Phase I Subsurface Characterization
Third Creek Monofill
City of Statesville
Statesville, North Carolina
May 5, 1995

Prepared For

City of Statesville
Statesville, North Carolina

For Submittal To

North Carolina Department of Environment,
Health, and Natural Resources
Division of Solid Waste Management
Hazardous Waste Section
Raleigh, North Carolina

Prepared By

Aquaterra, Inc.
Greensboro, North Carolina

aquaterra®
A GREAT LAKES CHEMICAL CORPORATION COMPANY

ENVIRONMENTAL CONSULTANTS:
POST OFFICE BOX 49532 • GREENSBORO, NC 27419 • (910) 852-5003 • FAX (910) 854-9199

May 5, 1995

Mr. Joe Hudson
Water/Wastewater Treatment Department
The City of Statesville
Post Office Box 1111
Statesville, North Carolina 28677-1111

Reference: Phase I Subsurface Characterization
Third Creek Monofill
City of Statesville
Statesville, North Carolina
Aquaterra Job No. 5302100

Dear Mr. Hudson:

Aquaterra, Inc. (Aquaterra) is pleased to submit this *Phase I Subsurface Characterization* report for subsurface characterization activities conducted at the Third Creek Monofill site, located southeast of the City of Statesville, North Carolina. This report includes a summary of the tasks conducted to characterize the subsurface conditions at the site and the results of these tasks as required in the Administratve Order on Consent (AOC) issued by the North Carolina Department of Environment, Health, and Natural Resources (DEHNR), Division of Solid Waste Management (DSWM) and signed on March 8, 1995 by the City of Statesville and the results of these tasks.

If you require any additional information or have any questions, please contact us at (910) 852-5003.

Sincerely,

AQUATERRA, INC.

Susan Kite

Susan Kite, P.G.
Senior Project Manager

Kirk B. Pollard

Kirk B. Pollard, P.G.
Senior Project Manager

cc: Mr. Douglas D. Vaughn, P.E.-Peirson & Whitman
Mr. George House-Brooks, Pierce, McLendon, Humphrey & Leonard, L.L.P.
Mr. Dan Biur, Acting Chief-NCDEHNR, DSWM

GR5057/SK/KBP

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1 Introduction

The City of Statesville operates a waste water treatment system at the Third Creek site located southeast of the city limits of Statesville, North Carolina (see Figure 1). The Third Creek facility is located near the City of Statesville in Iredell County, North Carolina. The site is situated on a dirt road off of Third Creek Road southeast of Staesville. The site is bordered to the north by pasture land. To the south of the facility is Third Creek. To the east of the property is residential property and to the west woodlands. The site operates under an NPDES permit (Permit No. 0020591) and a non-discharge permit (Permit No. WQ004040). Concerns of elevated concentrations of cadmium in the treatment system were raised in 1993. The non-discharge permit was modified to allow the removal and landfilling of over 20 years of accumulated solids from Aeration Basin 1 and 2 and the Digestor in an effort to reduce the amount of cadmium in the waste water treatment system. The sludge was placed in eight landfill trenches on property near the waste water treatment plant. Subsequent sampling of the landfilled sludge identified cadmium levels in excess of the regulatory limit for cadmium according to the toxicity leaching procedure (TCLP).

Based upon this investigation and the laboratory analytical results, the North Carolina Department of Environment, Health, and Natural Resources (NCDEHNR) Division of Solid Waste Management (DSWM) issued an Administrative Order on Consent (Order) that was signed by the City of Statesville on March 8, 1995. Based upon this Order, The City of Statesville was required to submit a *Phase I Subsurface Characterizaton Work Plan* to address the requirements of the Order. This workplan was submitted on April 8, 1995. The purpose of this report is to summarize the results of the Phase I Subsurface Characterization work activities.

2 Phase I Subsurface Characterization Work Activities

The primary objective of this report is to present the findings of the subsurface investigation at the site. The work activities included the installation of four borings in the surficial aquifer, and one boring advanced to auger refusal. In addition, four shallow ground water monitoring wells were completed in the surficial aquifer.

2.1 Monitoring Well Installation

2.1.1 Drilling

Monitoring wells MW-1 through MW-4 were installed on June 3, 1987 by the Yadkin Well Company, Inc. Monitoring wells MW-5 through MW-8 were installed by Geologic Exploration, Inc. on April 17 through April 19, 1995. These wells were installed with a rotary drill rig with 8-3/4 inch hollow stem augers. The holes were drilled to a diameter of approximately 8-3/4 inches. Soil samples were collected at

five foot intervals according to the Standard Method for Penetration Tests and Split Barrel Sampling of Soils (ASTM D 1586-84) and logged in the field by a geologist according to the Unified Soil Classification System. The geologist also recorded drilling rates, rod drops, etc., to help characterize the geology of the boring.

Four borings were advanced into the surficial aquifer at the site and were converted to monitoring wells. One additional boring was advanced until auger refusal was reached. The purpose of this boring was to characterize the geology at depth beneath the site. Plastic was placed around the proposed boring locations with a hole for the augers to pass through. The plastic collected the soil and ground water generated from the boring by the drilling process. All soil and ground water generated from each boring was placed in steel 55-gallon drums and labeled with the drum contents and origin.

2.1.2 Well Construction

Following the completion of the drilling, the monitoring wells were installed. All screens had centralizers installed at their base and top to ensure that the screen was centered within the boring. A sandpack consisting of clean washed sand and gravel containing less than 5 percent deleterious material by weight was tremied around the screen and carried from 2 to 4 feet above the screen top. Deleterious materials are considered to be wood debris, other organic matter, heterogeneous material, and degradable materials.

Above the sandpack, volclay was placed to form a seal between the annular space and the well. After the seal, a neat cement grout was poured to the surface. The well was capped with a water tight locking cap, and finished with a lockable protective steel casing installed around the well.

Well locations to the nearest foot and vertical elevations to the nearest 0.01 foot were surveyed following well installation by a land surveyor registered in the State of North Carolina. The locations of the soil boring and monitoring wells are illustrated in Figure 2.

2.1.3 Well Depth and Construction Materials

The existing monitoring wells MW-1 through MW-4 were installed in 1987 by the Yadkin Well Company, Inc. According to Yadkin Well Company records, MW-1 was completed at 68 feet, MW-2 was drilled to 38 feet, MW-3 was completed at 32 feet, and MW-4 was drilled to 28 feet. Monitoring wells MW-5 through MW-8 were installed on April 17 through April 19, 1995 by Geologic Exploration, Inc. MW-5 was drilled to a completion depth of 36 feet below land surface, MW-6 was drilled to 40 feet, MW-7 was completed at 43 feet, and MW-8 was completed at 50 feet (see Appendix A).

All wells were constructed of 2-inch schedule 40 PVC casing and screen. The PVC casing and screen were connected by flush threaded end connections. No PVC solvent or glue was used to connect the pipe. The well screens for all wells consisted of a 10-foot length of slotted screen with screen openings of 0.010 inches.

2.1.4 Construction Standards and Permitting

The ground water monitoring wells installed in 1995 were constructed to the standards discussed in 15 NCAC 2C.0108, *Standard of Construction, Wells Other Than Water Supply (c)* and the *RCRA Ground Water Monitoring Technical Enforcement Guidance Document*. Upon completion of the monitoring wells, Aquaterra submitted Well Completion Form GW-1 for each well as required by North Carolina law. The originals were submitted to the Division of Environmental Management (DEM) and copies are included in Appendix A.

2.1.5 Well Development

After the wells were installed, the wells were cleaned of all clay, silt, or sand that may have accumulated in the well. The wells were pumped or bailed for a sufficient length of time to settle the sandpack and remove any fines. The wells were considered developed when the water removed from the well was reasonably free of sand, silt, and clay. All development water was containerized in steel drums pending proper disposal.

3 Subsurface Characterization Results

3.1 Geology

The Third Creek Monofill site is located in the Piedmont Physiographic Province of North Carolina. According to the Geologic Map of North Carolina (Brown, 1985), the site is located in the Charlotte Belt and is characterized by metamorphosed igneous and sedimentary bedrock such as granite, gneiss, schist, quartzite, slate, marble, and phyllite overlain by clay-rich saprolite on hill tops and slopes, and alluvium near rivers and streams.

