO DARK GREY GRAVEL AND COASRS SAND SIZE INDUSTRIAL FILL W/ SOME SLAG FRAGMENTS DRY. AUGER REFUSAL @ 12.5' (BOTTOM OF BORING)		STEEL MAKING SLAG
				15				
				20				
				25				
				30				
				35				

NOTES: INFORMATION IN REMARKS COLUMN IS BASED ON EXAMINATION OF SAMPLES BY LTV PERSONNEL.

BORING B-7

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-02-1
DATE: JUNE 20, 1985	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: EARTH DIMENSIONS	INSPECTOR: J. WHITNEY
DRILLING METHOD: 8" x 4 1/4" HOLLOW STEM AUGER	SAMPLING METHOD: 2" ø SPLIT SPOON AT 5' INTERVALS
ELEVATION:	DATUM:

SAMPLE no.	SAMPLE depth	blows per 6"	DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN	WELL CONST.	REMARKS
S-1	0'-2'	3, 18, 26, 66			VERY DENSE BLACK FINE SAND AND GRAVEL SIZE CINDERY ASH AND SLAG FRAGMENTS FILL DRY LOOSE WHEN DISTURBED.		STEEL MAKING SLAG
S-2	4.5'-6.5'	13, 21, 23, 23	5		VERY DENSE DARK BROWN SAND SIZE CINDERY ASH WITH SOME BRICK AND GRAVEL SIZE SLAG FRAGMENTS FILL, DRY, LOOSE WHEN DISTURBED.		STEEL MAKING SLAG AND SCARFING FLASH
S-3	9.5'-11.5'	3, 15, 16, 10	10		DENSE BROWN SAND AND GRAVEL SIZE INDUSTRIAL FILL, DRY W/ SOME SLAG FRAGMENTS, LOOSE WHEN DISTURBED.		STEEL MAKING SLAG
S-4	14.5'-16.5'	1, 1, 1/12"	15		SOFT REDDISH BROWN SILT AND FINE SAND SIZE FILL, WET		STEEL MAKING DUST
S-5	19.5'-21.5'	7, 31, 24, 22	20		VERY DENSE DARK BROWN SAND AND COARSE GRAVEL SIZE INDUSTRIAL FILL, DRY, W/ SOME BRICK AND SLAG FRAGMENTS		STEEL AND BLAST FURNACE SLAG
S-6	24.5'-26.5'	7, 47, 66, 45	25		VERY DENSE DARK BROWN COARSE SAND AND GRAVEL SIZE INDUSTRIAL FILL, DRY W/ SOME SLAG AND DETERIORATED BRICK FRAGMENTS BOTTOM OF BORING AT 26.5'		
			30				
			35				

NOTES: AUGERS LOST IN HOLE, HOLE ABANDONED AT 26.5'

INFORMATION IN REMARKS COLUMN IS BASED ON EXAMINATION OF SAMPLES BY LTV SAMPLES

BORING B-8

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-02-1
DATE: JUNE 12, 1985	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: EARTH DIMENSIONS	INSPECTOR: J. WHITNEY
DRILLING METHOD: 8" x 4 1/4" HOLLOW STEM AUGER	SAMPLING METHOD: 2" Ø SPLIT SPOON AT 5' INTERVALS
ELEVATION:	DATUM:

SAMPLE no.	SAMPLE depth	blows per 6"		DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN	WELL CONST.	REMARKS
S-1	0'-2'	61	55			VERY DENSE BROWN TO GREY BLUE TO BLACK SAND TO COARSE GRAVEL SIZE INDUSTRIAL FILL SOME BRICK FRAGMENTS, DRY		STEEL MAKING SLAG AND BRICK
		32	21					
			10					
S-2	4.5'-6.25'	7	8	5		MEDIUM DENSE BLACK/GREY COARSE SAND TO GRAVEL SIZE FILL W/ SOME SLAG FRAGMENTS		STEEL MAKING SLAG
		50/3"						
			55					
S-3	9.5'-11.33'	68	88	10		VERY DENSE BLACK/GREY/BROWN COARSE SAND TO GRAVEL SIZE FILL W/ SOME SLAG, BRICK AND WOOD FRAGMENTS		STEEL MAKING SLAG AND GRAVEL
		100/4"						
						AUGER REFUSAL @ 11.3' (BOTTOM OF BORING)		
				15				
				20				
				25				
				30				
				35				

NOTES: INFORMATION IN REMARKS COLUMN IS BASED ON EXAMINATION OF SAMPLES BY LTV PERSONNEL.

BORING B-9

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-02-1
DATE: JULY 8, 1985	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: EARTH DIMENSIONS	INSPECTOR: J. WHITNEY
DRILLING METHOD: 8" x 4 1/4" HOLLOW STEM AUGER	SAMPLING METHOD: 2" ø SPLIT SPOON AT 5' INTERVALS
ELEVATION:	DATUM:

SAMPLE no.	SAMPLE depth	blows per 6"		DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN	WELL CONST.	REMARKS
S-1	0'-2'	5	10			MEDIUM DENSE BLACK FINE SAND TO GRAVEL SIZE CINDERY ASH AND SLAG W/SOME BROWN STAINING FILL, MOIST.		CLARIFIER SLUDGE
		14	12					
S-2	5.0'-5.75'	50	100/3	5		EXTREMELY DENSE BLACK SAND TO GRAVEL SIZE FILL WITH SOME SLAG FRAGMENTS, DRY.		CLARIFIER SLUDGE AND SLAG
S-3	10'-12'	1	2	10		VERY SOFT BLACK SILT TO FINE SAND SIZE ASH FILL TO 11.5' TO BLACK SAND AND GRAVEL SIZE FILL TO 12' WET TO 11.5, DRY TO 12.0'		CLARIFIER SLUDGE
		3	9					
S-4	15'-17'	1	3	15		SOFT DARK BROWN TO BLACK SILT, SAND AND GRAVEL SIZE FILL, MOIST.		CLARIFIER SLUDGE
		3	6					
S-5	20'-22'	1	6	20		MEDIUM DENSE DARK BROWN TO BLACK SAND AND GRAVEL SIZE CINDERY ASH AND SLAG FILL WITH SOME SLAG FRAGMENTS, DRY.		CLARIFIER SLUDGE
		12	10					
S-6	25'-27'	5	5	25		MEDIUM DENSE DARK BROWN SAND AND GRAVEL SIZE FILL, DRY W/ SOME SLAG FRAGMENTS.		CLARIFIER SLUDGE
		6	4					
S-7	30'-32'	2	5	30		STIFF DARK GREY SILT AND FINE SAND SIZE FILL, MOIST WITH SOME GRAVEL SIZED SLAG.		CLARIFIER SLUDGE
		7	5					
S-8		3	6	35		MEDIUM DENSE DARK GREY FINE SAND SIZE FILL WITH GRAVEL SIZE SLAG PARTICLES.		CLARIFIER SLUDGE
		4	3					

NOTES: SAMPLE S-6 NO RECOVERY (PUSHED A PIECE OF SLAG AHEAD OF SAMPLER) SAMPLER DROPPED WITH WEIGHT OF RODS FOR NEW RECOVERY.
INFORMATION IN REMARKS COLUMN BASED ON EXAMINATION OF SAMPLES BY LTV PERSONNEL.

MALCOLM

BORING B-9

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-02-1
DATE: JULY 8, 1985	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: EARTH DIMENSIONS	INSPECTOR: J. WHITNEY
DRILLING METHOD: 8" x 4 1/4" HOLLOW STEM AUGER	SAMPLING METHOD: 2" ø SPLIT SPOON AT 5' INTERVALS
ELEVATION:	DATUM:

SAMPLE no.	SAMPLE depth	blows per 6"		DEPTH	STRATA	SOIL DESCRIPTION: density, color, SOIL, admixtures, moisture, other notes, ORIGIN	WELL CONST.	REMARKS
S-9	40'-42'	33	48	40		VERY DENSE GREY COARSE SAND AND GRAVEL SIZE FILL, WET @ 41.0' W/ SOME SLAG FRAGMENTS.		BLAST FURNACE SLAG.
		21	9					
			50/0.5"					
S-10	44.5'			45		BOTTOM OF BORING @ 44.5'		
				50				
				55				
				60				
				65				
				70				
				75				
				80				

NOTES: NO RECOVERY SAMPLE S-10 SOME SAND FLOWED UP INTO SAMPLER

INFORMATION IN REMARKS COLUMN IS BASED ON EXAMINATION OF SAMPLES BY LTV PERSONNEL

MALCOLM PIRNIE

BORING B-10

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-02-1
DATE: JUNE 11, 1985	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: EARTH DIMENSIONS	INSPECTOR: J. WHITNEY
DRILLING METHOD: 8" x 4 1/4" HOLLOW STEM AUGER	SAMPLING METHOD: 2" ø SPLIT SPOON AT 5' INTERVALS
ELEVATION:	DATUM:

SAMPLE no.	SAMPLE depth	blows per 6"	DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN	WELL CONST.	REMARKS
S-1	0'-2'	5 6 / 8 8			MEDIUM DENSE BLACK GRAVEL SIZE FILL TO 6" TO BROWN SAND AND GRAVEL SIZE FILL TO 2' WITH SOME SEAMS OF BLACK SILT SIZE PARTICLES (FILL)		CLARIFIER SLUDGE AND SLAG
S-2	5'-7'	2 2 / 3 2	5		LOOSE BLACK CINDERY SAND DRY FILL.		BLAST FURNACE FLUEDUST
S-3	10'-12'	2 2 / 3 2	10		VERY LOOSE BLACK CINDERY SAND SOME CINDER FRAGMENTS W/ SLIGHT BROWN STAINING DRY FILL		FLUEDUST AND SLAG
S-4	15'-17'	1 2 / 1 1	15		SIMILAR		FLUEDUST WITH SOME SLAG
S-5	20'-22'	2 10 / 10 11	20		MEDIUM DENSE GREENISH BLUE COARSE GRAVEL SIZE FILL WITH SOME SLAG FRAGMENTS, MOIST		BLAST FURNACE SLAG
S-6	25'-27'	1 2 / 5 10	25		LOOSE GRAVEL AND SAND SIZE GREY SLAG TO 25.5' TO SOFT BLACK PEAT SOME WOOD TO 26.0' TO LOOSE LIGHT BROWN FINE SAND TO 27' - BOTTOM OF BORING @ 27'		
			30				
			35				

NOTES: INFORMATION IN REMARKS COLUMN IS BASED ON EXAMINATION OF SAMPLES BY LTV PERSONNEL.

MALCOLM

BORING B-11

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-02-1
DATE: JUNE 12, 1985	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: EARTH DIMENSIONS	INSPECTOR: J. WHITNEY
DRILLING METHOD: 8" x 4 1/4" HOLLOW STEM AUGER	SAMPLING METHOD: 2" ø SPLIT SPOON AT 5' INTERVALS
ELEVATION:	DATUM:

SAMPLE no.	SAMPLE depth	blows per 6"		DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN	WELL CONST.	REMARKS
S-1	0'-2'	1	7			MEDIUM DENSE BROWN TO BLACK COARSE SAND TO GRAVEL SIZE FILL W/ SOME WOOD AND BRICK FRAGMENTS, DRY		HOT POURED SLAG FROM E+L RIGHT-OF-WAY
		8	22					
S-2	4.5'-6.5'		7					
		8	8	5		MEDIUM DENSE DARK BROWN COARSE SAND TO COARSE GRAVEL SIZE FILL (SLAG) W/ SOME WOOD FRAGMENTS, DRY.		MISC. FILL
		5						
S-3	9.5'-11.5'		7					
		6	8	10		FIRM LIGHT BROWN CLAYEY SILT, WET (LAKE SEDIMENT) LAMINATED. BOTTOM OF BORING @ 11.5'		
		10						
				15				
				20				
				25				
				30				
				35				

NOTES: INFORMATION IN REMARKS COLUMN IS BASED ON EXAMINATION OF SAMPLES BY LTV PERSONNEL.

BORING B-12

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-02-1
DATE: JUNE 19, 1985	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: EARTH DIMENSIONS	INSPECTOR: J. WHITNEY
DRILLING METHOD: 7"x 3¼" HOLLOW STEM AUGER 0'-30', REDRILLED W/ 8"x 3⅜" H.S.A.	SAMPLING METHOD: 2" ø SPLIT SPOON AT 5' INTERVALS
ELEVATION:	DATUM:

SAMPLE no.	SAMPLE depth	blows per 6"		DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN	WELL CONST.	REMARKS
S-1	0'-1.17'	9	32			VERY DENSE DARK BROWN SAND AND GRAVEL SIZE FILL, DRY LOOSE WHEN DISTURBED		STEEL MAKING SLAG AND BLAST FURNACE SLAG
		100/2"						
S-2	4.5'-5.3'		37	5		VERY DENSE DARK BROWN SAND AND GRAVEL SIZE FILL		STEEL MAKING SLAG AND BLAST FURNACE SLAG.
		100/4"						
S-3	9.5'-11.5'		95	10		SIMILAR		STEEL MAKING SLAG AND BLAST FURNACE SLAG.
		43	50					
		30						
S-4	14.5'-16.5'		8	15		SIMILAR		STEEL MAKING SLAG AND BLAST FURNACE SLAG
		17	24					
		20						
S-5	19.5'-21.5'		29	20		VERY DENSE OLIVE BROWN SAND, GRAVEL AND SILT SIZE FILL MOIST, SOME BRICK FRAGMENTS AND SLAG.		STEEL MAKING SLAG, BLAST FURNACE SLAG AND BRICK FRAGMENTS
		32	23					
		15						
S-6	24.5'-26.5'		14	25		VERY DENSE DARK BROWN SAND AND GRAVEL SIZE FILL, WET @ 25.5' to 25.7' SOME BRICK AND SLAG FRAGMENTS.		STEEL MAKING SLAG
		40	33					
		40						
			16					
S-7	29.5'-31.3'	42	50	30		VERY DENSE GREY/BLACK COARSE SAND AND GRAVEL SIZE FILL, DRY W/ SOME SLAG AND CINDER FRAGMENTS.		STEEL MAKING SLAG WITH SOME PEAQUARTZ
		100/4"						
S-8	34.5'-36.5'		56	35		EXTREMELY DENSE GRAY/BLACK COARSE SAND AND GRAVEL SIZE FILL WET WITH SOME SLAG AND BRICK FRAGMENTS. AUGER REFUSAL @ 39' (BOTTOM OF BORING) AUGERS LOST IN HOLE, ABANDONED, MOVED TO MW-8B*		
		37	66					
		100/4.5'						

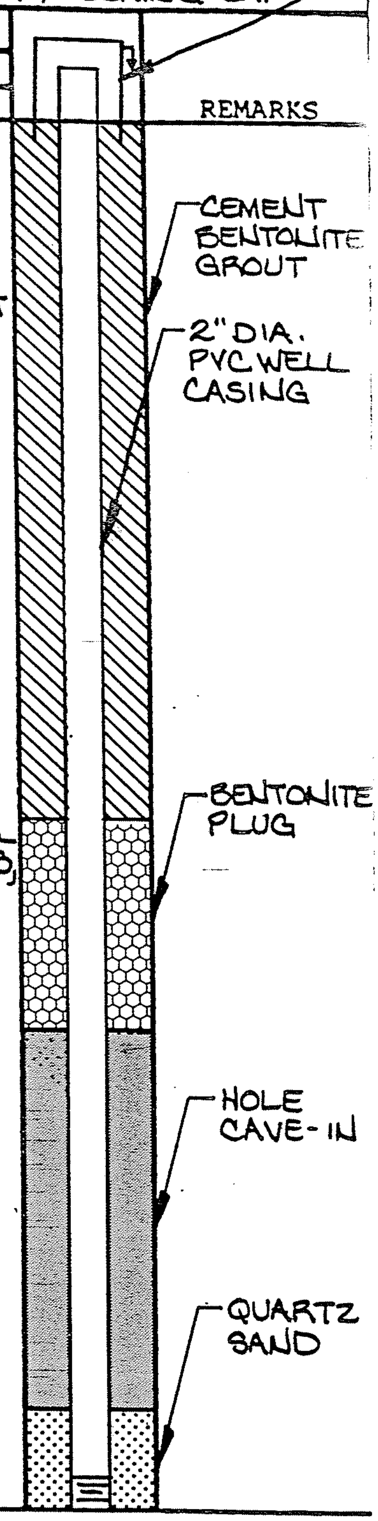
NOTES: EXTREMELY DIFFICULT AUGERING BETWEEN 17 + 19.5', 30' & DOWN AUGER REFUSAL @ 39' HAD TO HEAT THE AUGERS TO BREAK APART, LEFT AUGERS IN GROUND @ 1:30 (6-20-85) AUGERS LOST IN HOLE 7-3-85; INFORMATION IN REMARKS COLUMN IS BASED ON EXAMINATION OF SAMPLES BY LTV PERSONNEL.

* REDRILLED FIRST 30' W/ 8"x 3⅜" AUGERS (RAN OUT OF 7"x 3¼")

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-02-1
DATE: JUNE 18, 1985	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: EARTH DIMENSIONS	INSPECTOR: J. WHITNEY
DRILLING METHOD: 8" x 4 1/4" HOLLOW STEM AUGER	SAMPLING METHOD: 2" ø SPLIT SPOON AT 5' INTERVALS
ELEVATION:	

SAMPLE no.	depth	blows per 6"		DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN
S-1	0'-2'	7	5			MEDIUM DENSE DARK BROWN SAND AND GRAVEL SIZE FILL W/ SOME BRICK SILT SIZE PARTICLES
		8	9			
S-2	4.5'-6.5'		5	5		LOOSE BROWN SAND AND GRAVEL SILT SIZE FILL, MOIST
		5	4			
		6				
S-3	9.5'-11.0'		23	10		VERY DENSE DARK BROWN TO BLACK SAND AND GRAVEL SIZE FILL, DRY
		90	75			
S-4	14.5'-16.5'	1	WOH/18"	15		NO RECOVERY SAMPLE S-4
S-5	19.5'-20.08'		70	20		VERY DENSE BROWN SAND AND GRAVEL SIZE FILL W/ SOME SLAG FRAGMENTS, MOIST
		100/1"				
S-6	24.5'-26.5'	WOR	WOR	25		VERY SOFT BROWN SILT SIZE FILL, WET TO 26.25' TO BLACK FINE SAND SIZE FILL, WET TO 26.5'
		1	1			
S-7	29.5'-31.5'	WOR	3	30		LOOSE LIGHT GREENISH-GREY FINE SILTY SAND TO 31', MOIST TO STIFF LIGHT GREENISH GREY CLAYEY SILT LAMINATED WITH A BROWN VERY FINE SAND, DRY TO 31.5'
		3	9			
S-8	34.5'-36.5'		3	35		FIRM GREY SILTY CLAY MOTTLED W/ BROWN OXIDATION LAYERS, LAKE SEDIMENTS
		6	9			
		9				
			WOR			

REMARKS



NOTES: WOR - WEIGHT OF RODS
WOH - WEIGHT OF HAMMERS

BORING MW-7A

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-02-1
DATE: JUNE 18-19, 1985	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: EARTH DIMENSIONS	INSPECTOR: J. WHITNEY
DRILLING METHOD: 8" x 3 3/8" HOLLOW STEM AUGER	SAMPLING METHOD: 2" Ø SPLIT SPOON AT 5' INTERVALS
ELEVATION:	DATUM:

SAMPLE no.	SAMPLE depth	blows per 6"	blows per 6"	DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN	WELL CONST.	REMARKS
S-9	39.5-41.2'	1	8	40		SOFT GREY SANDY SILT W/ SOME COARSE SAND AND GRAVEL, SOME SHALE FRAGMENTS, WET, GLACIAL TILL	BOTTOM OF WELL	2" DIA. .010" SLOTTED PVC WELL SCREEN
		100/.2'				BOTTOM OF BORING @ 41.2'		
				45				
				50				
				55				
				60				
				65				
				70				
				75				

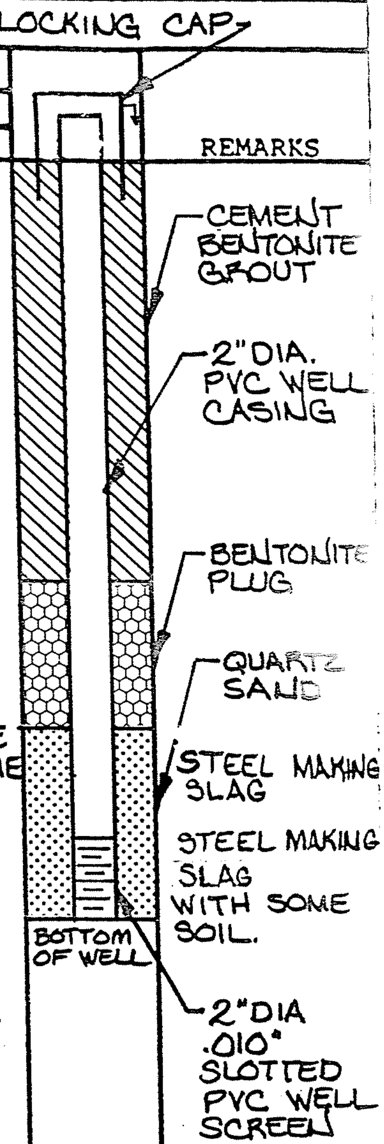
NOTES:

BORING MW-8B

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-02-1
DATE: JULY 8-9, 1985	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: EARTH DIMENSIONS	INSPECTOR: J. WHITNEY
DRILLING METHOD: 8" x 4 1/4" HOLLOW STEM AUGER	SAMPLING METHOD: 2" ø SPLIT SPOONS AT 5' INTERVALS
ELEVATION:	

SAMPLE no.	SAMPLE depth	blows per 6"		DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN
				5		
						SEE B-12
				10		
				15		
S-1	16.5'-18.1'	11	12			VERY DENSE DARK BROWN COARSE SAND AND GRAVEL SIZE FILL W/SOME BRICK AND SLAG FRAGMENTS
		30	50/1"			
S-2	20'-21.8'	66	45	20		EXTREMELY DENSE MOTTLED GREY GRAVEL SIZE FILL, MOIST W/ 40% SLAG FRAGMENTS
		33	100/3"			BOTTOM OF BORING @ 21.8' AUGER AND SAMPLER REFUSAL
				25		
				30		
				35		

REMARKS

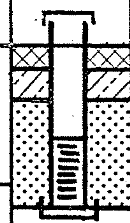


NOTES: INFORMATION IN REMARKS COLUMN BASED ON EXAMINATION OF SAMPLES BY LTV PERSONNEL.

BORING MW-3B

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-03-1
DATE: OCTOBER 4, 1985	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: ROCHESTER DRILLING	INSPECTOR: J. WHITNEY
DRILLING METHOD: HAND HELD AUGER (POWER, 6"Ø)	SAMPLING METHOD:
ELEVATION:	DATUM:

SAMPLE no.	SAMPLE depth	SAMPLE blows per 6"	DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN
					Grey Sand and Gravel size FILL (grading to Reddish Brown) at 6" (Steel making Slag and Dust) to 4'-6".
S-1	5.5'		5		Clear transition to Soft black Organic Matter to 5'-0", wet grading to FINE SAND with reddish brown staining
			10		Soft grey Clayey Silt retrieved from bottom of flush-joint casing used to set well.
			15		
			20		
			25		
			30		
			35		



PROTECTIVE CAP

CEMENT, CAP 0-1'

BENTONITE PELLETS 1'-1.8'

SAND 1.8'-5.'

0.010 SCREEN 3'-5'

CAP AT 5'

NOTES:

BORING MW-4B

PROJECT: LTV MARILLA STREET	PROJECT NO: 848-03-1110
DATE: OCTOBER 25, 1985	LOCATION: 5'W OF MW-4A
DRILLING CONTRACTOR: ROCHESTER DRILLING	INSPECTOR: KCO
DRILLING METHOD: 8" O.D. x 3 3/4" I.D. HOLLOW STEM AUGER	SAMPLING METHOD: SPLIT SPOON SAMPLE STANDARD PENETRATION TEST
ELEVATION:	DATUM:

SAMPLE no.	depth	blows per 6"		DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN	WELL CONST.	REMARKS
S-1	0'-2'	3	8			MEDIUM DENSE, REDDISH BROWN, SAND AND GRAVEL, SOME SILT, WET, SLAG, FILL		CEMENT CAP 0' TO 3'
		9	14			CHANGING @ 4 FT TO:		BENTONITE PELLETS 3' TO 7'
S-2	5'-7'	20	22	5		DENSE, BROWN, SAND, SOME GRAVEL, SATURATED, PLANT FRAGMENTS AND ROOTS, YELLOWISH-BROWN LENSES		
		22	20					WELL SORTED SAND 7'-11'
S-3	10'-12'	10	3	10		CHANGING AT 11.0' FT TO:		WELL SCREEN 9'-11
		3	5			STIFF, GREY, CLAYEY SILT, MOIST		
				15		BOTTOM OF BORING AT 11 FT.		
				20				
				25				
				30				
				35				

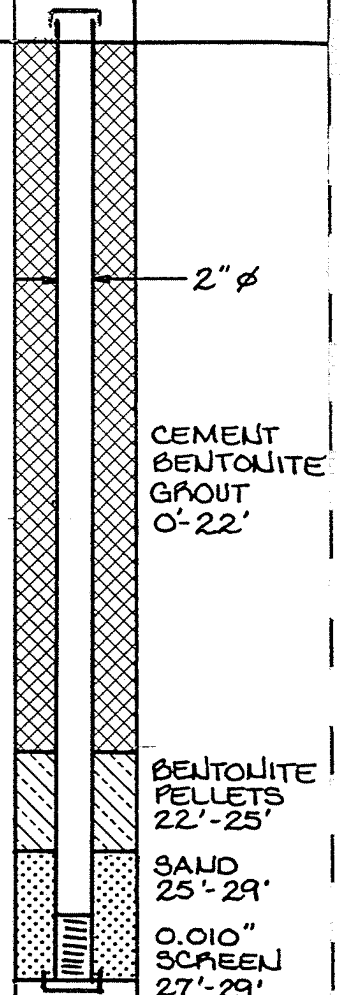
NOTES: CLASSIFICATION BASED UPON VISUAL INSPECTION BY MPI INSPECTOR IN FIELD. WELL 2" DIAMETER PVC CASING WITH SLOTTED SCREEN. PROTECTIVE STEEL CASING WITH LOCKING CAP OVER STICK-UP.

BORING MW-7B

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-03-1
DATE: SEPTEMBER 27, 1985	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: ROCHESTER DRILLING	INSPECTOR: J. WHITNEY
DRILLING METHOD: 8" x 3 3/4" HOLLOW STEM AUGERS	SAMPLING METHOD: 2" ø SPLIT SPOON
ELEVATION:	DATUM:

SAMPLE no.	SAMPLE depth	blows per 6"	blows per 6"	DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN
				5		
				10		
				15		
				20		
				25		
S-1	29'-31'	6	8			Firm grey Silty Clay laminated with fine brown Sand, moist, Lake Sediments.
		13	13	30		
				35		

PROTECTIVE CASING



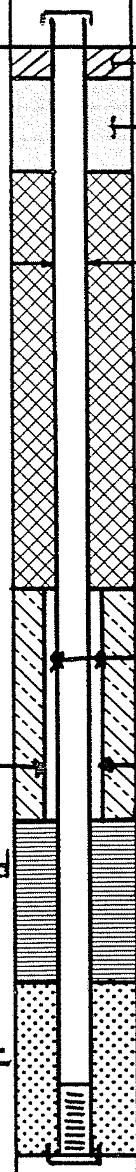
NOTES:

BORING MW-9B

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-03-1
DATE: STARTED: OCT 1, COMPLETED: OCT 3	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: ROCHESTER DRILLING	INSPECTOR: J. WHITNEY
DRILLING METHOD: 8" x 3 3/4" HOLLOW STEM AUGER	SAMPLING METHOD: 2" Ø SPLIT SPOON
ELEVATION:	DATUM:

SAMPLE no.	SAMPLE depth	blows per 6"		DEPTH	STRATA	SOIL DESCRIPTION: density, color, SOIL, admixtures, moisture, other notes, ORIGIN
S-1	5'-7'	10	40	5		Very dense brown Gravel and Sand size FILL consisting of Brick and Slag fragments, moist
		22	9			
S-2	10'-12'	9	10	10		Dense grey/black Sand and Gravel size FILL (SLAG) and brick fragments, dry.
		14	12			
S-3	15'-17'	9	6	15		Medium dense brown Sand and Gravel size FILL (SLAG) and brick fragments, dry.
		8	9			
S-4	20'-22'	18	18	20		Dense dark brown Sand and Gravel size FILL (SLAG) and brick fragments, moist.
		20	7			
S-5	25.5'-26'		50/6	25		Very dense dark brown Sand and Gravel size FILL (SLAG) and brick fragments, moist.
S-6	30'-32'	7	6	30		Loose brown Sand and Gravel size FILL (SLAG) and brick, wet
		6	5			
S-7	35'-37'	4	5	35		Firm grey Silty Clay with trace organics, grading to stiff grey TILL, damp.
		11	11			

PROTECTIVE CASING

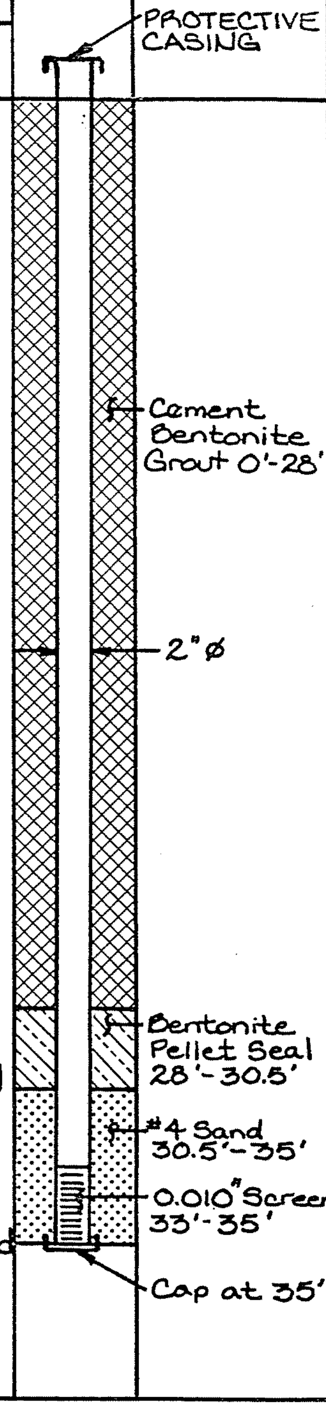


NOTES: POOR SAMPLE RECOVERY S-3

BORING MW-105

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-03-1
DATE: SEPTEMBER 30, 1985	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: ROCHESTER DRILLING	INSPECTOR: J. WHITNEY
DRILLING METHOD: 8"x 3 3/4" HOLLOW STEM AUGER	SAMPLING METHOD: 2" ø SPLIT SPOON
ELEVATION:	DATUM:

SAMPLE no.	SAMPLE depth	blows per 6"		DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN
				5		
				10		
				15		
				20		
				25		
S-1	30'-32'	2	2	30		Loose brown Sand and Gravel size FILL, moist (SLAG and STEEL MAKING DUST)
		2	2			
S-2	35'-37'	3	5	35		Firm grey Silty CLAY, laminated with fine brown Sand, moist, Lake Sediments.
		8	10			

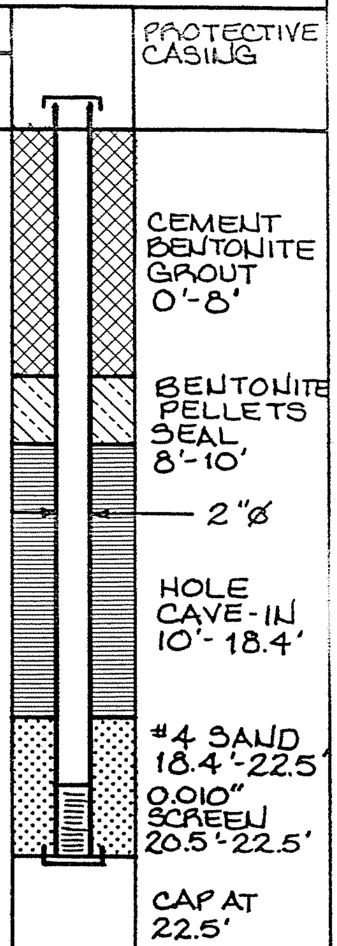


NOTES:

BORING MW-11B

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-03-1
DATE: SEPTEMBER 30, 1985	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: ROCHESTER DRILLING	INSPECTOR: J. WHITNEY
DRILLING METHOD: 8" x 3 3/4" HOLLOW STEM AUGERS	SAMPLING METHOD: 2" Ø SPLIT SPOON
ELEVATION:	DATUM:

SAMPLE no.	SAMPLE depth	blows per 6"		DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN
S-1	20'-22'	12	4	20		Fill to 21.0' to loose grey Fine SAND to 21.5' to soft grey Silty CLAY, wet
		2	3			

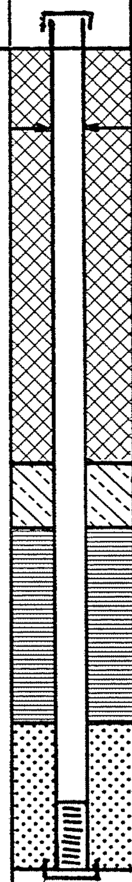


NOTES:

BORING MW-12B

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-03-1
DATE: OCTOBER 3, 1985	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: ROCHESTER DRILLING	INSPECTOR: J. WHITNEY
DRILLING METHOD: 8" x 3¾" HOLLOW STEM AUGER	SAMPLING METHOD: 2" Ø SPLIT SPOON @ 5' INTERVALS
ELEVATION:	DATUM:

SAMPLE no.	SAMPLE depth	blows per 6"		DEPTH	STRATA	SOIL DESCRIPTION (density, color, SOIL, admixtures, moisture, other notes, ORIGIN)	PROTECTIVE CASING
							2"Ø
S-1	5'-7'	7	10	5		Very dense brown Sand and Gravel size FILL (SLAG) and brick fragments, damp	CEMENT BENTONITE GROUT 0'-13'
		35	40				
S-2	10'-12'	12	17	10		Very dense brown Sand and Gravel size FILL (SLAG) and some brick fragments, damp	
		25	20				BENTONITE PELLET SEA[L] 13'-15'
S-3	15'-17'	3	11	15		Medium dense brown Sand and Gravel size FILL (SLAG) with little brick fragments.	HOLE CAVE-IN 15'-21'
		10	11				
S-4	20'-22'	4	3	20		Loose brown Sand and Gravel size FILL (SLAG) wet clear transition to loose brown fine Sand @ 21'-6", wet. Same to 26'	#4 SAND 21'-25.5'
		2	3				
S-5	22'-24'	6	7				
		7	7				0.010" SCREEN 23.5'-25.5'
S-6	25'-27'	2	3	25		Clear transition to soft brown Clayey Silt laminated with fine brown SAND, moist	CAP AT 25.5'
		4	4				
				30			
				35			



NOTES:

MALCOLM PIRNIE

SHEET ___ OF ___

BORING MW-13B

PROJECT: LTV MARILLA STREET	PROJECT NO: 848-03-1110
DATE: OCTOBER 25, 1985	LOCATION: ~100' W OF MW-4A + MW-4B
DRILLING CONTRACTOR: ROCHESTER DRILLING	INSPECTOR: KCO
DRILLING METHOD: 8" O.D. X 3 3/4" I.D. HOLLOW STEM AUGER	SAMPLING METHOD: SPLIT SPOON SAMPLE STANDARD PENETRATION TEST
ELEVATION:	DATUM:

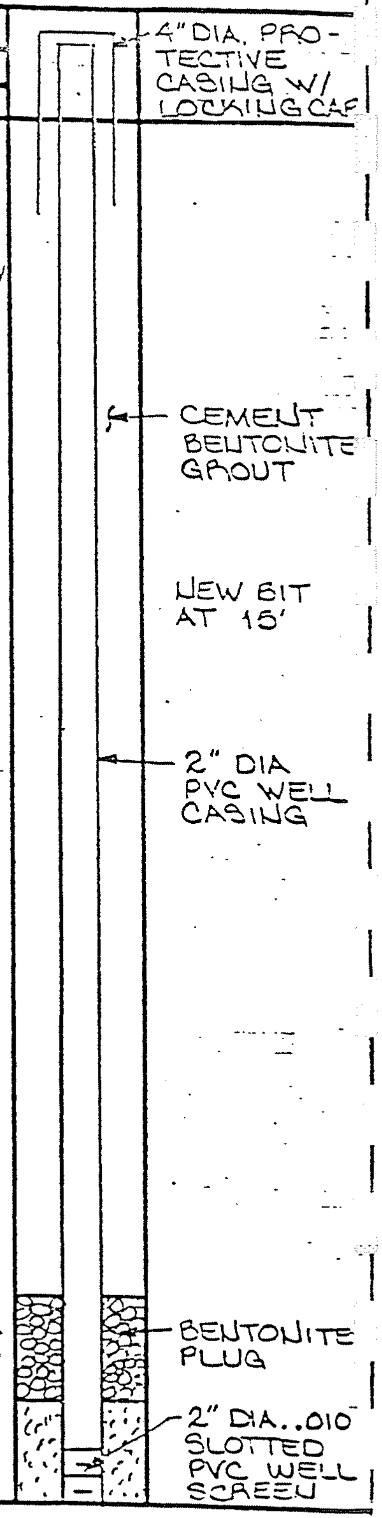
SAMPLE no.	depth	blows per 6"		DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN	WELL CONST.	REMARKS
S-1	0'-2'	5	5			MEDIUM DENSE, BLACK, SAND AND GRAVEL, SOME SILT, WET, SLAG, BRICK, CONCRETE, FILL		CEMENT CAP 0'-4'
		10						
				5		CHANGING AT 6FT TO:		BENTONITE PELLETS 4'-8'
S-2	5'-7'	1	2					
		1	2			VERY LOOSE, BROWN, FINE SAND, TRACE GRAVEL, WET, PLANT FRAGMENTS, YELLOWISH-BROWN LENSES.		WELL SORTED SAND 8'-12'
				10				
S-3	10'-12'	3	4			CHANGING AT 11'-10" TO:		WELL SCREEN 10'-12'
		4	3					
S-4	12'-14'	2	3			FIRM, GREY, CLAYEY SILT, MOIST.		
		4	4					
				15				
						BOTTOM OF BORING @ 12 FT		
				20				
				25				
				30				
				35				

NOTES: CLASSIFICATION BASED UPON VISUAL INSPECTION BY MPI INSPECTOR IN FIELD. WELL 2" DIAMETER PVC CASING WITH SLOTTED SCREEN. PROTECTIVE STEEL CASING WITH LOCKING CAP OVER STICK-UP.

