KENT SCHOOL DISTRICT

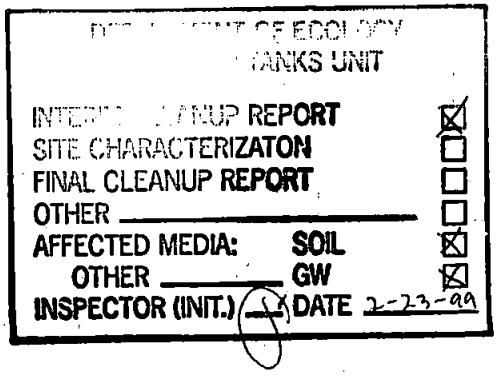
TRANSPORTATION FACILITY

MONITORING WELL INSTALLATION AND GROUNDWATER SAMPLING

JANUARY 1999

NOWICKI & ASSOCIATES
ENERGY & ENVIRONMENTAL MANAGEMENT

33516 9th Avenue South, Bldg. 6
Federal Way, WA 98003-6322
(253) 927-5233


DEPARTMENT OF ECOLOGY
TANKS UNIT
INTERIM CLEANUP REPORT
SITE CHARACTERIZATON
FINAL CLEANUP REPORT
OTHER
AFFECTED MEDIA: SOIL
OTHER GW
INSPECTOR (INIT.)
DATE 2-23-99

KENT SCHOOL DISTRICT
TRANSPORTATION FACILITY
MONITORING WELL INSTALLATION AND GROUNDWATER SAMPLING

25211 – 104th Avenue SE
Kent, WA 9803

Client:
Kent School District
12033 SE 256th
Kent, WA 98031
Contacts: Rod Collins
(253) 813-7102

Consultant:
Nowicki & Associates, Inc.
33516 9th Ave. S. Bldg. #6
Federal Way, WA 98003
Contact: Arlene Van De Wege
(253) 927-5233

The purpose of this report is to document the installation of groundwater monitoring wells and subsequent sampling at the Kent School District Transportation Facility site. This report is written in accordance with WAC 173-340, Model Toxics Control Act (MTCA).

EXECUTIVE SUMMARY

Three monitoring wells were installed surrounding the backfilled tank excavation. One well and one boring were installed on December 22, 1998 and the two remaining wells were installed on December 30, 1998. Groundwater samples were collected for laboratory analysis on January 6, 1999. No diesel or heavy oil was detected in any of the wells. One year of quarterly monitoring is recommended. The next monitoring is scheduled for April 1999.

DISCUSSION

History

In April 1998, one 400-gallon waste oil underground storage tank (UST) was removed from the north side of the bus transportation garage. Refer to Sketch 1 for site location. Gasoline-range, kerosene-range, and heavy oil-range hydrocarbon contamination was identified. Inaccessible impacted soil was left in-place under the building and under the bus canopy concrete slab.

Groundwater was encountered at approximately six feet below grade. It was unclear if the water was actual groundwater or water resulting from a water line leak that was repaired the previous month on the east side of the garage. Up to 180,000 gallons of water may have entered the ground from the pipe break. However, since contaminated soil was in contact with assumed groundwater, groundwater monitoring is required to comply with MTCA.

Well Installation

On December 22, 1998, one 2" monitoring well and one boring were installed by Cascade Drilling, Inc. using a hollow stem auger rig. The remaining two wells were installed on December 30, 1998. The north and west wells were screened across the water table from five feet to twenty feet and the east well was screened from five feet to fifteen feet. The wells were

set at twenty and fifteen feet, respectively. Factory cleaned 0.02 slot PVC screen and PVC casing were lowered into the auger and #2/12 sand pack was placed around the monitoring well screens by pouring the sand down the auger/PVC annulus. The auger was withdrawn in steps, adding more sand pack at each step so that some sand always remained within the auger. The top of the sand packs were placed two feet above the well screens. The wells were sealed with two feet of bentonite chips and one foot of cement. Well heads were secured with watertight, flush-to-grade heavy-duty monuments. Well construction logs for KT-MW1 through KT-MW3 and soil boring log KT-B1 are attached. Refer to Table 3 for well diameter, screened interval, and monument elevation data.

Monitoring Well KT-MW1, the west well, was placed approximately 43 feet west and 4 feet north of the garage southwest corner. Soil samples were collected at 7.5', 10', 12.5', 15', and 20' below grade. The top few feet of material was fill material. Moisture was present in the top ten feet, however no water was obvious. Below the fill material was brown sand and gravel material. Dry dense brown till material was encountered in the "15-foot" sample. Soil type corresponded to Group SW from the Unified Soil Classification System. No contamination was obvious using visual and olfactory means of detection. The soil collected at 10 feet below grade was submitted for laboratory analysis.

Boring KT-B1 was placed approximately 28 feet north and 31 feet west of the garage northwest corner. Soil samples were collected at 7.5', 10', 12.5', 15', and 20' below grade. A sample was attempted at 22'6" below grade where refusal was reached. No sample was collected at this depth or at 15 feet below grade where a rock was encountered. The remaining samples all contained dry dense brown sand and gravel till material corresponding to Group SW from the Unified Soil Classification System. No well was set. The boring was filled with bentonite chips and sealed with a foot of concrete.

Monitoring Well KT-MW2, the east well, was placed immediately 11 feet north and 25 feet east of the garage southeast corner. The well was placed approximately twenty feet from the repaired water leak. Soil samples were collected at 5', 7'6", 10', and 15' below grade. The top few feet was fill material. The "5-foot" and "7.5-foot" samples contained slightly moist brown sand and gravel. The "10-foot" and "15-foot" samples were wet brown sand, gravel & cobbles. Soil type corresponded to Group SW from the Unified Soil Classification System. No contamination was obvious using visual and olfactory means of detection. There was no sheen on the water. The soil collected at 10' below grade was submitted for laboratory analysis.