The site has been mapped as being underlain by fine-grained biotite gneiss. Biotite gneiss is the predominant rock type in this area, but other rock types such as mica schists and amphibolites have also been documented. Data collected during the installation of the monitoring wells indicated that the soils encountered at the site grade from a silty sand (SM) at the ground surface to a highly weathered mica schist at depths of 25 to 30 feet below grade. Competent bedrock was reached in the vertical extent boring (SB-1) at a depth of 86.5 feet below grade (see Appendix A).

The soils contain water in pore spaces between soil particles. The bedrock, on the other hand, does not have any significant intergranular porosity. Instead, it contains water in fractures and joints in the otherwise solid rock.

3.2 Ground Water

The ground water underlying the Third Creek Monofill site is typical of shallow aquifers within the Piedmont Physiographic region of North Carolina. Unconfined water table conditions exist across the site. Under these conditions, the water table surface is in equilibrium with the atmosphere, with no confining units present between the water table and ground surface. Recharge to the water table occurs through direct infiltration of precipitation. Discharge from the aquifer occurs at

topographic and hydrogeologic lows where the water table and surface water bodies are in contact.

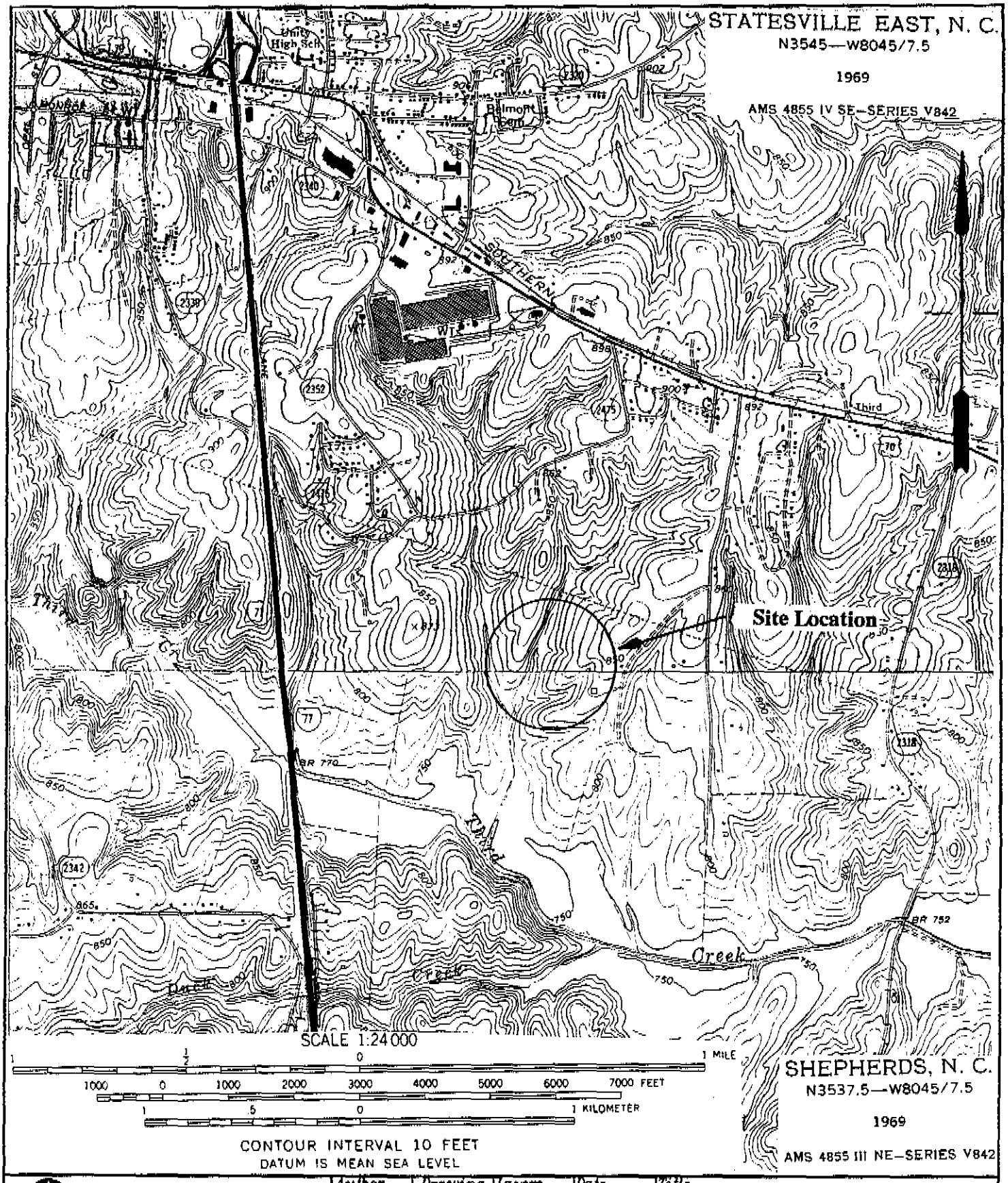
Ground water was noted in the wells at depths ranging from between 15 and 44 feet below the top of casing (TOC). The TOC elevation and water level elevation data is summarized in Table 1. The measured ground water elevations from each well were used in developing the ground water elevation contour map shown in Figure 3. The figure shows the ground water flow direction is toward the southwest with an average hydraulic gradient of 0.016 ft./ft.

4 Ground Water Monitoring Plan

4.1 Ground Water Sampling

Ground water samples will initially be obtained from MW-5, MW-6, MW-7 and MW-8 monitoring wells. The ground water samples will be collected using the protocols specified in the *Sampling and Analysis Plan*. Prior to sample collection, the depth to ground water in each well will be measured and recorded. Using this data and the total depth of each well, the volume of ground water in each well will be calculated. Each well will be purged of three to five volumes of well water. Measurements of pH, conductivity and temperature will be recorded after each volume of water has been removed. After the pH, conductivity and temperature in each well have stabilized, a ground water sample will be collected.

To collect the samples, an apparatus will be lowered to the points selected for sampling. The samples will then be collected and submitted to the laboratory for analysis. For specific analytical requirements and sampling frequency, please refer to Aquaterra's *Sampling and Analysis Plan* dated May 8, 1995.



