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December 22, 1994

Ms. Janis D. McHargue
North Carolina Department of Health,
Environment and Natural Resources
585 Waughtown Street
Winston-Salem, North Carolina 27107-2241

Fac/Perm/Co ID #	Date	Doc ID#
6013	08/01/2011	DIN 14616

Subject: Hydrogeologic Considerations Response
(justifications in response to DEHNR December 16, 1994 Memorandum letter)

Dear Ms. McHargue:

Ecological Services, Inc. (ESI), on behalf of Mr. Larry Griffin, offers the following in response to additional hydrogeologic considerations outlined in Jim Bateson's December 16, 1994 memorandum.

Groundwater Monitoring Well MW-2

In order to accommodate ground surface elevation increases around monitoring well MW-2, 10 feet of 2-inch PVC riser was added to the existing monitoring well. In turn, the elevation of the top of casing was increased from 681.00 feet to 691.00 feet. Furthermore, all depth to water elevation data collected during the May gauging events were adjusted to accommodate the additional riser section. Ground surface elevation increases around monitoring well MW-2 were necessary during the holding pond construction. It is ESI's understanding that no grading or surface cover removal associated with the land fill operations will be conducted in this area.

As noted in ESI's November 18, 1994 Hydrogeologic Considerations Response letter, anomalous depth to water levels noted in MW-2 are thought to be due to recharge from the adjacent holding pond. Just as storm events contribute to the projected base flow of a stream, storm events which influence the water level in the holding pond are expected to contribute to the monitoring well in a similar fashion.

Based on the above, ESI maintains that the originally modeled phreatic surface map, constructed from gauging data collected on May 27, 1994 is an accurate depiction of piezometric surface conditions at the site.

Proposed Monitoring Plan

ESI recommends that a groundwater monitoring program be implemented following the Phase II permitting of the subject site. To ensure adequate site coverage, ESI proposes that the following groundwater monitoring well locations should be sampled:

Site Monitoring Points

MW-4 (deep monitoring point near Council well)
MW-3
MW-9
MW-10
PZ-6

**Monitoring well construction information is included as Appendix A*

Water levels will be measured prior to each sampling event with an oil/water interface probe to determine groundwater elevation. The monitoring wells will then be purged by bailing or pumping at least 4 times the water volume within the well, including the sand pack, or to dryness. After allowing each well to recover at least 60% of the initial head, or 24 hours, whichever occurs first, the monitoring well will be sampled using disposable approved sampling bailers. At the time the water samples are collected from the wells, pH, temperature, and specific conductivity will be recorded in the field to ensure that representative groundwater is being obtained for chemical analysis. One field blank sample will be obtained in the field by pouring distilled water into a sampling bailer and then decanting the contents of the bailer into the appropriate glass container. A laboratory trip blank will also accompany the groundwater samples.

All groundwater samples will be properly preserved and shipped to a North Carolina approved analytical laboratory for chemical analysis as outlined in the attached Solid Waste Section Sampling and Analysis Requirements (Appendix B). Appropriate chain-of-custody records will be maintained during each stage of sample collection and transportation.

At the completion of each semi-annual sampling event, a summary of our field activities, collected data, and laboratory results will be forwarded to the DEHNR-Solid Waste Management in a letter report.

Sincerely,
ECOLOGICAL SERVICES, INC.

Paul A. Banks
Project Geologist

cc: Jim Bateson

APPENDIX A
Well Construction Data

Geologist Log

Ecological Services, Inc

Job #: ES-0675		North Mecklenburg Landfill		Well #: MW-3	Page 1 of 1
County: Mecklenburg	State: NC	Date Begin:	Date End:	Casing Height:	Land Surface Elevation:
Lat:	Long:	Drilled By: Graham & Currie		Static Water Level	
Grid Coord:		Logged By: Paul Banks		Development Method	
Tests:		Drilling Method: Hollow Stem		Sampling Method:	
Grout: 5% Bentonite		Seal: 6 - 8 ft		Gravel Pack: 80/20 Silica Sand (8 to 20 ft)	
Casing Type:		Diameter:	Depth: 0 - 10 ft	Hole Dia: 4"	
Screen Type:		Diameter:	Slot: 0.010 inch	Depth: 9 - 19 ft	Total Depth: 20 ft
PID/FID Reading (ppm)	Penetration Resistance	Depth (ft)	Lithology/Remarks	Well Completion	
		0		0	
		3.0 - 5.0 ft	Brownish Green Fine Grained Sand with Little Silt	Grout (0 - 6 ft)	Casing (0 to 10 ft)
		8.0 - 10.0 ft	Saprolite: Greenish Brown Fine Grained Silty Sand with Trace Clay	Bentonite (6 to 8 ft)	
		13.0 - 15.0 ft	Saprolite: Greenish Brown Fine Grained Silty Sand with Trace Clay		Screen (10 to 20 ft)
		18.0 - 20.0 ft	Partially Weathered Bedrock: Brown Silty Coarse Sand with Rock Fragments	Sand (8 - 20 ft)	
		20	Boring Terminated at 20 ft	20	
		30		30	
		40		40	
		50		50	
		60		60	

Geologist Log

Ecological Services, Inc

Job #: ES-0675		North Mecklenburg Landfill		Well #: MW-4		Page 1 of 1	
County: Mecklenburg		State: NC		Date Begin:		Date End:	
Lat:		Long:		Drilled By: Graham & Currie		Casing Height:	
Grid Coord:		Logged By: Ben Hope		Development Method:		Land Surface Elevation:	
Tests:		Drilling Method: Air Rotary		Sampling Method:			
Grout: 5% bentonite		Seal: 40-44 ft		Gravel Pack: FX 50 sand 44-67 ft			
Casing Type: Sch 40 PVC		Diameter: 2"		Depth: 0 - 47 ft		Hole Dia.: 6"	
Screen Type: Sch 40 PVC		Diameter: 2"		Slot: 0.010-inch		Depth: 47-67 ft	
						Total Depth: 67 ft	
PID/FID Reading (ppm)	Penetration Resistance	Depth (ft)	Lithology/Remarks			Well Completion	
		0	0 - 30.0 ft: Tan Silty Fine Sand				
		10					
		20					
		30	30.0 - 40.0 ft: Brown Silty Fine Sand				
		40	40.0 - 50.0 ft: Partially Weathered Bedrock Sampled as Tan Silty Fine Medium Sand with Rock Fragments				
						Grout (0 - 40 ft)	
						Bentonite (40 - 44 ft)	
						Casing to 47 ft	
		50	50.0 - 67.0 ft: Gray Silty Medium Sand with Rock Fragments				
		60					
						Sand (44 - 67 ft)	Screen (47 - 67 ft)
			Boring Terminated at 67.0 ft				
		70					