Monitoring Well KT-MW3, the north well, was placed approximately 16' north and 4' east of the garage northwest. Soil samples were collected at 5', 7.5', 10', 15', and 20' below grade. The top few feet was fill material. Below the fill material was moist brown sand, gravel, and cobble material to 7'6". No water was obvious. Dry dense brown till material was encountered in the "10-foot" sample. The "15-foot" sample was slightly wet brown sand, gravel, and cobble, however the "20-foot" sample was once again dry till material. Soil type corresponded to Group SW from the Unified Soil Classification System. No contamination was obvious using visual and olfactory means of detection. The soil collected at 15 feet below grade was submitted for laboratory analysis.

Groundwater Monitoring

The wells were developed and water samples were collected on January 6, 1999. Water levels were measured to the top of the monument using water-finding paste. Well development consisted of purging each well dry or over 20 gallons of water (more than three well casing volumes) using a Boart-Longyear pail pump. The wells were allowed to recharge for one hour and water samples were then collected with a stainless steel bailer. The pump and bailer were decontaminated in Alconox solution and rinse water between sampling. Temperature, conductivity, and pH were documented. Field parameters are listed in Table 4.

Centre Pointe Surveying obtained survey elevations to the top of the well monuments. Groundwater flow direction was calculated to be to the northwest with a gradient of 25.9" per 100 feet. Monitoring well locations and groundwater gradient are shown in Sketch 2. Refer to Table 3 for water-level data.

LABORATORY RESULTS

All soil and groundwater samples were lab-analyzed by Transglobal Environmental Geosciences Northwest, Inc. (TEG) for diesel and heavy oil total petroleum hydrocarbons (TPH-diesel and TPH-oil) using Method NWTPH-Dx/Dx Extended. TEG, a Department of Ecology certified laboratory, is located at 677 Woodland Square Loop SE, Suite D, Lacey, Washington.

Soil samples were collected using a Dames & Moore 3" spilt-spoon sampler. The sampler was driven ahead of the auger using a 140# hammer. With the aid of a stainless steel hand tool, each soil sample was placed directly in a laboratory-supplied precleaned 4-oz glass jar with a Teflon lid. All jars, filled to capacity to prevent air space, were placed immediately in an ice-filled cooler.

Water was placed directly from the stainless steel bailer in to laboratory-supplied pre-cleaned voas, plastic 250 ml, and plastic 500 ml bottles and kept in an ice-filled cooler until hand-delivered to the laboratory. All appropriate sampling protocols were followed and there is nothing to indicated that the quality of the data or the validity of the results was compromised.

Initial laboratory analysis of the soil samples indicated diesel hydrocarbons in the soil at 68 ppm and 63 ppm, below the MTCA Method A cleanup level of 200 ppm. However, the chromatograms for these samples were not indicative of diesel but of possible organics. TEG does not filter samples through silica gel per Method NWTPH-Dx unless requested to do so. The same type of chromatogram was present for water samples collected the same day at Kent Elementary School. When the Kent Elementary water samples were recollected and run through silica gel prior to analysis, no contamination was detected.

The existing Kent Transportation soil samples for wells KT-MW2 and KT-MW3 were run through silica gel and reanalyzed on January 11, 1999. No hydrocarbons were detected. These results are indicative of either field or laboratory organic contamination. The chromatograms for both the 12-31-98 and 1-11-99 analyses are attached with the laboratory results.

Water samples were collected on January 6, 1999. No silica gel was used prior to analysis for hydrocarbons. No diesel or heavy oil hydrocarbons were detected.

A significant amount of water was encountered between 7'6" and 10' below grade during drilling well KT-MW2. This situation was not encountered during drilling of wells KT-MW1 and KT-MW3. Indication was that this water remained from the previous year's water leak since locates identified the water line approximately 15' from the well. The water meter did not show a change after the well installation and the Transportation Facility did not experience any unusual water usage. However to eliminate the possibility of the well installation causing damage to the water line, water samples were collected from KT-MW-2 and analyzed for fluoride and chlorine. Fluoride and chlorine analyses were also performed for KT-MW1 and KT-MW3 for comparison data.

According to Dave Cihak of the City of Kent Water Department fluoride level in the City water is 1 ppm and Chlorine is 0.6 ppm. Background level for fluoride in the area is around 0.15 ppm. There is no background level for Chlorine. Fluoride was detected at or below background levels in all three wells at 0.03 ppm, 0.04 ppm, and 0.2 ppm, respectively. Chlorine was detected at 0.24 ppm, 0.41 ppm, and 0.21 ppm, respectively. It is unclear why chlorine is present in all three wells. It would be anticipated that chlorine from the previous water leak would dissipate immediately and there may be residual fluoride. The chlorine in the small amount of tap water that the drillers added during drilling should have degraded by sampling time. We recommend that next quarterly sampling include sampling for fluoride and chlorine.

CONCLUSIONS AND RECOMMENDATIONS

No soil or groundwater contamination was detected at the three monitoring well locations. We recommend continuing groundwater monitoring on a quarterly basis for one year. The next monitoring is due in April 1999.