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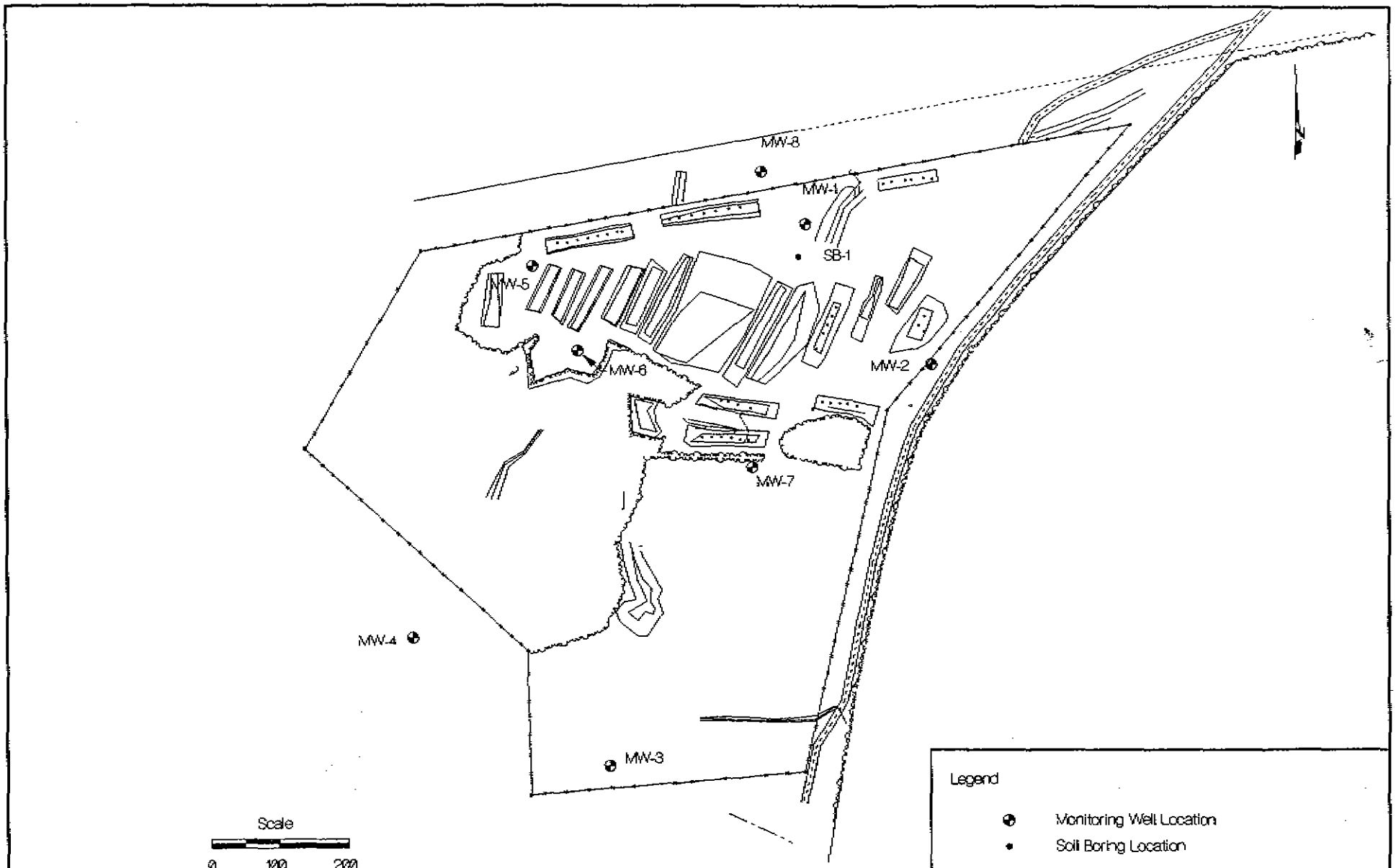
Author	Drawing	Layers	Date	Title
sk			4-07-95	Site Location Map
Job No.	Revision	Figure	Scale	Project
5302100		1	1:24,000	Third Creek Monofill Statesville, North Carolina



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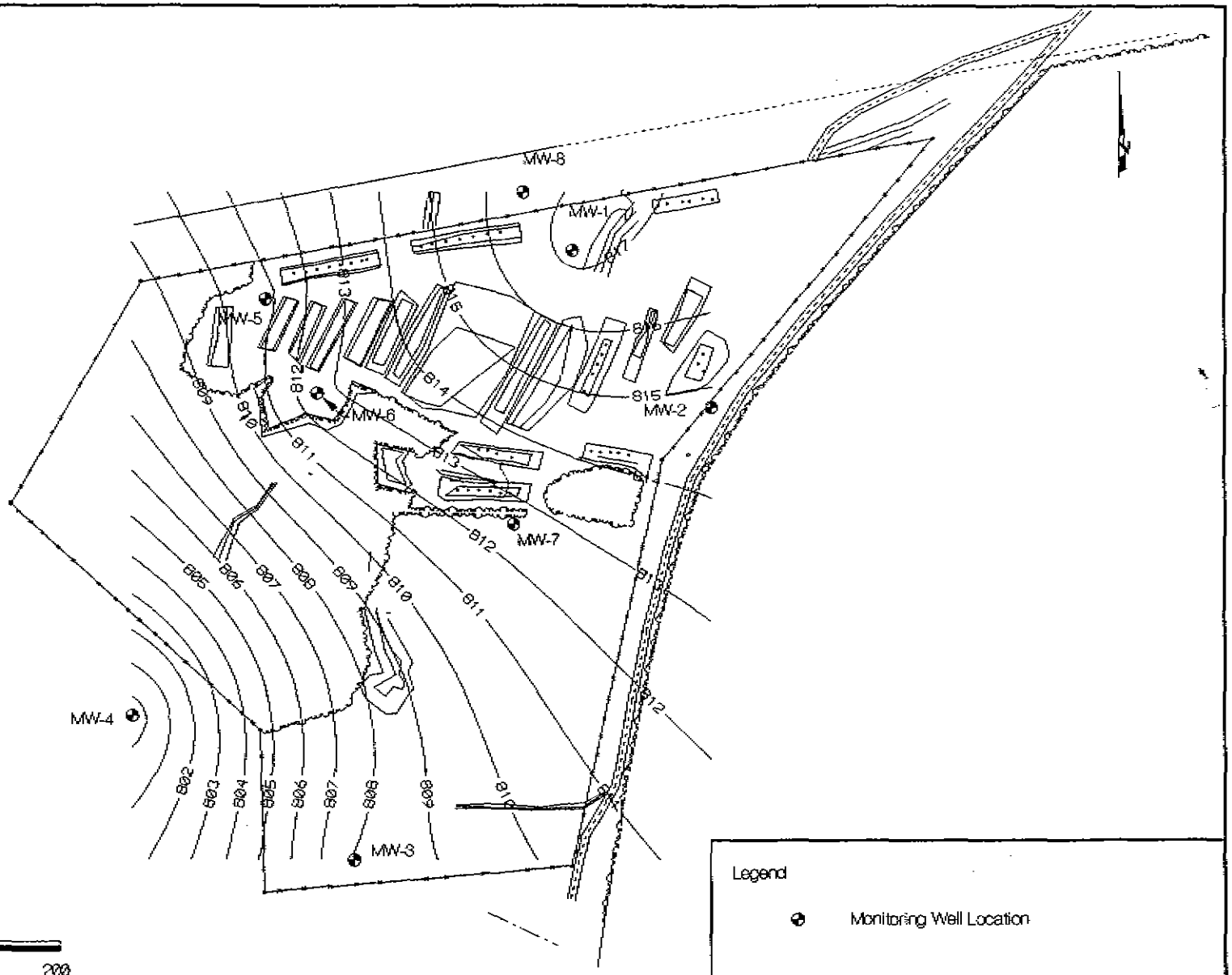
Author	Drawing	Layers	Date	Title
dg	53021-1	0,1,2,6	3-28-95	Site Map With Monitoring Well & Soil Boring Locations
Job No.	**Revision**	**Figure**	**Scale**	**Project**
5302100	0	2	1" = 200'	Third Creek Monofill Facility Statesville, North Carolina



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Author	Drawing	Layers	Date	Title
dg	53021-1	0,2,5	3-28-95	Ground Water Contour Map (From May 2, 1995 Data)
Job No.	**Revision**	**Figure**	**Scale**	**Project**
5302100	0	3	1" = 200'	Third Creek Monofill Facility Statesville, North Carolina

Table 1. Ground Water Elevations, Third Creek Monofill Facility, Statesville, North Carolina

Well No.	Measuring Point Elevation (ft) (Top of Casing)	Screened Interval (ft below TOC)	Depth to Water (ft)	Water Table Elevation (ft)
MW-1	860.08	59.28 - 69.28	42.80	817.28
MW-2	847.94	29.44 - 39.44	33.24	814.70
MW-3	823.85	23.15 - 33.15	15.79	808.06
MW-4	814.68	19.88 - 29.88	15.28	799.40
MW-5*	847.16	28.36 - 38.36	36.42	810.74
MW-6*	850.21	32.51 - 42.51	37.38	812.83
MW-7*	847.70	35.60 - 45.60	35.15	812.55
MW-8*	861.44	42.44 - 52.44	44.87	816.57

**Wells installed by Aquaterra, Inc./Geologic Exploration, Inc.*

All elevations referenced to previously determined MW-1 elevation.

Aquaterra Job No. 5302100

Boring /Well Construction Log

Well Construction Permit Number

Aquaterra, Inc.

I. D. Number	SB-1	Purpose	Site Soil Characterization
Project Name	City of Statesville WWTP	Contractor	Geo. Expl.
Project No.	5302100	Registration No.	1105
Geologist	Tom Haynes	Driller	Mike McConahey
Start Date	04/17/95 Complete Date	Equipment	Mobile B-61 HSA

Drilling Method	HSA = Hollow Stem Auger
Comments	Split Spoon every 5' for soil characterization down to auger refusal.