BORING 14A

PROJECT: LTV MARILLA STEET LANDFILL	PROJECT NO: 84-8-04-9
DATE: JULY 1, 1986	LOCATION: SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: ROCHESTER DRILLING	INSPECTOR: J. AMEND
DRILLING METHOD: 8" x 4 1/4" HOLLOW STEM AUGER	SAMPLING METHOD: 2" Ø SPLIT SPOON AT 5' INTERVALS
ELEVATION:	DATUM:

SAMPLE no.	SAMPLE depth	blows per 6"	blows per 6"	DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN
S-1	1-5'	18	29			MEDIUM DENSE, DARK BROWN SAND AND GRAVEL SIZE FILL AND SLAG, SOME YELLOW BRICK, MED MOIST NO RECOVERY SAMPLE DEPTH 5-7 FEET
		40	27			
				5		
S-2	10-12'	25	100/3	10		VERY DENSE, SILVER GRAY SLAG MIXED WITH DARK BROWN SAND AND GRAVEL MOIST
S-3	15-17'	29	43	15		MEDIUM DENSE LT BROWN TO DARK BROWN FINE GRAVEL AND SLAG, SOME BRICK AND GLASS FRAGMENTS, MOIST
		45	45			
S-4	20-22'	33	54	20		MEDIUM DENSE RED BROWN TO BLACK FINE TIGHTLY PACKED SAND AND FILL SOME FINE SLAG AND BRICK, MOIST
		26	42			
S-5	25-27'	40	26	25		MEDIUM DENSE, RED BROWN WITH GRAY STREAKS, FINE SLAG AND FILL MATERIAL, MOIST
		44	39			
S-6	30-32	100/5		30		VERY DENSE, BLACK FINE [illegible] GRAVEL AND SAND, WET
S-7	35-37	9	18	35		LOOSE GRAY, BLACK SILT SIZE FILL MIXED WITH SMALL STONES, WET.
		16	17			



NOTES:

MALCOLM

BORING 14B

PROJECT: LTV/ MARILLA STREET LANDFILL	PROJECT NO: 848-03-1
DATE: JULY 1, 1986	LOCATION: SOUTH BUFFALO, NEW YORK
ELEVATION:	DATUM:

SAMPLE no.	SAMPLE depth	blows per 6"		DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN	WELL CONST.	REMARKS
S-8	40-42	7	16			VERY LOOSE TO 41 MEDIUM GREEN/GRAY CLAY MOTTLED @ 41'	BOTTOM OF WELL	QUARTZ SAND; NATIVE CLAY
		23	37					
				45				
				50				
				55				
				60				
				65				
				70				
				75				

NOTES:

APPENDIX E

GROUND SAMPLING
AND
ANALYSIS PLAN

MARILLA STREET LANDFILL GROUNDWATER SAMPLING AND ANALYSIS PLAN

LTV Steel Company
Buffalo, New York

August 1985
Project: 848-02-9

LTV STEEL COMPANY

MARILLA STREET LANDFILL

GROUNDWATER SAMPLING AND ANALYSIS PLAN

INTRODUCTION

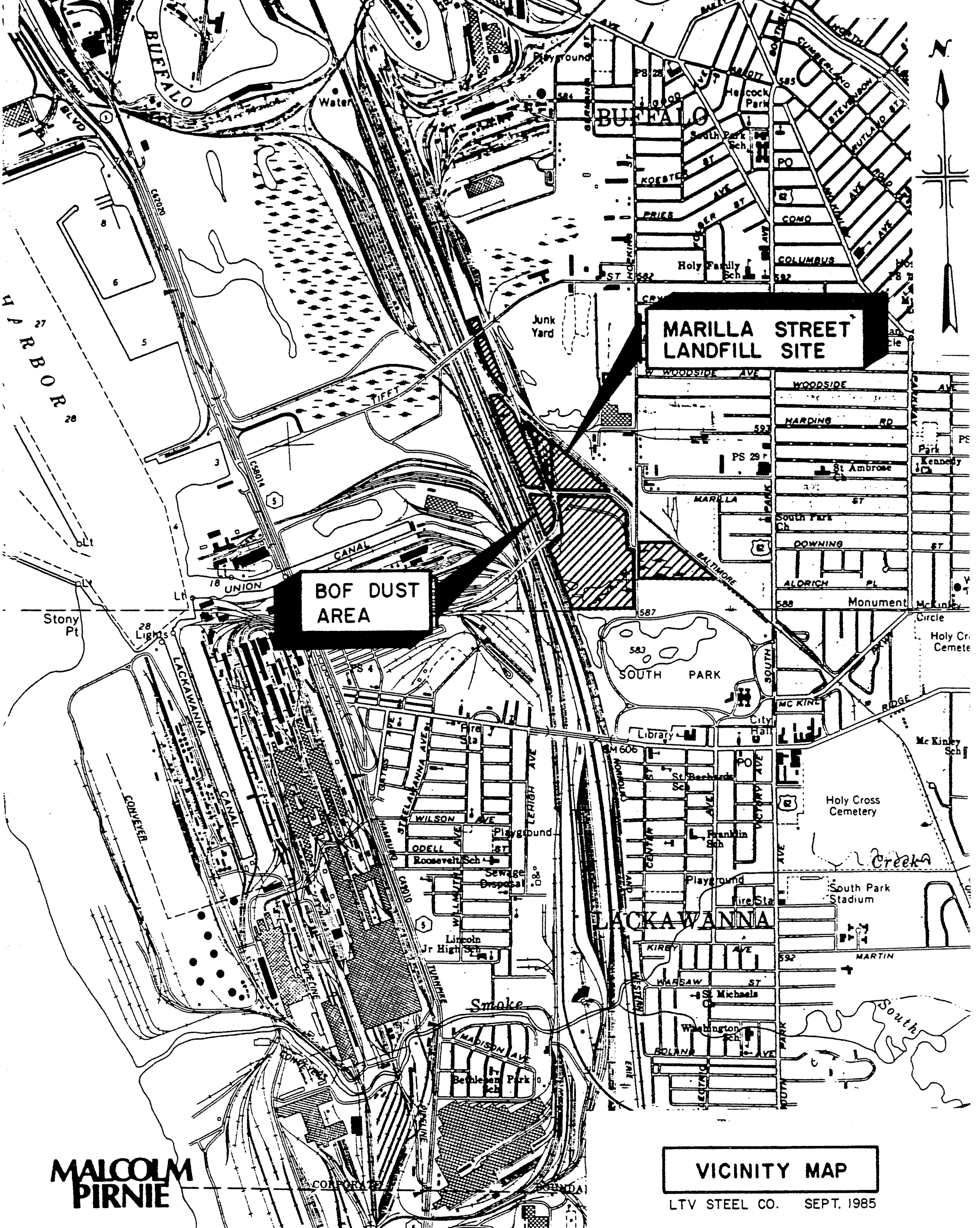
The Marilla Street Landfill (See Figure 1 for locations) has been operated by LTV Steel Company (previously Republic Steel Corporation) since 1930. A variety of wastes have been disposed of at the site including: slag, precipitator dust (including BOF dust), clarifier sludge, railroad ties, checker bricks, scrap wood, tool scale, blast furnace dust, minus fines, BOD brick and construction debris.

Since the BOF dust is classified as an "EP Toxic" characteristic hazardous waste under the Resource Conservation and Recovery Act (RCRA) and was disposed of at the landfill site in a waste pile after November 19, 1980 and the waste pile will be closed as a landfill, the site is subject to groundwater monitoring requirements established under 40 CFR Part 265, Subpart F of RCRA. In accordance with RCRA, a groundwater monitoring system has been installed and the following groundwater sampling and analysis plan has been prepared. This groundwater sampling and analysis plan includes:

- Description of the Groundwater Monitoring System
- Sample Collection Procedures
- Sample Handling Procedures
- Analytical Methods
- Chain of Custody Control Procedures

A detailed discussion of each is presented below.

FIGURE 1



VICINITY MAP

LTV STEEL CO. SEPT. 1985

DESCRIPTION OF THE GROUNDWATER MONITORING SYSTEM

A groundwater monitoring system consisting of eighteen (18) monitoring wells has been developed. Four of the wells (viz. 7B - upgradient and 4B, 9B and 13B - downgradient) will serve as the RCRA monitoring wells for the BOF Dust Area. The remaining wells will be utilized to monitor groundwater quality for the entire site. The well locations are shown on Plate 3. Based on preliminary hydrogeologic evaluations and site inspections, both shallow and deep groundwater systems exist beneath the site. The shallow groundwater flows toward the northwest and appears to be discharging to the pond at the northwest corner of the site. The direction of groundwater flow in the deep aquifer appears to be to the west toward Lake Erie.

The monitoring wells consist of two-inch diameter PVC casing with 2 feet of 0.02-inch machine-slotted PVC well screen. All monitoring wells except 5B are equipped with protective casings with locking caps.

SAMPLE COLLECTION

Groundwater will be withdrawn from the monitoring wells with bailing pumps or hand bailors. To safeguard against collecting non-representative stagnant water or contaminating the sample, the person withdrawing the groundwater samples should adhere to the following step by step procedure:

Step 1: Measure and record the distance from the top of the casing to the water surface using a graduated string with a weight attached or an electronic water level sensing device.

Step 2: If the depth of the well is unknown, measure and record the distance to the bottom of the well using the graduated string with the weight attached.

Step 3: Determine the volume of water in the well casing as follows:

Well Casing Size	Well Casing Volume
2 in. i.d.	0.0136 gal/in.

Step 4: Pump or bail 3 volumes of water from the well.

Example:
The well contains 12" of water.
Inside well diameter equals 2"
1" of water = 0.0136 gallons
Amount of water to be pumped is:
(3 volumes) x (12 inch/volume) x (0.0136 gal/inch) = 0.49 gal.

If the well is pumped dry before the 3 volumes are withdrawn and does not recharge in a reasonable length of time, allow the necessary time for the well to refill and then collect the sample. This may require that the well be left overnight.

Wells which cannot be purged to dryness will be purged with the pump positioned such that all stagnant water will be exchanged. The purge water will be monitored for pH, conductivity and temperature until stabilization, or to a maximum of five (5) well volumes.

Step 5: If significant amounts of silt are present in the well, attempts will be made to remove as much from the well as possible prior to sample collection. This may require pumping or bailing the well several times. In the event the silt cannot be removed, care will be taken during sample collection not to disturb the sediments in the bottom of the well.

Step 6: A Teflon hand bailer will be used whenever possible for sample collection in order to prevent cross-contamination of the wells. A bladder pump may be used for sample collection only if properly cleaned prior to each use.

Step 7: Prior to collecting the sample, the bailer or pump will be cleaned using the following procedure:

A. Bailer

i. Wash in a detergent solution using bottle brush

ii. Rinse with tap water

iii. Rinse again using distilled water or sample

B. Pump

i. Wash all external surfaces of pump and/or other wetted parts with detergent solution

ii. Pump approximately 2 gallons of tap water to waste

iii. Allow to drain prior to use

Step 8: Lower the bailer or pump into the well to collect sample. Bail or pump some sample to waste prior to collection. Record the depth at which the sample was collected.

Step 9: Pour sample into the appropriate container taking extreme caution to prevent any contamination. All containers should be filled completely.

Step 10: If chemical preservatives were not added during container preparation, add chemical preservatives (addition of chemical preservatives during container preparation is recommended) and handle as appropriate.

Step 11: Repeat Steps 1-10 at each of the specified monitoring locations.

SAMPLE HANDLING

Samples for total organic halogen determinations will be collected in amber glass bottles with Teflon or foil-lined caps. Samples for persistent organic determinations will be collected in glass bottles with Teflon or foil-lined caps. The glass containers will be dried in a muffle furnace at 400° C before use. The remaining samples will be collected in either glass or plastic bottles. These sample containers will be washed with detergent, and triple-rinsed with tap water, followed by nitric acid (sulfuric acid will be used on containers for nitrate determination), and then rinsed with distilled water. Sterilized bottles will be used to collect samples for coliform determinations.

Special preservation methods will be utilized to retard biological and chemical changes that can take place in the samples while they are being transported and awaiting analysis. Table I, attached, lists the volume of sample required for analysis, maximum recommended holding times and preservation methods for each of the parameters of interest.

A chain-of-custody record will be attached to the sample as it is collected. The sample containers will be packaged in such a way as to prevent breakage and spillage and will be transported to the laboratory performing the analysis as quickly as possible.

SAMPLE ANALYSIS

Analysis of the groundwater samples will be performed in accordance with EPA guidelines or as outlined in one of the following publications:

- Standard Methods for the Examination of Water and Wastewater, 15th Ed., APHA, 1980.
- "Manual of Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1979.

Table II, attached, contains a summary of the analytical procedures which will be utilized. Four (4) replicate measurements will be performed on parameters used as indicators of groundwater contamination (i.e. pH, specific conductance, total organic halogen and total organic carbon) during the first year (viz. to establish background values) of RCRA groundwater monitoring for the BOF Dust Area. The parameters to be routinely monitored after the first year will be specified based on the background monitoring results.

CHAIN OF CUSTODY CONTROL

The chain of custody records will be maintained by the field sampling personnel, from the time the sample is collected, until it is delivered to the laboratory or transferred to an authorized custodian. The following information will be recorded as part of the chain of custody control:

- location of sample collection point, i.e. monitoring well No.
- description of the sample including volume and visual characteristics (i.e. color, sediment, presence of oil, turbidity, etc.).
- identification of person performing the sampling.
- time and date of sampling.
- laboratory identification number (if appropriate).
- method of collection (i.e. pumped, manual or automatic sampler).
- well data (i.e. depth of sampling, location of water table prior to bailing).
- method of preservation.
- name and address of client (i.e. LTV Steel Company).
- name and address of analytical laboratory performing analysis.
- type and number of sample containers.

An example of the Chain-of-Custody Record which will be attached to the containers is provided as Figure 2.

LTV STEEL COMPANY
MARILLA STREET LANDFILL

SAMPLING AND ANALYSIS PLAN
TABLE I

PARAMETER	PRESERVATION METHOD[(a)]	MINIMUM VOLUME REQUIRED (ml)	MAXIMUM RECOMMENDED HOLDING TIME
Indicator Parameters			
pH	none-required	50	6 hrs[(b)]
Specific Conductance	none-required	100	24 hrs[(b)]
Total Organic Carbon	H_2SO_4 to pH 2	150	28 hrs
Total Organic Halogen	none-required	500	10 days
		Subtotal 800	
Groundwater Quality Parameters			
Chloride	none-required	100	7 days
Metals[(c)]	HNO_3 to pH 2	200	6 mos
Phenols	H_2SO_4 to pH 2	500	28 days
Sulfate	none-required	50	7 days
		Subtotal 850	
Drinking Water Parameters			
Metals[(d)]	HNO_3 to pH 2	300	6 mos
Persistent Organics[(e)]	none-required	1000	7 days
Nitrate	H_2SO_4 to pH 2	100	24 hrs
Turbidity	none-required	100	48 hrs
Coliform	none-required	100	6 hrs
Fluoride	none-required	300	7 days
Radium	HNO_3 to pH 2	1000	6 mos
Gross Alpha	HNO_3 to pH 2	1000	6 mos
Gross Beta	HNO_3 to pH 2	1000	6 mos
		Subtotal 4900	

Notes:

(a) All samples will be kept on ice (@4°C) prior to analysis.

(b) Field measurement recommended

(c) Metals analyzed will include iron, manganese and sodium.

(d) Metals analyzed will include arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver.

(e) Persistent organics include endrin, lindane, methoxychlor, toxaphene, 2,4-D and 2,4,5-TP.

LTV STEEL COMPANY
MARILLA STREET LANDFILL

SAMPLING AND ANALYSIS PLAN
TABLE II

PARAMETER	METHOD NO.[e]
Indicator Parameters	
pH[a]	9040
Specific Conductance[a]	9050
Total Organic Carbon	9060
Total Organic Halogen	9020
Ground Water Quality Parameters	
Chloride	9252
Metals[b]	3005
Phenols	9066, 9065
Sulfate	9038
Drinking Water Parameters	
Metals[c]	7000
Persistent Organics[d]	8000
Nitrate	9200
Turbidity	180.1[f]
Coliform	9131, 9132
Fluoride	340.1[f]
Radium	9320
Gross Alpha	9310
Gross Beta	9315

NOTES:

(a) Field measurement recommended.

(b) Metals include iron, manganese and sodium.

(c) Nitric acid digestion, flame or furnace atomic absorption will be utilized for barium, cadmium, chromium, lead and silver; Gaseous hydride-flame atomic absorption or furnace atomic absorption for arsenic and selenium; cold vapor, atomic absorption will be utilized for mercury.

(d) Persistent organics include endrin, lindane, methoxychlor, toxaphene, 2,4,-D and 2,4,5-TP.

(e) EPA Test Methods for Evaluating Solid Waste Physical/ Chemical Methods - SW-846.

(f) EPA Manual of Methods for Chemical Analysis of Water and Wastes

CHAIN OF CUSTODY RECORD

Client Name:________________
Address:________________

Monitoring Well No:____________

Sample Description	Collected By: Date: Time:	Sampling Method	Depth of Sampling Depth of Water Table	Characteristic(s) to be tested	Method of Preservation	Received By: Date:	Tested By: Date:

Laboratory:________________
Address:________________

Laboratory Identification No:________

Comments:________________

FIGURE 2

APPENDIX F

COMPREHENSIVE GROUND WATER QUALITY ASSESSMENT PROGRAM OUTLINE

LTV STEEL COMPANY

MARILLA STREET LANDFILL

COMPREHENSIVE GROUNDWATER QUALITY ASSESSMENT PROGRAM

OUTLINE

1.0 INTRODUCTION

LTV Steel Company owns the Marilla Street Landfill. The BOF (Basic Oxygen Furnace) Dust Area of the Marilla Street Landfill received BOF Dust which was classified as an "EP Characteristic Hazardous" waste due to lead leachability. Since the BOF Dust Area is being closed as a landfill, it is subject to the groundwater monitoring requirements under Part 265, Subpart F of RCRA.

In accordance with RCRA, the following outline of a plan for development of a comprehensive groundwater quality assessment program has been prepared. This outline describes a comprehensive groundwater monitoring program which will be capable of determining:

- Whether hazardous wastes or hazardous waste (viz. Appendix VIII) constituents have entered the groundwater.
- The rate and extent of migration of hazardous wastes or hazardous waste constituents in the groundwater.
- The concentrations of hazardous waste or hazardous waste constituents in the groundwater.

The following outline also provides the background information necessary for specifying:

- o Groundwater monitoring System Details
- o Sampling Procedures.
- o Analytical Methods
- o Evaluation Procedures
- o Implementation Schedule

A brief discussion of each is presented below.

2.0 GROUNDWATER MONITORING SYSTEM DETAILS

2.1 Existing Monitoring System

The existing groundwater monitoring system is described in the Groundwater Sampling and Analysis Plan attached as Appendix 2-C.

2.2 Additional Monitoring Wells

In order to provide a comprehensive groundwater monitoring system, it may be necessary to install additional groundwater monitoring wells located as follows:

a. Shallow wells located downgradient of the BOF Dust Area based on the direction of flow in the shallow groundwater system.

b. Deep wells located upgradient and/or downgradient of the BOF Dust Area based on the direction of flow in the deep groundwater system.

The need, number, location, depth and construction details of additional monitoring wells will be estalished based on the estimated rate, extent and direction of the migration of hazardous waste constituents in the groundwater.

2.3 Surface Water Monitoring

Due to the numerous drainage ditches and ponds located in close proximity to the BOF Dust Area and the Marilla Street Landfill, it is possible that contamination of the shallow groundwater would result in contamination of the surface water. Therefore, in order to determine the extent of migration, it may be necessary to collect surface water samples. The need and location of surface water sampling will be determined based on the existing groundwater monitoring data and the flow pattern(s) of the surface water.

3.0 SAMPLING PROCEDURES

3.1 Sample Collection

a. Groundwater: Samples will be collected from selected existing and proposed monitoring wells. Groundwater will be withdrawn from the monitoring wells with dedicated teflon hand bailers. To safeguard against collecting non-representative samples, the step-by-step procedure provided in the Groundwater Sampling and Analysis Plan should be followed (See Appendix 2-C).

b. Surface Water: Procedures for collecting surface water samples will be developed based on the physical characteristics of flow within the drainage ditch or pond in order to adequately assess pollutant transfer.

3.2 Sample Handling

Specially prepared sample containers will be utilized for sample collection and special preservation methods will be undertaken to prevent any biological or chemical alterations of the samples. The type of containers (i.e. glass or plastic) and the method of preservation will be specific to the analyses being performed. A chain of custody record similar to that specified in the Groundwater Sampling and Analysis Plan (See Appendix 2-C) will be attached to the samples as they are collected. The samples will be shipped to the laboratory performing the analyses as quickly as possible.

4.0 ANALYTICAL METHODS

4.1 Appendix VIII Constituents

The list of Appendix VIII constituents for which the samples will be analyzed will be developed based on the following information:

a. The results of routine groundwater monitoring analyses.

b. The suspected source of the contamination.

c. Knowledge of the BOF Dust (viz. waste characteristics).

4.2 Sample Analysis

Analysis of all samples will be performed in accordance with EPA guidelines or as outlined in one of the following publications:

a. Standard Methods for the Examination of Water and Wastewater, 16th Ed., APHA 1985.

b. Manual of Methods for Chemical Analysis of Water and Wastes, U.S.Environmental Protection Agency (EPA), March 1983.

The actual pollutants to be analyzed for and the recommended analytical procedures will be specified prior to sample collection.

5.0 EVALUATION PROCEDURES

In order to fully evaluate the effect of the facility on groundwater quality, the following evaluation procedures will be utilized:

5.1 Pollutant Concentrations

Whether hazardous wastes or hazardous waste constituents have entered the groundwater as a result of the facility and the concentration of these hazardous wastes or hazardous waste constituents will be determined by:

a. Comparing upgradient to downgradient groundwater quality.

b. Comparing present groundwater quality to previous groundwater quality - if analyses of the pollutant of interest have been previously performed.

c. Comparing present groundwater quality to the National Interim Primary Drinking Water Standards.

5.2 Extent of Migration

The extent of migration of hazardous wastes or hazardous waste constituents will be determined by evaluating whether groundwater contamination has affected surface water quality and/or downgradient groundwater monitoring wells (existing or additional).

5.3 Rate of Migration

The rate of migration of hazardous wastes or hazardous waste constituents will be estimated using the following modifications of Darcy's Law:

$$\bar{v} = \frac{k\ dh/dl}{\theta}$$

where: v = average velocity (i.e. rate of migration)

k = permeability

dh/dl = slope of potentiometric or piezometric surface in direction of groundwater flow.

θ = porosity of the soil

The permeability of the soil beneath the facility will be measured in the field utilizing the existing or proposed groundwater monitoring wells. Either the falling-head method or the well recharge method will be used depending upon the groundwater elevation. The porosity of the soil will be determined based on existing literature and hydrogeologic information.

6.0 IMPLEMENTATION SCHEDULE

If analyses performed under the routine groundwater monitoring program confirm that the BOF Dust Area may be affecting groundwater quality, the following schedule for preparation and implementation of a comprehensive groundwater quality program will be adhered to:

6.1 Within 7 days of confirmation of possible groundwater contamination, notify the Regional Administrator in writing which parameters/constituents have shown statistically significant changes.

6.2 Within 15 days of confirmation of possible groundwater contamination, prepare a specific plan (based on the outline provided herein) certified by a qualified geologist or geotechnical engineer for submission to the Regional Administrator of the Environmental Protection Agency (EPA).

6.3 Within 30 days of plan submittal: install additional monitoring wells (if required); establish additional monitoring points (if required); and collect first set of samples.

6.4 Within 15 days of completion of analyses, submit a written report to the Regional Administrator of the EPA containing an assessment of the groundwater quality.

6.5 Within 90 days of possible groundwater contamination, submit to the Regional Administrator an application for permit modification to establish a compliance monitoring program and/or take corrective action.

APPENDIX G

GROUND WATER QUALITY STANDARDS

WATER QUALITY REGULATIONS

SURFACE WATER AND GROUNDWATER CLASSIFICATIONS AND STANDARDS

New York State
Codes, Rules and Regulations
Title 6, Chapter X
Parts 700-705

New York State Department of Environmental Conservation

This booklet contains New York State water quality regulations which were initially promulgated in 1950. Numerical standards for groundwater (Part 703) were last revised in 1978, and major revisions were made to the surface water regulations (Part 701) in 1985. Presented here are the complete regulations with revisions through March 31, 1986 as published in the New York State Official Compilation of Codes, Rules and Regulations. Please note that printing errors in the equations for calculating ammonia standards (Appendix 31, page 502.34) have been corrected by the Department of Environmental Conservation.

PART 700

TESTS OR ANALYTICAL DETERMINATIONS

(Statutory authority: Environmental Conservation Law, § 17-0303)

Historical Note

Part repealed, new filed: April 28, 1972; Feb. 25, 1974 eff. 30 days after filing.

Section 700.1 Collection of samples. In making any tests of analytical determinations to determine compliance or noncompliance of sewage, industrial wastes or other waste discharges with established standards, samples shall be collected in such manner and at such locations as are approved by the commissioner. In approving such locations, the commissioner shall be guided by the fact that:

(a) there must be prompt mixing of the discharge with the receiving waters;

(b) the mixing will not interfere with biological communities to a degree which is damaging to the ecosystem; and

(c) the mixing will not diminish other beneficial uses disproportionately.

Historical Note

Sec. repealed, new filed: April 28, 1972; Feb. 25, 1974 eff. 30 days after filing.

700.2 Tests or analytical determinations. Tests or analytical determinations to determine compliance or noncompliance with standards shall be made in accordance with:

(a) *Standard methods for the Examination of Water and Wastewater* (see section 705.2 of this Title);

(b) *Methods for Chemical Analysis of Water and Wastes* (see section 705.2), prepared by Environmental Protection Agency (EPA);

(c) *Water Standards of the American Society for Testing and Materials (ASTM)* (see section 705.2 of this Title); or

(d) by other methods approved by the commissioner and the administrator as giving results equal to or superior to methods listed in any of the other documents.

Historical Note

Sec. repealed, new filed: April 28, 1972; Feb. 25, 1974; amd. filed Nov. 5, 1984 eff. Nov. 5, 1984. Amended (a)-(c).

PART 701

CLASSIFICATIONS AND STANDARDS OF QUALITY AND PURITY

(Statutory authority: Environmental Conservation Law, §§ 3-0301[2][m], 15-0313, 17-0301)

Historical Note

Part repealed, new filed: April 28, 1972; Feb. 25, 1974 eff. 30 days after filing.

Section 701.1 Definitions. The terms, words or phrases used in Parts 700, 701, 702 and 704 of this Title shall have the following meanings:

(a) *Commissioner* shall mean the Commissioner of the Department of Environmental Conservation.

(b) *Administrator* shall mean the administrator of the United States Environmental Protection Agency.

(c) *Best usage of waters* as specified for each class shall be those used as determined by the commissioner and the administrator in accordance with the considerations prescribed by the Environmental Conservation Law and the Federal Water Pollution Control Act of 1972 (see section 705.1 of this Title).

(d) *Approved treatment* as applied to water supplies shall mean treatment accepted as satisfactory by the authorities responsible for exercising supervision over the sanitary quality of water supplies.

(e) *Source of water supply for drinking, culinary or food processing purposes* shall mean any source, either public or private, the waters from which are used for domestic consumption or used in connection with the processing of milk, beverages or foods. (When water is taken for public drinking, culinary or food processing purposes, refer to New York State Department of Health regulations—10 NYCRR Part 170.)

(f) *Primary contact recreation* shall mean recreational activities where the human body may come in direct contact with raw water to the point of complete body submergence. Such uses include swimming, diving, water skiing, skin diving and surfing.

(g) *Secondary contact recreation* shall mean recreational activities where contact with the water is minimal and where ingestion of the water is not probable. Such uses include, but are not limited to, fishing and boating.

(h) *Saline surface waters* shall mean all waters which are so designated by the commissioner.

(i) *International boundary waters* shall mean those waters to which the water quality standards developed and adopted pursuant to the Boundary Water Treaty of 1909 and the Great Lakes Quality Agreement of 1972 apply.

(j) *Sewage, industrial waste* and *other wastes* shall have the meanings given in section 17-0105 of the Environmental Conservation Law.

(k) *Estuary* shall mean the tidal portion of a river or stream.

(l) A *thermal discharge* is one which results or would result in a temperature change of the receiving water.

(m) *Heat of artificial origin* shall mean all heat from other than natural sources including but not limited to cumulative effects of multiple and proximate thermal discharges.

(n) *Coastal waters* shall mean those marine waters within the territorial limits of the State other than estuaries and enclosed bays. Long Island Sound is designated as coastal waters for the purposes of thermal discharges.

(o) *Enclosed bays* shall mean those marine waters within the territorial limits of New York State, other than coastal waters or estuaries, in which exchange of sea water is severely limited by barrier beaches. For the purposes of thermal discharges, the following are designated as enclosed bays: Jamaica Bay, Hempstead Bay, Great South Bay, Moriches Bay, Shinnecock Bay and Mecox Bay.

(p) *Oncogenic chemical* is a chemical for which the induction of tumors has been demonstrated in:

(1) humans;
(2) two mammalian species;
(3) one mammalian species, independently reproduced;
(4) one mammalian species, to an unusual degree with respect to incidence, latency period, site, tumor type or age at onset; or
(5) one mammalian species, supported by positive results in short-term tests which are indicative of potential oncogenic activity.

(q) *Acute toxic effect* is an effect that usually occurs shortly after the administration of either a single dose or multiple doses of a chemical.

(r) *Chronic toxic effect* is an effect that is irreversible or progressive or occurs because the rate of injury is greater than the rate of repair during prolonged exposure to a chemical.

Historical Note

Sec. repealed, new filed April 28, 1972; amds. filed: Nov. 5, 1984; July 3, 1985 eff. 30 days after filing. Added (p)-(r).

701.2 Conditions applying to all classifications and standards. (a) In any case where the waters into which sewage, industrial wastes or other wastes effluents discharge are assigned a different classification than the waters into which such receiving waters flow, the standards applicable to the waters which receive such sewage or wastes effluents shall be supplemented by the following: "The quality of any waters receiving sewage, industrial wastes or other wastes discharges shall be such that no impairment to the best usage of waters in any other class shall occur by reason of such sewage, industrial wastes or other wastes discharges."

(b) Natural waters may on occasion have characteristics outside of the limits established by the standards. The standards adopted herein relate to the condition of waters as affected by the discharge of sewage, industrial wastes or other wastes.

(c) Control of taste and odor producing substances, toxic wastes and deleterious substances, as specified in the quality standards for fresh and saline surface waters, shall be implemented by using ambient water quality standards derived from the methodologies set forth in sections 701.3 through 701.13 of this Part, for the protection of best usage of receiving waters. These standards shall be the basis of effluent limitations for use in State pollutant discharge elimination system permits issued pursuant to Parts 750-758 of this Title. The standards will consider, to the extent possible, variations in natural or background conditions of waters, including but not limited to alkalinity, temperature, hardness and pH.

Historical Note

Sec. repealed, new filed: April 28, 1972; Feb. 25, 1974; amd. filed July 3, 1985 eff. 30 days after filing. Added (c).