Arlene N. Van De Wege
Licensed IFCI Site Assessor

Attached are:

Sketches – Sketch 1: Site Location
Sketch 2: Monitoring Well Locations with 1-6-99 gradient

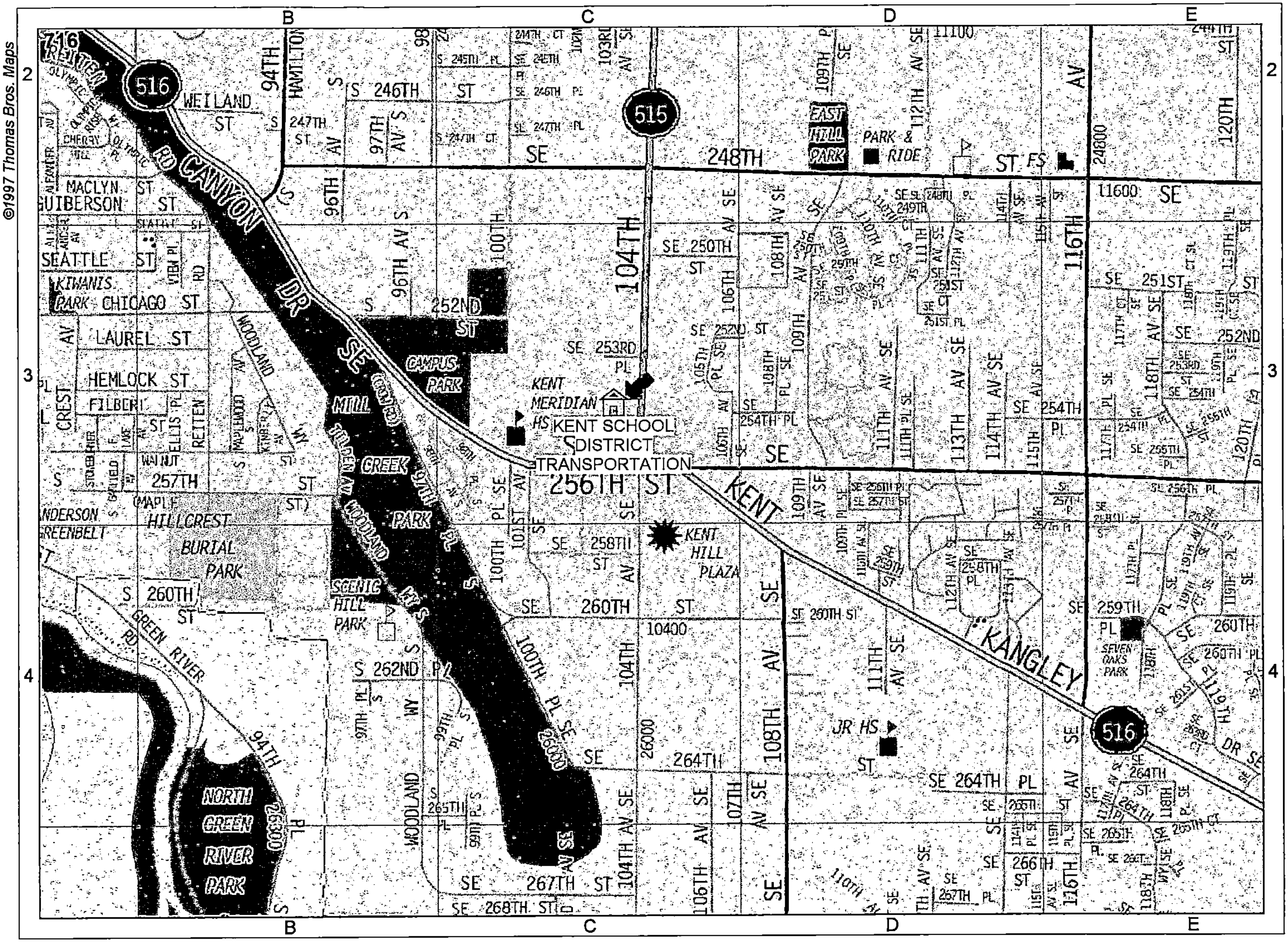
Tables - Table 1: Soil Sample Laboratory Analysis
Table 2: Groundwater Laboratory Analysis
Table 3: Water-Level Data
Table 4: Field Parameters

Well Construction Logs
Centre Pointe Surveying Well Monument Elevations
TEG Laboratory Analysis (with 12-21-98, 12-30-98, and 1-6-99 chains-of-custody)
Quality Assurance/Quality Control Review
Sound Analytical Services Analysis (with 1-6-99 chain-of-custody)