Geologist Log

Ecological Services, Inc

Job #: ES-0675		North Mecklenburg Landfill		Well #: MW-9	
County: Mecklenburg		State: NC		Date Begin: 1-10-94 Date End: 1-11-94	
Casing Height:		Land Surface Elevation:		Static Water Level:	
Lat.: Long.:		Drilled By: Graham & Currie		Development Method:	
Grid Coord.:		Logged By: Ben Hope		Sampling Method:	
Tests:		Drilling Method: Hollow Stem			
Grout: 5% bentonite		Seal: bentonite 7 - 10 ft		Gravel Pack: FX 50 sand 10 - 22 ft	
Casing Type: Sch 40 PVC		Diameter: 2"		Depth: 0 - 12 ft	
Screen Type: Sch 40 PVC		Diameter: 2"		Slot: 0.010-inch	
				Depth: 12 - 22 ft	
				Total Depth: 22 ft	
PID/FID Reading (ppm)	Penetration Resistance	Depth (ft)	Lithology/Remarks	Well Completion	
		0	0 - 10.0 ft: Brown Silty Medium Sand	0	
				Grout (0 - 7 ft)	
		10	10.0 - 20.0 ft: Grayish Brown Silty Medium Sand with Some Pebbles	10	Bentonite (7 - 10 ft)
					Casing to 12 ft
		20	Boring Terminated at 22 ft	20	Sand (10 - 22 ft)
					Screen (12 - 22 ft)
		30		30	
		40		40	
		50		50	
		60		60	

Geologist Log

Ecological Services, Inc

Job #: ES-0675		North Mecklenburg Landfill		Well #: MW-10	
County: Mecklenburg		State: NC		Date Begin: 1-10-94 Date End: 1-11-94	
Casing Height:		Land Surface Elevation:		Static Water Level:	
Lat:		Long.:		Drilled By: Graham & Currie	
Grid Coord.:		Logged By: Ben Hope		Development Method:	
Tests:		Drilling Method: Hollow Stem		Sampling Method:	
Grout: 5% bentonite 0 - 4.5 ft		Seal: bentonite 4.5 - 7 ft		Gravel Pack: FX 50 sand 7 - 19 ft	
Casing Type: Sch 40 PVC		Diameter: 2"		Depth: 0 - 9 ft	
Screen Type: Sch 40 PVC		Diameter: 2"		Slot: 0.010-inch	
				Depth: 9 - 19 ft	
				Total Depth: 19 ft	
PID/FID Reading (ppm)	Penetration Resistance	Depth (ft)	Lithology/Remarks	Well Completion	
		0	0 - 19.0 ft: Grayish Brown Sandy Fine Silt	0	
				Grout (0 - 4.5 ft)	
				Bentonite (4.5 - 7 ft)	
		10			Casing to 9 ft
				Sand (7 - 19 ft)	Screen (9 - 19 ft)
		20	Boring Terminated at 19 ft		
		30			
		40			
		50			
		60			

Job #: ES-0675		North Mecklenburg Landfill		Well #: PZ-6	Page 1 of 1
County: Mecklenburg	State: NC	Date Began: 5/11/94	Date End: 5/11/94	Casing Height:	
Lat.:	Long.:	Drilled By: Alliance		Static Water Level:	
Grid Coord.:		Logged By: Paul Banks		Development Method:	
Tests:		Drilling Method: Hollow Stem		Sampling Method:	
Grout: 5% Bentonite		Seal: 6 to 8 ft		Gravel Pack: 80/20 Silica Sand (8 to 20 ft)	
Casing Type:		Diameter:	Depth: 0 to 10 ft	Hole Diameter: 4"	
Screen Type:		Diameter:	Slot: 0.010"	Depth: 10 to 20 ft	Total Depth: 20 ft
PID/FID Reading (ppm)	Penetration Resistance	Depth (ft)	Lithology/Remarks	Well Completion	
		0		0	
		3 to 5	Brownish Green Fine Grained Sand with Little Silt		
		8 to 10	Saprolite: Greenish Brown Fine Grained Silty Sand with Trace Clay	Bentonite (6 to 8 ft)	Casing (0 to 10 ft)
		13 to 15	Saprolite: Greenish Brown, Fine Grained Silty Sand with Trace Clay		
		18 to 20	Partially Weathered Bedrock: Brown Silty Coarse Sand with Rock Fragments	Sand (8 to 20 ft)	Screen (10 to 20 ft)
		20	Boring Terminated at 20 ft		
		30			
		40			
		50			

APPENDIX B
Sampling and Analysis Requirements

**SAMPLING AND ANALYSIS REQUIREMENTS
N.C. SOLID WASTE SECTION**

LAB CERTIFICATION REQUIREMENTS:

The Solid Waste Section now requires water quality sample analysis by a laboratory certified by the Division of Environmental Management for groundwater analysis (15A NCAC 2H .0800). The laboratories used for water quality analysis for Solid Waste Section facilities shall be certified under the Division of Environmental Management (DEM) Certification program for the approved methods and at the approved levels of certification.

SAMPLING ANALYTICAL METHODS AND REPORTING LIMITS:

Each parameter on the following constituent list shall be certified at the designated level and an appropriately certified method used for the sample analysis. The data shall be reported at the specified Practical Quantitation Limit (PQL).

Parameter	Certification by DEM	PQL in ppb
Arsenic	Metals, Group I - low level	10
Barium	Barium (20)	500
Cadmium	Metals, Group I - low level	1
Chromium	Metals, Group I - low level	10
Lead	Metals, Group I - low level	10
Mercury	Metals (21)	1
Selenium	Metals, Group I - low level	20
Silver	Metals, Group II - low level	10

Volatile Organic Compounds

For the parameters and PQLs required for volatile organic compound analysis, refer to the next page of this attachment. For volatile organic analysis the laboratory shall be certified for an SW-846 GC/MS Method (8240 or 8260). The recommended method of analysis is EPA Method 8260.