Well Construction Information	Depth From - To	Blow Count 6"	6"	6"	6"	Soil / Rock Description / Comments	FID/PID (ppm) @ Depth (ft.)
Borehole Dia.	0-5					0-2" Grass organics/topsoil	
Riser Type						2"-Red, brown slightly micaceous, slightly sandy,	
Diameter						silty clay.	
Screen Type							
Diameter	4.5-6'	6	6	7		Orange, red highly micaceous, sandy silt. (Damp)	
Riser interval							
Screen interval	9.5-11'	4	5	4		Orange, tan, highly micaceous, sandy silt	
Slot Size						w/coarse grain sand vein @ 11'. Damp.	
Grout Type	14.5-16'	4	4	4		Yellow, tan, orange, brown micaceous, sandy,	
Interval						silt w/coarse grain sand vein @ 15.5 (Damp)	
Bentonite Type							
Interval	19.5-21'	4	4	6		Tan, white, brown micaceous slightly	
Filter Pack						sandy, mottled silt. (moist)	
Interval							
Total Depth	24.5-26'	4	4	6		Yellow, tan, brown micaceous, mottled silt. (moist)	
R.P.Elevation							
Datum	29.5-31'	5	7	9		Grey, tan, white, micaceous silty finegrain sand.	
Water Level Information						(Damp) Highly weathered rock.	
Date / W. L. Below R. P.							
						Light brown, grey, yellow, white, micaceous	
	34.5-36'	8	7	7		fine silty sand. (Damp) Highly weathered rock.	

R.P. = Reference Point W.L. = Water Level TBM = Temporary Benchmark MSL = Mean Sea Level

Boring /Well Construction Log

Well Construction Permit Number _____ *Aquaterra, Inc.*

I. D. Number	SB-1	Purpose	Site Lithology Description
Project Name	City of Statesville WWTP	Contractor	Geo. Expl.
Project No.	5302100	Registration No.	1105
Geologist	Tom Haynes	Driller	Mike McConahey
Start Date	04/17/95 Complete Date _____	Equipment	Mobile B-61

Drilling Method	HSA
Comments	Weathered rock has appearance of granite or shist.

Well Construction Information		Depth From - To	Blow Count 6"	6"	6"	6"	Soil / Rock Description / Comments	FID / PID (ppm) @ Depth (ft.)
Borehole Dia.		39.5-41'	9	14	19		Brown, yellow, grey micaceous, slightly sandy silt.	
Riser Type							@ 40.5 white quartz 1 feldspar vein. Weathered rock.	
Diameter							(Very moist)	
Screen Type								
Diameter		44.5-46'	8	10	14		Grey, white, tan micaceous slightly sandy silt.	
Riser interval							Weathered rock. Groundwater @45'	
Screen interval								
Slot Size		49.5-51'	12	19	29		Grey, yellow, white micaceous sandy	
Grout Type							silt. Weathered rock. (wet)	
Interval								
Bentonite Type		54.5-56'	22	30	44		Grey, yellow, white micaceous fine grain sandy	
Interval							silt. Weathered rock. (Damp)	
Filter Pack								
Interval		59.5-61'	17	22	30		Tan, grey, white, yellow micaceous	
Total Depth							silty sand. Coarse grain quartz seam @ 60'.	
R.P.Elevation							(Damp). Weathered rock.	
Datum								
Water Level Information		50/4"						
Date	**W. L. Below R. P.**	64.5-66'					Brown, tan, grey micaceous silty sand.	
							Weathered rock. (wet)	
	50/5.5"	69.5-71'					Brown, tan, grey micaceous silty sand.	
							Weathered rock. (wet)	

R.P. = Reference Point W.L. = Water Level TBM = Temporary Benchmark MSL = Mean Sea Level

Boring /Well Construction Log

Well Construction Permit Number _____ *Aquaterra, Inc.*

I. D. Number	SB-1	Purpose	Site Lithology Description
Project Name	City of Statesville WWTP	Contractor	Geo-Expl.,
Project No.	5302100	Registration No.	1105
Geologist	Tom Haynes	Driller	Mike McConahey
Start Date	04/17/95 Complete Date _____	Equipment	Mobile B-61 HSA

Drilling Method	HSA
Comments	86.5' Auger refusal.

Well Construction Information		Depth From - To	Blow Count 6"	6"	6"	6"	Soil / Rock Description / Comments	FID / PID (ppm) @ Depth (ft.)
Borehole Dia.	50/4"	74.5-76'					Orange, tan, yellow, white slightly	
Riser Type							micaceous silty sand. Weathered rock. (Damp)	
Diameter								
Screen Type								
Diameter	50/5.5"	79.5-81'					Black, grey, white slightly micaceous silty sand.	
Riser interval							Weathered rock. (Damp) Some rock fragments	
Screen interval							granite appearance, shist.	
Slot Size								
Grout Type	50/6"	84.5-86'					Brown, tan, white, grey slightly micaceous silty sand.	
Interval							Weathered rock. (Damp)	
Bentonite Type								
Interval							86.5' hit refusal.	
Filter Pack								
Interval								
Total Depth								
R.P.Elevation								
Datum								
Water Level Information								
Date								

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Boring /Well Construction Log

Well Construction Permit Number *NA* ***Aquaterra, Inc.***

I. D. Number	MW-5	Purpose	Monitoring Well
Project Name	City of Statesville, 3rd Creek	Contractor	Geologic Exp.
Project No.	5302100	Registration No.	
Geologist	Susan Kite	Driller	Mark & Kevin
Start Date	04/18/95 Complete Date	Equipment	Mobile B-57, Hollow Stem Augers

Drilling Method	Hollow Stem Augers 4 1/2, 8 1/4 ID/OD
Comments	Just West of Trench C
	GW + 32' in boring below ground surface
	2.5' stick up

Well Construction Information		Depth From - To	Blow Count 6"	6"	6"	6"	Soil / Rock Description / Comments	FID /PID (ppm) @ Depth (ft.)
Borehole Dia.	8.25"	0-2.0					Red-brown silty micaceous clay, moist	
Riser Type	2" PVC	2.0-10					(Residual)	
Diameter	Sched 40	4-5.5	4	6	7		Red-brown silty fine sand, moist	
Screen Type	Sched 40							
Diameter	2" PVC	9-10.5	3	4	5		Tan micaceous silty sand, (saprolite) moist	
Riser interval	2.6-+2.5'							
Screen interval	36-26						Biotite layering, quartz vien	
Slot Size	.010							
Grout Type	Neat Grout	14-15.5	3	4	6		Red-brown clay silty f. sand	
Interval	0-22						micaceous layering (saprolite)	
Bentonite Type	Chips							
Interval	24-22	19-20.5	4	4	6		Red-brown silty sand	
Filter Pack	36-24'						Quartz layer (saprolite) moist	
Interval	1a Sand						micaceous	
Total Depth	36 bgs							
R.P.Elevation		24-25.5	4	5	6		Tan-white silty sand	
Datum							Quartz layer (saprolite) micaceous	
Water Level Information								
Date	**W. L. Below R. P.**	29-30.5	3	4	5		Same as above	
4/18/95	35.5 TOC							
		36'					Rock-Auger Refusal - Boring Terminated	

R.P. - Reference Point W.L. = Water Level TBM = Temporary Benchmark MSL = Mean Sea Level

Boring /Well Construction Log

Well Construction Permit Number NA

Aquaterra, Inc.