701.3 Standards for protection of human health and potable water supplies. The standards for best usage as a source of potable water supply shall protect human health and the drinking water source. The standard shall be the most stringent of the following:

(a) 10 NYCRR Part 170 (Source of Water Supply);

(b) 10 NYCRR Part 5 (Drinking Water Supplies); or

(c) the lowest numerical value derived using the methodologies and procedures found in sections 701.4 through 701.7 of this Part.

Historical Note

Sec. amd. filed May 26, 1967; repealed, new filed: April 28, 1972; Feb. 25, 1974; renum. 701.18, new filed July 3, 1985 eff. 30 days after filing.

701.4 Procedure for deriving standards based on oncogenic effects. (a) Standards based on oncogenic effects shall be calculated using dose-response data from scientifically valid animal or human studies and a linearized multi-stage low-dose extrapolation model unless the scientific evidence is determined to be sufficient to support the use of an alternative extrapolation model.

(b) The dose response data deemed to be the most appropriate considering factors, including but not limited to route and duration of exposure, tumor type, species and statistical significance shall be used as a basis for the standard.

(c) The 95 percent lower confidence limit on the dose corresponding to an excess lifetime cancer risk of one in one million shall be the basis of the standard.

(d) An animal dose shall be converted to a human dose using the surface area conversion rule given below unless the scientific evidence is determined to be sufficient to support the use of an alternative trans-species conversion method:

$$\text{human dose (mg/kg/day)} = \left(\frac{\text{animal body weight (kg)}}{\text{human body weight (kg)}}\right)^{0.33} \times \text{animal dose (mg/kg/day)}$$

mg = milligrams of chemical
kg = kilograms of body weight

(e) The standard shall be based on an average 70 kilogram adult consuming 2 liters of water a day for 70 years.

Historical Note

Sec. repealed, new filed: April 28, 1972; Feb. 25, 1974; amd. filed Sept. 20, 1974; renum. 701.19, new filed July 3, 1985 eff. 30 days after filing.

701.5 Procedure for deriving standards based on nononcogenic effects. (a) Standards shall be based on a dose that does not produce an observed effect (no observed-effect level) derived from the results of scientifically valid human or animal studies determined most appropriate, considering factors, including but not limited to route and duration of exposure, effects, species and statistical significance. If a valid no observed effect level has not been determined, a minimal effect level may be used.

(b) The no observed effect level (NOEL) or the minimal effect level, expressed as a dose in milligrams of chemical per kilogram of body weight, shall be divided by a safety or uncertainty factor to obtain an acceptable daily intake (ADI). The magnitude of this factor will generally range from 10 to 1,000 and shall reflect the quantity and quality of the toxicologic data, the degree of confidence in the data and the nature of the effects of concern. General rules for determining the magnitude of the safety factor are:

(1) Where valid experimental results from prolonged exposure studies of humans and one or more animal species are available, with no indication of oncogenicity:

Uncertainty factor = 10

(2) Where experimental results from prolonged exposures of humans are inconclusive or not available and valid results of long-term studies on experimental animals exist, with no indication of oncogenicity:

Uncertainty factor = 100

(3) Where experimental results of studies on human exposure are unavailable or inconclusive and valid results from long-term ingestion studies on experimental animals are not available, with no indication of oncogenicity:

Uncertainty factor = 1,000

(c) Standards shall allow no more than 20 percent of the acceptable daily intake to come from drinking water.

(d) Standards based on acute health concerns shall be derived based on an average 10-kilogram child consuming one liter of water per day.

(e) Standards based on chronic health concerns shall be derived based on an average 70-kilogram human consuming two liters of water per day.

Historical Note

Sec. repealed, filed March 20, 1967; new filed Feb. 25, 1974; amd. filed Sept. 20, 1974; renum. 701.20, new filed July 3, 1985 eff. 30 days after filing.

701.6 Procedure for deriving standards based on aesthetic consideration. Standards based on aesthetic considerations, including but not limited to taste, odor and discoloration shall be based on an evaluation of the reported levels of the chemical affecting the aesthetic quality of water.

Historical Note

Sec. filed July 3, 1985 eff. 30 days after filing.

701.7 Procedure for deriving standards based on chemical correlations. When the available data are deemed insufficient for establishing a standard on the basis of sections 701.3 through 701.6 of this Part, a standard may be based on chemical correlations. Standards for chemical correlations shall be based on a relationship to a structurally similar chemical for which a standard has been established pursuant to sections 701.3 through 701.6 of this Part. The chemicals must have similar functional groups and potential metabolic and toxicologic pathways.

Historical Note

Sec. filed July 3, 1985 eff. 30 days after filing.

701.8 Standards for protection of aquatic life, fish and fish propagation. (a) The standards for best usage for aquatic life, fish and fish propagation shall assure survival and propagation of aquatic life for all surface water classes except classes D and SD. For classes D and SD the standards shall permit survival. Standards for all classes shall also prevent aquatic food tainting and shall be protective of the health of human or wildlife consumers of fish and shellfish flesh for chemicals which may bioaccumulate.

(b) The United States Environmental Protection Agency water quality criteria published in 49 *Federal Register* 4551 (Feb. 7, 1984), 45 *Federal Register* 79317 (Nov. 28, 1980), Quality Criteria for Water, Environmental Protection Agency, 440/9-76-023 (July 1976), and 40 CFR part 129, effective July 1, 1984, will be used when they are applicable to New York waters and are protective of aquatic and wildlife resources unless the department derives more stringent standards using procedures below.

(c) When an appropriate Environmental Protection Agency criterion is not available for a substance, a standard shall be developed using procedures described below. These standards will be derived using results of tests on species and in water representative of New York State.

(d) The standards adopted shall be based on the most stringent results of the following methodologies and determinations pursuant to sections 701.9 through 701.13 of this Part:

(1) survival and propagation;
(2) survival;
(3) tainting of aquatic food;
(4) bioaccumulation; and
(5) chemical and aquatic species correlation considerations.

Historical Note

Sec. filed July 3, 1985 eff. 30 days after filing.

701.9 Standards for survival and propagation. (a) *Standards determinations where the results of chronic tests are available.* A standard to permit survival and propagation shall be derived from a determination of the threshold for chronic toxic effects important to propagation of the test species, including, but not restricted to, embryo-larval productivity, teratogenesis or other reproductive effects, growth, long-term mortality or oncogenesis. A determination of the threshold shall be obtained from a full or partial life cycle or early life stage toxicity test from available scientific data. Where chronic test results are available from more than one test with an important, sensitive species, representative of New York waters, a geometric mean of the chronic values shall be used to derive a standard. When a chronic test does not provide a determination of the threshold for toxic effects, the lowest observed adverse effect concentration shall be multiplied by an application factor of 0.2 to obtain the standard.

(b) *Standards determinations where chronic test results are not available.* In the absence of chronic test results for sensitive species the standard shall be the concentration at which 50 percent of the specimens in an acute 48- or 96-hour toxicity test or similar short-term test survive or maintain mobility (LC_{50}), multiplied by an application factor. For metals, persistent chemicals, or chemicals of unknown persistence with an LC_{50} less than or equal to 1.0 milligram per liter (mg/l), an application factor of 0.01 shall be used. For all other nonpersistent chemicals or chemicals of unknown persistence with an LC_{50} greater than 1.0 mg/l, for sensitive species an application factor of 0.05 shall be used, or 0.03 if test results are for a species that is generally of lower sensitivity. Where an empirically determined chronic/acute ratio is available, then that chronic/acute ratio may be used in lieu of the application factor to derive a standard from acute test results with a sensitive species.

Historical Note

Sec. filed July 3, 1985 eff. 30 days after filing.

701.10 Standards for fish survival. A standard to permit survival shall be based on the concentration at which no greater than 99 percent of test specimens survive an exposure period greater than 96 hours or an LC_{50} concentration from a 48- or 96-hour toxicity test or similar short-term test, multiplied by an application factor of 0.1, whichever is smaller.

Historical Note

Sec. filed July 3, 1985 eff. 30 days after filing.

701.11 Standards based on tainting of aquatic food. A water quality standard for aquatic food tainting will be 1/5 the concentration of a chemical that imparts a disagreeable flavor or odor to the flesh of fish or other aquatic life, wildlife or livestock that are consumed by humans and which acquire such flavor or odor because of habitation in, passage through or ingestion of waters.

Historical Note

Sec. filed July 3, 1985 eff. 30 days after filing.

701.12 Standards based on bioaccumulation. A water quality standard based on bioaccumulation and human consumption of fish and shellfish shall be determined by the following formula:

$$C = \frac{A \times 2\,l/d}{0.033\,Kg/d \times BF}$$

Where C = the standard in micrograms per liter (ug/l)

A = the standard obtained using procedures in sections 701.3 through 701.7 of this Part in ug/l

2 l/d = 2 liters/day, the daily water consumption of an average 70 Kg adult (A × 2 l/d = an allowable daily intake in ug/d)

0.033 Kg/d = 0.033 kilograms of fish per day, the metric equivalent to consumption of one half pound fish per week

BF = a bioaccumulation factor in

$$\frac{ug/Kg}{ug/l}$$

These water quality standards shall also be determined using aquatic flesh levels known to be toxic to wildlife fish consumers, along with a bioaccumulation factor. Bioaccumulation factors will be determined from measured values in the scientific literature or determined using either measured or calculated octanol/water partition coefficients.

Historical Note

Sec. filed July 3, 1985 eff. 30 days after filing

701.13 Standards based on chemical and aquatic species correlation consideration. Correlations shall be used to determine standards if adequate toxicologic, bioaccumulation or tainting data are not available for a particular chemical or aquatic species but sufficient information is available for a structurally similar chemical and appropriate aquatic species.

Historical Note

Sec. filed July 3, 1985 eff. 30 days after filing

701.14 Ambient water quality standards. The department shall derive ambient standards for specific chemicals using the methodologies and procedures found in this Part. Such standards shall be included in Appendix 31, *infra* to this Part and entitled Ambient Water Quality Standards. In cases where more than one standard is listed for a given chemical for a water classification, the most stringent standard shall apply.

Historical Note

Sec. filed July 3, 1985 eff. 30 days after filing.

701.15 Derivation of effluent limitations. (a) The ambient water quality standards found in Appendix 31, *infra*, will be the basis for water quality-based effluent limitations for use in State pollutant discharge elimination system (SPDES) permits.

(b) When deriving a water quality-based effluent limitation from an ambient water quality standard, the department may take into account factors, including but not limited to, analytical detectability, treatability, natural background levels and the waste assimilative capacity of the receiving waters.

(c) In cases where these factors indicate that achieving a water quality-based effluent limitation derived from an ambient water quality standard established for aquatic considerations would be clearly unreasonable, the department may substitute a modified water quality-based effluent limitation in conjunction with biological monitoring; or a technology-based effluent limitation in conjunction with biological monitoring; or biological monitoring alone in lieu of the water quality-based effluent limitation.

(d) For chemicals which do not appear in Appendix 31, *infra*, and which the department determines may pose a threat to aquatic life or the environment if discharged to the waters of the State, an ambient water quality value may be derived by applying the appropriate methodology from sections 701.8 through 701.13 of this Part. The water quality-based effluent limitation shall then be derived as in subdivisions (b) and (c) of this section. For any chemical for which an ambient water quality value has been derived in this manner, the department will initiate rule making to adopt an ambient water quality standard.

(e) For chemicals which do not appear in Appendix 31, *infra*, and which the department determines may pose a threat to human health if discharged into the waters of the State, an ambient water quality value may be derived by applying the appropriate methodology from sections 701.3 through 701.7 of this Part. The water quality-based effluent limitation will then be derived as in subdivision (b). For any chemical for which an ambient water quality value has been derived in this manner, the department will initiate rule making to adopt an ambient water quality standard. If none of the methodologies found in sections 701.3 through 701.7 of this Part are appropriate, an effluent limitation for use in SPDES permit may be derived by applying a general ambient water quality value of 50 ug/l for any chemical belonging to one of the following classes of chemicals:

alkanes,
aliphatic and aromatic alcohols,
aliphatic and aromatic aldehydes and ketones, aliphatic and aromatic esters,
halogenated aliphatics,
unsaturated aliphatics with an aldehyde, ketone or nitrile functional group,
aromatic hydrocarbons - benzene derivatives only, halogenated aromatic hydrocarbons,
phthalates,
polynuclear hydrocarbons,
aliphatic and aromatic nitro, cyano and amine compounds

(f) The maximum ambient water quality value for the total of organic chemicals which have a standard or value established pursuant to sections 701.3 through 701.7 of this Part or subdivision (e) of this section, shall be 100 ug/l, except that this total shall not include any organic chemicals which have an ambient water quality standard or value of 100 ug/l or greater.

Historical Note

Sec. filed July 3, 1985 eff. 30 days after filing.

701.16 Variances. (a) The department may, upon written application from the applicant for a SPDES permit or a SPDES permittee, grant a variance from one or more effluent limitations based on ambient water quality standards for the protection of aquatic life, fish and fish propagation established pursuant to section 701.8 through 701.13 of this Part. No variance may be granted which would result in an effluent limitation which would be less stringent than:

(1) an effluent limitation derived from an ambient water quality standard for the protection of human health; or

(2) the applicable technology-based effluent limitation or other applicable effluent limitation required pursuant to section 754.1 of this Title.

(b) An application for a variance must:

(1) identify the specific effluent limitation or limitations in the SPDES permit for which a variance is sought; and

(2) demonstrate that due to conditions unique and peculiar to the applicant's situation, compliance with the proposed effluent limitation would result in substantial and widespread economic and social impacts.

(c) In granting such variances, the department may impose specific conditions, including but not limited to, additional monitoring and biological studies, extending through the life of the permit, as necessary.

(d) Article 70 of the Environmental Conservation Law and the rules and regulations promulgated thereunder shall govern applications for variances.

Historical Note

Sec. filed July 3, 1985 eff. 30 days after filing.

701.17 Referenced materials. All materials referenced in this Part can be purchased from the United States Government Printing Office, Washington, DC, and are available for copying and inspection at the Department of Environmental Conservation, Division of Water, 50 Wolf Road, Albany, NY 12233.

Historical Note

Sec. filed July 3, 1985 eff. 30 days after filing.

701.18 Class N. Best usage of waters. Enjoyment of water in its natural condition and where compatible, as source of water for drinking or culinary purposes, bathing, fishing and fish propagation, recreation and any other usages except for the discharge of sewage, industrial wastes or other wastes of any sewage or waste effluent.

Quality Standards for Class "N" Waters

Items	*Specifications*
1. Sewage, industrial wastes, or other wastes, waste effluents or any sewage effluents not having had filtration resulting from at least 200 feet* of lateral travel through unconsolidated earth.	None
2. Deleterious substances, hydrocarbons, substances which would contribute to eutrophication, or surface runoff containing any of such substances.	None

Historical Note

Sec. added by renum 701.8, filed July 3, 1985 eff. 30 days after filing

* A greater distance may be required if an inspection shows that, due to peculiar geological conditions, this distance is inadequate to protect the water from pollution

701.19 Classes and standards for fresh surface waters. The following items and specifications shall be the standards applicable to all New York fresh waters which are assigned the classification of AA, A, B, C or D, in addition to the specific standards which are found in this section under the heading of each such classification.

Quality Standards for Fresh Surface Waters

Items	*Specifications*
1. Turbidity.	No increase except from natural sources that will cause a substantial visible contrast to natural conditions. In cases of naturally turbid waters, the contrast will be due to increased turbidity.
2. Color.	None from man-made sources that will be detrimental to anticipated best usage of waters.
3. Suspended, colloidal or setteable solids.	None from sewage, industrial wastes or other wastes which will cause deposition or be deleterious for any best usage determined for the specific waters which are assigned to each class.
4. Oil and floating substances.	No residue attributable to sewage, industrial wastes or other wastes nor visible oil film nor globules of grease.
5. Taste and odor-producing substances, toxic wastes and deleterious substances.	None in amounts that will be injurious to fishlife or which in any manner shall adversely affect the flavor, color or odor thereof, or impair the waters for any best usage as determined for the specific water which are assigned to each class.
6. Thermal discharges.	(See Part 704 of this Title.)

CLASS "AA"

Best usage of waters. Source of water supply for drinking, culinary or food processing purposes and any other usages.

Conditions related to best usage of waters. The waters, if subjected to approved disinfection treatment, with additional treatment if necessary to remove naturally present impurities, will meet New York State Department of Health drinking water standards and will be considered safe and satisfactory for drinking water purposes.

Quality Standards for Class "AA" Waters

Items	*Specifications*
1. Coliform.	The monthly median coliform value for 100 ml of sample shall not exceed 50 from a minimum of five examinations and provided that not more than 20 percent of the samples shall exceed a coliform value of 240 for 100 ml of sample.
2. pH	Shall be between 6.5 and 8.5
3. Total dissolved solids.	Shall be kept as low as practicable to maintain the best usage of waters, but in no case shall it exceed 500 milligrams per liter.
4. Dissolved oxygen.	For cold waters suitable for trout spawning, the DO concentration shall not be less than 7.0 mg/l from other than natural conditions. For trout waters, the minimum daily average shall not be less than 6.0 mg/l. At no time shall the DO concentration be less than 5.0 mg/l. For non-trout waters, the minimum daily average shall not be less than 5.0 mg/l. At no time shall the DO concentration be less than 4.0 mg/l.

CLASS "A"

Best usage of waters. Source of water supply for drinking, culinary or food processing purposes and any other usages.

Conditions related to best usage of waters. The waters, if subjected to approved treatment equal to coagulation, sedimentation, filtration and disinfection, with additional treatment if necessary to reduce naturally present impurities, will meet New York State Department of Health drinking water standards and will be considered safe and satisfactory for drinking water purposes.

Quality Standards for Class "A" Waters

Items	*Specifications*
1. Coliform.	The monthly median coliform value for 100 ml of sample shall not exceed 5,000 from a minimum of five examinations, and provided that not more than 20 percent of the samples shall exceed a coliform value of 20,000 for 100 ml of sample and the monthly geometric mean fecal coliform value for 100 ml of sample shall not exceed 200 from a minimum of five examinations.
2. pH	Shall be between 6.5 and 8.5.
3. Total dissolved solids.	Shall be kept as low as practicable to maintain the best usage of waters, but in no case shall it exceed 500 milligrams per liter.
4. Dissolved oxygen.	For cold waters suitable for trout spawning, the DO concentration shall not be less than 7.0 mg/l from other than natural conditions. For trout waters, the minimum daily average shall not be less than 6.0 mg/l. At no time shall the DO concentration be less than 5.0 mg/l. For non-trout waters, the minimum daily average shall not be less than 5.0 mg/l. At no time shall the DO concentration be less than 4.0 mg/l.

CLASS "B"

Best usage of waters. Primary contact recreation and any other uses except as a source of water supply for drinking, culinary or food processing purposes.

Quality Standards for Class "B" Waters

Items	*Specifications*
1. Coliform.	The monthly median coliform value for 100 ml of sample shall not exceed 2,400 from a minimum of five examinations, and provided that not more than 20 percent of the samples shall exceed a coliform value of 5,000 for 100 ml of sample and the monthly geometric mean fecal coliform value for 100 ml of sample shall not exceed 200 from a minimum of five examinations. This standard shall be met during all periods when disinfection is practiced.
2. pH	Shall be between 6.5 and 8.5.
3. Total dissolved solids.	None at concentrations which will be detrimental to the growth and propagation of aquatic life. Waters having present levels less than 500 milligrams per liter shall be kept below this limit.
4. Dissolved oxygen.	For cold waters suitable for trout spawning, the DO concentration shall not be less than 7.0 mg/l from other than natural conditions. For trout waters, the minimum daily average shall not be less than 6.0 mg/l. At no time shall the DO concentration be less than 5.0 mg/l. For non-trout waters, the minimum daily average shall not be less than 5.0 mg/l. At no time shall the DO concentration be less than 4.0 mg/l.

CLASS "C"

Best usage of waters. The waters are suitable for fishing and fish propagation. The water quality shall be suitable for primary and secondary contact recreation even though other factors may limit the use for that purpose.

Quality Standards for Class "C" Waters

Items	*Specifications*
1. Coliform.	The monthly median coliform value for 100 ml of sample shall not exceed 2,400 from a minimum of five examinations, and provided that not more than 20 percent of the samples shall exceed a coliform value of 5,000 for 100 ml of sample and the monthly geometric mean fecal coliform value for 100 ml of sample shall not exceed 200 from a minimum of five examinations. This standard shall be met during all periods when disinfection is practiced.
2. pH	Shall be between 6.5 and 8.5.

Items	*Specifications*
3. Total dissolved solids.	None at concentrations which will be detrimental to the growth and propagation of aquatic life. Waters having present levels less than 500 milligrams per liter shall be kept below this limit.
4. Dissolved oxygen.	For cold waters suitable for trout spawning, the DO concentration shall not be less than 7.0 mg/l from other than natural conditions. For trout waters, the minimum daily average shall not be less than 6.0 mg/l. At no time shall the DO concentration be less than 5.0 mg/l. For non-trout waters, the minimum daily average shall not be less than 5.0 mg/l. At no time shall the DO concentration be less than 4.0 mg/l.

CLASS "D"

Best usage of waters. The waters are suitable for fishing. The water quality shall be suitable for primary and secondary contact recreation even though other factors may limit the use for that purpose. Due to such natural conditions as intermittency of flow, water conditions not conducive to propagation of game fishery or stream bed conditions, the waters will not support fish propagation.

Conditions related to best usage of waters. The waters must be suitable for fish survival.

Quality Standards for Class "D" Waters

Items	*Specifications*
1. pH	Shall be between 6.0 and 9.5.
2. Dissolved oxygen.	Shall not be less than 3 milligrams per liter at any time.
3. Coliform.	The monthly median coliform value for 100 ml of sample shall not exceed 2,400 from a minimum of five examinations and provided that not more than 20 percent of the samples shall exceed a coliform value of 5,000 for 100 ml of sample and the monthly geometric mean fecal coliform value for 100 ml of sample shall not exceed 200 from a minimum of five examinations. This standard shall be met during all periods when disinfection is practiced.

Historical Note

Sec. added by renum. and amd. 701.4, filed July 3, 1985, amd. filed Sept. 20, 1985 eff. 30 days after filing.

701.20 Classes and standards for saline surface waters. The following items and specifications shall be the standards applicable to all New York saline surface waters which are assigned the classification of SA, SB, SC or SD, in addition to the specific standards which are found in this section under the heading of each such classification

Quality Standards for Saline Surface Waters

Items	*Specifications*
1. Garbage, cinders, ashes, oils, sludge or other refuse.	None in any waters of the marine district as defined by Environmental Conservation Law (§ 17-0105)
2. pH	The normal range shall not be extended by more than one-tenth (0.1) pH unit.
3. Turbidity.	No increase except from natural sources that will cause a substantial visible contrast to natural conditions. In cases of naturally turbid waters, the contrast will be due to increased turbidity.
4. Color.	None from man-made sources that will be detrimental to anticipated best usage of waters.
5. Suspended, colloidal or settleable solids.	None from sewage, industrial wastes or other wastes which will cause deposition or be deleterious for any best usage determined for the specific waters which are assigned to each class.
6. Oil and floating substances.	No residue attributable to sewage, industrial wastes or other wastes, nor visible oil film nor globules of grease.
7. Thermal discharges.	(See Part 704 of this Title.)

CLASS "SA"

Best usage of waters. The waters shall be suitable for shellfishing for market purposes and primary and secondary contact recreation.

Quality Standards for Class "SA" Waters

Items	*Specifications*
1. Coliform.	The median MPN value in any series of samples representative of waters in the shellfish-growing area shall not be in excess of 70 per 100 ml.
2. Dissolved oxygen.	Shall not be less than 5.0 mg/l at any time.
3. Toxic wastes and deleterious substances.	None in amounts that will interfere with use for primary contact recreation or that will be injurious to edible fish or shellfish or the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color, odor or sanitary condition thereof, or impair the waters for any other best usage as determined for their specific waters which are assigned to this class.

CLASS "SB"

Best usage of waters. The waters shall be suitable for primary and secondary contact recreation and any other use except for the taking of shellfish for market purposes.

Quality Standards for Class "SB" Waters

Items	*Specifications*
1. Coliform.	The monthly median coliform value for 100 ml of sample shall not exceed 2,400 from a minimum of five examinations, and provided that not more than 20 percent of the samples shall exceed a coliform value of 5,000 for 100 ml of sample and the monthly geometric mean fecal coliform value for 100 ml of sample shall not exceed 200 from a minimum of five examinations. This standard shall be met during all periods when disinfection is practiced.
2. Dissolved oxygen.	Shall not be less than 5.0 mg/l at any time.
3. Toxic wastes and deleterious substances.	None in amounts that will interfere with use for primary contact recreation or that will be injurious to edible fish or shellfish or the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color, odor or sanitary condition thereof, or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.

CLASS "SC"

Best usage of waters. The waters are suitable for fishing and fish propagation. The water quality shall be suitable for primary and secondary contact recreation even though other factors may limit the use for that purpose.

Quality Standards for Class "SC" Waters

Items	*Specifications*
1. Coliform.	The monthly medial coliform value for 100 ml of sample shall not exceed 2,400 from a minimum of five examinations and provided that not more than 20 percent of the samples shall exceed a coliform value of 5,000 for 100 ml of sample and the monthly geometric mean fecal coliform value for 100 ml of sample shall not exceed 200 from a minimum of five examinations. This standard shall be met during all periods when disinfection is practiced.
2. Dissolved oxygen	Shall not be less than 5.0 mg/l at any time

Items	Specifications
3. Toxic wastes and deleterious substances.	None in amounts that will interfere with use for secondary contact recreation or that will be injurious to edible fish or shellfish or the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color, odor or sanitary condition thereof, or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.

CLASS "SD"

Best usage of waters. All waters not primarily for recreational purposes, shellfish culture or the development of fishlife, and because of natural or man-made conditions cannot meet the requirements of these uses.

Quality Standards for Class "SD" Waters

Items	*Specifications*
1. Dissolved oxygen.	Shall not be less than 3.0 mg/l at any time.
2. Toxic wastes and deleterious substances.	None alone or in combination with other substances or wastes in sufficient amounts to prevent survival of fishlife, or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.

Historical Note

Sec. added by renum. 701.5, filed July 3, 1985; amd. filed Sept. 20, 1985 eff. 30 days after filing.

PART 702

SPECIAL CLASSIFICATIONS AND STANDARDS

(Statutory authority: Environmental Conservation Law, §§ 3-0301[2][m], 15-0313, 17-0301)

Historical Note

Part repealed, new filed: April 28, 1972; Feb. 25, 1974 eff. 30 days after filing.

Section 702.1 Class A—Special (International boundary waters).

(GREAT LAKES WATER QUALITY AGREEMENT OF 1972)

Best usage of waters. Source of water supply for drinking, culinary or food processing purposes, primary contact recreation and any other usages.

Conditions related to best usage. The waters, if subjected to approved treatment, equal to coagulation, sedimentation, filtration and disinfection with additional treatment, if necessary, to reduce naturally present impurities, meet or will meet New York State Department of Health drinking water standards and are or will be considered safe and satisfactory for drinking water purposes.

Quality Standards for Class A—Special Waters (International Boundary Waters)

Items	*Specifications*
1. Coliform.	The geometric mean of not less than five samples taken over not more than a 30 day period should not exceed 1,000 per 100 ml total coliform nor 200 per 100 ml fecal coliform
2. Dissolved oxygen	In the rivers and upper waters of the lakes not less than 6.0 mg/l at any time. In hypolimnetic waters, it should be not less than necessary for the support of fishlife, particularly cold water species

Items	Specifications
3. Total dissolved solids.	Should not exceed 200 milligrams per liter.
4. pH	Should not be outside the range of 6.7 to 8.5.
5. Iron.	Should not exceed 0.3 milligrams per liter as Fe.
6. Phosphorus.	Concentrations should be limited to the extent necessary to prevent nuisance growths of algae, weeds and slimes that are or may become injurious to any beneficial water use.
7. Radioactivity.	Should be kept at the lowest practicable levels, and in any event should be controlled to the extent necessary to prevent harmful effects on health.
8. Taste and odor-producing substances, toxic wates and deleterious substances.	None in amounts that will interfere with use for primary contact recreation or that will be injurious to the growth and propagation of fish, or which in any manner shall adversely affect the flavor, color or odor thereof, or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.
9. Suspended, colloidal or settleable solids.	None from sewage, industrial wastes or other wastes which will cause deposition or be deleterious for any best usage determined for the specific waters which are assigned to this class.
10. Oil and floating substances.	No residue attributable to sewage, industrial wastes or other wastes, nor visible oil film nor globules of grease.
11. Thermal discharges.	(See Part 704 of this Title.)

To meet the water quality objectives referred to in the "Great Lakes Water Quality Agreement of 1972," the standards listed above shall be subject to revision from time to time after further hearings on due notice.

Historical Note

Sec. repealed, new filed: April 28, 1972; Feb. 25, 1974; amds. filed: Sept. 20, 1974; July 3, 1985 eff. 30 days after filing.

702.2 Class AA – Special (Lake Champlain drainage basin).

CLASS AA – SPECIAL

Best usage of waters. Any usage except for disposal of sewage, industrial wastes or other wastes.

Quality Standards for Class AA – Special Waters (Lake Champlain drainage basin)

Items	Specifications
1. Floating solids, settleable solids; oil; sludge deposits; toxic wastes; deleterious substances; colored or other wastes or heated liquids.	None attributable to sewage, industrial waste or other wastes.
2. Sewage or waste effluents.	None into waters of this class.

Historical Note

Sec. repealed, new filed: April 28, 1972; Feb. 25, 1974 eff. 30 days after filing; provided, however, if the application, pursuant to Parts 800 to 941, inclusive, of Title 6, of any provision of Part 701 or 702 shall be found to be invalid, the corresponding provision of Part 701 or 702 in effect immediately prior to such effective date shall be deemed not to have been repealed and shall remain in effect until such time as the provision, the application of which was found to be invalid, can lawfully be made applicable.

702.3 Special classes and standards for the Lower Hudson River, Arthur Kill, Kill Van Kull, Harlem River, Raritan Bay and Lower East River drainage basins, New York Bay area, Nassau County, including Long Island Sound, Suffolk County, Upper East River, Long Island Sound drainage basins within Queens, Bronx and Westchester Counties, and Jamaica Bay drainage basin within Kings and Queens Counties, including a certain portion of Rockaway Inlet. (a) This section applies to the waters within the following areas, which constitute the Interstate Sanitation District:

(1) the drainage basin of the Lower Hudson River, from the mouth to northern Westchester-Rockland county lines, except Saw Mill River and Sparkill Creek drainage basins;

(2) the drainage basins of Arthur Kill, Kill Van Kull, Harlem River and Raritan Bay;

(3) the drainage basin of Lower East River, from the mouth to a line across East River north of Wards Island between Stony Point in Bronx County and Lawrence Point in Queens County;

(4) New York Bay, including Gravesend Bay, Coney Island Creek, Atlantic Basin, Erie Basin, Gowanus Bay, Gowanus Canal. The Narrows and Atlantic Ocean waters off Coney Island lying westerly of a north south line from Light Inlet at the southeasterly tip of Coney Island Peninsula to the south tip of Rockaway Point, thence along the jetty to Rockaway jetty light, thence due south to the New York – New Jersey boundary line;

(5) Nassau County, including the waters of Long Island Sound between Nassau-Queens and Nassau-Suffolk county lines, and the waters of Atlantic Ocean to the three-mile limit between said county lines;

(6) the area within Suffolk County lying west of a north-south topographical limit line and its extensions, to a point in Long Island Sound at the New York - Connecticut state boundary line due north of Miller Place Beach and to Blue Point on the south mainland, thence southward across Great South Bay to Water Island, thence three miles due south to a point in the Atlantic Ocean at the south state boundary line;

(7) certain tidal waters which are within the Upper East River and Long Island Sound drainage basins within Queens, Bronx and Westchester Counties; and

(8) Jamaica Bay drainage basin within Kings and Queens Counties, and including Rockaway Inlet, east of a north-south line drawn from Light Inlet at the southeasterly tip of Coney Island Peninsula near Manhattan Beach to the westerly shoreline west of lookout tower on Rockaway Point.

(b) Said classes and standards of quality and purity applicable thereto are set forth hereinafter and designated Class I and Class II.

CLASS "I"

Best usage of waters. The waters shall be suitable for secondary contact recreation and any other usage except for primary contact recreation and shellfishing for market purposes.

Quality Standards for Class "I" Waters

Items	*Specifications*
1. Garbage, cinders, ashes, oils, sludge or other refuse.	None in any waters of the marine district as defined by Environmental Conservation Law (§ 17-0105).
2. Coliform.	The monthly geometric mean total coliform value for 100 ml of sample shall not exceed 10,000, and the monthly geometric mean fecal coliform value for 100 ml of sample shall not exceed 2,000 from a minimum of five examinations. This standard shall be met during all periods when disinfection is practiced.
3. Dissolved oxygen.	Shall not be less than 4.0 mg/l at any time.
4. pH.	The normal range shall not be extended by more than one-tenth (0.1) pH unit.
5. Turbidity.	No increase except from natural sources that will cause a substantial visible contrast to natural conditions. In cases of naturally turbid waters, the contrast will be due to increased turbidity.
6. Color.	None from man made sources that will be detrimental to anticipated best usage of waters
7. Taste and odor-producing substances, toxic wastes and deleterious substances.	None in amounts that will interfere with use for secondary contact recreation, or that will be injurious to edible fish or shellfish or the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color, odor or sanitary conditions thereof, or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.
8. Suspended, colloidal or settleable solids.	None from sewage, industrial wastes or other wastes which will cause deposition or be deleterious for any best usage determined for the specific waters which are assigned to this class.
9. Oil and floating substances.	No residue attributable to sewage, industrial wastes or other wastes, nor visible oil film nor globules of grease.
10. Thermal discharges.	(See Part 704 of this Title.)

Historical Note

Sec. amd. filed March 27, 1972; repealed, new filed: April 28, 1972; Feb. 25, 1974; amds. filed: Sept. 20, 1974; Sept. 20, 1985 eff. 30 days after filing.

702.4 Class AA – Special (Upper Hudson River drainage basin).

CLASS AA – SPECIAL

Best usage of waters. Any usage except for disposal of sewage, industrial waste or other waste.

Quality Standards for Class AA – Special Waters (Upper Hudson River drainage basin)

Items	*Specifications*
1. Floating solids, settleable solids, oil, sludge deposits, toxic wastes, deleterious substances, colored or other wastes or heated liquids.	None attributable to sewage, industrial wastes or other wastes.
2. Sewage or waste effluents.	None into waters of this class.

Historical Note

Sec. amd. filed March 27, 1972, repealed, new filed April 28, 1972, repealed, filed Feb. 25, 1974 eff. 30 days after filing, provided, however, if the application, pursuant to Parts 800 to 941, inclusive, of Title 6, of any provision of Part 701 or 702 shall be found to be invalid, the corresponding provision of Part 701 or 702 in effect immediately prior to such effective date shall be deemed not to have been repealed and shall remain in effect until such time as the provision, the application of which was found to be invalid, can lawfully be made applicable.