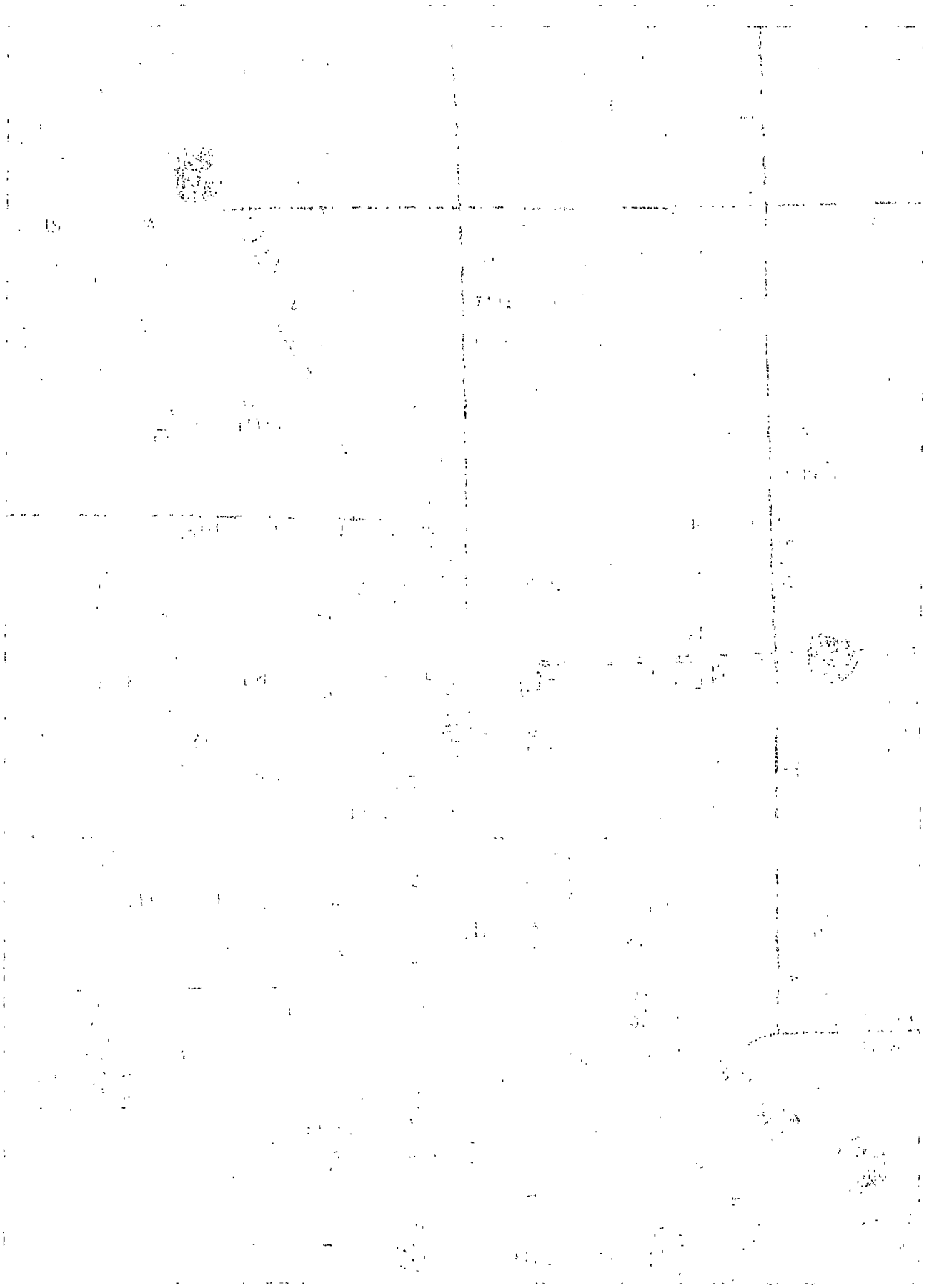
This report conforms to the scope of work detailed in purchase order #MD2240 and is for the sole use of the client. No additional distribution of this report is authorized without the express written consent of Nowicki & Associates, Inc.

It should also be noted that this report is not a definitive guarantee that no unidentified pollutants currently exist on the property or that an unspecified imminent contamination potential does not exist. This report covers only the scope of work associated with the monitoring of groundwater associated with the waste oil tank removal project.

Conclusions and recommendations prescribed by this analysis are predicated upon field screening and laboratory analysis. Interpretation of these elements has been performed within the generally accepted scope of a groundwater monitoring project and the specified scope of work.



🏠 *KENT SCHOOL DISTRICT TRANSPORTATION: 25211 SE 104th Av, Kent, 98031, Page & Grid 716 C3*