SAMPLING AND ANALYSIS:

In addition to sampling for the constituents referenced above, all sampling should also include field testing of pH, temperature, and specific conductivity. EPA requires analysis for total metals. No filtering of samples is allowed. The 3030C preparation method for metals analysis is not allowed.

VOLATILE ORGANIC COMPOUNDS

ORGANIC CONSTITUENT	PQL (UG/L)	ORGANIC CONSTITUENT	PQL (UG/L)
ACETONE	100	(40) T-1,3-DICHLOROPROPENE	10
ACRYLONITRILE	200	(41) ETHYLBENZENE	5
BENZENE	5	(42) METHYL BUTYL KETONE	50
BROMOCHLOROMETHANE	5	(43) METHYL BROMIDE	10
BROMODICHLOROMETHANE	5	(44) METHYL CHLORIDE	10
BROMOFORM	5	(45) METHYLENE BROMIDE	10
CARBON DISULFIDE	100	(46) METHYLENE CHLORIDE	10
CARBON TETRACHLORIDE	10	(47) MEK; 2-BUTANONE	100
CHLOROBENZENE	5	(48) METHYL IODIDE	10
CHLOROETHANE	10	(49) METHYL ISOBUTYL KETONE	100
CHLOROFORM	5	(50) STYRENE	10
CHLORODIBROMOMETHANE	5	(51) 1,1,1,2-TETRACHLOROETHANE	5
BCP	25	(52) 1,1,2,2-TETRACHLOROETHANE	5
ETHYLENE DIBROMIDE	5	(53) TETRACHLOROETHYLENE	5
1,2-DICHLOROBENZENE	5	(54) TOLUENE	5
DICHLOROBENZENE	5	(55) 1,1,1-TRICHLOROETHANE	5
1,4-DICHLORO-2-BUTENE	100	(56) 1,1,3-TRICHLOROETHANE	5
1,1-DICHLOROETHANE	5	(57) TRICHLOROETHYLENE	5
ETHYLENE DICHLORIDE	5	(58) CFC-11	5
ETHYLIDENE CHLORIDE	5	(59) 1,2,3-TRICHLOROPROPANE	15
1,1,2-DICHLOROETHENE	5	(60) VINYL ACETATE	50
1,2-DICHLOROETHENE	5	(61) VINYL CHLORIDE	10
ETHYLENE DICHLORIDE	5	(62) XYLENES	5
1,3-DICHLOROPROPENE	10		

OWN AS: (21) TRIBROMOMETHANE, (25) ETHYL CHLORIDE, (26) TRICHLOROMETHANE, BROMOCHLOROMETHANE, (28) 1,2-DIBROMO-3-CHLOROPROPANE, (29) 1,2-DIBROMOETHANE, CHLOROBENZENE, (31) 1,4-DICHLOROBENZENE, (33) ETHYLIDENE CHLORIDE, CHLOROETHANE, (35) 1,1-DICHLOROETHENE (ETHYLENE), (36) CIS-1,2-DICHLOROETHYLENE, IS-1,2-DICHLOROETHYLENE, (38) 1,2-DICHLOROPROPANE, (42) 2-HEXANONE, (43) BROMOMETHANE, BROMOMETHANE, (45) DIBROMOMETHANE, (46) DICHLOROMETHANE, (47) METHYL ETHYL KETONE, METHANE, (49) 4-METHYL-2-PENTANONE, (53) TETRACHLOROETHENE, PERCHLOROETHYLENE, ETHYLCHLOROFORM, (57) TRICHLOROETHENE, (58) TRICHLOROFLUOROMETHANE

N. Mecklenburg Landfill

Well	Screen	Screened Interval	W.T. ^{to c} Depth Elevation	Formation
MW-1	?	?	14.6	
MW-2	?	?	12.5 - 17.0	
MW-3	10-20	* 8-20	14.5 - (17.5)	Silty Sand / PWR
MW-4	47-67	X 44-67	29.0	PWR / Silty Sand
MW-5	55-75	X (400) 52-75	27.5	Bedrock / s. Sand
MW-6	78-98	X 62-98	(50) 58.5	Bedrock / s. Sand
MW-7	63-83	X 61-83	51.0	Silty Sand
MW-8	60-80	✓-OK 57-80	69.5	Bedrock ...
MW-9	12-22	✓- - 10-22	18.5 - (19.0)	Silty Sand
MW-10	9-19	✓ OK 7-19	11.0 - 12.0	Sandy Silt

- no well logs for MW-1 and MW-2
- few borings in footprint of landfill
- most well logs do not have survey data (elevations)
- No standard penetration data (except SB-1 thru SB-3)
- Need to revise Mon. System *
- two wells MW-1 ?
- Depth to Rock as defined by auger refusal or SPR 2 SD/.2
- Vertical separation? (fill?) (Report states W.T. in bedrock)
- Cross-section A-A' flat phreatic surface ?
- Dimensions of small maps ≠ dimensions of large plans
- ⊙ Phreatic Surface Contour Map
- Need large " w/ topography + GW contours

N. Mecklenburg CTD Landfill

<u>Boring</u>	<u>Drill Rig</u>	<u>Rock</u>	<u>T.D.</u>	<u>W.T.</u>	<u>PWR</u>	<u>SPR</u>
PZ-1	Air R.	50?	60	27 690.5	30	X
PZ-2	Air R.	40?	63	29 686.0	30	X
PZ-3	Air R.	50?	67	38 697.5	40	X
PZ-4	Air R.	50?	67	29 696.0	40	X
MW-1				14.5 673.5		
MW-2				12.5 669		
MW-3	Auger	?	20	14.5 692		X
MW-4	Air R.	50?	67	29.0 689.5		X
MW-5	Air R.	20	75	27.5 674.0		X
MW-6	Air R.	20 721	98	58 682.5 690.5		X
MW-7	Air R.	70?	83	51 688		X
MW-8	Air R.	50 718+	80	69.5 698		X
MW-9	Auger	?	22	18.5 691		X
MW-10	Auger	?	19	11.0 682		X
SB-1A	Auger	32	32	$728 - 32 = 696 + 4 = 700$ OK		✓
SB-2A	Auger	39	39			✓
SB-3A	Auger	14	14	$752 - 14 = 738 + 4 = 742$		✓
PZ-5				48 689.5		
PZ-6	Auger	?	20	8.3 688.5	18	X
PZ-7	Air R.	27	60	48 694	20	X