702.5

Historical Note

Sec. repealed, new filed April 28, 1972; repealed, filed Feb. 25, 1974 eff. 30 days after filing; provided, however, if the application, pursuant to Parts 800 to 941, inclusive, of Title 6, of any provision of Part 701 or 702 shall be found to be invalid, the corresponding provision of Part 701 or 702 in effect immediately prior to such effective date shall be deemed not to have been repealed and shall remain in effect until such time as the provision, the application of which was found to be invalid, can lawfully be made applicable.

702.6-702.7

Historical Note

Secs. repealed, filed March 22, 1968 eff. March 22, 1968.

702.8

Historical Note

Sec. filed May 24, 1967; repealed, new filed April 28, 1972; repealed, filed Feb. 25, 1974 eff. 30 days after filing; provided, however, if the application, pursuant to Parts 800 to 941, inclusive, of Title 6, of any provision of Part 701 or 702 shall be found to be invalid, the corresponding provision of Part 701 or 702 in effect immediately prior to such effective date shall be deemed not to have been repealed and shall remain in effect until such time as the provision, the application of which was found to be invalid, can lawfully be made applicable.

PART 703

GROUND WATER CLASSIFICATIONS, QUALITY STANDARDS AND EFFLUENT STANDARDS AND/OR LIMITATIONS

(Statutory authority: Environmental Conservation Law, §§ 17-0301, 17-0809)

Historical Note

Part (§§ 703.1-703.4) filed Mar. 20, 1967; repealed, new filed Apr. 28, 1972; repealed, new (§§ 703.1-703.11) filed Aug. 2, 1978 eff. 30 days after filing.

Section 703.1 Definitions. The terms, words or phrases used in this Part shall have the following meaning:

(a) *Administrator* shall mean the administrator of the United States Environmental Protection Agency.

(b) *Best usage of waters* as specified for each class shall be those uses as determined by the commissioner in accordance with the considerations prescribed by the Environmental Conservation Law.

(c) *Commissioner* shall mean the Commissioner of Environmental Conservation.

(d) *Consolidated rock* or *bed rock* is the compact or solid hard rock exposed at the surface of the earth or overlain by the unconsolidated deposits.

(e) *Department* shall mean the New York State Department of Environmental Conservation.

(f) *Disposal system* means a system for disposing of sewage, industrial waste or other wastes and including sewer systems and treatment works.

(g) *Effluent standard and/or limitation* shall mean any restriction on quantities, quality, rates and concentrations of chemical, physical, biological, and other constituents of effluents which are discharged or allowed to run from an outlet, point source or any other discharge within the meaning of Environmental Conservation Law, section 17-0501, into the unsaturated or saturated zones.

(h) *Fresh water* is that water having a chloride concentration equal to or less than 250 mg/l, or a total dissolved solids concentration equal to or less than 1000 mg/l.

(i) *Ground waters* are those waters in the saturated zone, including perched water areas.

(j) *Industrial waste* means any liquid, gaseous, solid or waste substance or a combination thereof resulting from any process of industry, manufacturing, trade, or business or from the development or recovery of any natural resources, which may cause or might reasonably be expected to cause pollution of the waters of the State in contravention of the standards adopted as provided in Environmental Conservation Law, article 17.

(k) *Land application techniques* include the following three basic methods of waste discharge application: Irrigation; infiltration-percolation; and overland flow.

(l) *Land utilization practices* entails the use of plants, the soil surface, and soil matrix for removal of certain wastewater constituents.

(m) *Micrograms per liter, ug/l,* is the weight in micrograms of any specific substance or substances contained in one liter of solution.

(n) *Milligrams per liter, mg/l,* is the weight in milligrams of any specific substance or substances contained in one liter of solution.

(o) *Other wastes* means garbage, refuse, decayed wood, sawdust, shavings, bark, sand, lime, cinders, ashes, offal, oil, tar, dyestuffs, acids, chemicals, leachate, sludge, salt and all other discarded matter not sewage or industrial waste which may cause or might reasonably be expected to cause pollution of the waters of the State in contravention of the standards adopted as provided in Environmental Conservation Law, article 17.

(p) *Outlet* means the terminus of a sewer system, or the point of emergence of any water-borne sewage, industrial waste or other wastes or the effluent therefrom, into the saturated or unsaturated zones.

(q) *Pathogenic organism* shall mean any disease-producing organism.

(r) *Perched ground water* shall mean unconfined ground water separated from an underlying body of ground water by an unsaturated zone.

(s) *Person* or *persons* shall mean any individual, public or private corporation, political subdivision, government agency, municipality, industry, co-partnership, association, firm, trust, estate or any other legal entity whatsoever.

(t) *Point source* means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation or vessel or other floating stock from which pollutants are or may be discharged.

(u) *Pollutant* means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, and industrial, municipal, and agricultural waste discharged into water.

(v) *Pollution* shall mean the presence in the environment of conditions and/or contaminants in quantities of characteristics which are or may be injurious to human, plant or animal life or to property or which unreasonably interfere with the comfortable enjoyment of life and property throughout such areas of the State as shall be affected thereby.

(w) *Potable waters* are those fresh waters usable for drinking, culinary or food processing purposes.

(x) *Quality standard* shall mean such measure of purity or quality for any ground waters in relation to their best usage.

(y) *Saline water* is that water having a chloride concentration of more than 250 mg/l or a total dissolved solids concentration of more than 1000 mg/l.

(z) The *saturated zone* is that extensive portion of the earth's crust which is saturated with water. (Includes perched water areas.)

(aa) *Sewage* means the water-carried human or animal wastes from residences, buildings, industrial establishments or other places, together with such ground water infiltration and surface water as may be present.

(bb) *Subsurface sewage disposal system* shall mean a disposal system which discharges sewage beneath the surface of the ground.

(cc) *Toxic pollutant* means those pollutants, or combination of pollutants, including disease causing agents, which after discharge and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly through food chains, will, on the basis of information available to the department, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions, including malfunctions in reproduction, or physical deformations, in such organisms or their offspring.

(dd) *Treatment works* means any plant, disposal field, lagoon, pumping station, constructed drainage ditch or surface water intercepting ditch, incinerator, area devoted to sanitary land fills or other works not specifically mentioned herein, installed for the purpose of treating, neutralizing, stabilizing or disposing of sewage, industrial waste or other wastes.

(ee) *Unconsolidated deposits* are all non- or poorly indurated soil materials above the bedrock.

(ff) The *unsaturated zone* is that portion of the earth's crust which does not contain sufficient water to fill all interconnected voids or pore spaces. Perched water bodies may exist within the unsaturated zone.

(gg) *Waste management system* includes the management of mechanical equipment, crops, irrigation and monitors as an operational unit.

Historical Note

Sec. filed March 20, 1967; repealed, new filed: April 28, 1972; Aug. 2, 1978 eff. 30 days after filing.

703.2 Purposes of classifications, quality standards, and effluent standards and/or limitations. The purpose of these classes, quality standards and effluent standards and/or limitations is to prevent pollution of ground waters and to protect the ground waters for use as potable water.

Historical Note

Sec. filed March 20, 1967; repealed, new filed: April 28, 1972; Aug. 2, 1978 eff. 30 days after filing.

703.3 Collection of samples. (a) The determination of compliance or noncompliance of sewage, industrial waste or other waste discharges with the requirements of this Part shall be made through tests or analytical determinations of ground water or effluent samples collected in such manner as are approved by the department.

(b) The location at which ground water samples are collected shall be determined by the department. In selecting or approving such locations, the department shall consider all relevant facts, including but not limited to:

(1) the mobility of pollutants in the unsaturated zone is governed by the rate of movement of percolating water and the active pollutant attenuation mechanisms in this zone:

(2) attenuation mechanisms may remove potential pollutants in passage through topsoil and adequate thicknesses of the unsaturated zone; and

(3) attenuation of pollutant concentrations with distance may occur in the saturated zone, similar to that in the unsaturated zone, as a result of attenuation processes occuring below the water table.

(c) The location at which effluent samples are collected shall be at a point where the effluent emerges from a treatment works, disposal system, outlet or point source and prior to being discharged to the ground.

Historical Note

Sec. filed March 20, 1967; repealed, new filed: April 28, 1972; Aug. 2, 1978 eff. 30 days after filing.

703.4 Tests or analytical determinations. Tests or analytical determinations to determine compliance or noncompliance with standards shall be made in accordance with:

(a) *Standard Methods for the Examination of Water and Wastewater* (see section 705.2 of this Title);

(b) *Methods for Chemical Analysis of Water and Wastes* (see section 705.2 of this Title);

(c) *Water Standards of the American Society for Testing and Materials* (see section 705.2 of this Title); or

(d) by other methods approved by the commissioner as giving results equal to or superior to methods listed above.

Historical Note

Sec. filed March 20, 1967; repealed, new filed: April 28, 1972; Aug. 2, 1978; amd. filed Nov. 5 1984 eff. Nov. 5, 1984.

703.5 Classes and quality standards for ground waters. (a) *Class GA.*

(1) The best usage of class GA waters is as a source of potable water supply. Class GA waters are fresh ground waters found in the saturated zone of unconsolidated deposits and consolidated rock or bed rock.

(2) Quality standards for class GA waters shall be the most stringent of:

(i) the items and specifications applicable to such waters found in this section;

(ii) the maximum contaminant levels for drinking water promulgated by the Commissioner of Health as found in 10 NYCRR Subpart 5-1, Public Water Supplies or any subsequent revision thereto or replacement thereof;

(iii) the maximum contaminant levels for drinking water promulgated by the administrator under the Safe Drinking Water Act (see section 705.1 of this Title) and 40 CFR Part 141, effective July 1, 1978 (see section 705.1); and

(iv) the standards for raw water quality promulgated by the Commissioner of Health as found in 10 NYCRR Part 170, Sources of Water Supply or any subsequent revision thereto or replacement thereof.

(3) The following quality standards shall be applicable to class GA waters:

	Items	*Specifications*
(*a*)	Sewage, industrial waste or other wastes, taste or odor producing substances, toxic pollutants, thermal discharges, radioactive substances or other deleterious matter.	None which may impair the quality of the ground waters to render them unsafe or unsuitable for a potable water supply or which may cause or contribute to a condition in contravention of standards for other classified waters of the State.
(*b*)	The concentration of the following substances or chemicals:	Shall not be greater than the limit specified, except where exceeded due to natural conditions:
(*1*)	Arsenic (As)	0.025 mg/l
(*2*)	Barium (Ba)	1.0 mg/l
(*3*)	Cadmium (Cd)	0.01 mg/l
(*4*)	Chloride (Cl)	250 mg/l
(*5*)	Chromium (Cr) Hexavalent	0.05 mg/l
(*6*)	Copper (Cu)	1.0 mg/l
(*7*)	Cyanide (Cn)	0.2mg/l
(*8*)	Fluoride (F)	1.5 mg/l
(*9*)	Foaming Agents[1]	0.5 mg/l
(*10*)	Iron (Fe)[2]	0.3 mg/l
(*11*)	Lead (Pb)	0.025 mg/l
(*12*)	Manganese (Mn)[2]	0.3 mg/l
(*13*)	Mercury (Hg)	0.002 mg/l
(*14*)	Nitrate (as N)	10.0 mg/l
(*15*)	Phenols	0.001 mg/l
(*16*)	Selenium (Se)	0.02 mg/l
(*17*)	Silver (Ag)	0.05 mg/l
(*18*)	Sulfate (SO_4)	250 mg/l
(*19*)	Zinc (Zn)	5 mg/l
(*20*)	pH Range	6.5-8.5
(*21*)	Aldrin, or 1, 2, 3, 4, 10, 10-hexachloro-1, 4, 4a, 5, 8, 8a-hexahydro-*endo*-1, 4-exo-5, 8-dimethanonaphthalene.	not detectable[3]
(*22*)	Chlordane, or 1, 2, 4, 5, 6, 7, 8, 8-octachloro-2, 3, 3a, 4, 7, 7a-hexahydro-4, 7-methanoindene.	0.1 ug/l
(*23*)	DDT, or 2, 2-bis- (p-chlorophenyl)-1, 1, 1-trichloroethane and metabolites.	not detectable[3]
(*24*)	Dieldrin, or 6, 7-epoxy aldrin.	not detectable[3]
(*25*)	Endrin, or 1, 2, 3, 4, 10, 10-hexachloro-6, 7-epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-octahydro-endo-1, 4-*endo*-5, 8-dimethanonaphthalene.	not detectable[3]
(*26*)	Heptachlor, or 1, 4, 5, 6, 7, 8, 8-heptachloro-3a, 4, 7, 7a-tetrahydro-4, 7-methanoindene and metabolites.	not detectable[3]
(*27*)	Lindane and other Hexachlorocyclohexanes or mixed isomers of 1, 2, 3, 4, 5, 6-hexachlorocyclohexane.	not detectable[3]
(*28*)	Methoxychlor, or 2, 2-*bis*-(p-methoxyphenyl)-1, 1, 1-trichloroethane.	35.0 ug/l
(*29*)	Toxaphene (a mixture of at least 175 chlorinated camphene derivatives).	not detectable[3]
(*30*)	2, 4-Dichlorophenoxyacetic acid (2, 4-D)	4.4 ug/l
(*31*)	2, 4, 5-Trichlorophenoxypropionic acid (2, 4, 5-TP) (Silvex)	0.26 ug/l
(*32*)	Vinyl chloride (chloroethene)	5.0 ug/l
(*33*)	Benzene	not detectable[3]
(*34*)	Benzo (a) pyrene	not detectable[3]
(*35*)	Kepone or decachlorooctahydro-1, 3, 4-metheno-2H-cyclobuta (cd) pentalen-2 one (chlordecone).	not detectable[3]

	Items	Specifications
(36)	Polychlorinated biphenyls (PCB) (Aroclor)	0.1 ug/l
(37)	Ethylene thiourea (ETU)	not detectable[3]
(38)	Chloroform	100 ug/l
(39)	Carbon tetrachloride (tetrachloromethane)	5 ug/l
(40)	Pentachloronitrobenzene (PCNB)	not detectable[3]
(41)	Trichloroethylene	10 ug/l
(42)	Diphenylhydrazine	not detectable[3]
(43)	bis (2-chloroethyl) ether	1.0 ug/l
(44)	2, 4, 5-Trichlorophenoxyacetic acid (2, 4, 5-T)	35 ug/l
(45)	2, 3, 7, 8-Tetrachlorodibenzo-p-dioxin (TCDD)	3.5×10^{-5} ug/l
(46)	2 - Methyl- 4 -chlorophenoxyacetic acid (MCPA)	0.44 ug/l
(47)	Amiben, or 3-amino-2, 5-dichlorobenzoic acid (chloramben)	87.5 ug/l
(48)	Dicamba, or 2-methoxy-3, 6-dichlorobenzoic acid	0.44 ug/l
(49)	Alachlor, or 2-chloro-2', 6'-diethyl-*N*- (meth oxymethyl)-acetanilide (Lasso)	35.0 ug/l
(50)	Butachlor, or 2-chloro-2', 6'-diethyl-N- (butoxymethyl)-acetanilide (Machete)	3.5 ug/l
(51)	Propachlor, or 2-chlor-N-isopropyl-N-acetanilide (Ramrod)	35.0 ug/l
(52)	Propanil, or 3', 4'-dichloropropionanilide	7.0 ug/l
(53)	Aldicarb, [2-methyl-2-(methylthio) propionaldehyde *0*-(methyl carbamoyl) oxime] and methomyl [1-methylthioacetaldhyde *0*-(methyl-carbamoyl) oxime]	0.35 ug/l
(54)	Bromacil, or 5-broma-3-sec-butyl-6-methluracil	4.4 ug/l
(55)	Paraquat, or 1, 1'-dimethyl-4, 4'-dipyridylium	2.98 ug/l
(56)	Trifluralin, or a, a, a-trifluoro-2, 6-dinitro-, N-dipropyl-p- toluidine (Treflan)	35.0 ug/l
(57)	Nitralin, or 4-(methylsulfonyl)-2, 6-dinitro-N, N-dipropylaniline (Planavin)	35.0 ug/l
(58)	Benefin, or N-butyl-N-ethyl-a, a, a-trifluoro-2, 6- dinitro-p-toluidine (Balan)	35.0 ug/l

	Items	Specifications
(59)	Azinphosmethyl, or *O, O*-dimethyl-S-4 oxo-1, 2, 3-benzotriazin-3 (4H)-ylmethylphosphorodithioate (Guthion)	4.4 micrograms per liter
(60)	Diazinon, or *O, O*-diethyl O-(2)- isopropyl-4-methyl-6- pyrimidinyl)-Phosphorothioate	0.7 micrograms per liter
(61)	Phorate (also for Disulfoton), or *O, O*-diethyl-*S*-[(ethylthio) methyl]-phosphorodithioate (Thimet R), and disulfoton, or *O, O*-diethyl-S-[(2-ethylthio) ethyl] phosphorodithioate (Di-System R)	not detectable[3]
(62)	Carbaryl, or 1-naphthyl-N-methylcarbamate	28.7 micrograms per liter
(63)	Ziram, or zinc salts of dimethyldithiocarbamic acid	4.18 micrograms per liter
(64)	Ferbam, or iron salts of dimethyldithiocarbamic acid	4.18 micrograms per liter
(65)	Captan, or *N*-trichloromethylthio-4-cyclohexene-1, 2-dicarboximide	17.5 micrograms per liter
(66)	Folpet, or *N*-trichloromethylthiophthalimide	56.0 micrograms per liter
(67)	Hexachlorobenzene (HCB)	0.35 micrograms per liter
(68)	Paradichlorobenzene (PDB) (Also orthodichlorobenzene)	4.7 micrograms per liter
(69)	Parathion (and Methl parathion), or (*O,-O*-diethyl-*O-p*-nitrophenylphosphorthioate, an methyl parathion, or *O,O*-dimethyl- *O- p*-nitrophenylphosphorothioate	1.5 micrograms per liter
(70)	Malathion, or *S*-1, 2-*bis* (ethoxycarbony 1) ethyl-*O,O*-dimethylphosphorodithioate	7.0 micrograms per liter
(71)	Maneb, or- manganese salt of ethylene- bis- dithiocarbamic acid	1.75 micrograms per liter
(72)	Zineb, or zinc salt of ethylene-bis-dithiocarbamic acid.	1.75 micrograms per liter
(73)	Dithane, or zincate of manganese ethylene-bis-dithiocarbomate	1.75 micrograms per liter
(74)	Thiram, or tetramethylthiuramdisulfide	1.75 micrograms per liter
(75)	Atrazine, or 2 chloro 4 ethylamino 6 isopropylamino S triazine	7.5 micrograms per liter
(76)	Propazine, or 2 chloro 4, 6 diisopropylamino S triazine	16.0 micrograms per liter

	Items	Specifications
(77)	Simazine, or 2-chloro-4, 6-diethylamino-S-triazine	75.25 micrograms per liter
(78)	Di-n-butylphthalate	770 micrograms per liter
(79)	Di (2-ethylhexyl) phthalate (DEHP)	4.2 milligrams per liter
(80)	Hexachlorophene, or 2, 2'-methylene-bis (3,4, 6-trichlorophenol)	7 micrograms per liter
(81)	Methyl methacrylate	0.7 milligrams per liter
(82)	Pentachlorophenol (PCP)	21 micrograms per liter
(83)	Styrene	931 micrograms per liter

Notes: [1] Foaming agents determined as methylene blue active substances (MBAS) or other tests as specified by the commissioner.
[2] Combined concentration of iron and manganese shall not exceed 0.5 mg/l.
[3] *Not detectable* means by tests or analytical determinations referenced in section 703.4.

(b) *Class GSA.* (1) The best usage of class GSA waters is as a source of potable mineral waters, for conversion to fresh potable waters, or as raw material for the manufacture of sodium chloride or its derivatives or similar products. Such waters are saline waters found in the saturated zone.

(2) The following quality standards shall be applicable to class GSA waters:

Items	Specifications
Sewage, industrial wastes or other wastes, color, taste or odor producing substances, toxic pollutants, thermal discharges, radioactive substances or other deleterious matter.	None which may impair the waters for use as sources of saline waters for the best usage outlines above or as to cause or contribute to a condition in contravention of standards for other classified waters of the State.

(c) *Class GSB.* (1) The best usage of class GSB waters is as a receiving water for disposal of wastes. Such waters are those saline waters found in the saturated zone which have chloride concentration in excess of 1,000 milligrams per liter or a total dissolved solids concentration in excess of 2,000 milligrams per liter.

(2) The following quality standards shall be applicable to class GSB waters:

Items	Specifications
Sewage, industrial wastes or other wastes, color, taste or odor producing substances, toxic pollutants, thermal discharges, radioactive substances or other deleterous matter.	None which may be deleterious, harmful, detrimental or injurious to the public health, safety or welfare or which may cause or contribute to a condition in contravention of standards for other classified waters of the State.

(3) Class GSB shall not be assigned to any ground waters of the State unless the commissioner finds that adjacent and tributary ground waters and the best usage thereof will not be impaired by such classification.

Historical Note

Sec. filed March 20, 1967; repealed, new filed: April 28, 1972, Aug. 9, 1978; amd. filed Nov. 6, 1984 eff. Nov. 6, 1984. Amended (a)(3)(iii).

703.6 Effluent standards and/or limitations for discharges to class GA waters. (a) The effluent standards and/or limitations in schedules I and II of this section apply to a discharge from a point source or outlet or any other discharge within the meaning of Environmental Conservation Law, section 17-0501 which discharge will or may enter the unsaturated or saturated zones.

(b) The department may establish additional effluent standards and/or limitations as set forth in section 703.7 of this Part.

(c) The effluent standards and/or limitations shall be incorporated in SPDES permits (under Part 750 *et seq.* of this Title) for discharges to ground waters, where applicable.

Schedule I

Applicability. The following effluent standards and/or limitations shall apply to all class GA waters in New York State.

Biological organisms. Coliform and/or pathogenic organisms shall not be discharged in amounts sufficient to render fresh ground waters detrimental to public health, safety or welfare.

Chemical characteristics.

	Substance	Maximum allowable concentration in mg/l (unless otherwise noted)
(1)	Aluminum	2.0
(2)	Arsenic	0.05
(3)	Barium	2.0
(4)	Cadmium	0.02
(5)	Chloride	500
(6)	Chromium (Cr) (Hexavalent)	0.10
(7)	Copper	1.0
(8)	Cyanide	0.40
(9)	Fluoride	3.0
(10)	Foaming Agents[1]	1.0
(11)	Iron[2]	0.6
(12)	Lead	0.05
(13)	Manganese[2]	0.6
(14)	Mercury	0.004
(15)	Nickel	2.0
(16)	Nitrate (as N)	20
(17)	Oil and Grease	15
(18)	Phenols	0.002
(19)	Selenium	0.04
(20)	Silver	0.1
(21)	Sulfate	500
(22)	Sulfide	1.0
(23)	Zinc	5.0
(24)	pH Range[3]	6.5-8.5
(25)	Aldrin, or 1, 2, 3, 4, 10, 10-hexachloro-1, 4, 4a, 5, 8, 8a-hexahydro-*endo*-1, 4-exo-5, 8-dimethanonaphthalene	not detectable[4]
(26)	Chlordane, or 1, 2, 4, 5, 6, 7, 8, 8-octachloro-2, 3, 3a, 4, 7, 7a-hexahydro-4, 7-methanoindene	0.1 ug/l

	Substance	Maximum allowable concentration in mg/l (unless otherwise noted)
(27)	DDT, or 2, 2-bis-(p-chlorophenyl)-1, 1, 1-trichloroethane and metabolites	not detectable[4]
(28)	Dieldrin, or 6, 7-epoxy aldrin	not detectable[4]
(29)	Endrin, or 1, 2, 3, 4, 10, 10-hexachloro-6, 7-epoxy-1, 4, 4a, 5, 6, 7, 8, 8a-octahydro-endo-1, 4-*endo*-5, 8-dimethanonaphthalene	not detectable[4]
(30)	Heptachlor, or 1, 4, 5, 6, 7, 8, 8-heptachloro-3a, 4, 7, 7a-tetrahydro-4, 7- methanoindene and metabolites	not detectable[4]
(31)	Lindane and other Hexachlorocyclohexanes or mixed isomers of 1, 2, 3, 3, 5, 6-hexachlorocyclohexane	not detectable[4]
(32)	Methoxychlor, or 2, 2-*bis*-(*p*-methoxphenyl)-1, 1, 1-trichloroethane	35 ug/l
(33)	Toxaphene (a mixture of at least 175 chlorinated camphene derivatives)	not detectable[4]
(34)	2, 4- Dichlorophenoxyacetic acid (2, 4-D)	4.4 ug/l
(35)	2, 4, 5-Trichlorophenoxypropionic acid (2, 4, 5-TP) (Silvex)	0.26 ug/l
(36)	Vinyl chloride (chloroethene)	5.0 ug/l
(37)	Benzene	not detectable[4]
(38)	Benzo (a) pyrene	not detectable[4]
(39)	Kepone or decachlorooctahydro-1, 3, 4-metheno-2H-cyclobuta (cd) pentalen-2-one (chlordeone)	not detectable[4]
(40)	Polychlorinated biphenyls (PCB) (Aroclor)	0.1 ug/l
(41)	Ethylene thiourea (ETU)	not detectable[4]
(42)	Chloroform	100 ug/l
(43)	Carbon tetrachloride (tetrachloromethane)	5 ug/l
(44)	Pentachloronitrobenzene (PCNB)	not detectable[4]
(45)	Trichloroethylene	10 ug/l
(46)	Diphenylhydrazine	not detectable[4]
(47)	bis (2-chloroethyl) ether	1.0 ug/l
(48)	2, 4, 5-Trichlorophenoxyacetic acid (2, 4, 5-T)	35 ug/l
(49)	2, 3, 7, 8-Tetrachlorodibenzo p-dioxin (TCDD)	3.5 x 10^{-8} ug/l
(50)	2- Methyl 4- chlorophenoxyacetic acid (MCPA)	0.44 ug/l

	Substance	Maximum allowable concentration in mg/l (unless otherwise noted)
(51)	Amiben, or 3-amino-2, 5-dichlorobenzoic acid (chloramben)	87.5 ug/l
(52)	Dicamba, or 2-methoxy-3, 6-dichlorobenzoic acid	0.44 ug/l
(53)	Alachlor, or 2-chloro-2', 6'-diethyl-*N*- (methoxymethyl)-acetanilide (Lasso)	35.0 ug/l
(54)	Butachlor, or 2-chlor-2', 6'-diethyl-N- (butoxymethyl)-acetanilide (Machete)	3.5 ug/l
(55)	Propachlor, or 2-chlor-N-isopropyl-N-acetanilide (Ramrod)	35.0 ug/l
(56)	Propanil, or 3', 4'-dichloropropionanilide	7.0 ug/l
(57)	Aldicarb, [2-methyl-2-(methylthio) propionaldehyde *O*-(methyl carbamoyl) oxime] and methomyl [1-methylthioacetaldehyde *O*- (methyl-carbamoyl) oxime]	0.35 ug/l
(58)	Bromacil, or 5-broma-3- sec-butyl-6-methluracil	4.4 ug/l
(59)	Paraquat, or 1, 1'-dimethyl-4, 4'-dipyridylium	2.98 ug/l
(60)	Trifluralin, or *a*, *a*, *a*-trifluoro-2, 6-dinitro-N-dipropyl-p-toluidine (Treflan)	35.0 ug/l
(61)	Nitralin, or 4-(methylsulfonyl) -2, 6-dinitro-N, N-dipropylaniline (Planavin)	35.0 ug/l
(62)	Benefin, or N-butyl-N- ethyl-*a*, *a*, *a*-trifluoro- 2, 6- dinitro-p-toluidine (Balan)	35.0 ug/l
(63)	Azinphosmethyl, or *O*, *O*-dimethyl-*S*- 4- oxo-1, 2, 3-benzotriazin-3 (4H)- ylmethylphosphorodithioate (Guthion)	4.4 ug/l
(64)	Diazinon, or *O*, *O*-diethyl *O*-(2-isopropyl- 4- methyl- 6-pyrimidinyl)-phosphorothioate	0.7 ug/l
(65)	Phorate (also for Disulfoton), or *O*, *O*- diethyl-*S*-[(ethylthio) methyl] -phosphorodithioate (Thimet R), and disulfoton, or *O*, *O*-diethyl-*S*- [(2-ethylthio) ethyl] phosphorodithioate (Di-Syston R)	not detectable[4]
(66)	Carbaryl, or 1-naphthyl-N-methylcarbamate	28.7 ug/l

	Substance	Maximum allowable concentration in mg/l (unless otherwise noted)
(67)	Ziram, or zinc salts of dimethyldithiocarbamic acid	4.18 ug/l
(68)	Ferbam, or iron salts of dimethyl-dithiocarbamic acid	4.18 ug/l
(69)	Captan, or *N*-trichloromethylthio-4-cyclohexene- 1, 2-dicarboximide	17.5 ug/l
(70)	Folpet, or *N*-trichloromethylthiophthalimide	56.0 ug/l
(71)	Hexachlorobenzene (HCB)	0.35 ug/l
(72)	Paradichlorobenzene (PDB) (also orthodichlorobenzene)	4.7 ug/l
(73)	Parathion (and Methyl parathion), or (*O*,-O-diethyl-*O*-*p*-nitrophenylphosphorthioate, and methyl parathion, or *O*, *O*-dimethyl-*O*-*p*- nitrophenylphosphorothioate.	1.5 ug/l
(74)	Malathion, or *S*-1, 2- *bis* (ethoxycarbonyl) ethyl- *O*, *O*-dimethylphosphorodithioate	7.0 ug/l
(75)	Maneb, or-manganese salt of ethylene- bis- dithiocarbamic acid	1.75 ug/l
(76)	Zineb, or zinc salt of ethylene-bis-dithiocarbamic acid	1.75 ug/l
(77)	Dithane, or zincate of manganese ethylene- bis- dithiocarbamate	1.75 ug/l
(78)	Thiram, or tetramethylthiuramdisulfide	1.75 ug/l
(79)	Atrazine, or 2- chlor- 4- ethylamino- 6- isopropylamino-S-triazine	7.5 ug/l
(80)	Propazine, or 2-chloro-4, 6-di-isopropylamino-S-triazine	16.0 ug/l
(81)	Simazine, or 2- chloro-4, 6-diethylamino-S-triazine	75.25 ug/l
(82)	di-n-butylphthalate	770 ug/l
(83)	Di (2-ethylhexyl) phthalate (DEHP)	4.2 mg/l
(84)	Hexachlorophene, or 2, 2'-methylene-bis (3, 4, 6-trichlorophenol)	7 ug/l
(85)	Methyl methacrylate	0.7 mg/l
(86)	Pentachlorophenol (PCP)	21 ug/l

	Substance	Maximum allowable concentration in mg/l (unless otherwise noted)
(87)	Styrene	931 ug/l

Notes: [1] Foaming agents determined as methylene blue active substances (MBAS) or other tests as specified by the commissioner.

[2] Combined concentration of iron and manganese shall not exceed 1.0 mg/l.

[3] When natural ground waters have a pH outside the range indicated above, that natural pH may be one extreme of the allowable range.

[4] *Not detectable* means by tests or analytical determinations referenced in section 703.4 of this Part.

Schedule II

Applicability. In addition to the effluent standards and/or limitations in Schedule I, the following also apply in the counties of Nassau and Suffolk:

Chemical Characteristics.

	Substance	Maximum allowable concentration in mg/l
(1)	Dissolved Solids, Total	1000
(2)	Nitrogen, Total (as N)	10

Historical Note

Sec. filed Aug. 2, 1978 eff. 30 days after filing.

703.7 Additional effluent standards and/or limitations. (a) The department, after consultation with the State Department of Health, may establish on a case by case basis more stringent effluent standards and/or limitations than those set forth in schedule I or II of section 703.6 of this Part and may impose effluent standards and/or limitations for a toxic pollutant or any substance not included in schedule I or II, when necessary, to prevent pollution and protect the ground waters for their best usage. The department shall consider rules and regulations promulgated by the administrator or the New York State Department of Health in establishing such standards and/or limitations. Additionally, the department shall consider action levels for compounds determined to exhibit toxic effects which are established by the New York State Commissioner of Health.

(b) Circumstances under which the department may consider more stringent effluent standards and/or limitations include, but are not limited to:

(1) a discharge to an aquifer which is the sole or principal source of a potable water supply;

(2) an existing or proposed discharge is directly on or into consolidated rock or bed rock;

(3) a discharge containing one or more substances which in combination with precipitation and/or natural soil constituents is likely to produce a toxic pollutant; or

(4) where adverse accumulative or synergistic effects can be established for constituents in a discharge.

(c) Where a discharge is proposed or exists which would or does contain a pollutant for which there is a quality standard under this Part but there is no applicable effluent standard and/or limitation under this Part for such a pollutant, the department, after consultation with the New York State Department of Health, shall establish effluent standards and/or limitations for such pollutant on a case by case basis.

Historical Note

Sec. filed Aug. 2, 1978 eff. 30 days after filing.

703.8 Modifications of effluent standards and/or limitations.

(a) (1) A person responsible for a discharge subject to this Part may petition in writing for a modification of the effluent standards and/or limitations found in section 703.6 or established pursuant to section 703.7 of this Part.

(2) Such person shall have the burden of establishing to the satisfaction of the commissioner, after his consultation with the New York State Commissioner of Health, that one or more of the effluent standards and/or limitations are unnecessarily restrictive as to a particular discharge in that such modification of certain standards and/or limitations would, notwithstanding noncompliance with such standards and/or limitations, prevent pollution and protect the ground waters for their best usage.

(b) The regulations contained in Part 753 of this title prescribing procedures for notice and public participation shall apply whenever a person petitions for a modification of effluent standards and/or limitations established pursuant to section 703.6 of this Part.

Historical Note

Sec. filed Aug. 2, 1978 eff. 30 days after filing.

703.9 Studies and monitoring. (a) The department may require the submission of information by any person responsible for a discharge in order that the department may evaluate the short- and/or long-term effect the discharge may have on ground waters of the State or for the purpose of determining additional effluent standards and/or limitations or modifications thereto, as set forth in sections 703.7 and 703.8 of this Part, respectively. Such information may include, but is not limited to:

(1) a statement of the property to be affected by a discharge and the extent to which such property is under the control of the person responsible for such discharge;

(2) a geohydrologic analysis of the aquifer(s) which may be affected;

(3) a determination of the direction and rate of movement of the discharge and the natural ground water;

(4) an evaluation of adverse effects a discharge may have on any aquifer, source of potable water supply, or other surface and ground waters of the State; and

(5) an evaluation of the ability of unconsolidated deposits, consolidated rock or bed rock and the ground waters to attentuate potential pollutants such that the best usage of the ground waters is maintained.

(b) The department may require the installation and operation of monitoring facilities in order to assure compliance with effluent standards and/or limitations or to evaluate the effect of the discharge on the quality of the ground water. Specific monitoring requirements shall be established by the department on a case by case basis and as may be required by Part 750 of this Title.

Historical Note

Sec. filed Aug. 2, 1978 eff. 30 days after filing.

