



ENGINEERING TECTONICS, P.A.
GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

P.O. Box I, Winston-Salem, NC 27108 (336) 724-6994

RECEIVED
N.C. Dept. of EHNR

FEB 10 1998

Winston-Salem
Regional Office

February 6, 1998

Ms. Sherri V. Knight
Groundwater Supervisor
NCDEHR
Winston-Salem Regional Office
585 Waughtown St.
Winston-Salem, NC 27107-2241

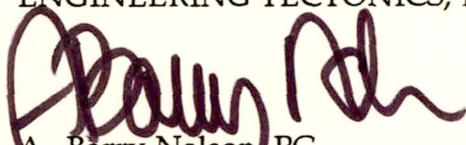
Subject: Dunleith Av/Lowery St
Final Groundwater Assessment

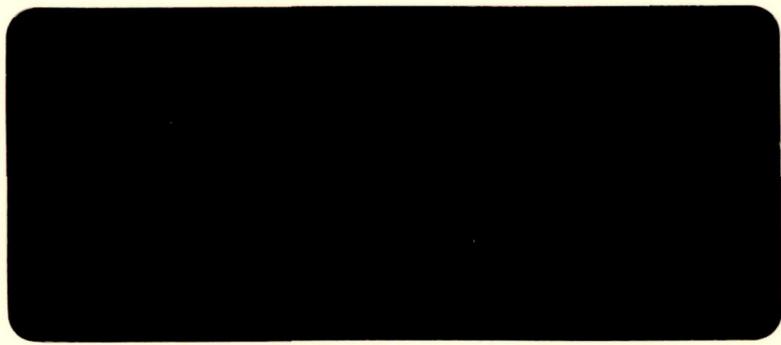
Dear Sherri:

Please find enclosed a copy of the Final Groundwater Assessment at the Dunleith Av/Lowery St site. This document summarizes all previous investigations and presents the data from the last sampling and testing event that we agreed to at our last meeting. Based on our followup telephone conversations concerning this site plus the results of the most recent analytical testing, we believe this site can be removed from any regulation. This would allow our client, Lowder Construction to proceed with purchase from the City of Winston-Salem, NC.

Should you have any questions, please contact us.

Very truly yours,
ENGINEERING TECTONICS, P.A.


A. Barry Nelson PG
Chief Geologist



ENGINEERING TECTONICS, P.A.
GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

P.O. Box I, Winston-Salem, NC 27108 (336) 724-6994

RECEIVED
N.C. Dept. of EHNR

FEB 10 1998

Winston-Salem
Regional Office

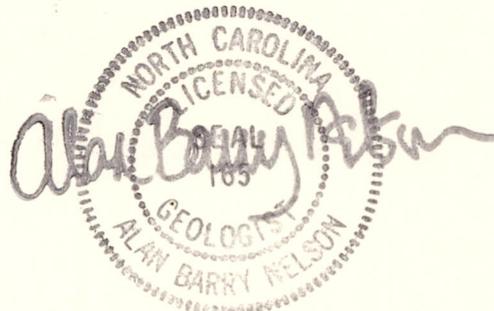
**SUMMARY OF GROUNDWATER
QUALITY INVESTIGATIONS**

**LOWERY STREET TRACT
WINSTON-SALEM, NC
UPDATED JANUARY 1998**

ETPA Project No: 97-391

Prepared for:

Lowder Construction



Thursday, February 05, 1998



Engineering Tectonics, P.A.
Geotechnical and Environmental Engineers, and Geologists
1720 Vargrave Street
Winston-Salem, North Carolina 27107
(336) 724-6994

**SUMMARY OF GROUNDWATER QUALITY INVESTIGATIONS
LOWERY STREET TRACT
WINSTON-SALEM, NC
UPDATED JANUARY 1998**

Introduction

This report outlines the findings of a limited groundwater quality investigation conducted on a tract of land (referred to herein as the subject site) currently owned by the City of Winston-Salem, just off Lowery Street in the so-called I-40 Industrial Complex Site. The current investigation (summer 1997 and January 1998) included the installation and testing of five temporary groundwater monitoring wells. These wells were installed at the direction of Gene Lowder of Lowder Construction Company as part of a preliminary assessment of the site for consideration in a real estate transfer. The Summer 1997 data was presented to Sherri Knight and Shu Ying Wang of the Winston-Salem Regional Office of the North Carolina Department of Environment and Natural Resources. They suggested that one final round of testing of key wells using USEPA Methods 624 and 625 would provide a final assessment of current groundwater quality. Further, water level measurements made during sampling could be used to identify the direction of groundwater movement and to infer the upgradient site as the probable source of contamination.

This report also summarizes, in one document, all the previous testing conducted at the site since 1987. The data will provide an excellent tool on which to base changes in groundwater quality at the site.

Previous Investigations

A subsurface exploration and groundwater assessment was conducted on property adjoining the subject site on the East, which was owned by Hawksnest Sports and was the previous location of a LARCO asphalt batch plant. Groundwater testing at the old LARCO site in 1987 revealed numerous indicators of groundwater contamination. Specifically, total organic carbon and total organic halogens were elevated. A summary of the lab results of the testing conducted in 1987 are included below in Table 1. Plate 1 shows the location of all wells installed from 1987-1997. The well numbers on the map correspond to the respective analytical results shown on each respective table.