735
12 ft

June 24, 1993

8. A closure and post-closure plan must be submitted for approval at least 90 days prior to closure or partial closure of any landfill unit. The plan must include all steps and measures necessary to close and maintain the facility in accordance with all rules in effect at that time. At a minimum, the plan shall address the following:
 - a. Design of a final cover system;
 - b. Construction and maintenance/operation of the final cover system and erosion control structures;
 - c. Surface water, ground water, and explosive gas monitoring.

MONITORING AND REPORTING REQUIREMENTS

1. Ground-water monitoring wells and monitoring requirements for the C&D landfill units:
 - a. Monitoring well design and construction shall conform to the specifications outlined in Attachment 2, "North Carolina Water Quality Monitoring Guidance Document for Solid Waste Facilities".
 - b. A total of six locations as illustrated in the approved plan shall be established to monitor the facility.
 - c. A geologist shall be in the field to supervise well installation. The exact locations, screened intervals, and nesting of the wells shall be established after consultation with the SWS Hydrogeologist at the time of well installation.
 - d. For each monitoring well constructed, a well completion record shall be submitted to DSWM within 30 days upon completion.
 - e. Prior to the acceptance of any waste at the facility, a baseline sampling event shall be completed.
 - f. Sampling equipment, procedures, and parameters shall conform to specifications outlined in the above-referenced guidance document, (Attachment 2), or the current guidelines established by DSWM at the time of sampling.
 - g. In order to determine ground-water flow directions and rates, each monitoring well shall be surveyed, and hydraulic conductivity values and effective porosity values shall be established for the screened intervals for each monitoring well.
 - h. The permittee shall sample the monitoring wells semi-annually or as directed by the SWS Hydrogeologist.
 - i. A readily accessible unobstructed path shall be initially cleared and maintained so that four-wheel drive vehicles may access the monitoring wells at all times.
2. The permittee shall maintain a record of all monitoring events and analytical data. Reports of the analytical data for each water quality monitoring sampling event shall be submitted to DSWM in a timely manner.

1.0 Monitoring Plan Objective

The proposed Ground Water Monitoring Plan is intended to determine the absence/presence of groundwater contamination associated with the operation of the proposed 10.0 acre demolition landfill tract. Ground water sampling activities will be performed semi-annually. This plan presents our recommended ground water monitoring program which includes well locations, well construction details, ground water sampling and chemical testing.

2.0 Monitoring Well Installation

Five Type II ground water monitoring wells are proposed to be installed at the approximate well locations shown on the attached proposed Monitoring Well Location Plan (Figure 10). Each well will be installed by air rotary method which is necessary to penetrate the relatively shallow bedrock at the subject site. Due to construction details of existing well MW-1, ESI does not recommend utilizing this well as a downgradient monitoring well.

The Type II wells will consist of 2-inch diameter, Schedule 40, PVC pipe with flush-threaded joints inserted each 10-inch diameter borehole. The bottom 15-foot section of each well consisted of manufactured well screen with 0.010-inch wide openings. The screen will be placed so that the time-of-drilling water level was within the upper half of the screen. Washed sand backfill will be placed around the outside of the pipe to at least one foot above the top of the well screen. The sand backfill will be used to stabilize the formation and to help yield a less turbid ground-water sample. A two-foot thick (minimum) bentonite seal will be installed on top of the sand backfill to seal the monitoring well at the desired level. The remainder of the borehole will then be grouted with a cement/bentonite mixture to the ground surface. A lockable above-ground steel protective stand up cover will be placed over each well.

The Monitoring Well Installation Diagram (Figure 11) illustrates construction details for the proposed monitoring wells.

2.1 Well Development and Ground Water Sampling

Following stabilization of water levels in the newly installed monitoring wells, water levels will be measured prior to each sampling event with an oil/water interface probe to determine depth to the water surface. The measured value will be used in conjunction with the total casing depth to determine the height of the water column and the volume of water standing in each well will then be calculated. The monitoring wells will be developed by bailing/pumping at least 3-5 the volume/water within the wells, including the sand pack or to dryness twice. Development will be continued (if necessary) until the development water runs clear or the pH and conductivity measurements stabilize.

After allowing a minimum of twenty-four hours after development, ground water samples will be collected from the newly installed and existing ground water monitoring wells using clean teflon bailers. Prior to sampling the wells they will be purged by removal of at least three volumes of ground water, including sandpack, and allowed to recover to 60% of their initial head, or 24 hours, whichever occurs first..

The wells will be sampled using bailers constructed of 3 ft. long, 1.6-inch diameter teflon pipe. To minimize the potential for cross-contamination between wells, the bailers were cleaned with laboratory soap, rinsed with distilled water, rinsed with dilute hydrochloric acid, rinsed with distilled water, rinsed with isopropyl alcohol and finally rinsed with distilled water prior to sampling each well.

At the time the water samples are collected from the wells, pH, temperature, and specific conductivity will be recorded in the field to ensure that representative ground water is being obtained for chemical analysis. Measurement of the sample temperature will be made using a mercury thermometer. Field measurement of pH will be conducted with a portable pH meter and specific conductivity will be measured with a conductivity meter.