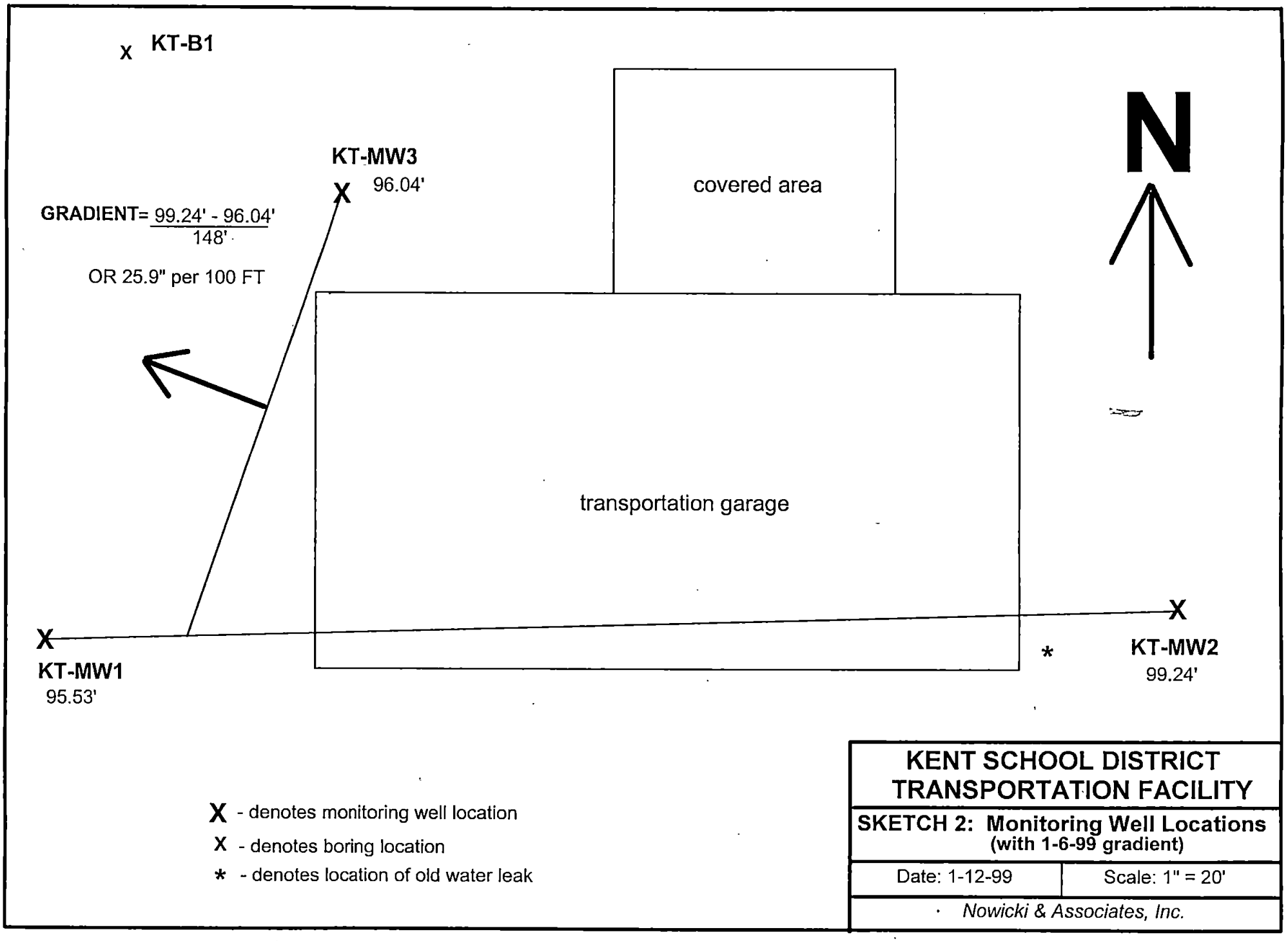

X KT-B1
KT-MW3
X
96.04'
GRADIENT= 99.24' - 96.04' / 148'
OR 25.9" per 100 FT
covered area
N
transportation garage
X
KT-MW1
95.53'
*
X
KT-MW2
99.24'
X - denotes monitoring well location
X - denotes boring location
* - denotes location of old water leak
KENT SCHOOL DISTRICT
TRANSPORTATION FACILITY
SKETCH 2: Monitoring Well Locations
(with 1-6-99 gradient)
Date: 1-12-99
Scale: 1" = 20'
Nowicki & Associates, Inc.

TABLE 1: SOIL SAMPLE LABORATORY RESULTS

Sample ID	Date Collected	Location	TPH-diesel NWTPH-Dx	TPH-heavy oil NWTPH-Dx Extended
KT-MW1-10	12-21-98	Monitoring well 1, 10' below grade	nd	nd
KT-MW2-10	12-30-98	Monitoring well 2, 10' below grade	63	nd
KT-MW2-10	12-30-98	Acid digestion then rerun sample	nd	nd
KT-MW3-15	12-30-98	Monitoring well 3, 15' below grade	68	nd
KT-MW3-15	12-30-98	Acid digestion then rerun sample	nd	nd
Method Detection Limit			20	40
Model Toxics Control Act Method A cleanup level			200	200

All units are reported in mg/kg or ppm.

TABLE 2: WATER SAMPLE LABORATORY RESULTS

Sample ID	Date Collected	TPH-diesel NWTPH-Dx	TPH-heavy oil NWTPH-Dx Extended	Fluoride EPA 300.0	Chlorine SM 4500-Cl-G
KT-MW-1	1-6-99	nd	nd	30	240
KT-MW2	1-6-99	nd	nd	40	410
KT-MW3	1-6-99	nd	nd	200	210
Method Detection Limit		200	400	30 (60 for MW3)	50
MTCA Method A level		1,000	1,000	NA	NA

All units are reported in ppb.

TABLE 3: WATER-LEVEL DATA

Well ID	Well Diam/Depth (in/ft)	Screened Interval (ft)	Survey Elev. (ft)	1-6-99	
				Depth to Water (ft)	Water Level El. (ft)
KT-MW1	2/20	5-20	101.04	5.51	95.53
KT-MW2	2/15	5-15	102.93	3.69	99.24
KT-MW3	2/20	5-20	101.21	5.17	96.04

TABLE 4: FIELD PARAMETERS

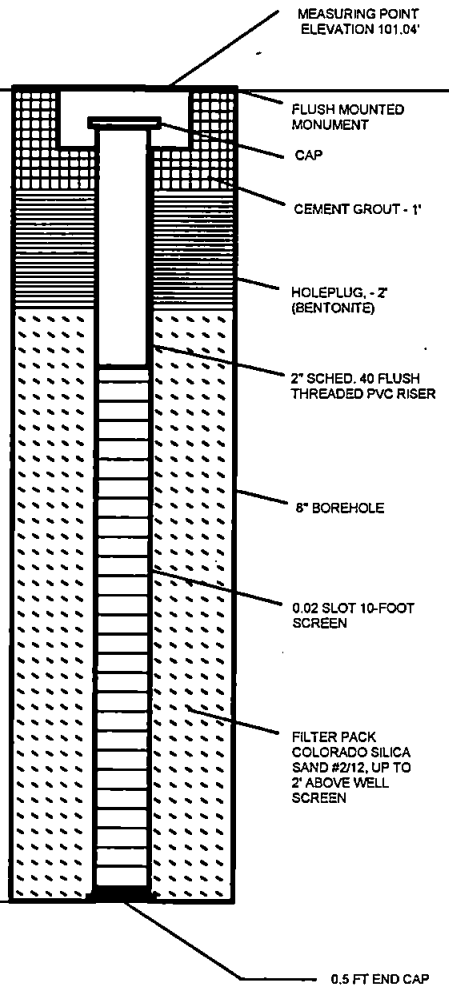
Well ID	Date Sampled	Temperature (degrees F)	Conductivity (umhos/cm)	pH
KT-MW1	12-30-98	55.6	596	7.6
KT-MW2	12-30-98	57.0	688	6.6
KT-MW3	12-30-98	56.5	605	6.9

MONITORING WELL CONSTRUCTION LOG

PROJECT NAME: KENT SCHOOL DISTRICT TRANSPORTATION FACILITY

WELL ID: KT-MW1

DEPTH (FEET)	SOIL TYPE	SAMPLE NUMBER	WELL CONSTRUCTION
		BLOW COUNTS	
0	Top 3' fill material. No odor.		
5.0	▽ APPROXIMATE GROUNDWATER TABLE ▽		
7.5	Brown sand, gravel, & cobbles. Moist. No odor.	1	
10.0	Brown sand, gravel, & cobles. Moist. No odor.	25, 50-3" 2 *	
12.5	Brown sand & gravel - till material. Dry. No odor.	65-6" 3	
15.0	Brown sand & gravel - till material. Dry. No odor.	100-5" 4	
20.0	Gray sand, gravel, & cobble till material. Dry. No odor.	100-3" 5	100-3"