**TABLE 1
GROUNDWATER SAMPLE TEST RESULTS (1988)**

Well	pH (Field/Lab)	Conductivity (Field/Lab)	TOC (ppm)	TOX (ppm)	Lead (ppm)
B-4	6.1/6.9	180/210	30	0.05	<0.02
B-17	5.9/6.8	196/210	15	0.03	<0.02
B-18	5.2/6.4	242/270	20	<0.01	<0.02
B-19	5.0/5.9	152/170	13	<0.01	<0.02
B-21	5.6/5.6	146/160	906	0.01	<0.02
B-22	6.9/6.8	332/390	43	0.03	<0.02
B-26	7.0/6.8	178/210	36	0.04	<0.02

In 1990, testing was completed at the property line just upgradient of the subject site on the Hawksnest's property by Engineering Tectonics. Unknown organic groundwater contaminants ranging in concentrations from 2-120 parts per billion were identified. The presence of the TOC and TOX compounds on property at the batch plant and numerous organic compounds that could not be identified certainly raises questions concerning the groundwater quality at the subject site. A summary of the lab results of the Engineering Tectonics 1990 sampling event is included below in Table 2.

**TABLE 2
GROUNDWATER SAMPLING EVENT (MARCH 1990)**

PARAMETER	WELL 4	WELL 5	UNITS
Bis (2-ethylhexyl) Phthalate	3.3 J	15	ppb
Zinc	110.0	BDL	ppb
All Other Priority Pollutants	BDL	BDL	

Non-Targeted Library Search

Compound	Concentration	units	Scan #
Well 4			
Unknown	120	ppb	1129
Unknown	6	ppb	1593
Unknown	12	ppb	3471
Unknown Phthalate Ester	7	ppb	1905
WELL 5			
Unknown	5	ppb	529
Unknown	5	ppb	659
Unknown	81	ppb	1125
Unknown	4	ppb	1590
Unknown Phthalate Ester	10	ppb	1901
Method Blank			
Unknown	2	ppb	1864
Unknown Phthalate Ester	6	ppb	1908
Unknown	23	ppb	3111

BDL Below Detectable Limits

J Estimated Concentration Below Practical Quantitation Limit

Trigon Engineering also conducted limited groundwater testing at the site in October 1990. Trigon tested wells MW-2, MW-3 and MW-5 using USEPA 625 base neutrals and acid extractables. No compounds on the 625 list were detected. The results of this testing event are shown in Table 3 below.

**TABLE 3
OCTOBER 1990 SAMPLING***

WELL NO	TEST METHODS	RESULTS
MW-2	625 BNA	non-detect
MW-3	625 BNA	non-detect
MW-5	625 BNA	non-detect

*Sampling by Trigon Engineering

Results of Current Groundwater Assessment

Five groundwater monitoring wells were installed at the site in June 1997. Analysis of five (5) groundwater samples collected in June of this year at the subject site indicate that while no parameters were identified that exceed any listed 2L Groundwater Standard. However, numerous contaminants not on the 2L list were identified at concentrations above the method detection limit. Based on a pure interpretation of the 2L Groundwater Standards, if the parameter identified in the groundwater is not listed on the 2L list, then if it is above the method detection limit, it violates the Standards. The contaminants detected appear to be breakdown products of the petroleum hydrocarbon type. These constituents were reportedly identified on the property just upgradient of the subject site. Therefore, the mere fact that they were detected in the groundwater indicates the subject site would be considered to contain groundwater that has been impacted. Laboratory results of the five groundwater samples collected in June are shown in Table 4 below.

**TABLE 4
GROUNDWATER SAMPLE RESULTS JUNE (1997)**

Compound	TW-1	TW-2	TW-3	TW-4	TW-5
2,3 Dimethyl Heptanol	.875		.889		
3- Ethyl Hexanol	.705	.753	.694	.818	
Hexyl Pentyl Ether	.600	.726			
1',2',3,4,-Imidazo[1,5-A]Pyridine	.718				
4,5-Dimethyl nonane	.790	.806			
5-Methyl Undecanol	.917				
2,3-Diphenyl-2-Cyclopropen-1-one	.733				
2-Propanamine	.958				
3-Ethyl-2-Methyl Hexane	.635				
Pivaldehyde	.757		.664		
L-Lysine	.627				
3,2-Dimethyl Heptanol		.783			
Decanol		.890			
3-Methyl-3-Pentanol		.735	.772		
Decanoic Acid		.888		.872	.896
1-Methoxy-2-Propanol		.876			
4-Isopropoxy Butyric Acid		.628			
3-Hexanol		.672			
N,N-Dimethyl-3-Octanamine			.714		
2,3-Dimethyl Butane			.809		
3-Penten-2-one				.946	
1,2-Benzendicaroxyllic Acid Methyl Ester				.782	
N-Butylidene-1-Butanamine				.784	

Note:

The above results are based on GC/MS analyses and identified all peak identifications with a fit of 0.6 or greater. A fit of 0.9 or greater indicates that the compound is likely to be the one indicated, and are shown in the table above in bold type. A fit of less than 0.75 indicates that the identification is doubtful.