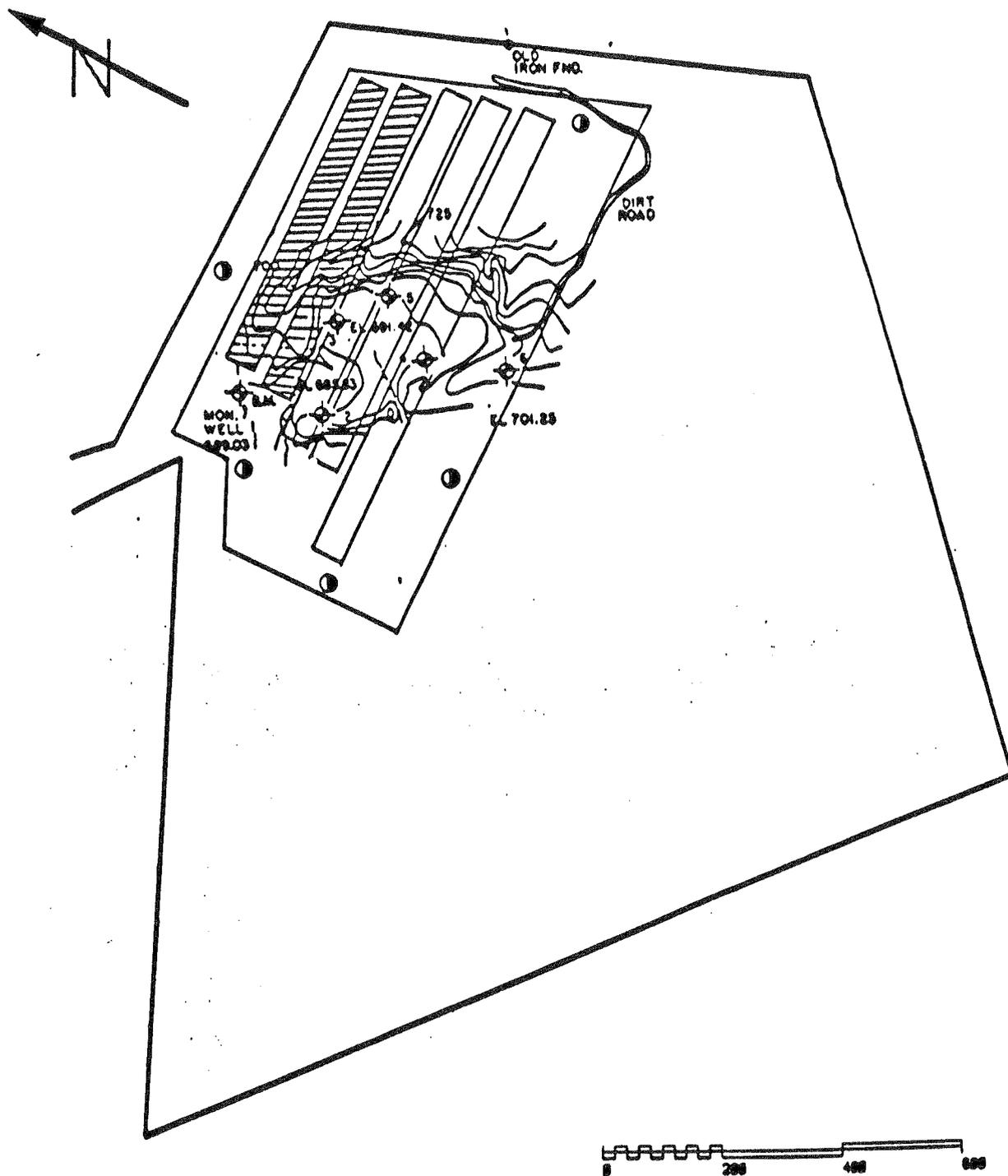
A bailer rinse blank sample will be obtained in the field by pouring distilled water into a sampling bailer and then into the appropriate glass container. A laboratory trip blank also will accompany the well samples. The ground water samples and quality assurance blanks will be labeled with identifying numbers, property preserved and shipped by an overnight courier to Industrial and Environmental Analyst (IEA) in Research Triangle Park, NC for chemical analysis. Appropriate chain-of-custody record will be maintained.

3.0 Ground Water Flow Direction

Monitoring well top-of-casing elevations shall be surveyed on all newly installed and existing monitoring wells to a common datum (if possible, utilizing a USGS survey pin or other permanent feature). After well development and fluids stabilization, water level and product thickness measurements shall be made. An estimate of ground water flow direction shall be made through construction of a ground water contour and flow direction map. All calculations and equation references shall be documented.

4.0 Report Preparation

At the completion of each semi-annual sampling event, a summary of our field activities, collected data, laboratory results will be made to DEHNR-Solid Waste Management in a letter report.