703.10 Exceptions. (a) *Activities and conditions.* The effluent standards and/or limitations for discharges to class GA waters set forth in section 703.6 of this Part are not applicable to the following activities:

(1) the discharge of sewage without the admixture of industrial waste or other wastes when:

(i) a disposal system, point source or outlet consists of a subsurface sewage disposal system designed, constructed and maintained in accordance with guidelines and standards satisfactory to the department;

(ii) monitoring facilities are utilized in accordance with requirements as may be specified by the department; and

(iii) the disposal system is designed to discharge, and discharges, less than 30,000 gallons per day;

(2) normally accepted agricultural practice of utilizing chemicals and fertilizers for growing of crops for human and animal consumption; and

(3) the potential renovative capabilities of a waste management system employing land application techniques and land utilization practices may be permitted for a discharge, provided it has been demonstrated to the satisfaction of the commissioner, after his consultation with the New York State Commissioner of Health, that:

(i) there shall be no actual or potential public health hazard;

(ii) applicable water quality standards shall be met in the saturated zone; and

(iii) applicable water quality standards shall not be contravened in any adjacent waters of the State.

(b) Nothing contained in this section shall be construed to allow any discharge which would preclude the best usage of class GA waters specified in section 703.5 of this Part.

Historical Note

Sec. filed Aug. 2, 1978 eff. 30 days after filing.

703.11 Assignment of ground water classifications and quality standards. The ground water classifications and quality standards enumerated in subdivisions (a) and (b) of section 703.5 of this Part are assigned to all the ground waters of the State of New York.

Historical Note

Sec. filed Aug. 2, 1978 eff. 30 days after filing.

PART 704

CRITERIA GOVERNING THERMAL DISCHARGES

(Statutory authority: Environmental Conservation Law, §§ 15-0313, 17-0301)

Historical Note

Part (§§ 704.1—704.4) added, filed Aug. 12, 1969; repealed, new filed: Apr. 28, 1972; Sept. 20, 1974 eff. 30 days after filing with the Secretary of State, provided, however, if the application, pursuant to Parts 800 to 941 inclusive of Title 6, of any provision of Part 704 shall be found to be invalid, the corresponding provision of Part 704 in effect immediately prior to such effective date shall be deemed not to have been repealed and shall remain in effect until such time as the provision, the application of which was found to be invalid, can lawfully be made applicable.

Section 704.1 Water quality standard for thermal discharges. (a) All thermal discharges to the waters of the State shall assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water.

(b) The criteria contained in this Part shall apply to all thermal discharges and shall be complied with, except as provided in this Part.

Historical Note

Sec. added, filed Aug. 12, 1969; repealed, new filed: Apr. 28, 1972; Sept. 20, 1974 eff. 30 days after filing with the Secretary of State, provided, however, if the application, pursuant to Parts 800 to 941 inclusive of Title 6, of any provision of Part 704 shall be found to be invalid, the corresponding provision of Part 704 in effect immediately prior to such effective date shall be deemed not to have been repealed and shall remain in effect until such time as the provision, the application of which was found to be invalid, can lawfully be made applicable.

704.2 Criteria governing thermal discharges. (a) *General criteria.* The following criteria shall apply to all waters of the State receiving thermal discharges, except as provided in section 704.6 of this Part:

(1) The natural seasonal cycle shall be retained.

(2) Annual spring and fall temperature changes shall be gradual.

(3) Large day-to-day temperature fluctuations due to heat of artificial origin shall be avoided.

(4) Development or growth of nuisance organisms shall not occur in contravention of water quality standards.

(5) Discharges which would lower receiving water temperature shall not cause a violation of water quality standards and section 704.3 of this Part.

(6) For the protection of the aquatic biota from severe temperature changes, routine shut down of an entire thermal discharge at any site shall not be scheduled during the period from December through March.

(b) *Special criteria.* The following criteria shall apply to all waters of the State receiving thermal discharges, except as provided in section 704.6 of this Part:

(1) *Non-trout waters.* (i) The water temperature at the surface of a stream shall not be raised to more than 90 degrees Fahrenheit at any point.

(ii) At least 50 percent of the cross sectional area and/or volume of flow of the stream including a minimum of one third of the surface as measured from shore to shore shall not be raised to more than five Fahrenheit degrees over the temperature that existed before the addition of heat of artificial origin or to a maximum of 86 degrees Fahrenheit whichever is less.

(iii) At least 50 percent of the cross sectional area and/or volume of flow of the stream including a minimum of one-third of the surface as measured from shore to shore shall not be lowered more than five Fahrenheit degrees from the temperature that existed immediately prior to such lowering.

(2) *Trout waters.* (i) No discharge at a temperature over 70 degrees Fahrenheit shall be permitted at any time to streams classified for trout.

(ii) From June through September no discharge shall be permitted that will raise the temperature of the stream more than two Fahrenheit degrees over that which existed before the addition of heat of artificial origin.

(iii) From October through May, no discharge shall be permitted that will raise the temperature of the stream more than five Fahrenheit degrees over that which existed before the addition of heat of artificial origin or to a maximum of 50 degrees Fahrenheit whichever is less.

(iv) From June through September no discharge shall be permitted that will lower the temperature of the stream more than two Fahrenheit degrees from that which existed immediatly prior to such lowering.

(3) *Lakes.* (i) The water temperature at the surface of a lake shall not be raised more than three Fahrenheit degrees over the temperature that existed before the addition of heat of artificial origin.

(ii) In lakes subject to stratification as defined in Part 652 of this Title, thermal discharges that will raise the temperature of the receiving waters shall be confined to the epilimnion.

(iii) In lakes subject to stratification as defined in Part 652 of this Title, thermal discharges which will lower the temperature of the receiving waters shall be discharged to the hypolimnion, and shall meet the water quality standards contained in Parts 701 and 702 of this Title in all respects.

(4) *Coastal waters.* (i) The water temperature at the surface of coastal waters shall not be raised more than four Fahrenheit degrees from October through June nor more than 1.5 Fahrenheit degrees from July through September over that which existed before the addition of heat of artificial origin.

(ii) The water temperature at the surface of coastal waters shall not be lowered more than four Fahrenheit degrees from October through June nor more than 1.5 Fahrenheit degrees from July through September from that which existed immediately prior to such lowering.

(5) *Estuaries or portions of estuaries.* (i) The water temperature at the surface of an estuary shall not be raised to more than 90 degrees Fahrenheit at any point.

(ii) At least 50 percent of the cross sectional area and/or volume of the flow of the estuary including a minimum of one-third of the surface as measured from water edge to water edge at any stage of tide, shall not be raised to more than four Fahrenheit degrees over the temperature that existed before the addition of heat of artificial origin or a maximum of 83 degrees Fahrenheit whichever is less.

(iii) From July through September, if the water temperature at the surface of an estuary before the addition of heat of artificial origin is more than 83 degrees Fahrenheit an increase in temperature not to exceed 1.5 Fahrenheit degrees at any point of the estuarine passageway as delineated above, may be permitted.

(iv) At least 50 percent of the cross sectional area and/or volume of the flow of the estuary including a minimum of one third of the surface as measured from water edge to water edge at any stage of tide, shall not be lowered more than four Fahrenheit degrees from the temperature that existed immediately prior to such lowering.

(6) *Enclosed bays.* No additional temperature change except that which occurs naturally shall be permitted in enclosed bays.

Historical Note

Sec. added, filed Aug. 12, 1969; repealed, new filed: Apr. 28, 1972; Sept. 20, 1974 eff. 30 days after filing with the Secretary of State, provided, however, if the application, pursuant to Parts 800 to 941 inclusive of Title 6, of any provision of Part 704 shall be found to be invalid, the corresponding provision of Part 704 in effect immediately prior to such effective date shall be deemed not to have been repealed and shall remain in effect until such time as the provision, the application of which was found to be invalid, can lawfully be made applicable.

704.3 Mixing zone criteria. The following criteria shall apply to all waters of the State receiving thermal discharges, except as provided in section 704.6 of this Part.

(a) The department shall specify definable, numerical limits for all mixing zones (e.g., linear distances from the point of discharge, surface area involvement, or volume of receiving water entrained in the thermal plume).

(b) Conditions in the mixing zone shall not be lethal in contravention of water quality standards to aquatic biota which may enter the zone.

(c) The location of mixing zones for thermal discharges shall not interfere with spawning areas, nursery areas and fish migration routes.

Historical Note

Sec. added, filed Aug. 12, 1969; repealed, new filed: Apr. 28, 1972; Sept. 20, 1974 eff. 30 days after filing with the Secretary of State, provided, however, if the application, pursuant to Parts 800 to 941 inclusive of Title 6, of any provision of Part 704 shall be found to be invalid, the corresponding provision of Part 704 in effect immediately prior to such effective date shall be deemed not to have been repealed and shall remain in effect until such time as the provision, the application of which was found to be invalid, can lawfully be made applicable.

704.4 Additional limitations or modifications. (a) An applicant may apply for a modification of the criteria set forth in sections 704.2 and 704.3 of this Part.

(b) Upon receipt of such application, the commissioner shall confer with the U.S. Environmental Protection Agency and shall transmit to that agency information to enable the administrator to fulfill responsibilities under Federal Law.

(c) The applicant shall have the burden of establishing to the satisfaction of the commissioner that one or more of the criteria are unnecessarily restrictive as to a particular project in that a modification of such criterion, or criteria, as the case may be, would assure the protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife in and on the body of water into which the discharge is to be made.

(d) The applicant shall consult with the Department of Environmental Conservation to determine appropriate studies which shall be conducted by the applicant. Prior approval shall be obtained by the applicant for a program of studies that will determine the impact of any proposed modification. Such studies shall include, but shall not be limited to:

(1) A comparative analysis of environmental effects of the thermal discharge on the receiving waters when subject to the stated criteria of this Part, and when subject to the applicant's proposed modification.

(2) An analysis of the different discharge modes (e.g., surface or subsurface) and the advantages and disadvantages of each mode with regard to effects on aquatic life.

(e) A public hearing shall be held upon the application.

(f) The commissioner may authorize a modification of the stated criteria, which modifications shall be conditioned upon post-operational experience. The commissioner may require additional treatment of, or change in, a thermal discharge in the event that post-operational experience shows a trend toward impairment by the discharge of the quality of the receiving waters for the protection and propagation of a balanced indigenous population of shellfish, fish and wildlife in and on the body of water.

Historical Note

Sec. filed Aug. 12, 1969; repealed, new filed: April 28, 1972; Sept. 20, 1974 eff. 30 days after filing.

704.5 Intake structures. The location, design, construction and capacity of cooling water intake structures, in connection with point source thermal discharges, shall reflect the best technology available for minimizing adverse environmental impact.

Historical Note

Sec. filed Sept. 20, 1974 eff. 30 days after filing.

704.6 Applicability of criteria. (a) In determining that a discharge existing prior to July 25, 1969 has violated the standard for thermal discharges, as provided in subdivision (a) of section 704.1 of this Part, the violation of any of the criteria contained in this Part shall not constitute evidence of a violation of such standard unless it is also shown that the violation of such criteria has contributed to the violation of the standard.

(b) The provisions of subdivision (a), subparagraphs (1)(iii), (2)(iv), (3)(iii), (4)(ii), (5)(iv), and paragraph (b)(6) of section 704.2 of this Part, and section 704.3, shall apply only to thermal discharges which have been brought into existence subsequent to July 31, 1973, or to which the criteria contained in this Part were intended to apply pursuant to any certification issued by the commissioner pursuant to section 401(d) of the Federal Water Pollution Control Act amendments of 1972.

(c) Whenever the commissioner has reason to believe that a thermal discharge, existing prior to the adoption of this Part, does not conform to subdivision (a) of section 704.1 of this Part, he may impose appropriate criteria contained in this Part upon such thermal discharge, unless, after public hearing, the owner or operator of any such thermal discharge establishes to the satisfaction of the commissioner that either such thermal discharge does conform to such subdivision (a) or that any such criteria are more stringent than necessary to assure conformance with such subdivision (a).

Historical Note

Sec. filed Sept. 20, 1974 eff. 30 days after filing.

PART 705

REFERENCES

(Statutory authority: Environmental Conservation Law, § 3-0301[2][m])

Historical Note

Part (§§ 705.1-705.3) filed Nov. 5, 1984 eff. Nov. 5, 1984.

Section 705.1 Federal statutes or regulations. The following Federal statutes or regulations have been referenced in Parts 700-704 of this Title.

(a) *40 CFR* means title 40 of the *Code of Federal Regulations* (Protection of the Environment).

(b) The Safe Drinking Water Act, 42 USC 300f *et seq.*, effective July 1, 1978.

(c) The Federal Water Pollution Control Act of 1972, 33 USC 466 *et seq.*, effective October 18, 1972.

(d) All United States publications referenced above are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

Historical Note

Sec. filed Nov. 5, 1984 eff. Nov. 5, 1984.

705.2 Books. The following books have been referenced in Parts 700-704 of this Title:

(a) *Standard Methods for the Examination of Water and Wastewater*, 12th edition, 1965, American Public Health Association (APHA), American Water Works Association (AWWA), and Water Pollution Control Federation (WPCF); 2626 Pennsylvania Avenue NW, Washington, DC 20037.

(b) *Methods for Chemical Analysis of Water and Wastes*, 1974, Environmental Protection Agency (EPA); Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(c) *Water Standards of the American Society for Testing and Materials* means 1968 Book of ASTM Standards, Part 23, Water; Atmospheric Analysis; published in October 1968 by the American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, PA 19103.

Historical Note

Sec. filed Nov. 5, 1984 eff. Nov. 5, 1984.

705.3 Availability. All material referenced in Parts 700-704 of this Title is available for copying and inspection at the Department of Environmental Conservation, Division of Water, 50 Wolf Road, Albany, NY 12233.

Historical Note

Sec. filed Nov. 5, 1984 eff. Nov. 5, 1984.

APPENDIX 31

(cf. Part 701)

AMBIENT WATER QUALITY STANDARDS

The following ambient water quality standards (units are micrograms/liter unless otherwise noted) apply to the designated water classifications. The chemical name is listed with associated Chemical Abstract Service registry numbers in brackets where applicable. Separate standards, where warranted, are listed for Classes A and AA based on human and aquatic life protection. Where more than one standard is listed for a classification, the most stringent standard applies. A letter note referencing the basis of the standard appears following the criterion and refers to Table 1. Special interpretive remarks are provided following the water classification list, as necessary.

The *acid-soluble form* of a substance is defined as the part of the substance that passes through a 0.45 micrometer membrane filter after the sample is acidified to pH 1.5 to 2.0 with nitric acid.

APPENDIX 31

Table 1

Basis for Establishment of Ambient Water Quality Standards

Consideration	*Note*	*Methodology used to establish standards*	*Rules and regulations section reference*
Human	A	Oncogenic	701.4
	B	Nononcogenic	701.5
	C	Aesthetic	701.6
	D	Chemical correlation	701.7
Aquatic	H	EPA published criteria	701.8(b)
	I	Propagation (chronic toxicity); chronic tests available	701.9(a)
	J	Propagation (chronic toxicity); chronic tests not available	701.9(b)
	K	Survival (acute toxicity)	701.10
	L	Aquatic food tainting	701.11
	M	Bioaccumulation	701.12
	N	Chemical and aquatic species correlation	701.13

APPENDIX 31

Substance [CAS No.]	*Water classes*	*Standards micrograms/liter*	*Notes*
Acenaphthene [83-32-9]	AA;AA-s;A;A-s (Human)	20	C
Aldicarb [116-06-3]	AA;AA-s;A;A-s (Human)	7	B
Aldrin [309-00-2]	AA;AA-s;A;A-s (Aquatic)	*	
	B;C	*	
	D	*	
	SA;SB;SC	*	
	SD	*	
	Remarks: *Refer to standards for "Aldrin and Dieldrin."		
Aldrin and Dieldrin [309-00-2; 60-57-11]	AA;AA-s;A;A-s (Aquatic)	0.001	H
	B;C	0.001	H
	D	0.001	H
	SA;SB;SC	0.001	H
	SD	0.001	H
	Remarks: Applies to sum of aldrin and dieldrin.		
Alkyl dimethyl benzyl ammonium chloride [68391-01-5]	AA;AA-s;A;A-s (Aquatic)	*	
	B;C	*	
	Remarks: * Refer to standards for "Quaternary ammonium compounds."		
Aluminum, ionic	AA;AA-s;A;A-s (Aquatic)	100	I
	B;C	100	I
Aminocresols [95-84-1; 2835-95-2; 2835-99-6]	AA;AA-s;A;A-s (Human)	*	
	AA;AA-s;A;A-s (Aquatic)	**	
	B;C	**	
	D	**	
	Remarks: * Refer to standards for Phenolic Compounds. ** Refer to standards for Phenols—Total Unchlorinated.		

Substance [CAS No.]	Water classes	Standards micrograms/liter	Notes
Ammonia	AA;AA-s;A;A-s (Human)	2000*	10 NYCRR Part 170
	AA;AA-s;A;A-s (Aquatic)	**	H
	B;C	**	H
	D	**	H

Remarks: * $NH_3 + NH_4$ as N
** unionized ammonia only as NH_3; formulae for calculating standards at varying pH and temperature for different classes are as follows:

Corrected equations are provided below:

AA;AA-s;A;A-s; B; C;

~~AWQC (mg/l) = 0.031 = [f(T)/g(pH)]~~ $AWQC\ (mg/L) = 0.031\ [f(T)/g(pH)]$

T = Temperature in °C and

$g(pH) = 1$; if $pH \geqq 7.7$

~~g(pH) = 10[0.74(7.7-pH)] ; if pH < 7.7~~ $g(pH) = 10^{[0.74\ (7.7-pH)]}$; if $pH < 7.7$

$f(T) = 1$; if $T \geqq 10°C$

~~f(T) = 1 + 10(9.73-pH) / 1 + 10(pKT-pH) ; if T < 10°C~~ $f(T) = \frac{1 + 10^{(9.73-pH)}}{1 + 10^{(pk_T-pH)}}$; if $T < 10°C$

$pK_T = 0.090 + \frac{2730}{(T + 273.2)}$

D;

$AWQC\ (mg/L) = 0.15\ [f(T)/g(pH)]$

~~g(pH) = 1 + 10[1.03(7.32-pH)]~~ $g(pH) = 1 + 10^{[1.03\ (7.32-pH)]}$

f(T) as above

Substance [CAS No.]	Water classes	Standards micrograms/liter	Notes
Arsenic [NA]	AA;AA-s;A;A-s (Human)	50	10 NYCRR Part 5
	AA;AA-s;A;A-s (Aquatic)	190*	H
	B;C	190*	H
	D	360*	H
	SA;SB;SC	63*	H
	SD	120*	H

Remarks: * Dissolved arsenic form.

Substance [CAS No.]	Water classes	Standards micrograms/liter	Notes
Azinphosmethyl [86-50-0]	AA;AA-s;A;A-s (Aquatic)	0.005	J
	B;C	0.005	J
	SA;SB;SC	0.01	J
Barium [NA]	AA;AA-s;A;A-s (Human)	1,000	10 NYCRR Part 5
Benzidine [92-87-5]	AA;AA-s;A;A-s (Aquatic)	0.1	H
	B;C	0.1	H
	D	0.1	H

Substance [CAS No.]	Water classes	Standards micrograms/liter	Notes
Beryllium (Acid-Soluble) [NA]	AA;AA-s;A;A-s (Aquatic)	11* or 1,100**	H
	B;C	11* or 1,100**	H

Remarks: * when hardness is less than or equal to 75 ppm
** when hardness is greater than 75 ppm

Substance [CAS No.]	Water classes	Standards micrograms/liter	Notes
Bis (2-ethylhexyl) phthalate [117-81-7]	AA;AA-s;A;A-s (Aquatic)	0.6	I
	B;C	0.6	I
Boron (Acid-Soluble) [NA]	AA;AA-s;A;A-s (Aquatic)	10,000	J
	B;C	10,000	J
	SA;SB;SC	1,000	J
Cadmium [NA]	AA;AA-s;A;A-s (Human)	10	10 NYCRR Part 5
	AA;AA-s;A;A-s (Aquatic)	*	I
	B;C (aquatic)	*	I
	D (aquatic)	**	H

Remarks: * exp (0.7852 [ln (ppm hardness)] - 3.490)
** exp (1.128 [ln (ppm hardness)] - 3.828)
All standards except (Human) apply to acid-soluble form.

Substance [CAS No.]	Water classes	Standards micrograms/liter	Notes
Carbofuran [1563-66-2]	AA;AA-s;A;A-s (Human)	15	B
	AA;AA-s;A;A-s (Aquatic)	1.0	J
	B;C	1.0	J
	D	10	K
Chloride [NA]	AA;AA-s;A;A-s (Human)	250,000	10 NYCRR Part 170
Chlorobenzene [108-90-7]	AA;AA-s;A;A-s (Human)	20	C
	AA;AA-s;A;A-s (Aquatic)	5	I
	B;C	5	I
	D	50	L
Chloroform [67-66-3]	AA;AA-s;A;A-s (Human)	0.2	A
2-Chloronaphthalene [91-58-7]	AA;AA-s;A;A-s (Human)	10	D

Substance [CAS No.]	Water classes	Standards micrograms/liter	Notes
Chromium [NA]	AA;AA-s;A;A-s (Human)	50	10 NYCRR Part 5
	AA;AA-s;A;A-s (Aquatic)	*	H
	B;C	*	H
	D	**	H
	Remarks: * exp (0.819 [1n (ppm hardness)] + 1.561) ** exp (0.819 [1n (ppm hardness)] + 3.688) All standards except (Human) apply to acid-soluble form.		
Chromium (VI) (Acid-Soluble) [NA]	AA;AA-s;A;A-s (Aquatic)	11	H
	B;C	11	H
	D	16	H
	SA;SB;SC	54	H
	SD	1,200	H
Cobalt (Acid-Soluble) [NA]	AA;AA-s;A;A-s (Aquatic)	5	I
	B;C	5	I
Copper [NA]	AA;AA-s;A;A-s (Human)	200	10 NYCRR Part 170
	AA;AA-s;A;A-s (Aquatic)	*	H
	B;C	*	H
	D	**	H
	SA;SB;SC	2.0	H
	SD	3.2	H
	Remarks: * exp (0.8545 [1n (ppm hardness)] - 1.465) ** exp (0.9422 [1n (ppm hardness)] - 1.464) All standards except (Human) apply to acid-soluble form.		
Cyanide [NA]	AA;AA-s;A;A-s (Human)	100	10 NYCRR Part 170
	AA;AA-s;A;A-s (Aquatic)	5.2*	H
	B;C	5.2*	H
	D	22*	H
	SA;SB;SC	1.0*	H
	SD	1.0*	H
	Remarks: * as free cyanide - the sum of HCN and CN expressed as CN.		
2,4-D [94-75-7]	AA;AA-s;A;A-s (Human)	100	10 NYCRR Part 5

Substance [CAS No.]	Water classes	Standards micrograms/liter	Notes
DDT, DDD, and DDE [50-29-3; 72-54-8; 72-55-9]	AA;AA-s;A;A-s (Human)	0.01	A
	AA;AA-s;A;A-s (Aquatic)	0.001	H
	B;C	0.001	H
	D	0.001	H
	SA;SB;SC	0.001	H
	SD	0.001	H
Demeton [8065-48-3; 298-03-3; 126-75-0]	AA;AA-s;A;A-s (Aquatic)	0.1	J
	B;C	0.1	J
	SA;SB;SC	0.1	J
Diazinon [333-41-5]	AA;AA-s;A;A-s (Aquatic)	0.08	J
	B;C	0.08	J
Dichlorobenzenes [95-50-1; 106-46-7; 541-73-1]	AA;AA-s;A;A-s (Human)	20*/30**	C
	AA;AA-s;A;A-s (Aquatic)	5	I,N
	B;C	5	I,N
	D	50	L
	Remarks: * applies to meta (1,3-) isomer only ** applies to para (1,4-) isomer only Other standards apply to total dichlorobenzenes.		
1,2-Dichloroethane [107-06-2]	AA;AA-s;A;A-s (Human)	0.8	A
2,4-Dichlorophenol [120-83-2]	AA;AA-s;A;A-s (Human)	0.3	C
	AA;AA-s;A;A-s (Aquatic)	*	
	B;C	*	
	D	*	
	Remarks: * Refer to standard for Phenols—Total Chlorinated.		
Dieldrin [60-57-1]	AA;AA-s;A;A-s (Aquatic)	0.001*	H
	Remarks: * Refer to standard for "Aldrin and Dieldrin" combined.		
Dyphylline [479-18-5]	AA;AA-s;A;A-s (Human)	50	D
Endosulfan [115-29-7]	AA;AA-s;A;A-s (Aquatic)	0.009	H
	B;C	0.009	H
	D	0.22	H
	SA;SB;SC	0.001	H
	SD	0.034	H

Substance [CAS No.]	Water classes	Standards micrograms/liter	Notes
Endrin [72-20-8]	AA;AA-s;A;A-s (Human)	0.2	10 NYCRR Part 5
	AA;AA-s;A;A-s (Aquatic)	0.002	H
	B;C	0.002	H
	D	0.002	H
	SA;SB;SC	0.002	H
	SD	0.002	H
Fluoride [NA]	AA;AA-s;A;A-s (Human)	1,500	10 NYCRR Part 170
	AA;AA-s;A;A-s (Aquatic)	*	J
	B;C	*	J
	D	**	J
	Remarks: * (0.02) exp (0.907[1n (ppm hardness)] + 7.394) ** (0.1) exp (0.907 [1n (ppm hardness)] + 7.394)		
Gross Alpha Radiation [NA]	AA;AA-s;A;A-s (Human)	15pCi/l*	10 NYCRR Part 5
	Remarks: * 15 picocuries per liter, excluding radon and uranium.		
Gross Beta Radiation [NA]	AA;A (Human)	1,000 pCi/l*	10 NYCRR Part 170
	Remarks: * 1,000 picocuries per liter, excluding strontium-90 and alpha emitters.		
Heptachlor and heptachlor epoxide [76-44-8; 1024-57-3]	AA;AA-s;A;A-s (Human)	0.009	A
	AA;AA-s;A;A-s (Aquatic)	0.001	H
	B;C	0.001	H
	D	0.001	H
	SA;SB;SC	0.001	H
	SD	0.001	H
Hexachlorobutadiene [87-68-3]	AA;AA-s;A;A-s (Human)	0.5	A
	AA;AA-s;A;A-s (Aquatic)	1.0	J
	B;C	1.0	J
	D	10	K
	SA;SB;SC	0.3	J
	SD	3.0	K
Hexachlorocyclohexanes [58-89-9; 319-84-6; 319-85-7; 319-86-8; 6108-10-7; 608-73-1]	AA;AA-s;A;A-s (Aquatic)	0.01	H
	B;C	0.01	H
	D	2	H
	SA;SB;SC	0.004	H
	SD	0.10	H
	Remarks: applies to sum of all isomers.		

Substance [CAS No.]	Water classes	Standards micrograms/liter	Notes
Hexachlorocyclo-pentadiene [77-47-4]	AA;AA-s;A;A-s (Human)	1.0	C
	AA;AA-s;A;A-s (Aquatic)	0.45	J
	B;C	0.45	J
	D	4.5	K
	SA;SB;SC	0.07	K
	SD	0.7	K
Hydrazine [302-01-2]	AA;AA-s;A;A-s (Aquatic)	*	J
	B;C	*	J
	D	**	K
	Remarks: * 5 ug/L at < 50 ppm hardness and 10 ug/L at > 50 ppm hardness ** 50 ug/L at < 50 ppm hardness and 100 ug/L at ≧ 50 ppm hardness		
Hydrogen sulfide [7783-06-4]	AA;AA-s;A;A-s (Aquatic)	2.0*	H
	B;C	2.0*	H
	SA;SB;SC	2.0*	H
	Remarks: * undissociated		
Hydroquinone [123-31-9]	AA;AA-s;A;A-s (Aquatic)	2.2	J
	B;C	2.2	J
	D	4.4	K
Iron [NA]	AA;AA-s;A;A-s (Human)	300	10 NYCRR Part 5
	AA;AA-s;A;A-s (Aquatic)	300	J
	B;C	300	J
	D	300	K
Isodecyl diphenyl phosphate [29761-21-5]	AA;AA-s;A;A-s (Aquatic)	1.73	I
	B;C	1.73	I
	D	22	K
Isothiazolones, Total (isothiazolinones) (includes 5-chloro-2-methyl-4-isothiazolin-3-one and 2-methyl-4-isothiazolin-3-one)	AA;AA-s;A;A-s (Aquatic)	1	J
	B;C	1	J
	D	10	K

Substance [CAS No.]	Water classes	Standards micrograms/liter	Notes
Lead [NA]	AA;AA-s;A;A-s (Human)	50	10 NYCRR Part 5
	AA;AA-s;A;A-s (Aquatic)	*	H
	B;C	*	H
	D	**	H
	SA;SB;SC	8.6	H
	SD	220	H
	Remarks: * exp (1.266 [1n (ppm hardness)] - 4.661) ** exp (1.266 [1n (ppm hardness)] - 1.416) All standards except (Human) apply to acid-soluble form.		
Linear alkyl benzene sulfonates (LAS) [NA]	AA;AA-s;A;A-s (Aquatic)	40*	J
	B;C	40*	J
	Remarks: * LAS with side chains greater than 13 carbons only.		
Magnesium [NA]	AA;AA-s;A;A-s (Human)	35,000	B
Malathion [121-75-5]	AA;AA-s;A;A-s (Aquatic)	0.1	H
	B;C	0.1	H
	SA;SB;SC	0.1	H
Manganese [NA]	AA;AA-s;A;A-s (Human)	300	10 NYCRR Part 5
Mercury [NA]	AA;AA-s;A;A-s (Human)	2	10 NYCRR Part 5
Methoxychlor [72-43-5]	AA;AA-s;A;A-s (Human)	35	10 NYCRR Part 170
	AA;AA-s;A;A-s (Aquatic)	0.03	H
	B;C	0.03	H
	SA;SB;SC	0.03	H
Methylene bisthiocyanate [6317-18-6]	AA;AA-s;A;A-s (Aquatic)	1.0	J
	B;C	1.0	J
Mirex [2385-85-5]	AA;AA-s;A;A-s (Aquatic)	0.001	H
	B;C	0.001	H
	D	0.001	H
	SA;SB;SC	0.001	H

Substance [CAS No.]	Water classes	Standards micrograms/liter	Notes
Naphthalene [91-20-3]	AA;AA-s;A;A-s (Human)	10	C
Niacinamide [98-92-0]	AA;AA-s;A;A-s (Human)	500	B
Nickel (Acid-Soluble) [NA]	AA;AA-s;A;A-s (Aquatic)	*	H
	B;C	*	H
	D	**	H
	SA;SB;SC	7.1	H
	SD	140	H
	Remarks: * exp (0.76 [1n (ppm hardness)] + 1.06) ** exp (0.76 [1n (ppm hardness)] + 4.02)		
Nitrate [NA]	AA;AA-s;A;A-s (Human)	10,000*	10 NYCRR Part 5
	Remarks: * as N		
Nitrilotriacetate (NTA) [NA]	AA;AA-s;A;A-s (Aquatic)	5,000	J
	B;C	5,000	J
Nitrite [NA]	AA;AA-s;A;A-s (Aquatic)	100* or 20**	J
	B;C	100* or 20**	J
	Remarks: * warm water fishery waters ** cold water fishery waters		
Nitrobenzene [98-95-3]	AA;AA-s;A;A-s (Human)	30	C
Parathion and Methyl Parathion [56-38-2; 298-00-0]	AA;AA-s;A;A-s (Aquatic)	0.008	I,N
	B;C	0.008	I,N
Pentachlorophenol [87-86-5]	AA;AA-s;A;A-s (Human)	*	
	AA;AA-s;A;A-s (Aquatic)	0.4	I
	B;C	0.4	I
	D	**	L
	Remarks: * Refer to standard for Phenolic compounds (total phenols). ** Refer to standard for Phenols, total chlorinated.		
Phenol [108-95-2]	AA;AA-s;A;A-s (Human)	*	
	AA;AA-s;A;A-s (Aquatic)	**	L
	B;C	**	L
	D	**	L
	Remarks: * Refer to standard for Phenolic compounds (total phenols). ** Refer to standard for Phenols, total unchlorinated.		

Substance [CAS No.]	Water classes	Standards micrograms/liter	Notes
Phenolic compounds (total phenols) [NA]	AA;AA-s;A;A-s (Human)	1	10 NYCRR Part 170
Phenols, total chlorinated [NA]	AA;AA-s;A;A-s (Human)	*	
	AA;AA-s;A;A-s (Aquatic)	1.0	L
	B;C	1.0	L
	D	1.0	L
	Remarks: * Refer to standard for Phenolic compounds (total phenols)		
Phenols, total unchlorinated [NA]	AA;AA-s;A;A-s (Aquatic)	5.0	L
	B;C	5.0	L
	D	5.0	L
Phenyl ether [101-84-8]	AA;AA-s;A;A-s (Human)	10	C
Polychlorinated Biphenyl, PCB [NA]	AA;AA-s;A;A-s (Human)	0.01	A
	AA;AA-s;A;A-s (Aquatic)	0.001	H
	B;C	0.001	H
	D	0.001	H
	SA;SB;SC	0.001	H
	SD	0.001	H
Quaternary ammonium compounds (including dimethyl benzyl ammonium chloride and dimethyl ethyl benzyl ammonium chloride) [NA]	AA;AA-s;A;A-s (Aquatic)	10	J
	B;C	10	J
Radium 226 [NA]	AA (Human)	3 pCi/L*	10 NYCRR Part 170
	Remarks: * 3 picocuries per liter.		
Radium 226 plus Radium 228 [NA]	AA;AA-s;A;A-s (Human)	5 pCi/L*	10 NYCRR Part 5
	Remarks: * 5 picocuries per liter.		