Based on a request by Sherri Knight of the Winston-Salem Regional Office of the Department of Environment and Natural Resources, one final round of sampling and analyses was conducted in December 1997 and reported herein. Three of the new monitoring wells installed in June 1997 were sampled and tested by Methods 624 and 625 plus a library search. During this last sampling event, wells TW-1 and TW-3 were identified for testing to document the groundwater quality closest to the believed source (the old asphalt plant). TW-4 was also selected for testing as it was the most downgradient well at the site.

The data was similar to previous testing events where Method 624 and 625 were used. No target compounds were identified in any of the three wells. However, a suite of tentatively identified compounds (TICs) were found and quantified. Of these compounds, the highest concentrations were unknowns at 32.6 and 34.5

ug/l. Phenolic compounds and decanoic acids dominated the TICs. The results of the testing are shown in Table 5 below.

TABLE 5
DECEMBER 1997 GROUNDWATER SAMPLING
EPA METHOD 624/625

TW-1

TIC	Concentration**
2,4-bis(1,1-dimethyl ethyl)-phenol	5.05
2-methyl-1-(1,1-dimethylethyl)-2-methyl-1,3-propanediyl propanoic Acid	5.83
Unknown phenol	4.32
Nonylphenol	5.18
4-Nonylphenol	4.65
Hexadecanoic Acid	6.74
Octadecanoic Acid	10.0

TW-3

TIC	Concentration**
Aminocaproic Acid	9.39
N,N-bis(2-hydroxyethyl)-dodecanamide	7.24
Tetradecanoic Acid	2.83
Unknown Acid	16.3
Octadecanoic Acid	6.59
Unknown	32.6
4,41-butylidenebis(2-1,1 dimethylethyl-5-methyl)phenol	10.9
4,4'-thiobis[2-(1,1dimethylethyl)-5-methyl] phenol	7.67
Unknown	12.3

TW-4

TIC	Concentration**
Aminocaproic Acid	34.3
N,N-bis(2-hydroxyethyl)-dodecamine	10.9
Tetradecanoic Acid	5.4
Unknown Acid	26
Octadecanoic Acid	11.2
Unknown	34.5
4,41-butylidenebis(2-1,1dimethylethyl-5-methyl)phenol	12.8
4,4'-thiobis[2-(1,1dimethylethyl)-5-methyl] phenol	13.2
Unknown	24.9

*No 624/625 compounds were identified. A library search was conducted and TIC compounds were quantified.

**All data in ug/l (ppb)

Regulatory Implications

The fact that the groundwater at the subject site does not contains listed constituents that are above the 2L groundwater standard appears to leave room for regulatory interpretation. If the regulations are enforced to the letter of the law it appear the potential liability to a new owner is significant. However, we

believe that the data presented herein illustrates that natural attenuation is successfully occurring at the site and the groundwater quality continues to improve. Because there are no receptors that could be exposed to the groundwater, it appears that no further action is a viable end to this situation. Therefore, we believe that the groundwater section could classify the site such that it can be used for commercial development without exposing a new owner to significant risk and liability.

Contact has been made with Charlotte Jesnick of the ^{Superfund} ~~State Attorney Generals Office~~ concerning the potential for the subject site to be addressed under "Brownfields" legislation. Based on the recent passage of laws pertaining to old industrial centers such as the subject site, it was hoped that the Attorney Generals Office could intercede with the Groundwater Section of the Division of Water Quality such that ownership of the property would have limited liability. Unfortunately, while the legislation has been passed, no regulations or guidelines are expected to be issued until late spring or early summer of 1998. If a memorandum of understanding could be developed between the Attorney Generals Office and the Division of Waste Management and Groundwater Section such that no regulatory agencies will pursue the site, the Brownfield regulation could be utilized to make this site attractive.

Proposed Action

The proposed use of this tract of land for a construction demolition material landfill area is a suitable land use for this site since beneficial fill can be used to restore the grade with surrounding sites, and ultimately, have the potential for commercial development. While the area appears to have some level of contamination, there is no active source of contamination at the subject site. The contamination is originating from the old LARCO asphalt batch plant which was located adjacent to and upgradient from the subject site. Figure 1 shows the direction of groundwater flow at the site. The current compounds detected at the site indicate that the compounds are undergoing natural attenuation. These compounds will continue to break down over time, and continue to attenuate as the plume undergoes lateral dispersion. The proposed use of this land is such that there would be no contact between potential receptors, therefore, no risk to human health and the environment, as all facilities near the subject site are served by public water. We, therefore, ask that this site be removed from the State of North Carolina's Inactive Waste Site List and any other regulatory program so as to allow productive use of this land.

2/20 Talked w/ Keith Snavely
Superfund - Couldn't
find on Inactive List.