① APPROXIMATE LOCATIONS OF PROPOSED GROUND WATER MONITORING WELLS

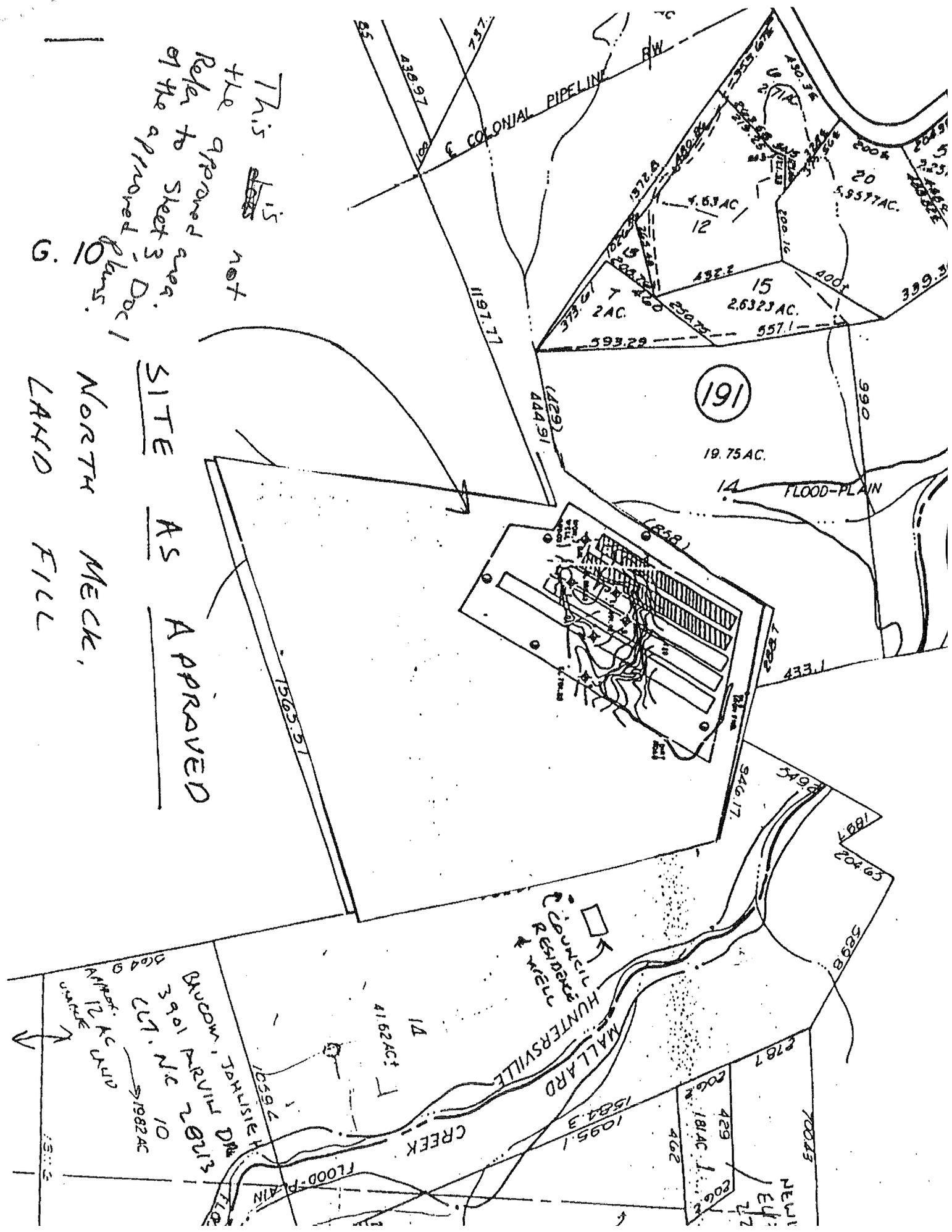
SCALE: ON DRAWING
 DATE: JUNE, 15, 1992

ESI 
 ECOLOGICAL SERVICES, INC.

FIGURE: #10 PROPOSED
 MONITORING WELL
 LOCATION PLAN
 LARRY GRIFFIN
 N. MECK. LANDFILL
 HUNTERSVILLE, NC

This is not the approved area. Refer to sheet 3 of the approved plans. Doc 1

SITE AS APPROVED
NORTH MECK,
LAND FILL

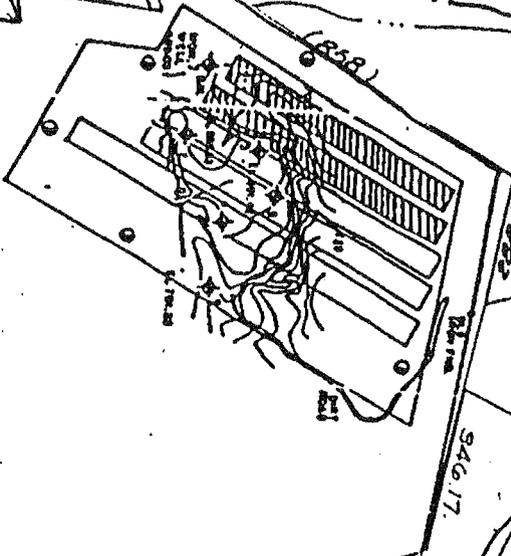


191

19.75 AC.

14

FLOOD-PLAIN



HUNTERSVILLE COUNCIL EXPANSION

MALLARD CREEK

14

41.62 AC

10592

BRADCOMB, MINTZ & GURTS
3901 N.C. 10
CUI. N.C. 10
1982 AC

NEWI EU: 272
429
1814 AC
402
2067

70043

1891

69702

5898

2787

10951

15843

2067

54617

54617

433.1

990

400

20

5.9577 AC.

271 AC

450.35

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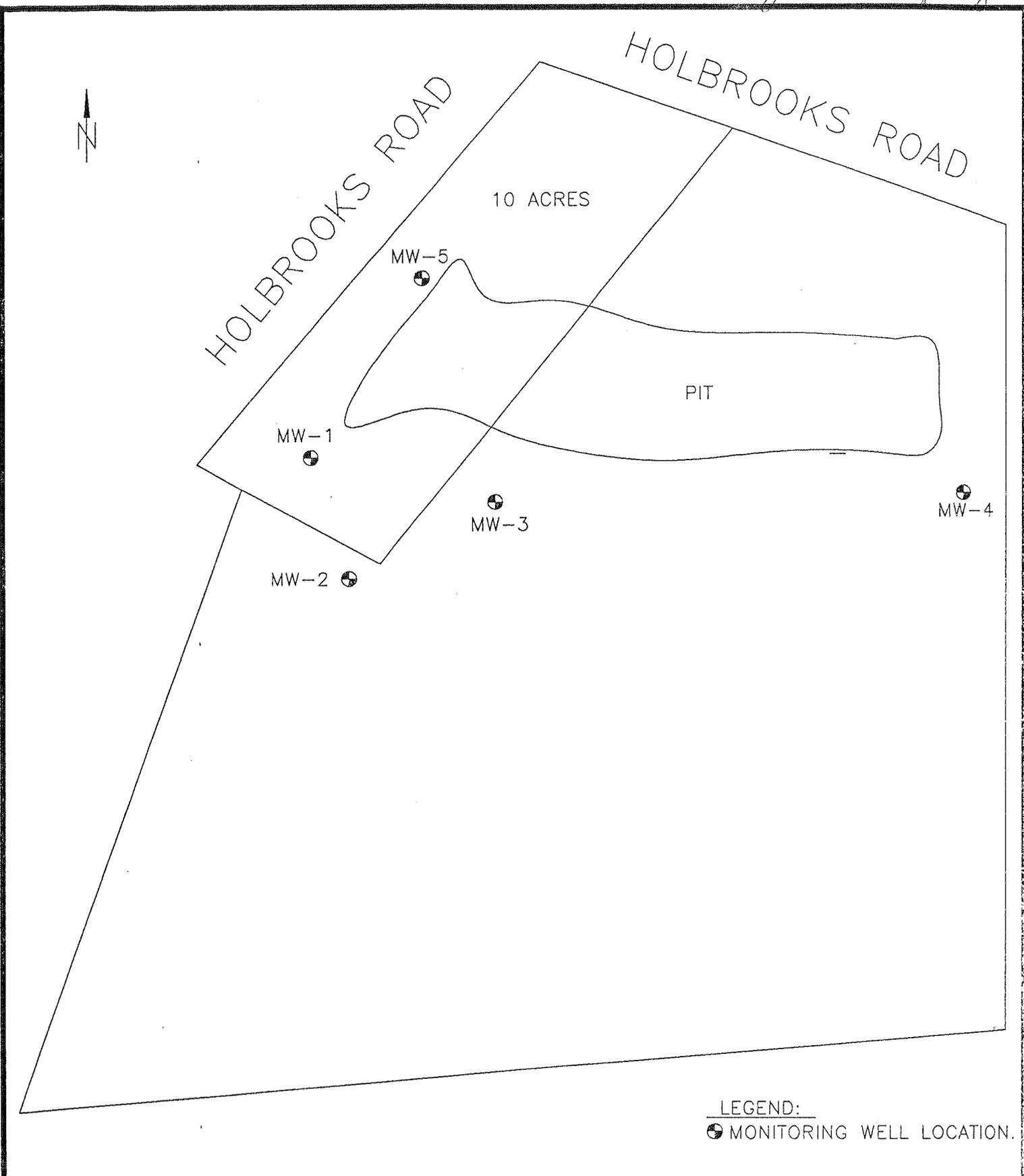
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Jan '94 Sampling