I. D. Number	MW-6	Purpose	Monitoring Well
Project Name	City of Statesville, 3rd Creek	Contractor	Geologic Exploration
Project No.	5302100	Registration No.	
Geologist	Susan Kite	Driller	Mark, Kevin
Start Date	04/18/95 Complete Date 04/18/95	Equipment	Mobile B-57, Truck Mount

Drilling Method	Hollow-Stem Augers
Comments	Well located near treeline, +/- south of trench 9/10
	4 1/2 ID, 8 1/4 OD HSA

Well Construction Information		Depth From - To	Blow Count 6"	6"	6"	6"	Soil / Rock Description / Comments	FID /PID (ppm) @ Depth (ft.)
Borehole Dia.	8.25"	0.0-4.5					Red brown silty clay micaceous	
Riser Type	PVC Sched 40	4.0-5.5	2	2	3		Tan & black silty fine sand	
Diameter	2"						(residual)	
Screen Type	2" PVC							
Diameter	Sched 40	9.0-10.5	3	4	5		Red brown highly micaceous	
Riser interval	30 - T						silty fine sand (residual)	
Screen interval	30-40							
Slot Size	.010	14.0-15.5	4	4	5		Tant Black highly micaceous	
Grout Type	Neat Grout						silty fine sand (residual)	
Interval	26-0							
Bentonite Type	Chips	19-20.5	4	5	5		Tan & black sll micaceous	
Interval	28-26						F. Sandy silt (residual) moist	
Filter Pack	Sand						MnOxide present	
Interval	40-28							
Total Depth	40	24-25.5	3	4	5		Tan & black highly micaceous	
R.P.Elevation							Silty f. sand (residual) moist	
Datum								
Water Level Information		29-30.5	3	4	5		Same as above	
Date	W. L. Below R. P.						strongly foliated	
							Boring terminated @ 40.0	

R.P. = Reference Point W.L. = Water Level TBM = Temporary Benchmark MSL = Mean Sea Level

Boring /Well Construction Log

Well Construction Permit Number _____

Aquaterra, Inc.

I. D. Number	MW-7	Purpose	Downgradient Monitoring Well
Project Name	City of Statesville WWTP	Contractor	Geo. Expl.
Project No.	5302100	Registration No.	1105
Geologist	Tom Haynes	Driller	Mark
Start Date	04/19/95 Complete Date	Equipment	Mobile B-57 HSA

Drilling Method	Hollow Stem Auger
Comments	Well located behind Trench H. Bore to 43' and set well.

Well Construction Information		Depth From - To	Blow Count 6"	6"	6"	6"	Soil / Rock Description / Comments	FID / PID (ppm) @ Depth (ft.)
Borehole Dia.	6 1/4" OD	0-3"					Grass Topsoil	
Riser Type	PVC Sched 40	3"-4.5'					Red, brown, micaceous, sandly silt	
Diameter	2"	4.5-6'	3	3	5		Red, brown, micaceous, sandy silt (dry)	
Screen Type	PVC Sched 40							
Diameter	2"	9.5-11'	4	4	4		Orange, brown, tan micaceous silty sand (dry)	
Riser interval	33-0							
Screen interval	43-33'							
Slot Size	0.010"	14.5-16'	4	4	7		Tan, white, micaceous, slightly silty sand, (dry)	
Grout Type	Type I Portland							
Interval	28' to 0'							
Bentonite Type	3/8" Pellets	19.5-21'	3	4	7		Brown, yellow, tan highly micaceous,	
Interval	31 to 28'						slightly sandy silt, (moist)	
Filter Pack	Fine Quartz Sand #1							
Interval	43-31'	24.5-26'	4	4	4		Orange, brown, tan highly micaceous, slightly sandy	
Total Depth	43'						silt, (moist)	
R.P.Elevation								
Datum		29.5-31'	4	4	6		Dark brown, orange, white highly micaceous,	
Water Level Information							slightly sandy silt. (moist)	
Date	**W.L. Below R.P.**							
		34.5-36'	4	5	6		Orange, brown, tan, white highly, micaceous,	
							sandy silt. (wet) Ground water at 35'.	

R.P. = Reference Point W.L. = Water Level TBM = Temporary Benchmark MSL = Mean Sea Level

Boring /Well Construction Log

Well Construction Permit Number _____ *Aquaterra, Inc.*

I. D. Number	MW-8	Purpose	Upgradient Monitoring Well
Project Name	City of Statesville WWTP	Contractor	Geo. Expl.
Project No.	5302100	Registration No.	1105
Geologist	Tom Haynes	Driller	Mike McConehey
Start Date	04/18/95 Complete Date 04/18/95	Equipment	Mobile B-61 HSA

Drilling Method	HSA
Comments	Boring terminated @50'.

Well Construction Information		Depth From - To	Blow Count 6"	6"	6"	6"	Soil / Rock Description / Comments	FID / PID (ppm) @ Depth (ft.)
Borehole Dia.	8 1/2 O.D	0-4.5					0-3" Grass/topsoil	
Riser Type	PVC Sched 40						3"-4.5' - Red brown slightly micaceous	
Diameter	2"						sandy silt w/trace clay.	
Screen Type	PVC Sched 40	4.5-6'	5	5	7		Orange, tan, brown slightly micaceous	
Diameter	2"						sandy silt (damp)	
Riser interval	40-0							
Screen interval	50-40'	9.5-11'	6	5	5		Yellow, brown, tan, slighty micaceous	
Slot Size	0.010						silty sand. (damp)	
Grout Type	Type I Portland							
Interval	36'-0'	14.5-16'	5	6	7		Yellow, tan, brown micaceous fine	
Bentonite Type	3/8" Pellets						silty sand. (Damp)	
Interval	38-36'							
Filter Pack	Fine #1 Quartz sand	19.5-21'	5	9	12		Tan, brown, yellow, silty fine sand.	
Interval	50-38'						(damp). Highly weathered rock.	
Total Depth	50'							
R.P.Elevation		24.5-26'	9	13	17		Tan, brown, yellow, silty course grain sand	
Datum							w/quartz pieces interspersed. (damp)	
Water Level Information							Highly weathered rock.	
Date	W. L. Below R. P.	29.5-31'	10	12	15		Brown, tan, yellow, micaceous, silty coarse	
							grain sand. Highly weathered rock. (damp)	

R.P. = Reference Point W.L. = Water Level TBM = Temporary Benchmark MSL = Mean Sea Level

Boring /Well Construction Log

Well Construction Permit Number _____ *Aquaterra, Inc.*

I. D. Number	MW-8	Purpose	Upgradient Monitoring Well
Project Name	City of Statesville WWTP	Contractor	Geo. Expl.
Project No.	5302100	Registration No.	1105
Geologist	Tom Haynes	Driller	Mike McConahey
Start Date	04/18/95 Complete Date 04/18/95	Equipment	Mobile B-61 HSA

Drilling Method HSA

Comments 33' very hard material

Well Construction Information	Depth From - To	Blow Count 6"	6"	6"	6"	Soil / Rock Description / Comments	FID / PID (ppm) @ Depth (ft.)
Borehole Dia.	34.5-36'	12	19	25		Brown, tan, black, yellow highly micaceous,	
Riser Type						slightly silty sand. Weathered rock (damp)	
Diameter							
Screen Type							
Diameter	39.5-41'	7	9	12		39.5-40.0 = Brown, tan, black highly micaceous silt	
Riser interval						sand. Weathered rock. 40.0' = yellow tan slightly	
Screen interval						micaceous, slightly silty fine sand. Very moist	
Slot Size						Groundwater @40.5'	
Grout Type							
Interval							
Bentonite Type						Terminate S.Spn sampling at this point due to 2	
Interval						location of ground water, however advance boring to	
Filter Pack						50' for monitoring well completion.	
Interval							
Total Depth							
R.P.Elevation							
Datum							

Water Level Information

Date	W. L. Below R. P.