Substance [CAS No.]	Water classes	Standards micrograms/liter	Notes
Selenium [NA]	AA;AA-s;A;A-s (Human)	10	10 NYCRR Part 5
	AA;AA-s;A;A-s (Aquatic)	1.0*	I
	B;C	1.0*	I
	Remarks: * all standards except (Human) apply to acid-soluble form.		
Silver [NA]	AA;AA-s;A;A-s (Human)	50	10 NYCRR Part 5
	AA;AA-s;A;A-s (Aquatic)	0.1*	I
	B;C	0.1*	I
	D	**	H,K
	SD	2.3	H
	Remarks: * Ionic silver ** exp (1.72 [1n (ppm hardness)] - 6.52) acid-soluble form applies to D and SD classes.		
Strontium 90 [NA]	AA;AA-s;A;A-s (Human)	8pCi/L*	10 NYCRR Part 5
	Remarks: * If two or more radionuclides are present, the sum of their doses shall not exceed annual potential dose of 4 millirems per year.		
Styrene [100-42-5]	AA;AA-s;A;A-s (Human)	50	C
Sulfate [NA]	AA;AA-s;A;A-s (Human)	250,000	10 NYCRR Part 5
Sulfite [NA]	AA;AA-s;A;A-s (Aquatic)	200	J
	B;C	200	J
Tetrachlorobenzenes [95-94-3; 634-66-2; 634-90-2]	AA;AA-s;A;A-s (Human)	10	C
2,3,7,8-Tetrachloro-dibenzo-p-dioxin (TCDD) [1746-01-6]	AA;AA-s;A;A-s (Aquatic)	0.000001	M
	B;C	0.000001	M
	D	0.000001	M
Thallium (Acid Soluble) [NA]	AA;AA-s;A;A-s (Aquatic)	8	I
	B;C	8	I
	D	20	K

Substance [CAS No.]	Water classes	Standards micrograms/liter	Notes
Theophylline [58-55-9]	AA;AA-s;A;A-s (Human)	40	B
Toxaphene [8001-35-2]	AA;AA-s;A;A-s (Aquatic)	0.005	H
	B;C	0.005	H
	D	1.6	H
	SA;SB;SC	0.005	H
2,4,5-TP (Silvex) [93-72-1]	AA;AA-s;A;A-s (Human)	10	10 NYCRR Part 5
Trichlorobenzenes [87-61-6; 108-70-3; 120-82-1; 12002-48-1]	AA;AA-s;A;A-s (Human)	10	C
	AA;AA-s;A;A-s (Aquatic)	5	I,N
	B;C	5	I,N
	D	50	L
	SA;SB;SC	5	I,N
	SD	50	L
	Remarks: Applies to sum of isomers.		
1,1,2-Trichloroethane [79-00-5]	AA;AA-s;A;A-s (Human)	0.6	A
Triphenyl phosphate [115-86-6]	AA;AA-s;A;A-s (Aquatic)	4	J
	B;C	4	J
	D	40	K
Tritium [NA]	AA;AA-s;A;A-s (Human)	20,000 pCi/l*	10 NYCRR Part 5
	Remarks: * 20,000 picocuries per liter; if two or more radionuclides are present, the sum of their annual dose equivalent to the total body or any organ shall not exceed 4 millirems per year.		
Vanadium (Acid-Soluble) [NA]	AA;AA-s;A;A-s (Aquatic)	14	J
	B;C	14	J
	D	190	K
Zinc [NA]	AA;AA-s;A;A-s (Human)	300	10 NYCRR Part 170
	AA;AA-s;A;A-s (Aquatic)	30	I
	B;C	30	I
	D	*	H
	SA;SB;SC	58	H
	SD	170	H
	Remarks: * exp (0.83 [1n (ppm hardness)] + 1.95) All standards except (Human) apply to acid-soluble form.		

APPENDIX H

DRAINAGE DITCH DESIGN CALCULATIONS

DRAINAGE DITCH DESIGN

REFERENCE - "Storm Drainage Design Manual"

Erie and Niagara Counties Regional Planning Board

A. MAXIMUM RATE OF RUNOFF:

Rational Method: $Q = CiA$

C, runoff coefficient - From Exhibit III-2:

Soil Group D, Slope 6% + and open space:

$C = 0.39$

Time of Concentration:

Distance = 820 ft (D)
Slope = 5% (s)

Using Exhibit III-3,

$$T_c = \frac{1.8(1.1 - c)D^{1/2}}{S^{1/3}}$$ where T_c is the time of concentration

$$T_c = \frac{1.8(1.1 - 0.39)(820)^{1/2}}{(5)^{1/3}}$$

$$T_c = 21.4 \text{ minutes}$$

Rainfall Intensity:

Part 360 Regulations dictate a 25 year, 24 hour storm

From Exhibit III-6 and using 21 minutes for rainfall duration:

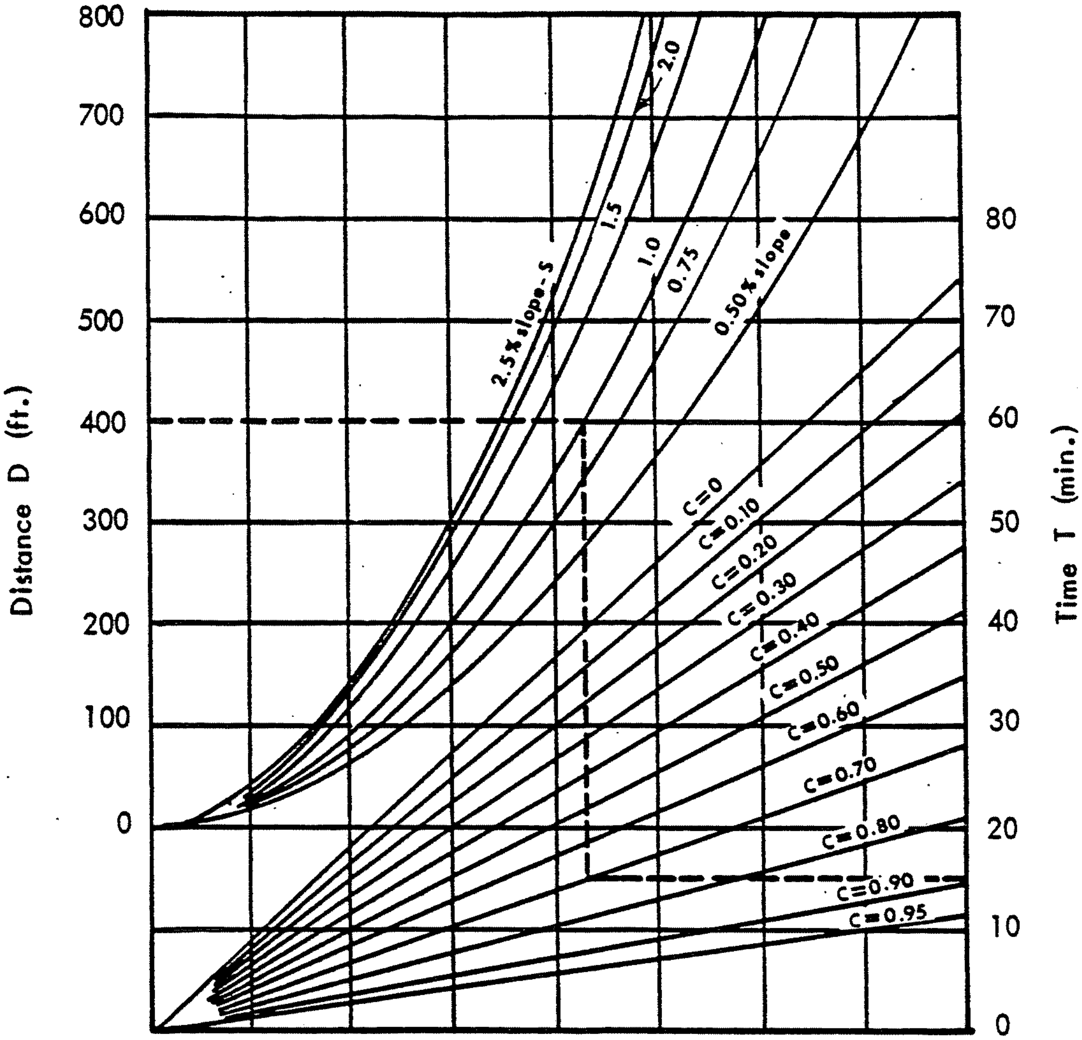
$i = 3.3$ inches per hour

RUNOFF COEFFICIENTS
FOR USE IN THE RATIONAL FORMULA

Hydrologic Soil Group	A			B			C			D		
Slope Range	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+
LAND USE												
Industrial	0.67 1/ 0.85 2/	0.68 0.85	0.68 0.86	0.68 0.85	0.68 0.86	0.69 0.86	0.68 0.86	0.69 0.86	0.69 0.87	0.69 0.86	0.69 0.86	0.70 0.88
Commercial	0.71 0.88	0.71 0.89	0.72 0.89	0.71 0.89	0.72 0.89	0.72 0.89	0.72 0.89	0.72 0.89	0.72 0.90	0.72 0.89	0.72 0.89	0.72 0.90
High Density 3/ Residential	0.47 0.58	0.49 0.60	0.50 0.61	0.48 0.59	0.50 0.61	0.52 0.64	0.49 0.60	0.51 0.62	0.54 0.66	0.51 0.62	0.53 0.64	0.56 0.69
Medium Density 4/ Residential	0.25 0.33	0.28 0.37	0.31 0.40	0.27 0.35	0.30 0.39	0.35 0.44	0.30 0.38	0.33 0.42	0.38 0.49	0.33 0.41	0.36 0.45	0.42 0.54
Low Density 5/ Residential	0.14 0.22	0.19 0.26	0.22 0.29	0.17 0.24	0.21 0.28	0.26 0.34	0.20 0.28	0.25 0.32	0.31 0.40	0.24 0.31	0.28 0.35	0.35 0.46
Agricultural	0.08 0.14	0.13 0.18	0.16 0.22	0.11 0.16	0.15 0.21	0.21 0.28	0.14 0.20	0.19 0.25	0.26 0.34	0.18 0.24	0.23 0.29	0.31 0.41
Open Space	0.05 0.11	0.10 0.16	0.14 0.20	0.08 0.14	0.13 0.19	0.19 0.26	0.12 0.18	0.17 0.23	0.24 0.32	0.16 0.22	0.21 0.27	0.28 0.39
Freeways and Expressways	0.57 0.70	0.59 0.71	0.60 0.72	0.58 0.71	0.60 0.72	0.61 0.74	0.59 0.72	0.61 0.73	0.63 0.76	0.60 0.73	0.62 0.75	0.64 0.78

1/ Lower runoff coefficients for use with storm recurrence intervals less than 25 years.
2/ Higher runoff coefficients for use with storm recurrence intervals of 25-years or more.
3/ High Density Residential - greater than 15 dwelling units per acre
4/ Medium Density Residential - 4 to 15 dwelling units per acre
5/ Low Density Residential - 1 to 4 dwelling units per acre

OVERLAND TIME OF FLOW



SOURCE: Airport Drainage Federal Aviation Agency
Department of Transportation Circular-AC 150-5320-5B
Washington, D.C., 1970

Where: T = time - minutes
D = distance - feet
S = slope - percentage
C = runoff coefficient

$$T = \frac{1.8\,(1.1 - C)\,D^{1/2}}{S^{1/3}}$$

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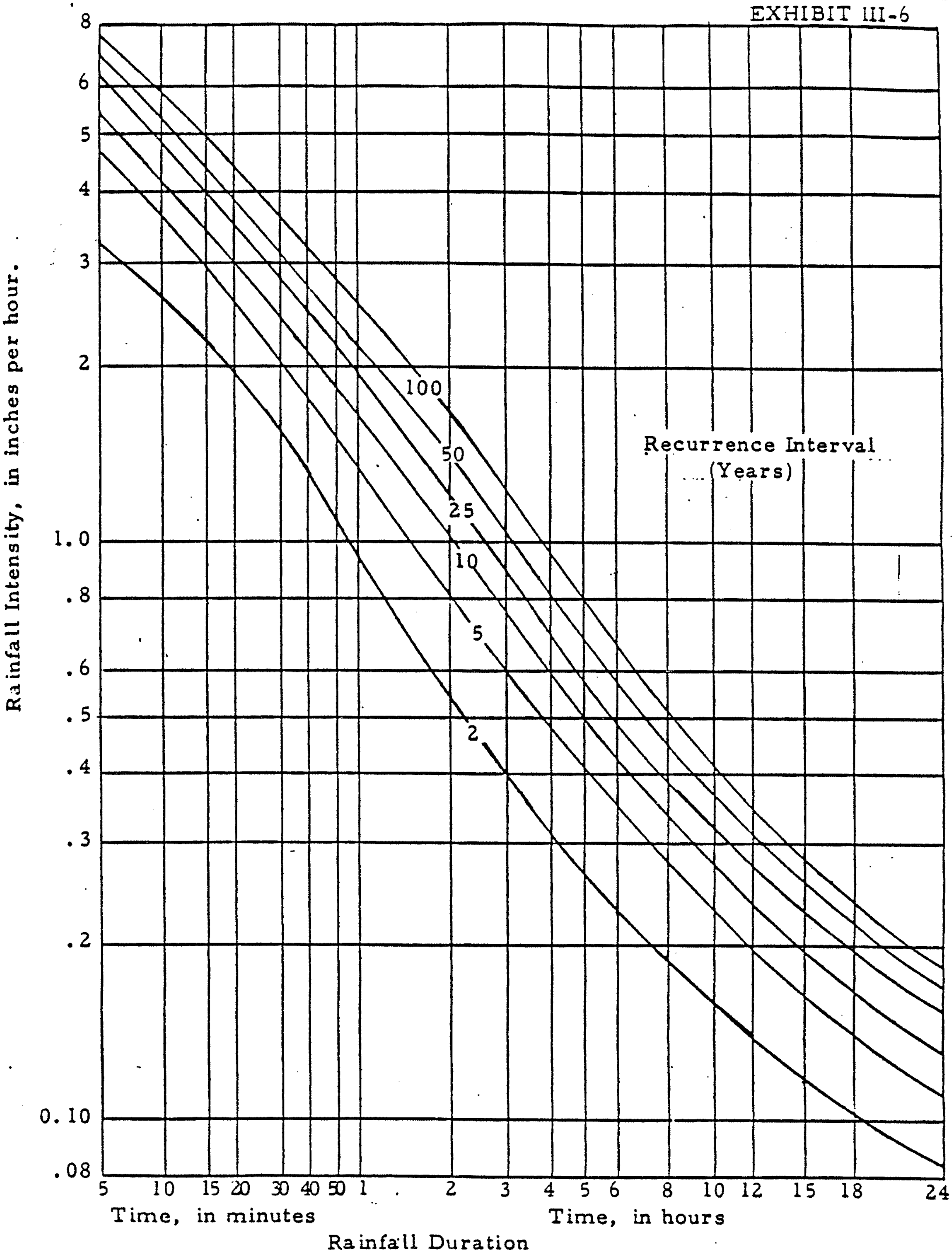

ERIE AND NIAGARA COUNTIES
REGIONAL PLANNING BOARD

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REGIONAL STORM-SURFACE WATER
DRAINAGE MANAGEMENT STUDY

RAINFALL INTENSITY-DURATION-FREQUENCY, BUFFALO, NEW YORK

Source: U.S. Weather Bureau

HARZA ENGINEERING COMPANY, APRIL 1972

Area :

Assume for design purposes that the entire landfill area (ie BOF Dust Area) contributes to one ditch.

$$\text{AREA} = (400\text{ ft} \times 340\text{ ft}) + \tfrac{1}{4}\left(\pi(340\text{ ft})^2\right) = 227{,}000\text{ ft}^2$$

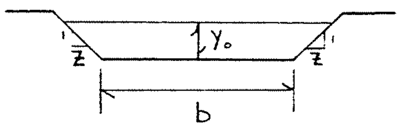
$$\text{AREA} = 5.2\text{ Acres}$$

Peak Runoff Flow Rate :

$$Q = CiA = (0.39)(3.3\text{ inches/hr})(5.2\text{ Acres}) = 6.71\text{ CFS}$$

B. NORMAL DEPTH

Channel Cross-section:



$z = 1$

$b = 2$ ft

slope = 0.05 ft/ft

channel "friction", $n = 0.027$ (grass-lined) from Table 5-6

Using Manning's Equation :

$$Q = \frac{1.49}{n} A R^{2/3} S_o^{1/2}$$

$$Qn \Big/ b^{8/3} S_o^{1/2} = (6.71\text{ CFS})(0.027) \Big/ (2^{8/3}\, 0.05^{1/2}) = 0.128$$

Using Exhibit V-1,

$$Y_o/b = 0.23$$

$$\Longrightarrow Y_o = 0.23(2\text{ ft}) = 0.46\text{ ft} = 5.5''$$

∴ 2 FT DEEP DITCH IS OKAY

TABLE 5-6. VALUES OF THE ROUGHNESS COEFFICIENT *n* (*continued*)

Type of channel and description	Minimum	Normal	Maximum
C. EXCAVATED OR DREDGED			
a. Earth, straight and uniform			
1. Clean, recently completed	0.016	0.018	0.020
2. Clean, after weathering	0.018	0.022	0.025
3. Gravel, uniform section, clean	0.022	0.025	0.030
4. With short grass, few weeds	0.022	0.027	0.033
b. Earth, winding and sluggish			
1. No vegetation	0.023	0.025	0.030
2. Grass, some weeds	0.025	0.030	0.033
3. Dense weeds or aquatic plants in deep channels	0.030	0.035	0.040
4. Earth bottom and rubble sides	0.028	0.030	0.035
5. Stony bottom and weedy banks	0.025	0.035	0.040
6. Cobble bottom and clean sides	0.030	0.040	0.050
c. Dragline-excavated or dredged			
1. No vegetation	0.025	0.028	0.033
2. Light brush on banks	0.035	0.050	0.060
d. Rock cuts			
1. Smooth and uniform	0.025	0.035	0.040
2. Jagged and irregular	0.035	0.040	0.050
e. Channels not maintained, weeds and brush uncut			
1. Dense weeds, high as flow depth	0.050	0.080	0.120
2. Clean bottom, brush on sides	0.040	0.050	0.080
3. Same, highest stage of flow	0.045	0.070	0.110
4. Dense brush, high stage	0.080	0.100	0.140
D. NATURAL STREAMS			
D-1. Minor streams (top width at flood stage <100 ft)			
a. Streams on plain			
1. Clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
2. Same as above, but more stones and weeds	0.030	0.035	0.040
3. Clean, winding, some pools and shoals	0.033	0.040	0.045
4. Same as above, but some weeds and stones	0.035	0.045	0.050
5. Same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
6. Same as 4, but more stones	0.045	0.050	0.060
7. Sluggish reaches, weedy, deep pools	0.050	0.070	0.080
8. Very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150

TABLE 5-6. VALUES OF THE ROUGHNESS COEFFICIENT *n* (*continued*)

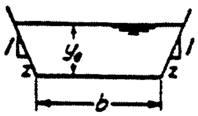
Type of channel and description	Minimum	Normal	Maximum
b. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
1. Bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
2. Bottom: cobbles with large boulders	0.040	0.050	0.070
D-2. Flood plains			
a. Pasture, no brush			
1. Short grass	0.025	0.030	0.035
2. High grass	0.030	0.035	0.050
b. Cultivated areas			
1. No crop	0.020	0.030	0.040
2. Mature row crops	0.025	0.035	0.045
3. Mature field crops	0.030	0.040	0.050
c. Brush			
1. Scattered brush, heavy weeds	0.035	0.050	0.070
2. Light brush and trees, in winter	0.035	0.050	0.060
3. Light brush and trees, in summer	0.040	0.060	0.080
4. Medium to dense brush, in winter	0.045	0.070	0.110
5. Medium to dense brush, in summer	0.070	0.100	0.160
d. Trees			
1. Dense willows, summer, straight	0.110	0.150	0.200
2. Cleared land with tree stumps, no sprouts	0.030	0.040	0.050
3. Same as above, but with heavy growth of sprouts	0.050	0.060	0.080
4. Heavy stand of timber, a few down trees, little undergrowth, flood stage below branches	0.080	0.100	0.120
5. Same as above, but with flood stage reaching branches	0.100	0.120	0.160
D-3. Major streams (top width at flood stage >100 ft). The *n* value is less than that for minor streams of similar description, because banks offer less effective resistance.			
a. Regular section with no boulders or brush	0.025	.....	0.060
b. Irregular and rough section	0.035	.....	0.100

ATTACHMENT NO. 6

EXHIBIT V-1

Uniform Flow in Trapezoidal Channels by Manning Formula

Values of $\frac{Qn}{b^{8/3}S_0^{1/2}}$



$\frac{y_0}{b}$	z = 0	z = 1/4	z = 1/2	z = 3/4	z = 1	z = 1 1/4	z = 1 1/2	z = 2	z = 2 1/2	z = 3	z = 4
0.02	0.00213	0.00215	0.00216	0.00217	0.00218	0.00219	0.00220	0.00221	0.00222	0.00223	0.00225
0.03	0.00414	0.00419	0.00423	0.00426	0.00429	0.00431	0.00433	0.00437	0.00440	0.00443	0.00449
0.04	0.00661	0.00670	0.00679	0.00685	0.00690	0.00696	0.00700	0.00707	0.00715	0.00722	0.00735
0.05	0.00947	0.00964	0.00980	0.00991	0.0100	0.0101	0.0102	0.0103	0.0104	0.0106	0.0109
0.06	0.0127	0.0130	0.0132	0.0134	0.0136	0.0137	0.0138	0.0141	0.0143	0.0145	0.0149
0.07	0.0162	0.0166	0.0170	0.0173	0.0176	0.0177	0.0180	0.0183	0.0186	0.0190	0.0196
0.08	0.0200	0.0206	0.0211	0.0215	0.0219	0.0222	0.0225	0.0231	0.0235	0.0240	0.0250
0.09	0.0240	0.0249	0.0256	0.0262	0.0267	0.0271	0.0275	0.0282	0.0289	0.0296	0.0310
0.10	0.0283	0.0294	0.0305	0.0311	0.0318	0.0324	0.0329	0.0339	0.0348	0.0358	0.0375
0.11	0.0329	0.0342	0.0354	0.0364	0.0373	0.0380	0.0387	0.0400	0.0413	0.0424	0.0448
0.12	0.0376	0.0393	0.0408	0.0420	0.0431	0.0441	0.0450	0.0466	0.0482	0.0497	0.0527
0.13	0.0425	0.0446	0.0464	0.0480	0.0493	0.0505	0.0516	0.0537	0.0556	0.0575	0.0613
0.14	0.0476	0.0501	0.0524	0.0542	0.0559	0.0573	0.0587	0.0612	0.0636	0.0659	0.0705
0.15	0.0528	0.0559	0.0585	0.0608	0.0628	0.0645	0.0662	0.0692	0.0721	0.0749	0.0805
0.16	0.0582	0.0619	0.0650	0.0676	0.0699	0.0720	0.0740	0.0776	0.0811	0.0845	0.0912
0.17	0.0638	0.0680	0.0717	0.0748	0.0775	0.0800	0.0823	0.0867	0.0907	0.0947	0.103
0.18	0.0695	0.0744	0.0786	0.0822	0.0854	0.0883	0.0910	0.0961	0.101	0.105	0.115
0.19	0.0753	0.0809	0.0857	0.0900	0.0936	0.0970	0.100	0.106	0.112	0.117	0.128
0.20	0.0813	0.0875	0.0932	0.0979	0.102	0.106	0.110	0.116	0.123	0.129	0.141
0.21	0.0873	0.0944	0.101	0.106	0.111	0.115	0.120	0.127	0.134	0.142	0.156
0.22	0.0935	0.101	0.109	0.115	0.120	0.125	0.130	0.139	0.147	0.155	0.171
0.23	0.0997	0.109	0.117	0.124	0.130	0.135	0.141	0.151	0.160	0.169	0.187
0.24	0.106	0.116	0.125	0.133	0.139	0.146	0.152	0.163	0.173	0.184	0.204
0.25	0.113	0.124	0.133	0.142	0.150	0.157	0.163	0.176	0.187	0.199	0.222
0.26	0.119	0.131	0.142	0.152	0.160	0.168	0.175	0.189	0.202	0.215	0.241
0.27	0.126	0.139	0.151	0.162	0.171	0.180	0.188	0.203	0.218	0.232	0.260
0.28	0.133	0.147	0.160	0.172	0.182	0.192	0.201	0.217	0.234	0.249	0.281
0.29	0.139	0.155	0.170	0.182	0.193	0.204	0.214	0.232	0.250	0.267	0.302
0.30	0.146	0.163	0.179	0.193	0.205	0.217	0.227	0.248	0.267	0.286	0.324
0.31	0.153	0.172	0.189	0.204	0.217	0.230	0.242	0.264	0.285	0.306	0.347
0.32	0.160	0.180	0.199	0.215	0.230	0.243	0.256	0.281	0.304	0.327	0.371
0.33	0.167	0.189	0.209	0.227	0.243	0.257	0.271	0.298	0.323	0.348	0.396
0.34	0.174	0.198	0.219	0.238	0.256	0.272	0.287	0.315	0.343	0.369	0.422
0.35	0.181	0.207	0.230	0.251	0.270	0.287	0.303	0.334	0.363	0.392	0.450
0.36	0.190	0.216	0.241	0.263	0.283	0.302	0.319	0.353	0.384	0.416	0.477
0.37	0.196	0.225	0.251	0.275	0.297	0.317	0.336	0.372	0.406	0.440	0.507
0.38	0.203	0.234	0.263	0.289	0.311	0.333	0.354	0.392	0.429	0.465	0.536
0.39	0.210	0.244	0.274	0.301	0.326	0.349	0.371	0.412	0.452	0.491	0.568
0.40	0.218	0.254	0.286	0.314	0.341	0.366	0.389	0.433	0.476	0.518	0.600
0.41	0.225	0.263	0.297	0.328	0.357	0.383	0.408	0.455	0.501	0.545	0.634
0.42	0.233	0.279	0.310	0.342	0.373	0.401	0.427	0.478	0.526	0.574	0.668
0.43	0.241	0.282	0.321	0.356	0.389	0.418	0.447	0.501	0.553	0.604	0.703
0.44	0.249	0.292	0.334	0.371	0.405	0.437	0.467	0.524	0.579	0.634	0.739
0.45	0.256	0.303	0.346	0.385	0.422	0.455	0.487	0.548	0.607	0.665	0.778
0.46	0.263	0.313	0.359	0.401	0.439	0.475	0.509	0.574	0.635	0.696	0.816
0.47	0.271	0.323	0.371	0.417	0.457	0.494	0.530	0.600	0.665	0.729	0.856
0.48	0.279	0.333	0.384	0.432	0.475	0.514	0.552	0.626	0.695	0.763	0.897
0.49	0.287	0.345	0.398	0.448	0.492	0.534	0.575	0.652	0.725	0.797	0.939
0.50	0.295	0.356	0.411	0.463	0.512	0.556	0.599	0.679	0.758	0.833	0.983
0.52	0.310	0.377	0.438	0.496	0.548	0.599	0.646	0.735	0.820	0.906	1.07
0.54	0.327	0.398	0.468	0.530	0.590	0.644	0.696	0.795	0.891	0.984	1.17
0.56	0.343	0.421	0.496	0.567	0.631	0.690	0.748	0.856	0.963	1.07	1.27
0.58	0.359	0.444	0.526	0.601	0.671	0.739	0.802	0.922	1.04	1.15	1.37
0.60	0.375	0.468	0.556	0.640	0.717	0.789	0.858	0.988	1.12	1.24	1.49
0.62	0.391	0.492	0.590	0.679	0.763	0.841	0.917	1.06	1.20	1.33	1.60
0.64	0.408	0.516	0.620	0.718	0.809	0.894	0.976	1.13	1.28	1.43	1.72

Source: "Engineering Hydraulics", H. Rouse

THE PREPARATION OF THIS REPORT HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE UNITED STATES DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT UNDER THE PROVISIONS OF THE HOUSING ACT OF 1954 AS AMENDED.

ERIE AND NIAGARA COUNTIES
REGIONAL PLANNING BOARD

REGIONAL STORM-SURFACE WATER DRAINAGE MANAGEMENT STUDY

NORMAL DEPTH FOR UNIFORM FLOW

$\frac{Y_0}{b}$ = 0.02 to 0.64

APPENDIX I

JUNE 1987 ANNUAL WATER MONITORING REPORT

LTV MARILLA STREET LANDFILL

BUFFALO, NEW YORK

ANNUAL GROUNDWATER MONITORING REPORT

JUNE 1987

PROJECT NO. 0848-07-1

PREPARED FOR:
LTV STEEL COMPANY
CLEVELAND, OHIO

PREPARED BY:
MALCOLM PIRNIE, INC.
BUFFALO, NEW YORK

1.0 INTRODUCTION

This report has been prepared in accordance with the guidelines established in the New York Code of Rules and Regulations (NYCRR) Part 373-3.6(e)(1)(ii)(b) and includes the following:

- An evaluation of the groundwater monitoring data collected for the BOF Dust Area during five (5) periods between November 1985 and April 1987;
- An evaluation of the current groundwater monitoring system for the BOF Dust Area; and
- A work plan specifying an approach for obtaining background groundwater monitoring data for the BOF Dust Area.

Additionally, responses were prepared which address NYSDEC comments issued in a letter dated April 29, 1987 regarding two (2) sampling periods at the Marilla Street Landfill (see Appendix B). These responses are presented in the last section of this report.

2.0 EVALUATION OF GROUNDWATER MONITORING DATA

2.1 Groundwater Elevations

Groundwater elevations are summarized in Table 1 for 19 on-site wells collected on five (5) separate occasions between November 1985 and April 1987. Average elevations were calculated from each well along with accompanying standard deviations. The standard deviations indicate that in any given well, the groundwater elevation has not varied greater than 0.2% from the average. Figures 1 through 4 graphically illustrate groundwater elevations versus time for each well. As the graphs depict, no apparent correlation exists on an overall basis between on-site

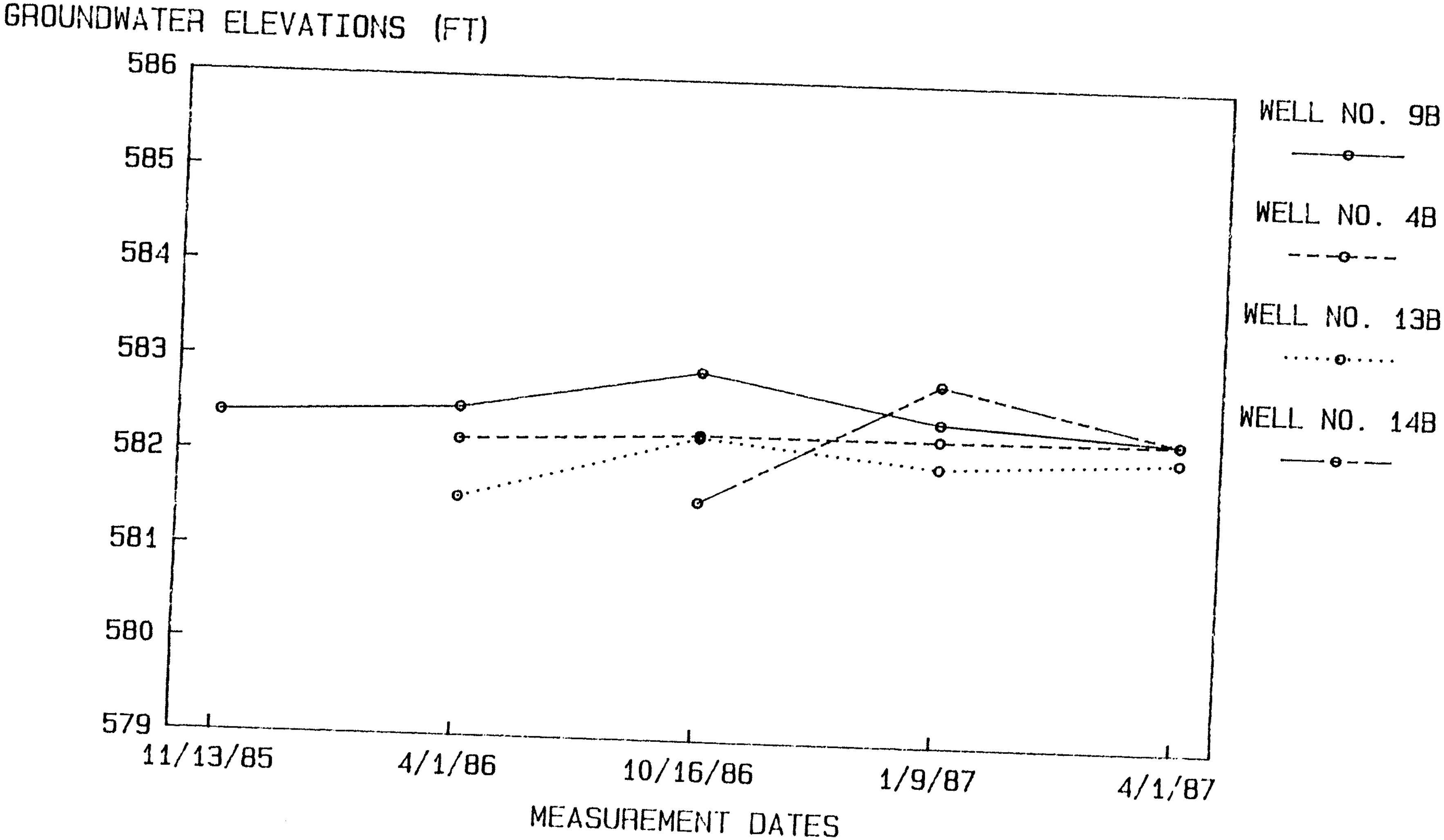
TABLE 1

LTV STEEL COMPANY, INC.
ANNUAL GROUNDWATER MONITORING REPORT

SUMMARY OF GROUNDWATER ELEVATIONS vs TIME

WELL	11/13/85	4/1/86	10/16/86	1/9/87	4/1/87	MEAN	STANDARD DEVIATION
2A	581.95	581.96	582.00	582.09	582.00	582.00	0.05
2B	582.17	582.20	582.05	582.20	582.25	582.17	0.07
3A	580.91	580.91	581.21	581.15	581.21	581.07	0.15
3B	580.31	580.21	580.41	580.37	580.86	580.43	0.25
4A	579.68	579.68	580.18	581.73	579.93	580.24	0.85
4B	ND	582.16	582.26	582.26	582.28	582.24	0.05
5A	583.75	583.52	583.62	583.92	583.84	583.73	0.16
5B	583.83	583.95	585.87	585.89	586.08	585.12	1.13
6A	584.28	585.21	585.61	585.15	584.83	585.01	0.50
6B	584.79	585.46	585.94	585.46	585.26	585.38	0.41
7A	579.80	579.69	ND	580.03	580.00	579.88	0.16
7B	583.23	583.94	584.62	583.75	583.32	583.77	0.56
8B	582.70	582.83	582.93	582.82	582.65	582.78	0.11
9B	582.40	582.50	582.92	582.44	582.28	582.50	0.24
10B	583.14	583.74	584.08	585.68	583.10	583.94	1.05
11B	582.91	582.57	582.87	584.17	582.49	583.00	0.68
12B	582.53	582.54	582.61	582.31	582.65	582.52	0.13
13B	ND	581.55	582.23	581.97	582.09	581.96	0.29
14B	ND	ND	581.55	582.84	582.28	582.22	0.65

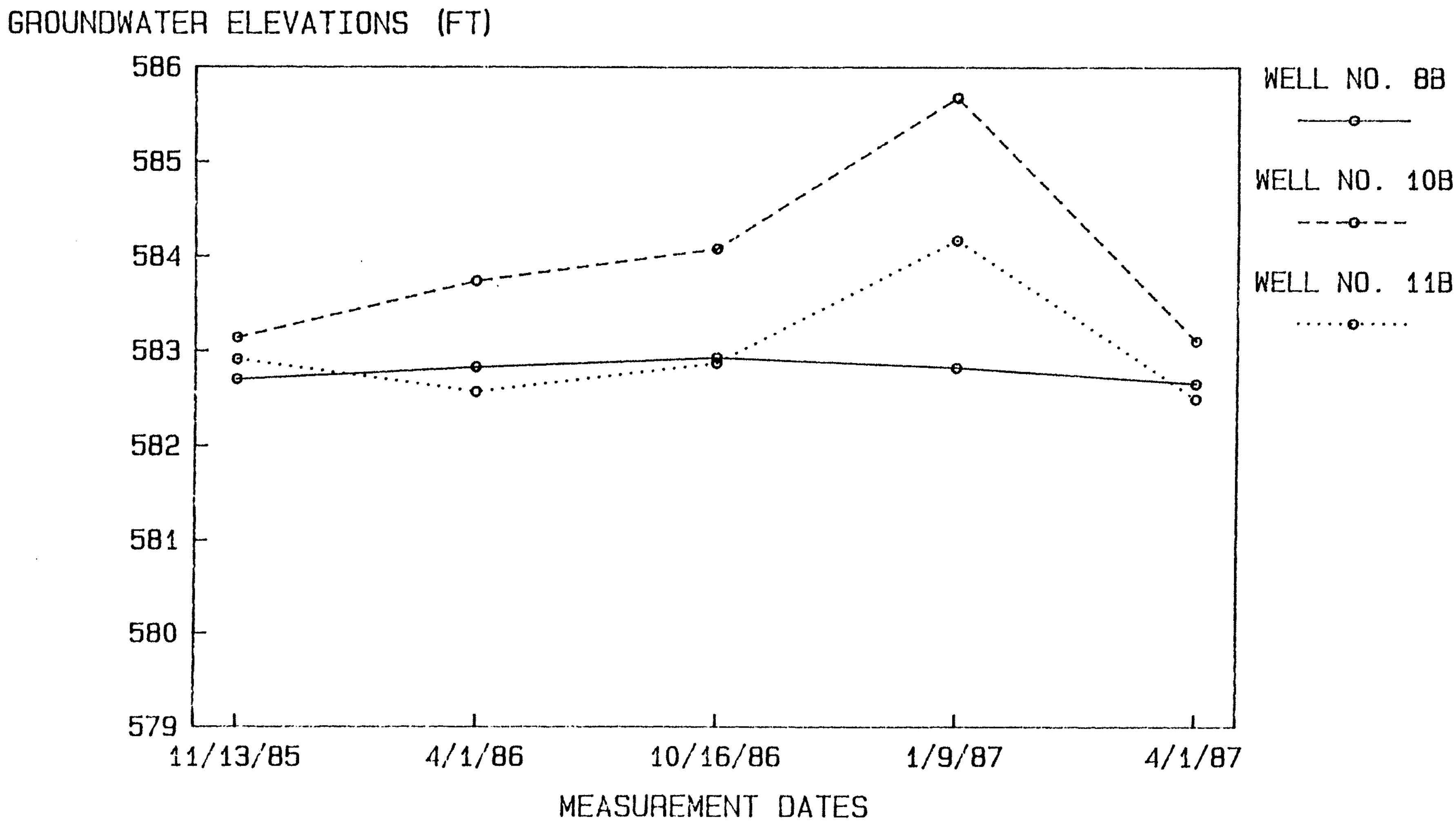
LTV STEEL - MARILLA STREET LANDFILL
SUMMARY OF GROUNDWATER ELEVATIONS
FOR CURRENT RCRA WELLS



LTV-RCRA

FIGURE 1.