WELL DEPTH: 20.0' BELOW GROUND SURFACE
DATE OF INSTALLATION: 12-21-98
DATE OF DEVELOPMENT: 1-6-99
INSTALLATION CONTRACTOR: CASCADE DRILLING, INC.
DRILLING METHOD: HOLLOW STEM AUGER (HSA)
SAMPLING METHOD: DAMES & MOORE SPLIT SPOON SAMPLER WITH A 140-LB HAMMER
SITE LOCATION: 25211- 104th AVENUE, SE, KENT, WASHINGTON

* SOIL SAMPLE SUBMITTED FOR LABORATORY ANALYSIS

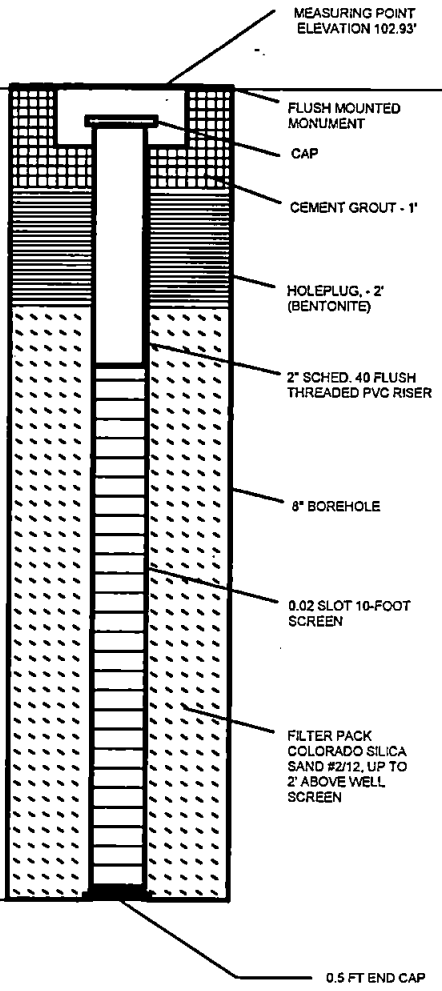
DATE: 1-13-99
DRAWN BY: ANV
PROJECT NO.: 99-CEI-003
NOWICKI & ASSOCIATES, INC.

MONITORING WELL CONSTRUCTION LOG

PROJECT NAME: KENT SCHOOL DISTRICT TRANSPORTATION FACILITY

WELL ID: KT-MW2

DEPTH (FEET)	SOIL TYPE	SAMPLE NUMBER	WELL CONSTRUCTION
		BLOW COUNTS	
0	Top 3' fill material. No odor.		
	Brown & gray silty sand. Slightly moist. No odor.	1	
5.0		14, 50-5"	
	Brown sand and gravel. Slightly moist. No odor.	2	
7.5	▽ APPROXIMATE GROUNDWATER TABLE ▽	15, 29, 30	
	Brown sand, gravel, & cobbles. Wet. No odor.	3 *	
10.0		34, 50-6"	
	Brown sand, gravel, & cobbles. Wet. No odor.	4	
15.0		100-6"	



WELL DEPTH: 15.0' BELOW GROUND SURFACE
DATE OF INSTALLATION: 12-30-98
DATE OF DEVELOPMENT: 1-6-99
INSTALLATION CONTRACTOR: CASCADE DRILLING, INC.
DRILLING METHOD: HOLLOW STEM AUGER (HSA)
SAMPLING METHOD: DAMES & MOORE SPLIT SPOON SAMPLER WITH A 140-LB HAMMER
SITE LOCATION: 25211- 104th AVENUE, SE, KENT, WASHINGTON

* SOIL SAMPLE SUBMITTED FOR LABORATORY ANALYSIS

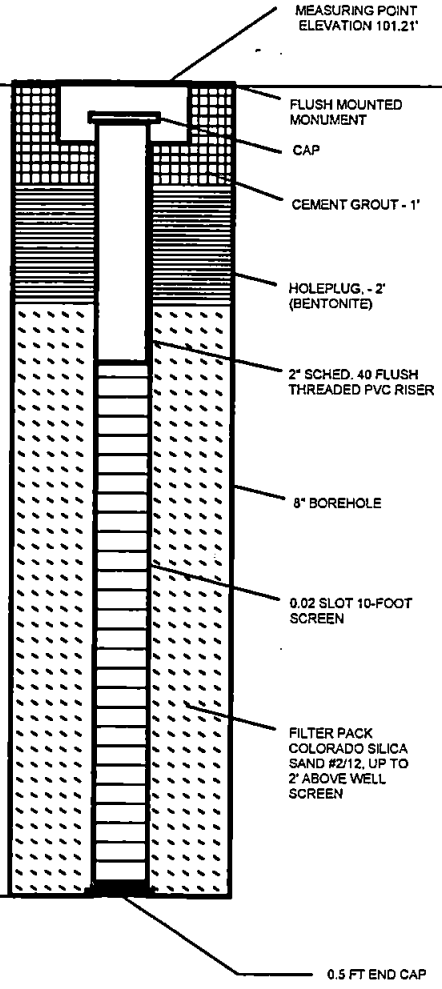
DATE: 1-13-99
DRAWN BY: ANV
PROJECT NO.: 99-CEI-003
NOWICKI & ASSOCIATES, INC.