R.P. = Reference Point W.L. = Water Level TBM = Temporary Benchmark MSL = Mean Sea Level

FROM : PHONE NO. : P02

WELL COMPLETION RECORD

MPLETE ALL INFORMATION REQUESTED BELOW FOR EACH WELL INSTALLED, AND RETURN FORM TO THE
PARTMENT OF HUMAN RESOURCES, SOLID AND HAZARDOUS WASTE MANAGEMENT BRANC
, BOX 2091, RALEIGH, N.C. 27602

AME OF SITE: City of Waterville - Third Creek Land Fill PERMIT NO.:

ADDRESS: Well #1 OWNER (print): Vaughn Brown, Exec

DRILLING CONTRACTOR: Yadkin Well Co. Inc. REGISTRATION NO.: 474

Casing Type: PVC dia. 2 in. Grout Depth: from 0 to 56 ft. - dia. 6
Casing Depth: from 0 to 58 ft. - dia. 2 in. Bentonite Seal: from 56 to 57 ft. - dia. 6
Screen Type: 001 Slot dia. 2 in. Sand/Gravel PK: from 57 to 70 ft. - dia. 6
Screen Depth: from 58 to 68 ft. - dia. 2 in. Total Well Depth: from ____ to 70 ft. - dia. 6

Static Water Level: 47 feet from top of casing Date Measured 6/3/82

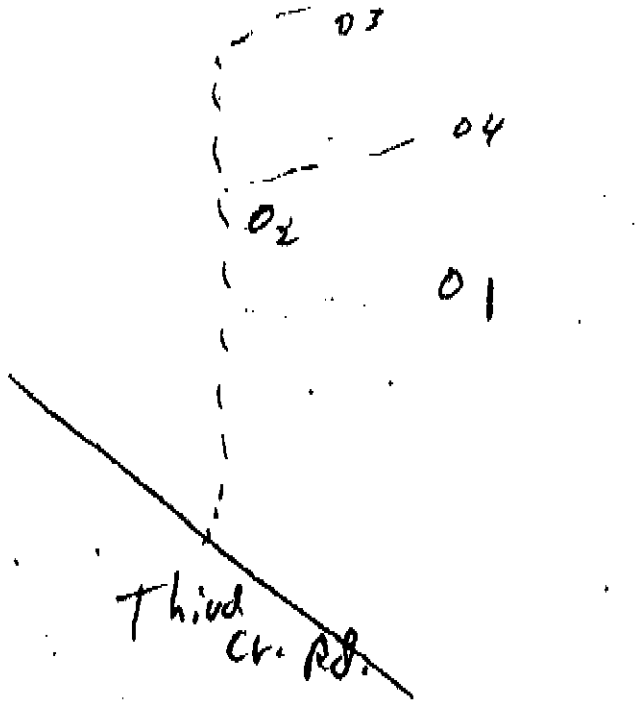
Yield (gpm): ____ Method of Testing: ____ Casing is 1 feet above land s.

DRILLING LOG

DEPTH FROM	TO	FORMATION DESCRIPTION

LOCATION SKETCH

(show distance to numbered roads, or other map reference p



REMARKS:

Date: 6/3/82 SIGNATURE: Vaughn Brown Exec.

FROM : PHONE NO. : P03

WELL COMPLETION RECORD

PLETE ALL INFORMATION REQUESTED BELOW FOR EACH WELL INSTALLED, AND RETURN FORM TO THE
ARTMENT OF HUMAN RESOURCES, SOLID AND HAZARDOUS WASTE MANAGEMENT BRAN
. BOX 2091, RALEIGH, N.C. 27602

City of Hickory - Third Creek Landfill
NE OF SITE: | PERMIT NO.:

Well #2

ADDRESS: | OWNER (print):

DrillingCONTRACTOR: | REGISTRATION NO.:

Hadkis Well Co. Inc. 474

Casing Type: PVC dia. 2 in. Grout Depth: from 0 to 26 ft. - dia. 6
Casing Depth: from 0 to 28 ft. - dia. 2 in. Bentonite Seal: from 26 to 27 ft. - dia. 6
Screen Type: Slotted dia. 2 in. Sand/Gravel PK: from 27 to 40 ft. - dia. 6
Screen Depth: from 28 to 38 ft. - dia. 2 in. Total Well Depth: from ____ to 40 ft. - dia. 6

Water Level: 32 feet from top of casing Date Measured 6/3/87

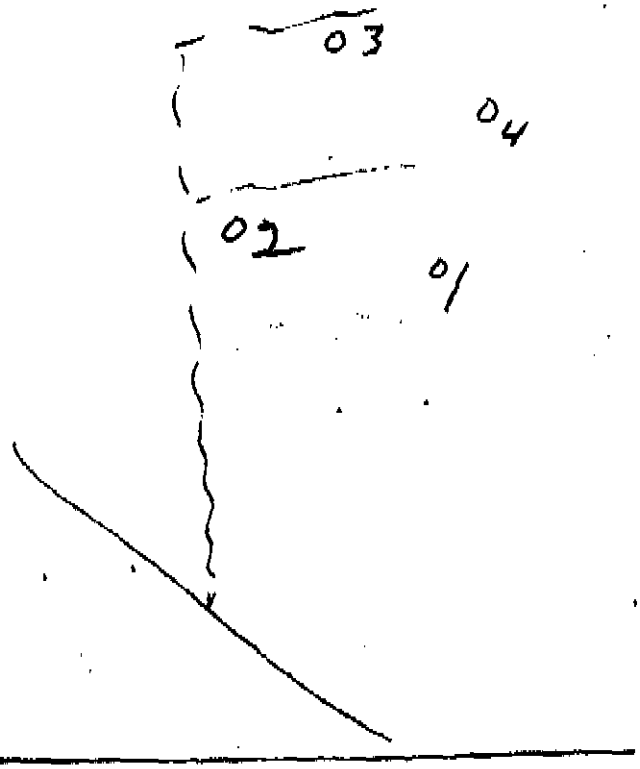
(gpm): ____ Method of Testing: ____ Casing is 1 feet above Land

DRILLING LOG

DEPTH FROM	TO	FORMATION DESCRIPTION

LOCATION SKETCH

(show distance to numbered roads, or other map reference)



REMARKS:

Date: 6/3/87 SIGNATURE: Vaughn Brown /Geo

FROM : PHONE NO. : P04

WELL COMPLETION RECORD

PLETE ALL INFORMATION REQUESTED BELOW FOR EACH WELL INSTALLED, AND RETURN FORM TO THE N
PARTMENT OF HUMAN RESOURCES, SOLID AND HAZARDOUS WASTE MANAGEMENT BRANC
. BOX 2091, RALEIGH, N.C. 27602

AME OF SITE: City of Statesville - Third Creek Landfill

PERMIT NO.:

ADDRESS: Well # 3

OWNER (print):

Drilling CONTRACTOR: Yadkin Well Co. Inc

REGISTRATION NO.: 474

Casing Type: PVC dia. 2 in. Depth: from 0 to 22 ft. - dia. 2 in.
Screen Type: 010 slot dia. 2 in. Depth: from 22 to 32 ft. - dia. 2 in.

Grout Depth: from 0 to 20 ft. - dia. 6
Bentonite Seal: from 20 to 21 ft. - dia. 6
Sand/Gravel PK: from 21 to 34 ft. - dia. 6
Total Well Depth: from ____ to 34 ft. - dia. 6

Water Level: 18 feet from top of casing Date Measured 6/3/87

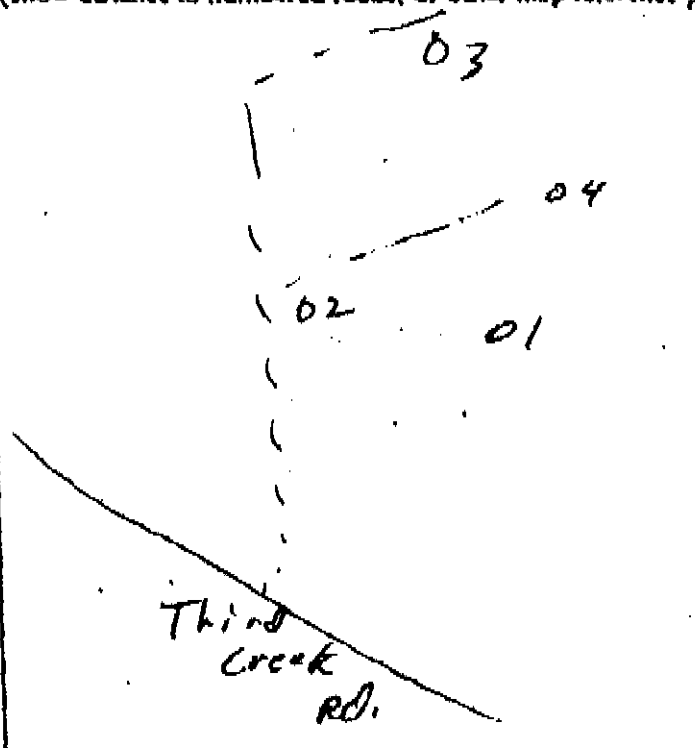
ld (gpm): ____ Method of Testing: ____ Casing is 1 feet above land s

DRILLING LOG

DEPTH FROM	TO	FORMATION DESCRIPTION

LOCATION SKETCH

(show distance to numbered roads, or other map reference p



REMARKS: ____

Date: 6/3/87 SIGNATURE: Vaughn Brown, Jr.