DATE: 02-22-94
SCALE: 1" = 200'
DWG. NO.: ES-531-1



FIGURE 1: SITE MAP
N MECKLENBURG LANDFILL
HUNTERSVILLE, NC

STATUS REPORT

Monitoring well resampling activities were performed by Mr. Brian Nesbit and Ms. Lisa Beckstrom of Ecological Services, Inc. (ESI) on January 19, 1994.

No free product was noted in any of the monitoring wells.

A site map is included as Figure 1.

A summary of the monitoring well field parameters is included as Table 1.

The laboratory analysis data sheets are included in Appendix A.

LABORATORY RESULTS

- No volatile organic compounds (EPA Method 8260) were noted above their respective laboratory detection limits.
- The results of laboratory analysis for the required inorganics is provided in Table 2. Total arsenic, selenium and lead concentrations exceed the North Carolina Department of Environment, Health and Natural Resources, Division of Environmental Management (NCDEM) groundwater standards in wells MW-1 and MW-5.

TABLE 2
Summary of Inorganics Analysis
North Mecklenburg Landfill
Kannapolis, North Carolina

Constituent	MW-1	MW-2	MW-3	MW-4	MW-5	NCDEM Standard
Arsenic, Total, in Groundwater	0.061	0.023	0.010	0.012	0.131	0.05
Selenium, Total, in Groundwater	0.114	0.020 ^{OK}	ND	0.013 ^{OK}	0.124	0.05
Cadmium, Total, in Groundwater	ND	ND	ND	ND	ND	0.005
Beryllium, Total	0.051	ND	ND	0.011	ND	NE
Chromium, Total, in Groundwater	ND	ND	ND	ND	ND	0.05
Copper, Total, in Groundwater	0.13	0.02	0.04	0.03	0.10	1.0
Cobalt, Total	ND	ND	ND	ND	ND	NE
Lead, Total, in Groundwater	0.031	ND	ND	ND	0.049	0.015
Nickel, Total, in Groundwater	0.10	ND	ND	ND	ND	0.1
Zinc, Total, in Groundwater	0.240	0.070	0.030	0.050	0.180	2.1
Silver, Total, in Groundwater	ND	ND	ND	ND	ND	0.18
Barium, Total, in Groundwater	0.568	0.088	0.032	0.041	0.879	2.0
Thallium, Total	ND	ND	ND	ND	ND	NE
Antimony, Total, in Groundwater	0.046	ND	ND	ND	0.039	NE
Vanadium, Total	ND	ND	ND	ND	ND	NE

ND = Not Detected

NE = Not Established

All results are shown in parts per million (ppm)

* Detection Limits too high for several parameters:

Cadmium
Chromium
Silver

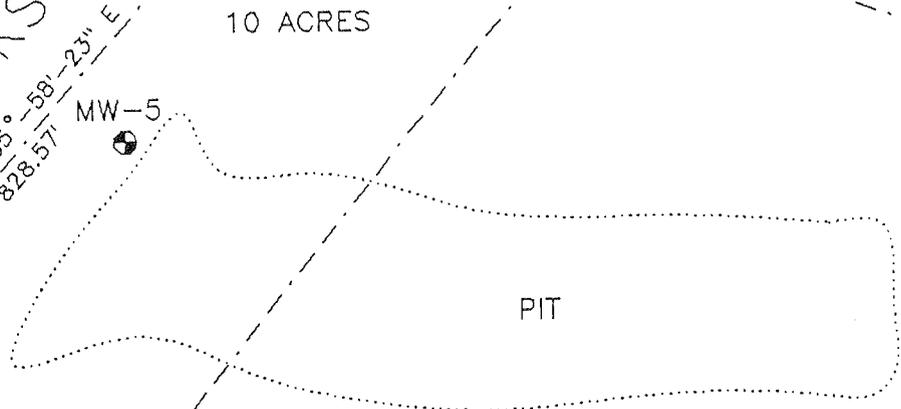
Sept. '94 Sampling



HOLBROOKS ROAD

HOLBROOKS ROAD

10 ACRES



MW-1

MW-5

MW-4

MW-3

MW-2

MW-10

N 75°-59'-28" E
1095.82'

S 85°-58'-23" E
828.57'

S 12°-25'-05" E
784.94'

1565.57'
N 41°-37'-41" W

1258.50'
S 54°-46'-57" W

LEGEND:

● MONITORING WELL LOCATION.