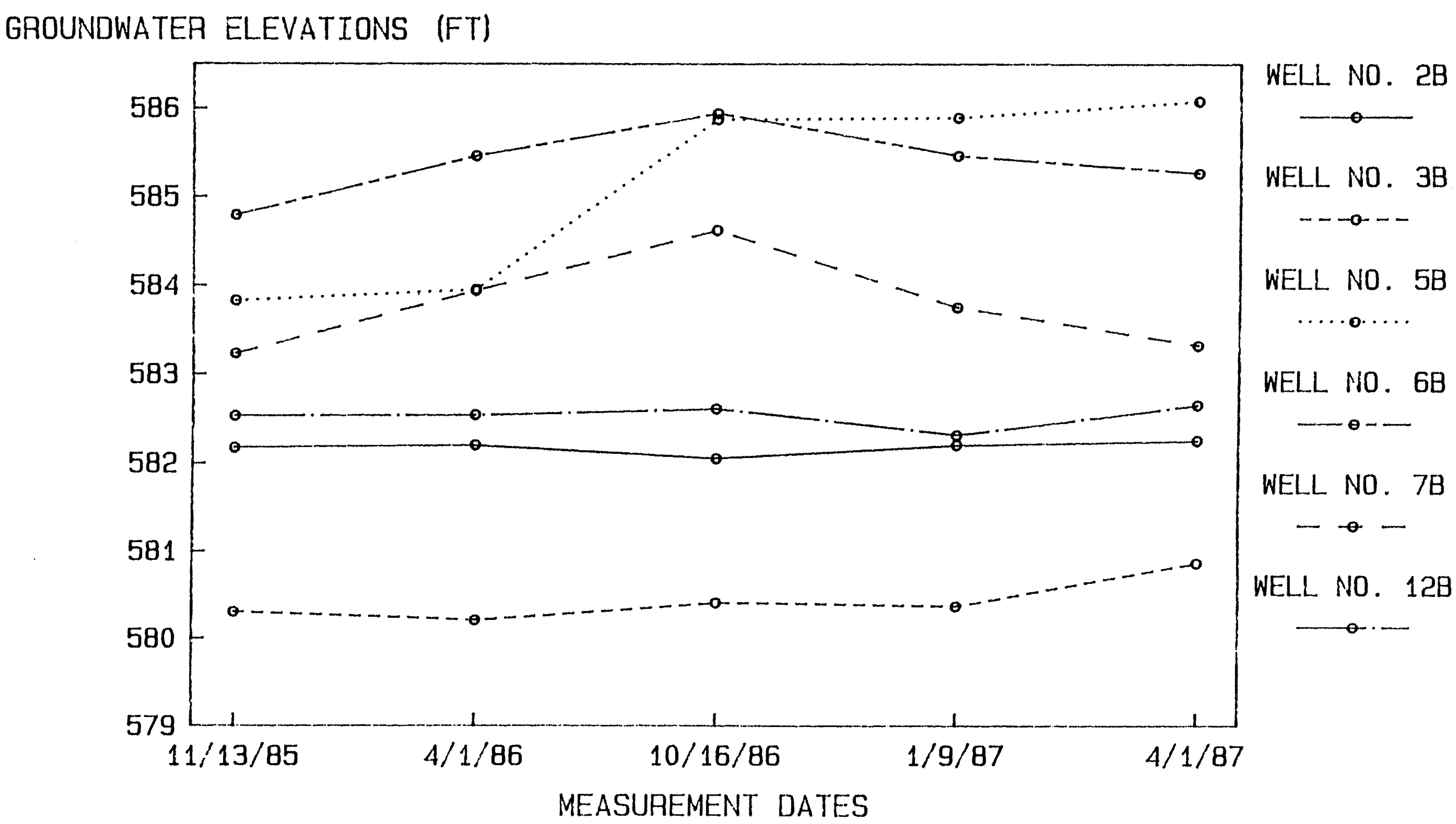
LTV STEEL - MARILLA STREET LANDFILL
SUMMARY OF GROUNDWATER ELEVATIONS
FOR SHALLOW WELLS



LTV-SH2

FIGURE 2

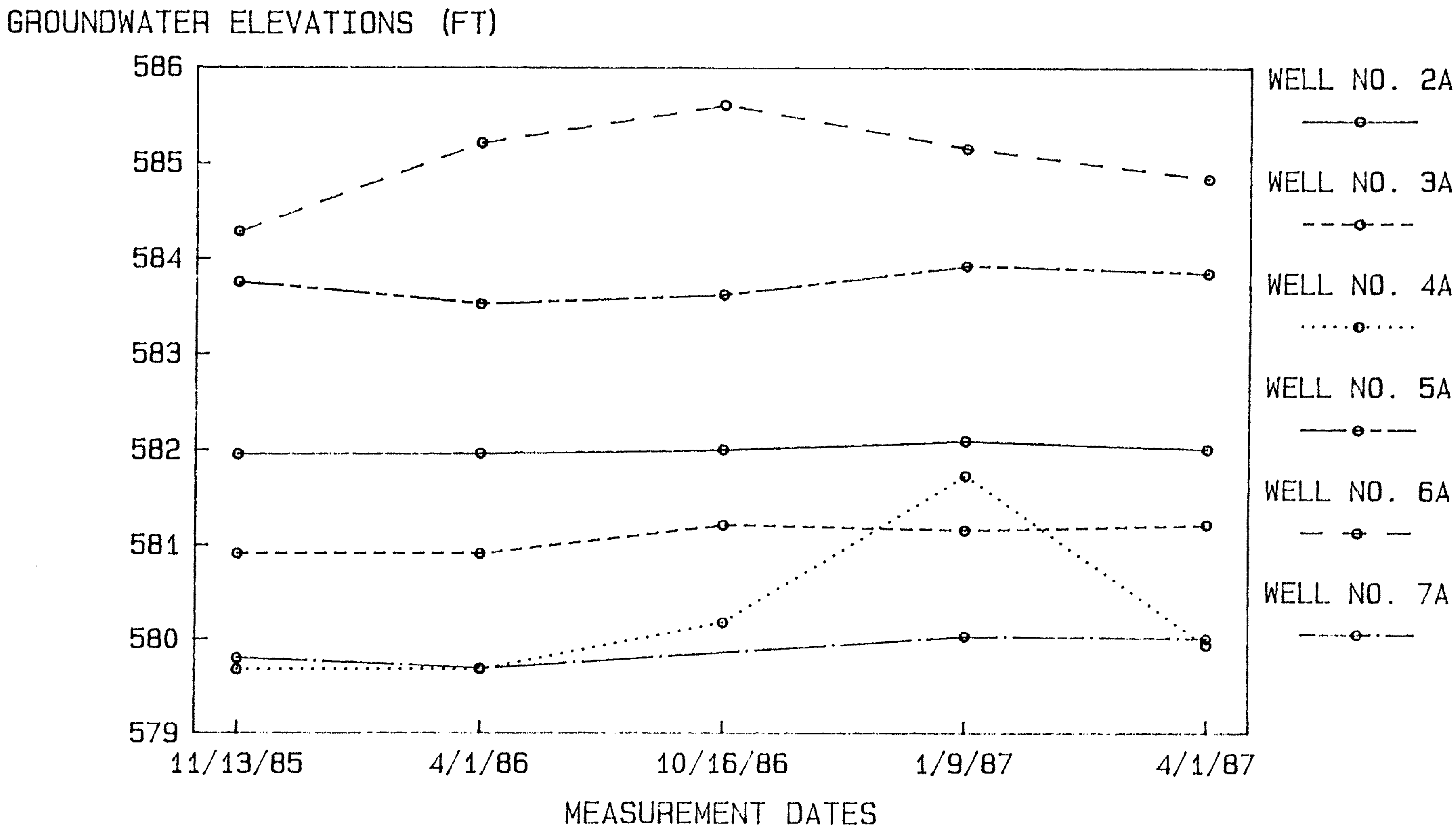
LTV STEEL - MARILLA STREET LANDFILL
SUMMARY OF GROUNDWATER ELEVATIONS
FOR SHALLOW WELLS



LTV-SH1

FIGURE 3

LTV STEEL - MARILLA STREET LANDFILL
SUMMARY OF GROUNDWATER ELEVATIONS
FOR DEEP WELLS



LTV-DEEP

FIGURE 4

groundwater fluctuations and seasonality. Fluctuations are more likely a result of specific precipitation events.

Plates 1 and 2 are groundwater isopotential maps for the on-site shallow wells and deep wells, respectively. Both maps represent average elevations for the five periods. The map for the shallow wells, based upon 13 locations, illustrates a groundwater "low" in the central portion of the site. Groundwater flows from both east and west directions to this central region with the ultimate flow, as shown on the map, exiting the site in a northwest direction. The shallow groundwater flow in the vicinity of the BOF Dust Area appears to be from west to east indicating that none of the currently or previous monitored NYCRR Part 373 monitoring wells (viz. 4B,9B,13B,7B, and 14B) are truly upgradient wells. The map for the deep wells (based upon six locations) illustrates a different flow pattern where groundwater is moving in both southwest and northwest directions, converging on the BOF Dust Area.

Groundwater vertical gradients were qualitatively evaluated using well couplets 5A/5B, 6A/6B, and 2A/2B in the southeast portion of the site and wells 4A/4B and 7A/7B in the BOF Dust Area. Using the average elevations obtained from wells 7A and 7B and a saturated thickness of 30 feet for the upper overburden layer, a vertical gradient of 0.13 ft/ft was calculated. A vertical gradient could not be evaluated in the vicinity of wells 3A/3B due to their spacing interval (refer to Plates 1 and 2).

2.2 ANALYTICAL DATA SUMMARY

2.2.1 General

Appendix A presents tables summarizing the indicator, groundwater quality and drinking water monitoring data for the NYCRR Part 373 groundwater monitoring wells (viz. wells 4B,7B,9B,13B, and 14B) in the vicinity of the BOF Dust Area for five (5) sampling periods between November 1985 and April 1987.

Table 2 presents average indicator, groundwater quality and drinking water parameter concentrations, along with the range of values detected in monitoring wells 4B, 7B, 9B, 13B and 14B over this sampling period.

2.2.2 Comparison of Part 373 Indicator Parameter Monitoring Data to Existing Indicator Parameter Monitoring Data for Well 6B (Proposed Upgradient Well)

Table 3 presents NYCRR Part 360 Routine Monitoring data for well 6B, which is being proposed as an upgradient well for the BOF Dust Area (see Section 3.0). Table 3 also presents a statistical summary of the referenced data. The standard deviations indicate a high variability in the data.

The upper portion of Table 3 summarizes data for pH, specific conductivity and TOC (viz. NYCRR Part 373-3 groundwater monitoring indicator parameters) over seven (7) sampling occasions. Standard deviations indicate the pH values were fairly stable over time showing only a 4% fluctuation from the mean. However, wider fluctuations were observed for conductivity and TOC having 22% and 103% deviations, respectively.

Table 4 summarizes the indicator parameters (viz. pH, conductivity, TOC and TOX) for the NYCRR 373 wells (BOF Dust Area) on the five sampling occasions between November 1985 and April 1987. The table indicates that values of pH increased with time in wells 4B and 14B. Recent values in Wells 4B and 14B exceeded the upgradient average (viz. in 6B). Conversely, Wells 9B and 13B showed a decrease in pH with time. Recent values from 9B and 13B were below the upgradient average. Well 7B had high values of pH (averaging 12.4) on the two occasions it was tested. Figure 5 graphically illustrates pH values for the wells over time.

The data for specific conductivity and TOC was also evaluated relative to background data obtained from the proposed upgradient monitoring point (viz. 6B). In general, no

TABLE 2

PART 373 MONITORING DATA
MARILLA STREET LANDFILL INVESTIGATION/CLOSURE
ANNUAL GROUNDWATER MONITORING REPORT

AVERAGE CONCENTRATION[2,4]

PARAMETER	WELL: 4B (4) Average	4B (4) Range	7B (2) Average	7B (2) Range	9B (4) Average	9B (4) Range	13B (4) Average	13B (4) Range	14B (3) Average	14B (3) Range
Temperature[5] (C)	14 (1)	-	-	-	10 (1)	-	13 (1)	-	11 (1)	-
pH[1,3]	7.86	7.1 - 8.92	12.22	11.56 - 12.87	6.51	5.8 - 7.11	7.05	6.5 - 7.68	8.87	7.8 - 10
Specific Cond[1,3] (umhos/cm)	1109	700 - 1469	8863	8750 - 8975	2488	1700 - 3125	1878	1400 - 2138	1317	900 - 2000
Fecal Coliform (C/100 ml)	<1.3(3)	<1 - <2	<1 (1)	-	<8.3 (3)	<1 - <20	<2 (3)	<1 - <4	<8	<2 - <20
Total Phenols	<0.01	<0.001 - <0.02	1.6	1.09 - 2.1	<0.01	<0.001 - <0.02	<0.01	<0.001 - <0.02	0.059	0.016 - 0.12
Fluoride	1.56	1.23 - 1.86	8.43	7.75 - 9.1	0.37	0.33 - 0.42	1.5	0.9 - 3.1	1.21	1.0 - 1.4
Chloride	69.2	51 - 101	446	368 - 524	41.4	34 - 52.4	248	155 - 356	84.3	82 - 88
TOC	21.4	15.3 - 33	336	191 - 480	60.3	8.02 - 126	51	32 - 84.2	27.6	21 - 40
Sulfate	264	164 - 314	192	145 - 238	1170	1040 - 1300	148	14.2 - 252	706	598 - 870
Total Organic Halogen	0.32	0.01 - 1.11	0.24	0.022 - 0.454	<0.3	<0.01 - 0.988	<0.19	<0.010 - 0.66	88.6	44.75 - 112
Nitrate, Nitrogen	<0.36	<0.05 - 1.23	5.3	0.27 - 10.3	<0.4	<0.05 - 1.52	<2.1	<0.05 - 7.97	0.94	0.07 - 2.6
Gross Alpha (pCi/liter)	<4.25	<3 - <5	<9	<5 - 13	<5	<1 - 8	<9	<5 - 18	<4.7	<4 - <5
Gross Beta (pCi/liter)	38.6	5.5 - 75	480	70 - 890	25	1.1 - 71	36	1.5 - 69	2.03	1.1 - 3.2
Total Radium (pCi/liter)	<1.87(3)	<1 - <3	<3	-	<4	<3.0 - 6.8	<5	<3 - <9	1.6	1.5 - 1.7
Endrin (ppb)	<0.08	<0.01 - <0.2	<0.06	<0.02 - <0.10	<0.08	<0.01 - <0.20	<0.08	<0.01 - <0.20	<0.11	<0.01 - <0.3
Lindane (ppb)	<0.05	<0.01 - <0.1	<0.06	<0.01 - <0.10	<0.09	<0.01 - <0.20	<0.05	<0.01 - <0.20	<0.08	<0.01 - <0.2
Methoxychlor (ppb)	<0.15	<0.05 - <0.4	<0.08	<0.05 - <0.10	<0.15	<0.05 - <0.40	<0.20	<0.05 - <0.40	<0.28	<0.05 - 0.7
Toxaphene (ppb)	<3	<0.5 - <10.0	<5.3	<0.50 - <10.0	<3	<0.50 - <10.0	<3	<0.5 - <10.0	<0.9	<0.2 - <2.0
2,4-D (ppb)	<0.15	<0.1 - <0.2	<0.10	-	<0.2	<0.10 - <0.25	<0.5	<0.10 - 1.5	0.76	0.2 - 1.2
2,4,5-TP (Silvex) (ppb)	<0.07	<0.03 - <0.10	<0.10	-	<0.1	<0.05 - <0.2	<0.08	<0.05 - <0.10	<0.15	<0.05 - <0.2

(continued)

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TABLE 2 (cont.)

PART 373 MONITORING DATA
MARILLA STREET LANDFILL INVESTIGATION/CLOSURE[2]
ANNUAL GROUNDWATER MONITORING REPORT

AVERAGE CONCENTRATION[2,4]

PARAMETER	WELL: 4B (4) Average	4B (4) Range	7B (2) Average	7B (2) Range	9B (4) Average	9B (4) Range	13B (4) Average	13B (4) Range	14B (3) Average	14B (3) Range
Total Metals										
Sodium	68	50 - 85	507	416 - 598	63	47 - 79	226.3	190 - 240	150	110 - 170
Barium	<0.34	<0.07 - <1.0	<0.6	<0.2 - <1.0	<0.4	<0.07 - <1.0	0.41	<0.2 - <1.0	0.49	0.1 - 1.2
Arsenic	<0.01	<0.005 - <0.025	<0.027	<0.025 - 0.028	<0.023	0.013 - 0.038	0.0025	0.005 - 0.059	0.09	<0.005 - 0.253
Selenium	<0.004	<0.002 - <0.005	<0.0055	<0.005 - 0.006	<0.004	<0.002 - <0.005	<0.0043	<0.002 - <0.005	<0.005	<0.005
Iron	3.5	1.45 - 6.3	343	42 - 643	409	41 - 1440	29.5	7.8 - 82	63.4	1.2 - 173
Manganese	0.44	0.157 - 0.71	1.33	1.25 - 1.41	32	2.4 - 120	4.23	3.2 - 7.16	4.01	0.11 - 11
Mercury	<0.001	<0.0005 - 0.003	0.00095	0.0009 - 0.001	<0.001	<0.0005 - 0.002	0.0013	<0.0005 - 0.003	0.0013	<0.0005 - 0.002
Silver	<0.0055	<0.005 - <0.010	<0.006	0.002 - <0.01	<0.006	0.001 - <0.01	<0.0055	<0.001 - <0.01	0.0067	<0.005 - 0.009
Lead	<0.043	<0.005 - 0.152	0.544	0.181 - 0.906	0.30	0.041 - 0.794	0.054	<0.005 - 0.177	0.062	<0.005 - 0.175
Cadmium	<0.073	<0.001 - 0.241	0.006	-	<0.01	<0.007 - 0.013	0.0058	<0.002 - 0.009	0.0097	<0.005 - 0.017
Chromium	<0.013	<0.005 - 0.03	0.10	0.059 - 0.15	0.23	0.129 - 0.356	0.032	<0.006 - 0.098	0.132	<0.006 - 0.359
Soluble Metals										
Sodium	67	45 - 85	486	394 - 577	63	47 - 83	222.8	190 - 242	130	100 - 160
Barium	<0.33	<0.05 - <1.0	<0.6	<0.20 - <1.0	<0.3	<0.07 - <1.0	0.36	0.09 - <1.0	0.12	<0.07 - 0.16
Arsenic	<0.011	<0.005 - <0.025	<0.020	0.014 - <0.025	<0.01	<0.005 - <0.025	0.0108	<0.005 - <0.025	<0.005	-
Selenium	<0.004	<0.002 - <0.005	<0.0035	<0.002 - <0.005	<0.004	<0.002 - <0.005	0.0043	<0.002 - <0.005	<0.005	-
Iron	<0.104	<0.02 - 0.31	4.25	0.651 - 7.84	<1.2	<0.025 - 3.9	0.49	<0.02 - 1.7	0.29	0.18 - 0.44
Manganese	0.25	0.102 - 0.61	<0.07	0.032 - <0.1	1.0	0.146 - 1.5	2.46	1.11 - 3.0	0.043	<0.01 - 0.079
Mercury	<0.001	<0.0005 - 0.002	0.001	0.0003 - 0.002	<0.001	0.0002 - 0.002	0.00065	<0.0005 - 0.001	<0.0005	-
Silver	<0.006	<0.001 - <0.010	<0.006	0.0025 - <0.01	<0.006	<0.001 - <0.01	0.006	0.003 - <0.010	<0.0053	<0.005 - 0.006
Lead	<0.020	<0.005 - 0.061	0.188	0.173 - 0.202	<0.05	<0.005 - 0.181	0.032	<0.005 - 0.106	<0.0053	<0.005 - 0.006
Cadmium	<0.017	<0.001 - 0.057	0.003	0.002 - 0.004	<0.005	<0.002 - <0.007	0.0055	<0.002 - 0.008	<0.0057	<0.005 - <0.007
Chromium	<0.010	<0.005 - 0.02	0.046	0.012 - 0.079	<0.02	<0.005 - 0.042	0.031	<0.005 - 0.103	<0.0053	<0.005 - <0.006

NOTES:
1. Analysis by Malcolm Pirnie, Inc.
2. All units mg/l except where noted.
3. Average of four (4) replicate measurements.
4. Number in parenthesis represents the number of sampling events per well, except as noted.
5. Temperature was measured only on 10/16/86.
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TABLE 3

PART 360 PARAMETERS FOR 6B
MARILLA STREET LANDFILL INVESTIGATION/CLOSURE

ANNUAL GROUNDWATER MONITORING REPORT

WELL 6B (BACKGROUND DATA)

PARAMETERS	4/1/87	1/9/87	10/16/86	4/1/86	7/22/85	4/23/85	8/24/84	Mean	Standard Deviation
	SUMMARY OF INDICATOR PARAMETERS[1]								
pH (units)*	7.0	7.1	7.5	7.0	6.6	7.1	7.2	7.1	0.3
Conductivity umhos/cm)*	2000	2000	1100	1975	2400	2300	2250	2003	433
Total Organic Carbon (mg/l)	60	7.0	37	8.8	2.9	12.2	13.0	20.1	20.8
	SUMMARY OF ADDITIONAL PART 360 PARAMETERS FOR 6B								
Total Dissolved Solids (mg/l)	1300	1120	1220	1532	2176	2148	2020	1645	459
Chloride (mg/l)	36	28	26	50	7	65	74.5	40.9	23.6
Sulfate (mg/l)	570	464	439	671	1230	709	1004	727	292
Total Phenols (mg/l)	<0.01	<0.01	<0.02	<0.001	0.133	<0.05	0.044	0.038	0.046
Total Iron (mg/l)	33	7.6	2.8	0.047	2.26	39.9	12.1	14.0	16.0
Total Chromium (mg/l)	0.035	0.018	<0.006	<0.010	NA	NA	NA	0.017	0.013
Total Lead (mg/l)	0.016	0.005	0.010	0.025	NA	NA	NA	0.014	0.009
Soluble Iron (mg/l)	0.09	<0.04	<0.03	<0.025	NA	NA	NA	0.046	0.030
Soluble Chromium (mg/l)	<0.005	<0.005	<0.006	<0.010	NA	NA	NA	<0.007	0.003
Soluble Lead (mg/l)	<0.005	<0.005	<0.005	<0.010	NA	NA	NA	<0.007	0.003

NOTES: (1) Each number represents one (1) analysis only.
* Field-measured
NA Not Analyzed

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TABLE 4

SUMMARY OF INDICATOR PARAMETERS

RCRA WELLS
pH (units)

WELL	11/13/85	4/1/86	10/16/86	1/9/87	4/1/87
4B	7.1	7.51	7.4	8.0	ND
7B	12.8	12.0	ND	ND	ND
9B	7.1	7.0	6.7	5.8	ND
13B	7.7	7.5	6.8	6.5	ND
14B	NI	NI	7.8	8.8	10.0

Specific Conductivity (umhos/cm)

WELL	11/13/85	4/1/86	10/16/86	1/9/87	4/1/87
4B	1165	1102	700	1469	ND
7B	8750	8875	ND	ND	ND
9B	2575	2550	1700	3125	ND
13B	1975	2137	1400	2000	ND
14B	NI	NI	900	1050	2000

Total Organic Carbon - TOC (ppm or mg/l)

WELL	11/13/85	4/1/86	10/16/86	1/9/87	4/1/87
4B	20.1 (1)	16.7	33	15	ND
7B	48.0 (1)	191	ND	ND	ND
9B	90.8 (1)	8.0	126	16	ND
13B	84.2 (1)	32.0	43	45	ND
14B	NI	NI	23	31	25

Total Organic Halogen - TOX (ppb or ug/l)

WELL	11/13/85	4/1/86	10/16/86	1/9/87	4/1/87
4B	1110 (1)	30	125	§10	ND
7B	454 (1)	21	ND	ND	ND
9B	988 (1)	16	195	§10	ND
13B	660 (1)	15	68	§10	ND
14B	NI	NI	112	109	45

NI - not yet installed
ND - no data obtained/not sampled
(1) One (1) analysis only.

NOTE: Each number above represents an average of four (4) replicate analyses unless specified.

LTV STEEL - MARILLA STREET LANDFILL
SUMMARY OF pH VALUES FOR
RCRA WELLS

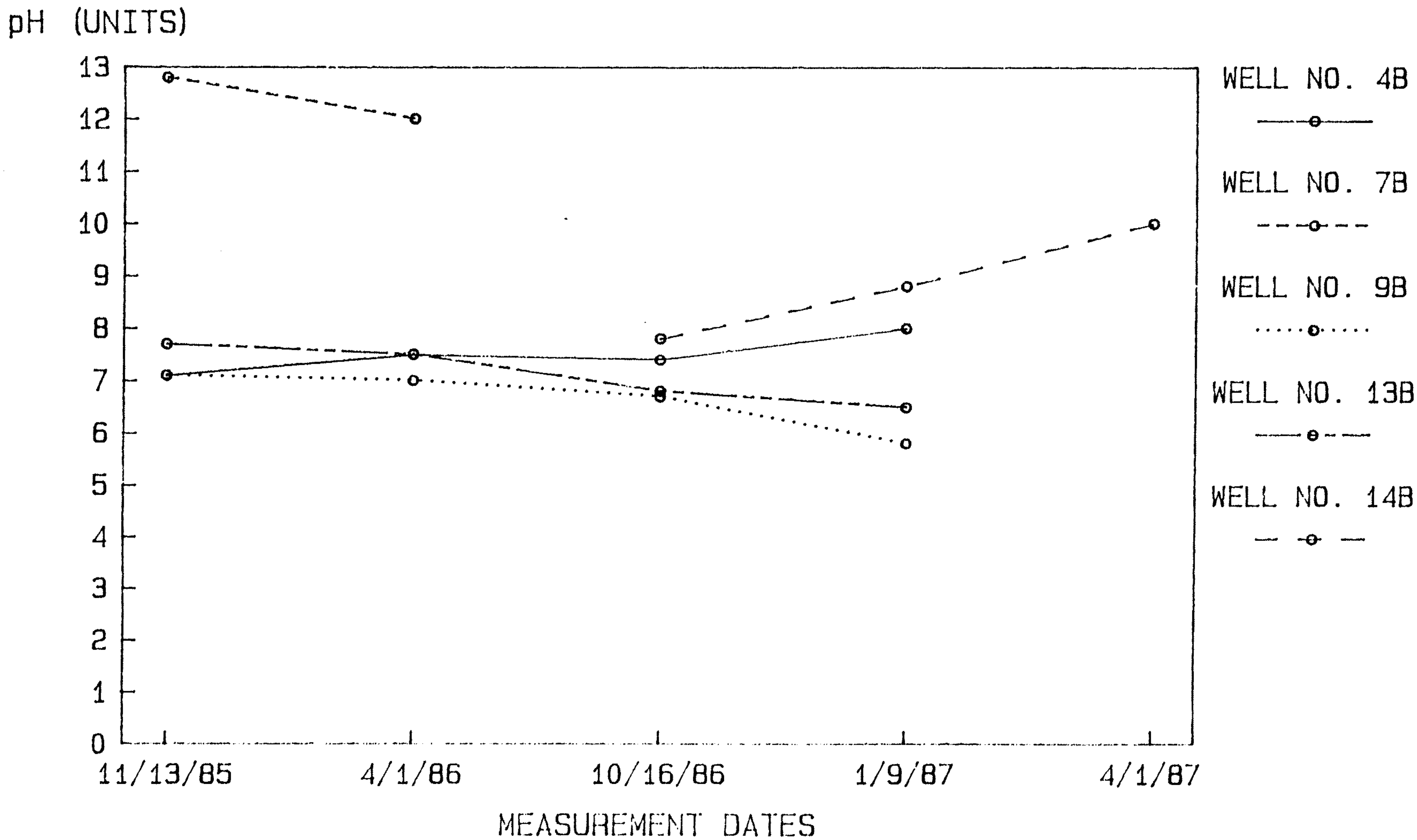

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FIGURE 5

correlations were observed for specific conductivity or TOC values except for well 7B, where values were significantly greater when compared to the data for 6B. While values for TOX are not presently available from well 6B, a general decrease in TOX values for the Part 373 wells was observed with time.

3.0 EVALUATION OF CURRENT GROUNDWATER MONITORING SYSTEM BOF DUST AREA

Based upon the directions of site groundwater flow, the number of existing (available) wells within and in the vicinity of the BOF Dust Area are deemed adequate as a "current" groundwater monitoring system for this locale (refer to Plates 1 and 2). It is noted, however, that the system currently lacks an upgradient well for background monitoring purposes. After an evaluation of the existing data and alternatives, well 6B was selected as a proposed upgradient monitoring point for the BOF Dust Area. This selection was based upon four (4) criteria, namely:

- Well 6B is the furthest existing well upgradient to the BOF Dust Area;
- Well 6B is believed to reside beyond the influence of significant landfilling operations;
- Well 6B is a shallow well, making it compatible to the wells which are currently being monitored in the BOF Dust Area; and
- Existing water quality data obtained from Well 6B (as discussed in section 2.2.2).