FROM : PHONE NO. : P05

WELL COMPLETION RECORD

MAY 3 1995

COMPLETE ALL INFORMATION REQUESTED BELOW FOR EACH WELL INSTALLED, AND RETURN FORM TO THE N.C. DEPARTMENT OF HUMAN RESOURCES, SOLID AND HAZARDOUS WASTE MANAGEMENT BRANCH, P.O. BOX 2091, RALEIGH, N.C. 27602

NAME OF SITE: City of Statesville - Third Creek Landfill

PERMIT NO.:

ADDRESS: Well #4

OWNER (print):

DRILLING CONTRACTOR: Watkins Well Co. Inc.

REGISTRATION NO.: 474

Riser Type: PVC dia. 2 in. Grout Depth: from 0 to 12 ft. - dia. 6 in.

Riser Depth: from 0 to 18 ft. - dia. 2 in. Bentonite Seal: from 16 to 12 ft. - dia. 6 in.

Screen Type: 010 Slot dia. 2 in. Sand/Gravel PK: from 12 to 30 ft. - dia. 6 in.

Screen Depth: from 18 to 28 ft. - dia. ___ in. Total Well Depth: from ___ to 30 ft. - dia. 6 in.

Static Water Level: 15 feet from top of casing Date Measured 6/7/87

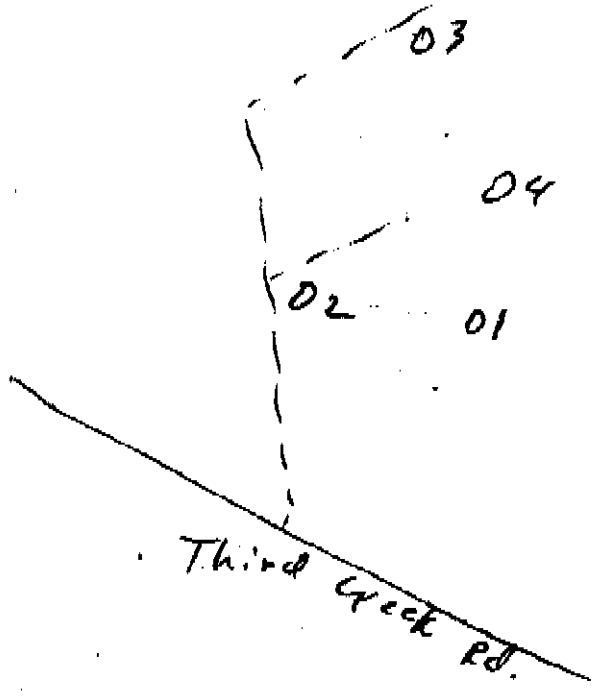
Yield (gpm): ___ Method of Testing: ___ Casing is 1 feet above land surface

DRILLING LOG

DEPTH FROM	TO	FORMATION DESCRIPTION

LOCATION SKETCH

(show distance to numbered roads, or other map reference points)



REMARKS:

Date: 6/7/87 SIGNATURE: Vaughn Brown, P.E.

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ RO
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent.

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Geologic Exploration, Inc.

STATE WELL CONSTRUCTION PERMIT NUMBER:

DRILLER REGISTRATION NUMBER: 1175

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Statesville County: Iredell
   Third Creek Road
   (Road, Community, or Subdivision and Lot No.)
2. OWNER City of Statesville Water & Waste Treatment
   ADDRESS P.O. Box 1111
   (Street or Route No.)
   Statesville NC 28677
   City or Town State Zip Code
3. DATE DRILLED 4-19-95 USE OF WELL monitor
4. TOTAL DEPTH 36.0 ft
5. CUTTINGS COLLECTED YES [ ] NO [X]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [X]
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS 3.0 FT. Above Land Surface*
   * Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): NA METHOD OF TEST NA
10. WATER ZONES (depth): NA
11. CHLORINATION: Type NA Amount NA
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From	0.0	To 26.0 Ft.	2 inch	Sch.40	PVC
From		To Ft.			
From		To Ft.			

13. GROUT:

	Depth		Material	Method
From	0.0	To 22.0 Ft.	Portland Bentonite Slurry	
From		To Ft.		

14. SCREEN:

	Depth		Diameter	Slot Size	Material
From	26.0	To 36.0 Ft	2 in.	.010 in.	PVC
From		To Ft.	in.	in.	
From		To Ft.	in.	in.	

15. SAND/GRAVEL PACK:

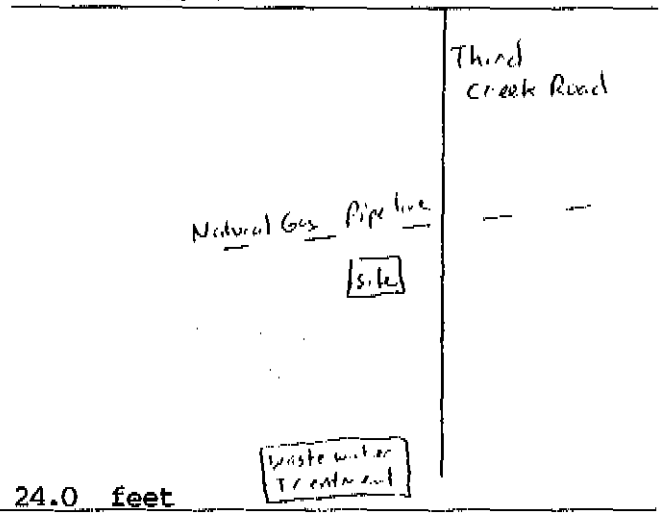
	Depth		Size	Material
From	24.0	To 36.0 Ft.	20-40	Fine Silica sand
From		To Ft.		

16. REMARKS: MW-5 Bentonite Seal from 22.0 to 24.0 feet

DEPTH From	DEPTH To	DRILLING LOG Formation Description
0.0'	10.0'	orange clay
10.0'	36.0'	tan black clay with manganese stains

If additional space is needed use back of form

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)



I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Stephen [illegible] 4-26-95

SIGNATURE OF CONTRACTOR OR AGENT DATE

Submit original to Division of Environmental Management and copy to well owner.

GW-1 REV. 9/91

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ FAC. _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Geologic Exploration, Inc.

DRILLER REGISTRATION NUMBER: 1175

STATE WELL CONSTRUCTION PERMIT NUMBER: _____

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Statesville County: Iredell

Third Creek Road
(Road, Community, or Subdivision and Lot No.)

2. OWNER City of Statesville Water & Waste Treatment

ADDRESS P.O. Box 1111
(Street or Route No.)

Statesville NC 28677
City or Town State Zip Code

3. DATE DRILLED 4-19-95 USE OF WELL monitor
4. TOTAL DEPTH 40.0 ft
5. CUTTINGS COLLECTED YES [ ] NO [X]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [X]
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS 3.0 FT. Above Land Surface*

Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): NA METHOD OF TEST NA
10. WATER ZONES (depth): NA
11. CHLORINATION: Type NA Amount NA
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From 0.0	To 30.0	Ft.	2 inch	Sch.40	PVC
From _____	To _____	Ft.	_____	_____	_____
From _____	To _____	Ft.	_____	_____	_____

13. GROUT:

	Depth		Material	Method
From 0.0	To 26.0	Ft.	Portland bentonite	slurry
From _____	To _____	Ft.	_____	_____

14. SCREEN:

	Depth		Diameter		Slot Size		Material
From 30.0	To 40.0	Ft	2	in.	.010	in.	PVC
From _____	To _____	Ft.	_____	in.	_____	in.	_____
From _____	To _____	Ft.	_____	in.	_____	in.	_____