MONITORING WELL CONSTRUCTION LOG

PROJECT NAME: KENT SCHOOL DISTRICT TRANSPORTATION FACILITY

WELL ID: KT-MW3

DEPTH (FEET)	SOIL TYPE	SAMPLE NUMBER	WELL CONSTRUCTION
		BLOW COUNTS	
0	Top 3' fill material. No odor.		
5.0	Brown sand, gravel, & cobles. Moist. No odor.	1	
	▽ APPROXIMATE GROUNDWATER TABLE ▽	18, 50-6"	
7.5	Brown sand, gravel, & cobbles. Moist. No odor.	2	
		100-6"	
10.0	Brown sand & gravel - till material. Dry. No odor.	3	
		100-4"	
15.0	Brown sand & gravel - till material. Wet. No odor.	4 *	
		100-5"	
20.0	Gray sand, gravel, & cobble till material. Dry. No odor.	5	
		100-4"	



WELL DEPTH: 20.0' BELOW GROUND SURFACE
DATE OF INSTALLATION: 12-30-98
DATE OF DEVELOPMENT: 1-6-99
INSTALLATION CONTRACTOR: CASCADE DRILLING, INC.
DRILLING METHOD: HOLLOW STEM AUGER (HSA)
SAMPLING METHOD: DAMES & MOORE SPLIT SPOON SAMPLER WITH A 140-LB HAMMER
SITE LOCATION: 25211- 104th AVENUE, SE, KENT, WASHINGTON

* SOIL SAMPLE SUBMITTED FOR LABORATORY ANALYSIS

DATE: 1-13-99
DRAWN BY: ANV
PROJECT NO.: 99-CEI-003
NOWICKI & ASSOCIATES, INC.

Drilling Company: Cascade Drilling, Inc. Split-spoon sampler with 140# hammer Date: 12-21-98
Location: Approximately 28' north and 31' west of garage northwest corner

Depth (ft)	Drives-Blow count	Field Screening	Soil Description
0 ---			3" asphalt
---			Top 5' till material

---			
5 ---			

	50-6"	No odor	Brown/gray sand, gravel, cobble till. Dry.

---			
10 ---	100-3"	No odor	Same

	100-3"	No odor	Brown till. Slightly moist.

---			
15 ---	100-3"	No sample	Rock. No soil sample.

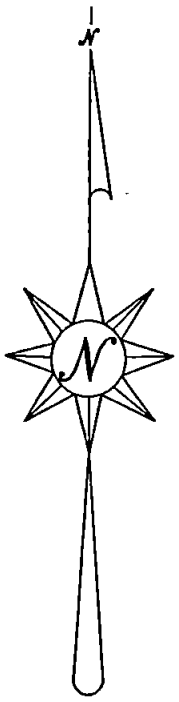
20---	100-4"	No odor	Gray sand gravel till. Dry.

22.5 ---	50-0"	No sample	Refusal. No sample.

BORING LOG: KT-B1

KENT SCHOOL DISTRICT TRANSPORTATION FACILITY: 25211 - 104th Avenue SE, Washington

25211 104th Avenue SE
Kent, Washington



101.21
North rim
Monitoring well
KT - MW3

101.04
North rim
Monitoring well
KT - MW1

Building

102.50

102.39

102.93
North rim
Monitoring well
KT - MW2

105.12

Traverse line

100.00
Assumed Base

Set cotton gin spike at the end of parking stripe between S16 & S17, south of power pole

Set tack in wooden hub 0.8' south of back of sidewalk and 3.3' east of north end of entrance walk to building (25211 104th Avenue SE)

0 30 60

Scale:
1" = 30'

2-2-99

NORMAN E. LARSON
STATE OF WASHINGTON
22338
REGISTERED
PROFESSIONAL LAND SURVEYOR
EXPIRES 12-15-1999

Centre Pointe Surveying
33639 9th Avenue South
Federal Way, WA. 98003
(253) 661-1901

Job No. 1496

teg TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES

CHAIN-OF-CUSTODY RECORD

CLIENT: [illegible]

ADDRESS: [illegible]

PHONE [illegible] FAX: [illegible]

CLIENT PROJECT #: _____ PROJECT MANAGER: [illegible]

DATE: 12-21-98 PAGE 1 OF 1

PROJECT NAME: Kent School Dist. / Transportation

LOCATION: Kent

COLLECTOR: [illegible] DATE OF COLLECTION 12-21-98

Sample Number	Depth	Time	Sample Type	Container Type	ANALYSES: VOA 601/8010	VOA 602/8020	VOA 624/8240	Semi Vol 625/8270	TPH 418.1	TPH 8015 (gasoline)	TPH (8015 (diesel)	TPH 8015 (g & d)	PAH 610/8100	PEST/PCBs 8080	HEX CHROME	ORGANIC LEAD	TOTAL LEAD	pH	ASBESTOS	NWTPH-Dx					FIELD NOTES	Total Number of Containers	Laboratory Note Number
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]															X							1	

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME
[illegible]		[illegible]	1:15 12/21/98
RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME

SAMPLE DISPOSAL INSTRUCTIONS

☐ TEG DISPOSAL @ $2.00 each ☐ Return ☐ Pickup

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	
CHAIN OF CUSTODY SEALS Y/N/NA	
SEALS INTACT? Y/N/NA	
RECEIVED GOOD COND./COLD	
NOTES:	

LABORATORY NOTES:

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST, INC.

7110 38th Drive SE
Lacey, Washington 98503

Mobile Environmental Laboratories
Environmental Sampling Services

Telephone: 360-459-4670
Fax: 360-459-3432

December 28, 1998

Arlene Van DeWege
Nowicki and Associates
33516 9th Ave South, Bldg. #6
Federal Way, WA 98003

Dear Ms. Van DeWege:

Please find enclosed the analytical data report for Kent School District Transportation Project in Kent, Washington. One soil sample was analyzed for Diesel and Oil by NWTPH-Dx/Dx Extended on December 23, 1998.

The results of these analyses are summarized in the attached table. All soil values are reported on a dry weight basis. Applicable detection limits and QA/QC data are included. An invoice for this analytical work is also enclosed.

TEG Northwest appreciates the opportunity to have provided analytical services to Nowicki and Associates for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Michael A Korosec

Michael A. Korosec
President

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST INC.