SCALE: 1" = 200'
DWG. NO.: ES-531-2



FIGURE 1: SITE MAP
N. MECKLENBURG LANDFILL
HUNTERVILLE, NC

TABLE 2
SUMMARY OF EPA 8260 ANALYSIS RESULTS
North Mecklenburg Landfill
Huntersville, North Carolina

Well ID	Chloroform (ppb)	Acetone (ppb)	2-Butanone (ppb)	Toluene (ppb)
NCDEM 2L QUALITY STANDARD	0.19	700	170	1000
<i>Sampling event performed September 12, 1994</i>				
MW-1	6	BDL	BDL	BDL
MW-10 (MW-2)	BDL	190	190	47
MW-3	BDL	BDL	BDL	BDL
MW-4	BDL	BDL	BDL	BDL
MW-5	BDL	BDL	BDL	BDL
<i>Sampling event performed October 11, 1994</i>				
MW-10	BDL	BDL	BDL	9
MW-20 (Field Blank)	BDL	BDL	BDL	BDL

BDL = Below Laboratory Detection Limits

ppb = Parts Per Billion

TABLE 3
SUMMARY OF INORGANICS ANALYSIS
North Mecklenburg Landfill
Huntersville, North Carolina

Constituent	MW-1	MW-10 (MW-2)	MW-3	MW-4	MW-5	NCDEM Standard
Antimony, total in gw	BDL	BDL	BDL	BDL	BDL	NE
Arsenic, total in gw	0.02	0.02	0.02	0.02	0.02	0.05
Barium, total in gw	0.06	0.07	0.03	0.02	0.11	2.0
Chromium, total in gw	BDL	BDL	BDL	BDL	BDL	0.05
Cobalt, total	BDL	BDL	BDL	BDL	BDL	NE
Copper, total in gw	0.020	0.050	0.020	0.020	BDL	1.0
Cadmium, total in gw	0.0042	0.002	BDL	0.002	0.005	0.005
Lead, total in gw	0.006	0.003	0.046	0.036	0.016	0.015
Selenium, total in gw	BDL	0.02	BDL	BDL	BDL	0.05
Nickel, total in gw	0.012	0.013	BDL	0.018	BDL	0.1
Thallium, total	BDL	BDL	BDL	BDL	BDL	NE
Zinc, total in gw	0.080	0.020	0.020	0.030	0.020	2.1
Vanadium, total	BDL	BDL	BDL	BDL	BDL	NE
Beryllium, total	BDL	BDL	BDL	BDL	BDL	NE
Silver, total in gw	BDL	BDL	BDL	BDL	BDL	0.18

BDL = Below Laboratory Detection Limits

NE = Not Established

gw = Groundwater

All data is listed in parts per billion (ppb).

including waste determination procedures where appropriate. Five sets of plans shall be required with each application.

(1) The following information shall be required for reviewing a site application for a proposed sanitary landfill:

✓ (a) An aerial photograph on a scale of at least 1 inch equals 400 feet and a blueprint of the photograph accurately showing the area within one-fourth mile of the proposed site's boundaries with the following specifically identified:

- ✓ (i) Entire property owned or leased by the person proposing the disposal site;
- ✓ (ii) Land use and zoning;
- ✓ (iii) Location of all homes, industrial buildings, public or private utilities, and roads;
- ✓ (iv) Location of wells, watercourses, dry runs, and other applicable details regarding the general topography; and
- ✓ (v) Flood plains.

(b) A map on a scale of at least 1 inch equals 1000 feet showing the area within two miles of the proposed site's boundaries with the following specifically identified:

- (i) Significant ground-water users;
- (ii) Potential or existing sources of ground-water and surface water pollution;
- (iii) Water intakes;
- (iv) Airport and runways; and
- (v) Subdivisions.

(c) A geological and hydrological study of the site which provides:

(i) Soil borings for which the numbers and depths have been confirmed by the Division and lab testing of selected soil samples that provide:

- ✓ (A) standard penetration - resistance;
- ✓ (B) particle size analysis;

Not classified (C) soil classification - USCS;

✓ (D) geologic considerations (slopes, solution features, etc.);

✓ (E) undisturbed representative geologic samples of the unconfined or confined or semiconfined hydrological units within a depth of 50 feet that provide the following information for each major lithologic units:

- ✓ (I) saturated hydraulic conductivity (or by in-situ);
- ✓ (II) volume percent water; and
- ✓ (III) porosity;

(F) remolded sample of cover soils that provide:

- ✓ (I) saturated hydraulic conductivity,
- Not (II) total porosity,
- ✓ (III) atterberg limits;

(G) stratigraphic cross-sections identifying hydrogeological units including lithology:

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T15A: 13B .0500

1, 4, 5 months after. (H) tabulation of water table elevations at time of boring, 24 hours, and seven days (The number of cased borings to provide this information shall be confirmed by the Division.); and

- ✓ (I) boring logs;
- ✓ (ii) A boundary plat locating soil borings with accurate horizontal and vertical control which are tied to a permanent onsite bench mark;
- (iii) A potentiometric map of the surficial aquifer based on stabilized water table elevations; and
- (iv) A report summarizing the geological and hydrological evaluation.

(d) A conceptual design plan presenting special engineering features or considerations which must be included or maintained in site construction, operation, maintenance and closure.

(e) Local government approvals:

- (i) If the site is located within an incorporated city or town, or within the extra-territorial jurisdiction of an incorporated city or town, the approval of the governing board of the city or town shall be required. Otherwise, the approval of the Board of Commissioners of the county in which the site is located shall be required. Approval may be in the form of either a resolution or a vote on a motion. A copy of the resolution, or the minutes of the meeting where the vote was taken, shall be forwarded to the Division.
- (ii) A letter from the unit of government having zoning jurisdiction over the site which states that the proposal meets all of the requirements of the local zoning ordinance, or that the site is

Not in
Mezzell's
BUREAU

N. NECK LEN PURG.

	SCREEN	SEAL	LITH.
PZ-1	37-47	35	BEDROCK
PZ-2	65-85	63	BEDROCK/PWR
PZ-3	47-67	45	PWR DARK RED
PZ-4	47-67	44	PWR TO 50', THEN B.R.
PZ-5	10-20	8	SAPROCLITE → PWR
PZ-6	10-20	8	SAPROCLITE → PWR

~~XXXXXXXXXXXX~~

N. Meek

- Ron GUILKERSON will forward MW-275
Land Clearing Debris within buffer (to 100')
EXTRA M.W. adjacent to Council Well
if rig moved?