15. SAND/GRAVEL PACK:

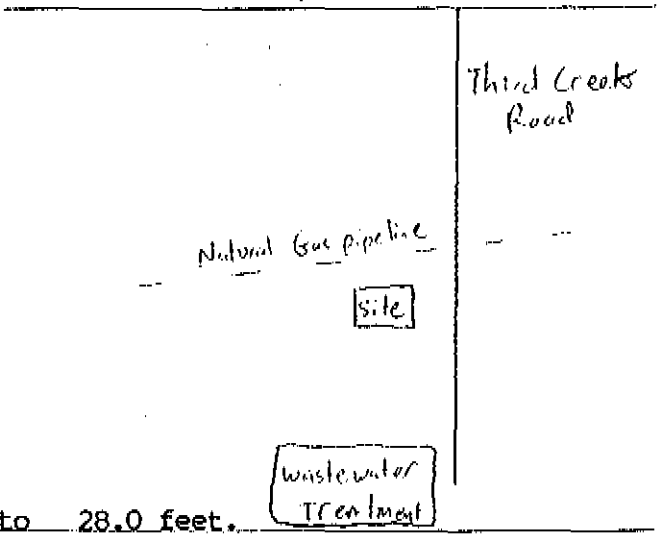
	Depth		Size	Material
From 28.0	To 40.0	Ft.	20-40	Fine Silica Sand
From _____	To _____	Ft.	_____	_____

16. REMARKS: MW-6 Bentonite seal from 26.0 to 28.0 feet.

DEPTH From	DEPTH To	DRILLING LOG Formation Description
0.0'	5.0'	tan brown clay
5.0'	40.0'	brown micaceous clayey silt

If additional space is needed use back of form

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)



I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Steph Z [illegible] 4-26-95

SIGNATURE OF CONTRACTOR OR AGENT DATE

Submit original to Division of Environmental Management and copy to well owner.

GW-1 REV. 9/91

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ RO _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Geologic Exploration, Inc.

DRILLER REGISTRATION NUMBER: 1175

STATE WELL CONSTRUCTION PERMIT NUMBER: _____

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Statesville County: Iredell
Third Creek Road
(Road, Community, or Subdivision and Lot No.)

2. OWNER City of Statesville Water & Waste Treatment
ADDRESS P.O. Box 1111
(Street or Route No.)
Statesville NC 28677
City or Town State Zip Code

3. DATE DRILLED 4-20-95 USE OF WELL monitor
4. TOTAL DEPTH 43.0 ft
5. CUTTINGS COLLECTED YES [ ] NO [X]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [X]
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS 3.0 FT. Above Land Surface*

* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): NA METHOD OF TEST NA
10. WATER ZONES (depth): NA
11. CHLORINATION: Type NA Amount NA
12. CASING:

Depth From	To	Ft.	Diameter	Wall Thickness or Weight/Ft.	Material
0.0	33.0		2 inch	Sch.40	PVC

13. GROUT:

Depth From	To	Ft.	Material	Method
0.0	29.0		Portland Bentonite	slurry

14. SCREEN:

Depth From	To	Ft.	Diameter	Slot Size	Material
33.0	43.0		2 in.	.010 in.	PVC
			in.	in.	
			in.	in.	

15. SAND/GRAVEL PACK:

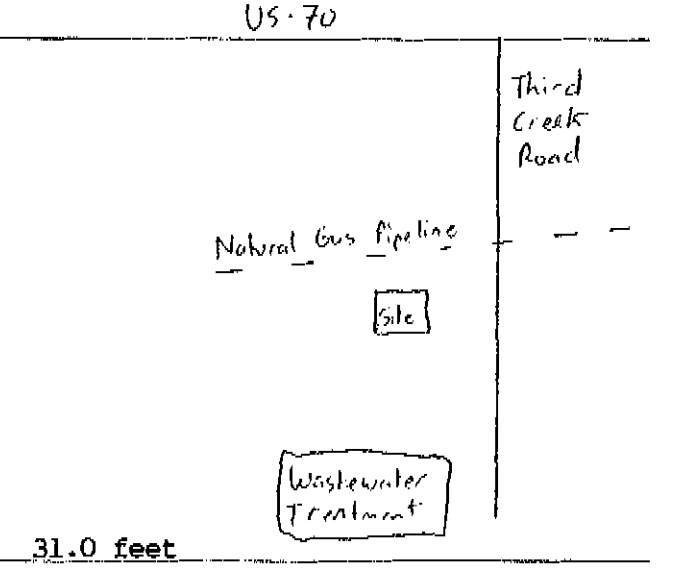
Depth From	To	Ft.	Size	Material
31.0	43.0		20-40	Fine Silica Sand

16. REMARKS: MW-7 Bentonite seal from 29.0 to 31.0 feet

DEPTH From	To	DRILLING LOG Formation Description
0.0'	5.0'	tan orange clay
5.0'	10.0'	orange sand
10.0'	15.0'	tan sandy silt
15.0'	43.0'	brown sandy silt

If additional space is needed use back of form

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)



I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Stephen [signature] 4-26-95
SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 REV. 9/91

Submit original to Division of Environmental Management and copy to well owner.

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ RO _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Geologic Exploration, Inc.

DRILLER REGISTRATION NUMBER: 1175

STATE WELL CONSTRUCTION PERMIT NUMBER: _____

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Statesville County: Iredell

Third Creek Road
(Road, Community, or Subdivision and Lot No.)

2. OWNER City of Statesville Water & Waste Treatment
ADDRESS P.O. Box 1111
(Street or Route No.)
Statesville NC 28677
City or Town State Zip Code

3. DATE DRILLED 4-18-95 USE OF WELL monitor
4. TOTAL DEPTH 50.0 ft
5. CUTTINGS COLLECTED YES [ ] NO [X]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [X]
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS 2.5 FT. Above Land Surface*

*Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): NA METHOD OF TEST NA
10. WATER ZONES (depth): NA
11. CHLORINATION: Type NA Amount NA
12. CASING:

	Depth From	Depth To	Diameter	Wall Thickness or Weight/Ft.	Material
	0.0	40.0 Ft.	2 inch	Sch.40	PVC
		Ft.			
		Ft.			

13. GROUT:

	Depth From	Depth To	Material	Method
	0.0	36.0 Ft.	Portland Bentonite Slurry	
		Ft.		

14. SCREEN:

	Depth From	Depth To	Diameter	Slot Size	Material
	40.0	50.0 Ft.	2 in.	.010 in.	PVC
		Ft.	in.	in.	
		Ft.	in.	in.	

15. SAND/GRAVEL PACK:

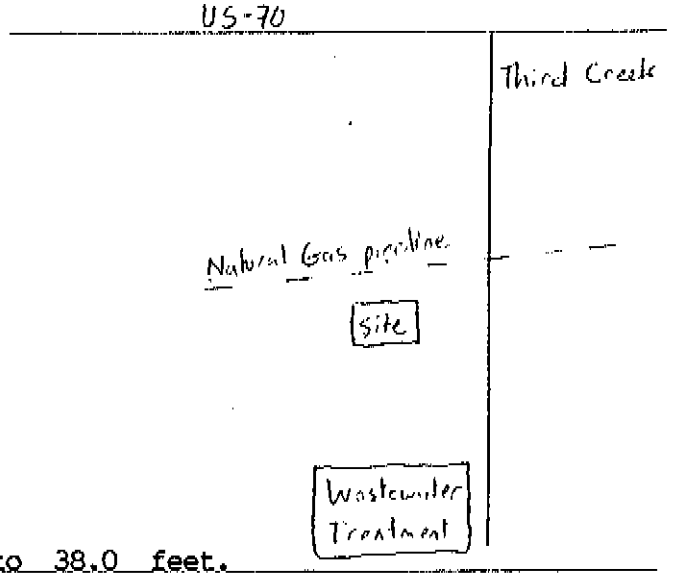
	Depth From	Depth To	Size	Material
	38.0	50.0 Ft.	20-40	Fine Silica Sand
		Ft.		

16. REMARKS: MW-8 Bentonite seal from 36.0 to 38.0 feet.

DEPTH From	DEPTH To	DRILLING LOG Formation Description
0.0'	2.0'	red brown silty sand
2.0'	14.0'	brown red clayey sandy silt
14.0	50.5	brown tan silty fine to coarse sand

If additional space is needed use back of form

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)



I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Steph Z [illegible] 4-26-95
SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 REV. 9/91

Submit original to Division of Environmental Management and copy to well owner.