Table 5 summarizes the details for monitoring wells which serve to monitor the BOF Dust Area. Well 6B, is also presented. (A boring log for well 14B, the most recently installed monitoring well, is included in this document and immediately follows Table 5. The logs for the remaining monitoring wells were previously submitted to the NYSDEC). Wells marked "B" on

TABLE 5

LTV ANNUAL REPORT
SUMMARY OF WELL DETAILS

BOF DUST AREA

WELL	TOTAL DEPTH (ft)	SCREENED INTERVAL (ft)	MATERIAL SCREENED
4B	11	9-11	Sand, some gravel
4A	19.5	16.5-19.5	Silty clay to clayey silt
7B	29	27-29	Silty sand
7A	41	39-41	Sandy silt, some gravel and shale fragments
9B	34.3	32.3-34.3	Fill grading to silty clay
10B	35	33-35	Fill grading to silty clay
11B	22.5	20.5-22.5	Fill grading to fine sand and silty clay
13B	12	10-12	Sand, trace of gravel
14B	41	39-41	Fill grading to silty clay

PROPOSED UPGRADIENT WELL

6B	13	11-13	Clayey silt

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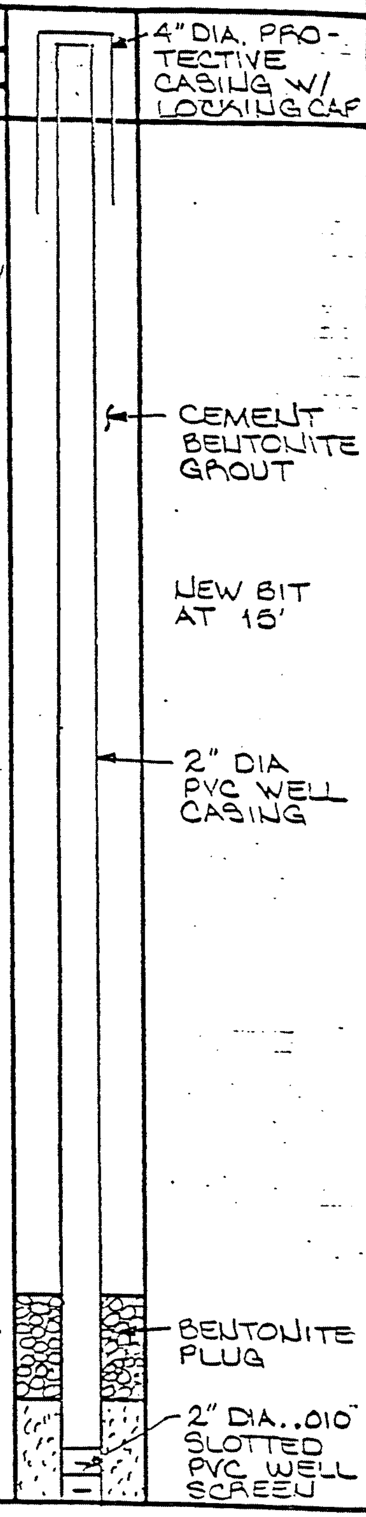
BORING 1-A

PROJECT: LTV MARILLA STEET LANDFILL	**PROJECT NO:** 84-8-04-9
DATE: JULY 1, 1986	**LOCATION:** SOUTH BUFFALO, NEW YORK
DRILLING CONTRACTOR: ROCHESTER DRILLING	**INSPECTOR:** J. AMELD
DRILLING METHOD: 8" x 4 1/4" HOLLOW STEM AUGER	**SAMPLING METHOD:** 2" Ø SPLIT SPOON AT 5' INTERVALS
ELEVATION:	**DATUM:**

SAMPLE no.	SAMPLE depth	blows per 6"		DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN
S-1	1-5'	18	29			MEDIUM DENSE, DARK BROWN SAND AND GRAVEL SIZE FILL AND SLAG, SOME YELLOW BRICK, MED MOIST NO RECOVERY SAMPLE DEPTH 5-7 FEET
		40	27			
				5		
S-2	10-12'	25	100/3	10		VERY DENSE, SILVER GRAY SLAG MIXED WITH DARK BROWN SAND AND GRAVEL MOIST
S-3	15-17'	29	43	15		MEDIUM DENSE LT BROWN TO DARK BROWN FINE GRAVEL AND SLAG, SOME BRICK AND GLASS FRAGMENTS, MOIST
		45	45			
S-4	20-22'	33	54	20		MEDIUM DENSE RED BROWN TO BLACK FINE TIGHTLY PACKED SAND AND FILL SOME FINE SLAG AND BRICK, MOIST
		28	42			
S-5	25-27'	40	26	25		MEDIUM DENSE, RED BROWN WITH GRAY STREAKS, FINE SLAG AND FILL MATERIAL, MOIST
		44	39			
S-6	30-32	100/3		30		VERY DENSE, BLACK FINE SAND GRAVEL AND SAND, WET
S-7	35-37	9	18	35		LOOSE GRAY, BLACK SILT SIZE FILL MIXED WITH SMALL STONES, WET.
		16	17			



NOTES:

MALCOLM PIRNIE

BORING 14B

PROJECT: LTV MARILLA STREET LANDFILL	PROJECT NO: 848-03-1
DATE: JULY 1, 1986	LOCATION: SOUTH BUFFALO, NEW YORK
ELEVATION:	DATUM:

SAMPLE no.	depth	blows per 6"		DEPTH	STRATA	SOIL DESCRIPTION density, color, SOIL, admixtures, moisture, other notes, ORIGIN	WELL CONST.	REMARKS
S-8	40-42	7	16			VERY LOOSE TO 41 MEDIUM GREEN/GRAY CLAY MOTTLED @ 41'		QUARTZ SAND
		23	37				BOTTOM OF WELL	NATIVE CLAY
				45				
				50				
				55				
				60				
				65				
				70				
				75				

NOTES:

MALCOLM PIRNIE ENVIRONMENTAL ENGINEERS, SCIENTISTS & PLANNERS

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the table are noted here as "shallow" wells which are either screened immediately below fill material, in natural deposits, or screened partially in both. Wells marked "A" are "deep" wells which are screened at a greater depth below the fill material as compared to the shallow wells.

A consideration for possible improvement to this monitoring system would be the addition of one monitoring couplet, comprised of two (2) wells (both shallow and deep), to be installed at a locale west of the BOF Dust Area. The purpose of this well couplet would include monitoring deep groundwater flow moving off site (refer to Plate 2) as well as investigating shallow groundwater flow directions beyond the limits of the BOF Dust Area (refer to Plate 1). This added location may pose one problem, however, in that it would not be located on LTV Steel property making access difficult, if not impossible.

Additionally, water elevation monitoring is proposed to be conducted in the ditch just west of the BOF Dust Area at upgradient, downgradient and intermediate locations. Three (3) graduated metal staff gauges will be installed along the ditch for monitoring changes in water elevation and possibly changes in flow direction. Observed elevations would also be used in evaluating the shallow groundwater system in the vicinity of the BOF Dust Area.

4.0 WORK PLAN - APPROACH FOR OBTAINING BACKGROUND MONITORING DATA FOR THE BOF DUST AREA.

This section specifies an approach for obtaining Part 373 background groundwater monitoring data for the BOF Dust Area which addresses the following:

- o Use of monitoring well 6B as the upgradient (background) well for the BOF Dust Area;

- o Use of previous pH, conductivity and TOC monitoring data for well 6B as background data;
- o An accelerated sampling schedule for TOX in well 6B;
- o Quarterly sampling of well 6B to establish baseline water quality; and
- o A schedule for routine monitoring of the BOF Dust Area;

PH, conductivity, and TOC data were collected on seven (7) occasions from 6B between 8/84 and 4/87. This data is considered sufficient for use as initial "background" water quality to begin to evaluate the impact of the BOF Dust Area on groundwater quality. Current data is not considered comprehensive enough for use in performing statistical evaluations. Consequently, beginning in July 1987, well 6B will be sampled on four (4) separate occasions, approximately two (2) weeks apart for, TOX, along with pH, conductivity, and TOC. Four (4) replicate analyses will be performed for each parameter on each sampling event. This data will be considered preliminary background data to be utilized for statistical comparisons only until seasonal background data can be collected and substituted.

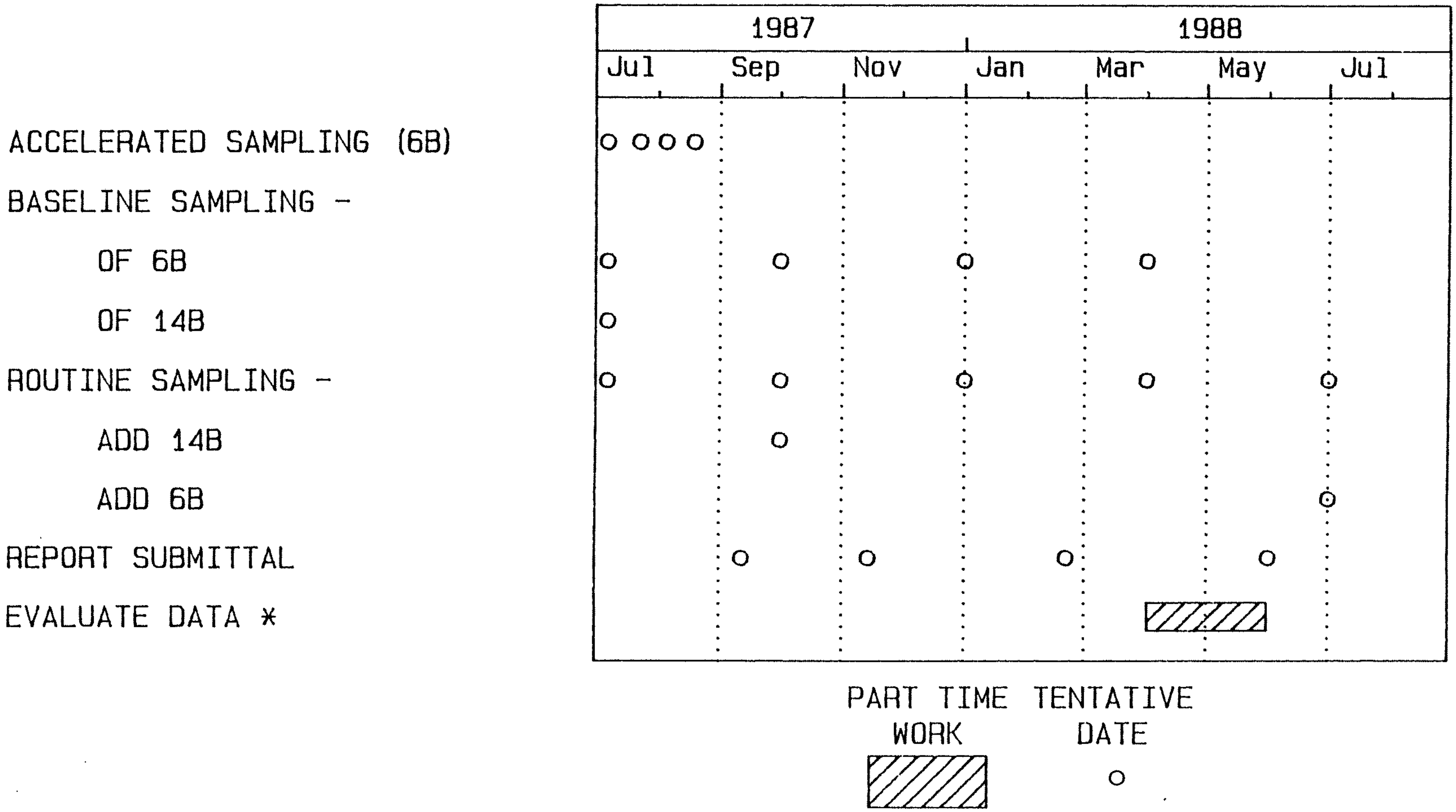
As a means of obtaining a complete set of seasonal baseline data, well 6B will be sampled on four (4) occasions, quarterly throughout the next year, for the full NYCRR Part 373 parameter list. Sampling of this well will begin in July 1987. Additionally, well 14B will be sampled during this period to obtain its fourth and final set of NYCRR Part 373 (RCRA) data (full parameter list).

Routine monitoring of the BOF Dust Area (according to 6 NYCRR Subpart 373-3) is also proposed to begin in July 1987. The list of proposed routine parameters is outlined in Table 6. This list was developed based on an evaluation of the existing monitoring data. This routine monitoring of groundwater will be conducted tentatively during the months of July, October, January, and April. Wells to be sampled on a "routine" basis will initially include 4B,7B,7A,9B, and 13B. Well 14B will be added in October 1987; well 6B will be added in July 1988.

It is noted that well 7A will be used in monitoring the potential for contaminant (vertical) migration into the lower groundwater regime. Data obtained from 7A will be compared against the data from 7B. Additionally, the West Pond will be sampled quarterly for all of the parameters found in Table 6. The data obtained from this locale will be used in monitoring the potential for lateral migration from the BOF Dust Area via the shallow groundwater system. Sampling reports will be submitted on a quarterly basis discussing the results for the previous sampling event(s). These reports will include a statistical evaluation of the data as specified in NYCRR Part 373. The preliminary background data collected for Well 6B will be utilized as the upgradient background data until seasonal background data can be collected. Laboratory chemical data will be appended to each report. A schedule for the first year routine/background monitoring activities is presented as Figure 6. The third report submittal date, as depicted in Figure 6, will also include the required Annual evaluation. This annual report will be submitted to the NYSDEC no later than March 1st of each year.

Subsequent to the fourth sampling event (April 1988), all monitoring data (beginning with July 1987) will be evaluated relative to the upgradient well (6B). Statistical comparisons will be made were applicable in an attempt to identify significant changes, trends, or fluctuations in the data. Upon final data review, a summary report, discussing the monitoring results in detail, will be submitted to NYSDEC with recommendations, if necessary, for modification of the groundwater monitoring system for the BOF Dust Area.

LTV STEEL - MARILLA STREET LANDFILL
SCHEDULE FOR IMPLEMENTING FIRST YEAR ROUTINE
NYCRR 373 MONITORING - BOF DUST AREA



* - DETAILED EVALUATION OF CHEMICAL DATA WITH RECOMMENDATIONS FOR SUBSEQUENT IMPROVEMENT TO THE BOF DUST AREA MONITORING (LTV-BOF)

FIGURE 6

5.0 RESPONSES TO NYSDEC COMMENTS

The following responses have been prepared which address NYSDEC comments issued in a letter dated April 29, 1987 regarding the October 1986 and January 1987 sampling results for the Marilla Street Landfill. A copy of this letter is presented as Appendix B. The numbering for the responses follows that of the comments.

1. No samples have been re-run nor were duplicates taken. One (1) duplicate sample will be obtained during subsequent sampling events. Additionally, all laboratory QA/QC data will be attached to subsequent sampling reports.

2. Well 7A phenol results are incorrect in the report as result of a "typo" error. The value should read 0.034 mg/l.

3. Comment #3 is correct in stating well 7B shows high values for pH, conductivity, TOC, iron, chlorides, and phenols.

4. If indeed the sample was contaminated, the mechanism of contamination is unknown.

5. The pH of the West Pond has varied significantly over the last two (2) years based on the following observations:

Measurement date	pH
4/1/87	7.5
1/9/87	11.4
10/16/86	11.6
4/1/86	8.8
7/23/85	8.1
4/23/85	9.1

The preceding data appears to indicate that seasonality has not been a controlling factor for the pH fluctuations. Shallow on-site groundwater travels in a general direction towards the

West Pond and would presumably discharge into it. Certain parameters which may have shown some variability in the groundwater in the past may have caused the observed pH fluctuations in the West Pond.

6. This comment is acknowledged in reference to well 5A.

7. The "less than" symbol is a typographical error. Values should read:

1/9/87	MM14B	Total mercury = 0.0029 mg/l
1/9/87	MW14B	Soluble barium = 0.14 mg/l etc.
1/9/87	MW9B	Soluble iron = 0.87 mg/l etc.

8. Total and soluble cadmium levels were elevated in the analytical data for well 4B dated October 16, 1986. These levels did return to normal values according to January 8 and April 1, 1987 sampling results.

APPENDIX A

NYCRR PART 373 MONITORING DATA

(NOVEMBER 1985 - APRIL 1987)

pH

TABLE 1

MARILLA STREET LANDFILL
SUMMARY OF ANALYTICAL RESULTS FOR RCRA GROUNDWATER PARAMETERS[2,4]
FOR SAMPLES TAKEN 11/6 & 11/13/85

PARAMETER	4B	7B	9B	13B
pH[1,3]	7.10	1287	7.11	7.68
Specific Cond[1,3] (umhos/cm)	1165	8750	2575	1975
Fecal Coliform	NG	NG	NG	NG
Total Phenols	<0.02	2.1	<0.02	<0.02
Fluoride	1.84	7.75	~~0.33~~	3.10
Chloride	101	368	38.2	276
TOC	20.8	480	90.8	84.2
Sulfate	269	145	1300	252
Total Organic Halogen	1.11	0.454	0.988	0.660
Nitrate, Nitrogen	<0.05	0.27	<0.05	<0.05
Gross Alpha (pCi/liter)[5]	<5	13	8	18
Gross Beta (pCi/liter)[5]	64	890	26	68
Total Radium (PCi/liter)[5]	-	<3	3.0	<3
Endrin	<0.10	<0.10	<0.10	<0.10
Lindane	≤0.10	<0.10	<0.10	<0.10
Methoxychlor	<0.10	<0.10	<0.10	<0.10
Toxaphene	<10.0	<10.0	<10.0	<10.0
2,4-D	<0.10	<0.10	<0.10	<0.10
2,4,5-TP (Silvex)	<0.10	<0.10	<0.10	<0.10
Total Metals				
Sodium	76.5	416	79	235
Barium	<1.0	<1.0	<1.0	<1.0
Arsenic	<0.005	0.028	0.016	0.059
Selenium	<0.005	<0.005	<0.005	<0.005
Iron	1.45	643.0	1440	82.0
Manganese	0.49	1.41	120	7.16
Mercury	0.003	0.001	0.002	0.003
Silver	<0.001	0.002	0.001	<0.001
Lead	0.152	0.181	0.181	0.177
Cadmium	<0.001	0.006	0.013	0.007
Chromium	0.03	0.150	0.356	0.098

TABLE 1 (cont.)

MARILLA STREET LANDFILL
SUMMARY OF ANALYTICAL RESULTS FOR RCRA GROUNDWATER PARAMETERS[2,4]
FOR SAMPLES TAKEN 11/6 & 11/13/85

PARAMETER	4B	7B	9B	13B
Soluble Metals				
Sodium	79	394	83	242
Barium	<1.0	<1.0	<1.0	<1.0
Arsenic	<0.005	0.014	<0.005	0.008
Selenium	<0.005	<0.005	<0.005	<0.005
Iron	0.31	7.84	3.90	<0.20
Manganese	0.11	<0.1	1.50	1.11
Mercury	0.002	0.002	0.002	0.001
Silver	<0.001	0.0025	<0.001	0.003
Lead	0.061	0.173	0.181	0.106
Cadmium	<0.001	0.002	0.004	0.008
Chromium	0.020	0.079	0.042	0.103

Notes

1. Analysis by Malcolm Pirnie
2. All units mg/l except where noted
3. Average of four replicate measurements
4. Analysis by Advanced Environmental Systems except where noted.
5. Analysis by Advanced Environmental Research Group of Cleveland, Ohio.

NG - No Growth
< - Less Than

TABLE 1

MARILLA STREET LANDFILL
SUMMARY OF ANALYTICAL RESULTS FOR RCRA GROUNDWATER PARAMETERS[2,4]
FOR SAMPLES TAKEN 4/1/86

PARAMETER	4B	7B	9B	13B
pH[3]	8.92	11.56	6.42	7.21
Specific Cond[1,3] (umhos/cm)	1103	8975	2550	2138
Fecal Coliform/100 ml	< 1	< 1	< 1	< 1
Total Phenols	< 0.001	1.09	< 0.001	< 0.001
Fluoride	1.86	9.10	0.38	1.00
Chloride	70.8	524	52.4	356
TOC[3]	16.7	191	8.02	32.0
Sulfate	164	238	1190	14.2
Total Organic Halogen[3]	0.030	0.022	0.016	0.016
Nitrate, Nitrogen	1.23	10.3	1.52	7.97
Gross Alpha (pCi/liter)	< 5	< 5	< 5	< 5
Gross Beta (pCi/liter)	75	70	71	69
Total Radium (PCi/liter)	< 3	< 3	< 3	< 3
Endrin (ppb)	< 0.02	< 0.02	< 0.02	< 0.02
Lindane (ppb)	< 0.01	< 0.01	< 0.01	< 0.01
Methoxychlor (ppb)	< 0.05	< 0.05	< 0.05	< 0.05
Toxaphene (ppb)	< 0.50	< 0.50	< 0.50	< 0.50
2,4-D (ppb)	< 0.10	< 0.10	< 0.10	< 0.10
2,4,5-TP (Silvex) (ppb)	< 0.10	< 0.10	< 0.10	< 0.10
Total Metals				
Sodium	85	598	65	240
Barium	< 0.2	< 0.2	< 0.2	< 0.2
Arsenic	< 0.025	< 0.025	< 0.025	< 0.025
Selenium	0.002	0.006	< 0.002	< 0.002
Iron	1.46	42	75.5	9.08
Manganese	0.157	1.25	2.99	3.36
Mercury	0.0011	0.0009	0.0009	0.0010
Silver	< 0.010	< 0.010	< 0.010	< 0.010
Lead	< 0.010	0.906	0.794	0.020
Cadmium	0.023	0.006	0.007	< 0.002
Chromium	< 0.010	0.059	0.180	0.017

TABLE 1 (cont.)

MARILLA STREET LANDFILL
SUMMARY OF ANALYTICAL RESULTS FOR RCRA GROUNDWATER PARAMETERS[2,4]
FOR SAMPLES TAKEN: 4/1/86

PARAMETER	4B	7B	9B	13B
Soluble Metals				
Sodium	85	577	63	239
Barium	< 0.20	< 0.20	< 0.20	< 0.20
Arsenic	< 0.025	< 0.025	< 0.025	< 0.025
Selenium	< 0.002	< 0.002	< 0.002	< 0.002
Iron	< 0.025	0.651	< 0.025	< 0.025
Manganese	0.102	0.032	0.146	2.93
Mercury	0.0006	0.0003	0.0002	0.0006
Silver	< 0.010	< 0.010	< 0.010	< 0.010
Lead	< 0.010	0.202	< 0.010	< 0.010
Cadmium	0.003	0.004	< 0.002	< 0.002
Chromium	< 0.010	0.012	< 0.010	< 0.010

Notes

1. Field Analysis by Malcolm Pirnie
2. All units mg/l except where noted
3. Average of four replicate measurements
4. Analysis by ARO Corporation except where noted.
5. Analysis by Advanced Environmental Research Group of Cleveland, Ohio.

< - Less Than

MALCOLM PIRNIE

TABLE 1

MARILLA STREET LANDFILL
SUMMARY OF ANALYTICAL RESULTS FOR RCRA GROUNDWATER PARAMETERS
ROUTINE WATER QUALITY SAMPLING (10/16/86)**

PARAMETER (Units as mg/l except as noted)	SAMPLE IDENTIFICATION — MONITORING WELL NUMBER 4B	9B	13B	14B
Temperature (C)***	14	10	13	11
pH (units)***	7.4	6.7	6.8	7.8
Total Organic Carbon*	33	126	43	22
Chloride	51	34	204	83
Fluoride	1.3	0.33	0.90	1.0
Nitrate (NO_3-N)	<0.05	0.05	0.10	0.07
Total Recoverable Phenolics	<0.01	<0.01	<0.01	0.042
Sulfate	309	1040	180	598
Conductivity (umhos/cm)***	700	1700	1400	900
TOTAL METALS				
Total Arsenic	0.008	0.013	0.005	<0.005
Total Barium	<0.07	<0.07	0.20	0.10
Total Cadmium	0.241	<0.007	0.009	<0.007
Total Chromium	0.007	0.129	<0.006	<0.006
Total Iron	4.9	41	7.8	1.2
Total Lead	<0.005	0.041	<0.005	<0.005
Total Manganese	0.42	2.4	3.2	0.11
Total Mercury	<0.0005	<0.0005	<0.0005	<0.0005
Total Selenium	<0.005	<0.005	<0.005	<0.005
Total Silver	<0.006	<0.006	<0.006	<0.006
Total Sodium	60	59	240	110
SOLUBLE METALS				
Soluble Arsenic	0.008	<0.005	<0.005	<0.005
Soluble Barium	<0.07	<0.07	0.09	<0.07
Soluble Cadmium	0.057	<0.007	<0.007	<0.007
Soluble Chromium	<0.006	<0.006	<0.006	<0.006
Soluble Iron	0.06	<0.03	1.7	0.44
Soluble Lead	<0.005	<0.005	<0.006	<0.006
Soluble Manganese	0.18	1.2	3.0	<0.04
Soluble Mercury	<0.0005	<0.0005	<0.0005	<0.0005
Soluble Selenium	<0.005	<0.005	<0.005	<0.005
Soluble Silver	<0.006	<0.006	<0.006	<0.006
Soluble Sodium	60	58	220	100

(continued)

MALCOLM PIRNIE

TABLE 1 (continued)

MARILLA STREET LANDFILL
SUMMARY OF ANALYTICAL RESULTS FOR RCRA GROUNDWATER PARAMETERS
ROUTINE WATER QUALITY SAMPLING (10/16/86)

PARAMETER (Units as mg/l except as noted)	SAMPLE IDENTIFICATION MONITORING WELL NUMBER			
	4B	9B	13B	14B
PESTICIDES/HERBICIDES				
Endrin	<0.0002	<0.0002	<0.0002	<0.0003
Lindane	<0.00006	<0.00006	<0.00006	<0.0002
Methoxychlor	<0.0004	<0.0004	<0.0004	<0.0007
Toxaphene	<0.0009	<0.0009	<0.002	<0.002
2,4-D	<0.0002	<0.0002	0.00032	0.0012
2,4,5-TP	<0.00005	<0.00005	<0.00005	<0.0002
MISCELLANEOUS				
Gross Alpha Radiation (pCi/l)	<3	<1	<7	<4
Gross Beta Radiation (pCi/l)	9.7 ± 0.3	2.5 ± 0.2	1.5 ± 0.1	1.1 ± 0.1
Total Radium (pCi/l)	<1	3.0 ± 1.4	<9	1.5 ± 1.0
Fecal Coliform (Colonies/100 ml)	<2	<20	<1	<2
Total Organic Halide* (ug/l)	125	195	68	112

NOTES:
* Represents an average of four replicate samples as reported in Table 3 and Attachment A.
** All analyses by RECRA Research Inc. unless otherwise noted.
*** Field measurements by Malcolm Pirnie, Inc.

MALCOLM PIRNIE

TABLE 2

MARILLA STREET LANDFILL
ANALYTICAL RESULTS - VOLATILE ORGANIC CHEMICALS
10/16/86

COMPOUND (Units of Measure = ug/l)	MONITORING WELL NUMBER				New York State Class "GA"	
	4B	9B	13B	14B	Guidance Values	Standard
Acrolein	<400	<400	<400	<400	-	-
Acrylonitrile	<400	<400	<400	<400	0.07	-
Benzene	<4.4	<4.4	<4.4	<4.4	-	ND
Bromodichloromethane	<2.2	<2.2	<2.2	<2.2	50	-
Bromoform	<4.7	<4.7	<4.7	<4.7	50	-
Bromomethane	<10	<10	<10	<10	-	-
Carbon Tetrachloride	<2.8	<2.8	<2.8	<2.8	-	5
Chlorobenzene	<6.0	<6.0	<6.0	<6.0	20	-
Chloroethane	<10	<10	<10	<10	-	-
2-Chloroethylvinyl ether	<10	<10	<10	<10	-	-
Chloroform	<1.6	<1.6	<1.6	<1.6	-	100
Chloromethane	<10	<10	<10	<10	-	-
Dibromochloromethane	<3.1	<3.1	<3.1	<3.1	50	-
1,2-Dichlorobenzene	<2.2	<2.2	<2.2	<2.2	-	
1,3-Dichlorobenzene	<2.1	<2.1	<2.1	<2.1	20	4.7*
1,4-Dichlorobenzene	<2.5	<2.5	<2.5	<2.5	-	
1,1-Dichloroethane	<4.7	<4.7	<4.7	<4.7	50	-
1,2-Dichloroethane	<2.8	<2.8	<2.8	<2.8	0.8	-
1,1-Dichloroethylene	<2.8	<2.8	<2.8	<2.8	0.07	-
trans-1,2-Dichloroethylene	<1.6	<1.6	<1.6	<1.6	50	-
1,2-Dichloropropane	<6.0	<6.0	<6.0	<6.0	50	-
cis-1,3-Dichloropropene	<5.0	<5.0	<5.0	<5.0	-	-
trans-1,3-Dichloropropene	<5.0	<5.0	<5.0	<5.0	-	-
Ethylbenzene	<7.2	<7.2	<7.2	<7.2	50	-
Methylene chloride	<2.8	<2.8	<2.8	<2.8	50	-
1,1,2,2-Tetrachloroethane	<6.9	<6.9	<6.9	<6.9	0.2	-
Tetrachloroethylene	<4.1	<4.1	<4.1	64	0.7	-
Toluene	<6.0	<6.0	<6.0	<6.0	50	-
1,1,1-Trichloroethane	<3.8	<3.8	<3.8	<3.8	50	-
1,1,2-Trichloroethane	<5.0	<5.0	<5.0	<5.0	0.6	-
Trichloroethylene	<1.9	<1.9	<1.9	<1.9	-	10
Trichlorofluoromethane	<2.8	<2.8	<2.8	<2.8	50	-
Vinyl chloride	<10	<10	<10	<10	-	5.0

NOTE: - indicates "not specified"
* 4.7 ug/l as total of dichlorobenzene isomers

TABLE 1 (continued)

MARILLA STREET LANDFILL
SUMMARY OF ANALYTICAL RESULTS FOR RCRA GROUNDWATER PARAMETERS
ROUTINE WATER QUALITY SAMPLING (4/1-2/87)

PARAMETER (Units as mg/l except as noted)	SAMPLE IDENTIFICATION Monitoring Well Number 14B
PESTICIDES/HERBICIDES	
Endrin	<0.00001
Lindane	<0.00001
Methoxychlor	<0.00008
Toxaphene	<0.0002
2,4-D	0.0002
2,4,5-TP	<0.00005
MISCELLANEOUS	
Gross Alpha Radiation (pCi/l)	<5
Gross Beta Radiation (pCi/l)	3.2 ± 0.4
Total Radium (pCi/l)	1.7 ± 1.3
Fecal Coliform (Colonies/100 ml)	<20
Total Organic Halide* (ug/l)	44.75

NOTES:

* Represents four replicate samples as reported in Attachment A.

** All analyses by RECRA Research Inc. unless otherwise noted.

*** Field measurements by Malcolm Pirnie, Inc.; number reported based upon average of replicates.

TABLE 2

LTV STEEL COMPANY
MARILLA STREET LANDFILL

FIELD TEST RESULTS
RCRA INDICATOR PARAMETERS (REPLICATE)*

Replicate No.	Well 14B
	pH (Standard Units)
1	10.0
2	10.0
3	10.0
4	10.0
	Conductivity (umhos/cm)
1	2000
2	2000
3	2000
4	2000

* Measurements taken from four separate samples collected on April 1, 1987.

TABLE 1

MARILLA STREET LANDFILL
SUMMARY OF ANALYTICAL RESULTS FOR RCRA GROUNDWATER PARAMETERS
ROUTINE WATER QUALITY SAMPLING (1/9/87)**

PARAMETER (Units as mg/l except as noted)	SAMPLE IDENTIFICATION MONITORING WELL NUMBER 4B	9B	13B	14B
pH (units)***	8.0	5.8	6.5	8.8
Total Organic Carbon*	18,14,17,12	11,13,16,25	65,51,31,34	30,35,40,21
Chloride	54	41	155	82
Fluoride	1.23	0.42	1.00	1.23
Nitrate (NO_3-N)	0.12	0.12	0.15	0.14
Total Recoverable Phenolics	<0.01	<0.01	<0.01	0.016
Sulfate	314	1150	146	650
Conductivity (umhos/cm)***	1469	3125	2000	1050
TOTAL METALS				
Total Arsenic	0.008	0.038	0.011	0.253
Total Barium	0.08	0.37	0.24	1.2
Total Cadmium	0.028	0.012	0.005	0.017
Total Chromium	<0.005	0.271	0.008	0.359
Total Iron	6.3	81	19	173
Total Lead	<0.005	0.180	0.013	0.175
Total Manganese	0.71	3.4	3.2	11.0
Total Mercury	<0.0005	<0.0005	<0.0005	0.0029
Total Selenium	<0.005	<0.005	<0.005	<0.005
Total Silver	<0.005	<0.005	<0.005	<0.005
Total Sodium	50	47	190	170
SOLUBLE METALS				
Soluble Arsenic	<0.005	<0.005	<0.005	<0.005
Soluble Barium	<0.05	0.10	0.16	0.14
Soluble Cadmium	0.006	<0.005	<0.005	<0.005
Soluble Chromium	<0.005	<0.005	<0.005	<0.005
Soluble Iron	<0.02	0.87	<0.02	0.24
Soluble Lead	<0.005	<0.005	<0.005	<0.005
Soluble Manganese	0.61	1.3	2.8	<0.01
Soluble Mercury	<0.0005	<0.0005	<0.0005	<0.0005
Soluble Selenium	<0.005	<0.005	<0.005	<0.005
Soluble Silver	<0.005	<0.005	<0.005	<0.005
Soluble Sodium	45	47	190	160

(continued)

TABLE 1 (continued)

MARILLA STREET LANDFILL
SUMMARY OF ANALYTICAL RESULTS FOR RCRA GROUNDWATER PARAMETERS
ROUTINE WATER QUALITY SAMPLING (1/9/87)

PARAMETER (Units as mg/l except as noted)	SAMPLE IDENTIFICATION MONITORING WELL NUMBER			
	4B	9B	13B	14B
PESTICIDES/HERBICIDES				
Endrin	<0.00001	<0.00001	<0.00001	<0.00001
Lindane	<0.00001	<0.0002	<0.00002	<0.00002
Methoxychlor	<0.00005	<0.00005	<0.00005	<0.00005
Toxaphene	<0.0005	<0.0005	<0.0005	<0.0005
2,4-D	<0.0002	<0.00025	0.0015	0.00089
2,4,5-TP	<0.00003	<0.0002	<0.00008	<0.0002
MISCELLANEOUS				
Gross Alpha Radiation (pCi/l)	<4	<5	<5	<5
Gross Beta Radiation (pCi/l)	5.5 ± 0.4	1.1 ± 0.1	6.2 ± 0.5	1.8 ± 0.3
Total Radium (pCi/l)	1.6 ± 1.3	6.8 ± 3.0	3.0 ± 1.5	1.6 ± 1.2
Fecal Coliform (Colonies/100 ml)	<1	<4	<4	<2
Total Organic Halide* (ug/l)	<10	<10	<10	109

NOTES:

* Represents four replicate samples as reported in Attachment A.

** All analyses by RECRA Research Inc. unless otherwise noted.

*** Field measurements by Malcolm Pirnie, Inc.

TABLE 2

LTV STEEL COMPANY
MARILLA STREET LANDFILL

FIELD TEST RESULTS
RCRA INDICATOR PARAMETERS (REPLICATE)*

Replicate No.	Well 4B	Well 9B	Well 13B	Well 14B
		pH (Standard Units)		
1	8.0	5.8	6.5	8.8
2	8.0	5.8	6.5	8.7
3	8.0	5.8	6.4	8.8
4	8.0	5.7	6.5	8.8
		Conductivity (umhos/cm)		
1	1500	3000	2000	1000
2	1500	3000	2000	1100
3	1425	3000	2000	1100
4	1450	3500	2000	1000

* Measurements taken from four separate samples per well collected on 1/9/87.

APPENDIX B

NYSDEC COMMENTS

New York State Department of Environmental Conservation
600 Delaware Avenue, Buffalo, N.Y. 14202-1073

Henry G. Williams
Commissioner

April 29, 1987

Mr. L.A. Szuhay
Manager-Solid and Hazardous Waste
Environmental Control
LTV Steel Company
3100 East 45th Street
Cleveland, Ohio 44127

Dear Mr. Szuhay:

This Department has reviewed your October 16, 1986 and January 8, 1987 results at the Marilla Street Landfill. The following comments are provided:

1) The total iron results for several of the wells appear to fluctuate greatly (i.e. Well 2A, Well 5A, Well 5B). Have any of these samples been re-run to confirm results, or have any duplicates been taken? The QA/QC data from the laboratory should be submitted with the data summary sheets.

2) Why is the phenol result in Well 7A on January 9, 1987 reported as less than 34 ug/l?

3) The January 9, 1987 results for Well 7B show results similar to previously recorded high values of pH, conductivity, TOC, iron, chlorides, and phenols.

4) In the October 16, 1986 sampling, what was the suspected mechanism of contamination of the sample from Well 5B?

5) The pH of the west pond has increased substantially over the last two sampling rounds. Please explain this increase.

6) Well 5A exhibits elevated levels of TOC, sulfates, and filterable residue on October 16 as compared to previous results. However, the January results did not exhibit these high values.

7) January 9, 1987 results show some values reported as less than (<) which appear to be typos, specifically: Well 14B total mercury and soluble barium; Well 9B soluble iron.

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8) October 16, 1986 results for Well 4B show suprisingly high levels of total and soluble cadmium. January 1987 results have returned to normal values.

If you have any questions, please contact me or Mr. Larry Thomas at 716-847-4585.

Sincerely,

Mary E. McIntosh

Mary E. McIntosh
Senior Engineering Geologist

cc: Mr. Larry Thomas
Mr. Gary Caspar

MEM:jps