KENT SCHOOL DISTRICT TRANSPORTATION PROJECT
Kent, Washington
Nowicki & Associates, Inc.

Diesel and Oil in Soil by NWTPH-Dx/Dx-Extended

Sample Number	Date	Recovery %	Diesel mg/kg	Heavy Oil mg/kg
Meth. Blank	12/23/98	104	nd	nd
KT-MW1-10	12/23/98	92	nd	nd
MDL			20	40

"nd" Indicates not detected at the listed detection limit.
"int" Indicates that interference peaks prevent determination.

QA/QC FOR ANALYTICAL METHODS

GENERAL

The TEG Northwest Laboratory quality assurance and quality control (QA/QC) procedures are conducted following the guidelines and objectives which meet or exceed certification/-accreditation requirements of California DOHS, Washington DOE, and Oregon DEQ. The Quality Control Program is a consistent set of procedures which assures data quality through the use of appropriate blanks, replicate analyses, surrogate spikes, and matrix spikes, and with the use of reference standards that meet or exceed EPA standards.

When analyses are taking place on-site with the mobile lab, the need for Field Blanks or Travel/Trip Blanks is eliminated. If there is going to be a delay before sample preparation for analysis, the sample is stored at 4^{O} C.

ANALYTICAL METHODS

TEG Northwest Labs use analytical methodologies which are in conformity with U. S. Environmental Protection Agency (EPA), Washington DOE, and Oregon DEQ methodologies. When necessary and appropriate due to the nature or composition of the sample, TEG may use variations of the methods which are consistent with recognized standards or variations used by the industry and government laboratories.

TPH-Gasoline, TPH-Diesel
(Gasoline and/or Diesel, Modified EPA 8015, NWTPH-Gx and NWTPH-Dx)

A check standard is run at the beginning of the day. 1) A close standard is run at the end of the day. 2) Both open and close standards must be within 15% of the continuing calibration curve value. All samples are prepared with a surrogate spike, and the recovery must be between 65% and 135% unless high sample concentrations interfere with the determination of the recovery percentage. A duplicate sample is run at a rate of 1 per 10 samples. At least 1 method blank is run per 20 samples analyzed.

teg TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES

CHAIN-OF-CUSTODY RECORD

CLIENT: [illegible]

ADDRESS: [illegible]

PHONE [illegible] FAX: [illegible]

CLIENT PROJECT #: ______ PROJECT MANAGER: [illegible]

DATE: 12-30-98 PAGE 1 OF 1

PROJECT NAME: [illegible]

LOCATION: Kent

COLLECTOR: [illegible] DATE OF COLLECTION [illegible]

Sample Number	Depth	Time	Sample Type	Container Type	VOA 601/8010	VOA 602/8020	VOA 624/8240	Semi Vol 625/8270	TPH 418.1	TPH 8015 (gasoline)	TPH (8015 (diesel)	TPH 8015 (g & d)	PAH 610/8100	PEST/PCBs 8080	HEX CHROME	ORGANIC LEAD	TOTAL LEAD	pH	ASBESTOS	[illegible]				FIELD NOTES	Total Number of Containers	Laboratory Note Number
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]															X						1	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]															X						1	

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME
[illegible]		[illegible]	12/31/98 9:[illegible]
RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME

SAMPLE DISPOSAL INSTRUCTIONS

☐ TEG DISPOSAL @ $2.00 each ☐ Return ☐ Pickup

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	
CHAIN OF CUSTODY SEALS Y/N/NA	
SEALS INTACT? Y/N/NA	
RECEIVED GOOD COND./COLD	
NOTES:	

LABORATORY NOTES:

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST, INC.

7110 38th Drive SE
Lacey, Washington 98503

Mobile Environmental Laboratories
Environmental Sampling Services

Telephone: 360-459-4670
Fax: 360-459-3432

January 4, 1999

Arlene Van DeWege
Nowicki and Associates
33516 9th Ave South, Bldg. #6
Federal Way, WA 98003

Dear Ms. Van DeWege:

Please find enclosed the analytical data report for KSD-Transportation Project in Kent, Washington. Soil samples were analyzed for Diesel and Oil by NWTPH-Dx/Dx Extended on December 31, 1998.

The results of these analyses are summarized in the attached table. All soil values are reported on a dry weight basis. Applicable detection limits and QA/QC data are included. An invoice for this analytical work is also enclosed.

TEG Northwest appreciates the opportunity to have provided analytical services to Nowicki and Associates for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Michael A. Korosec
President

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST INC.

KSD-TRANSPORTATION PROJECT
Kent, Washington
Nowicki & Associates, Inc.

Diesel and Oil in Soil by NWTPH-Dx/Dx-Extended

Sample Number	Date	Recovery %	Diesel mg/kg	Heavy Oil mg/kg
Meth. Blank	12/31/98	101	nd	nd
KT-MW2-10	12/31/98	96	63	nd
KT-MW3-15	12/31/98	85	68	nd
KT-MW3-15 Dup.	12/31/98	118	61	nd
MDL			20	40

"nd" Indicates not detected at the listed detection limit.
"int" Indicates that interference peaks prevent determination.

QA/QC FOR ANALYTICAL METHODS

GENERAL

The TEG Northwest Laboratory quality assurance and quality control (QA/QC) procedures are conducted following the guidelines and objectives which meet or exceed certification/-accreditation requirements of California DOHS, Washington DOE, and Oregon DEQ. The Quality Control Program is a consistent set of procedures which assures data quality through the use of appropriate blanks, replicate analyses, surrogate spikes, and matrix spikes, and with the use of reference standards that meet or exceed EPA standards.

When analyses are taking place on-site with the mobile lab, the need for Field Blanks or Travel/Trip Blanks is eliminated. If there is going to be a delay before sample preparation for analysis, the sample is stored at 4^{O} C.

ANALYTICAL METHODS

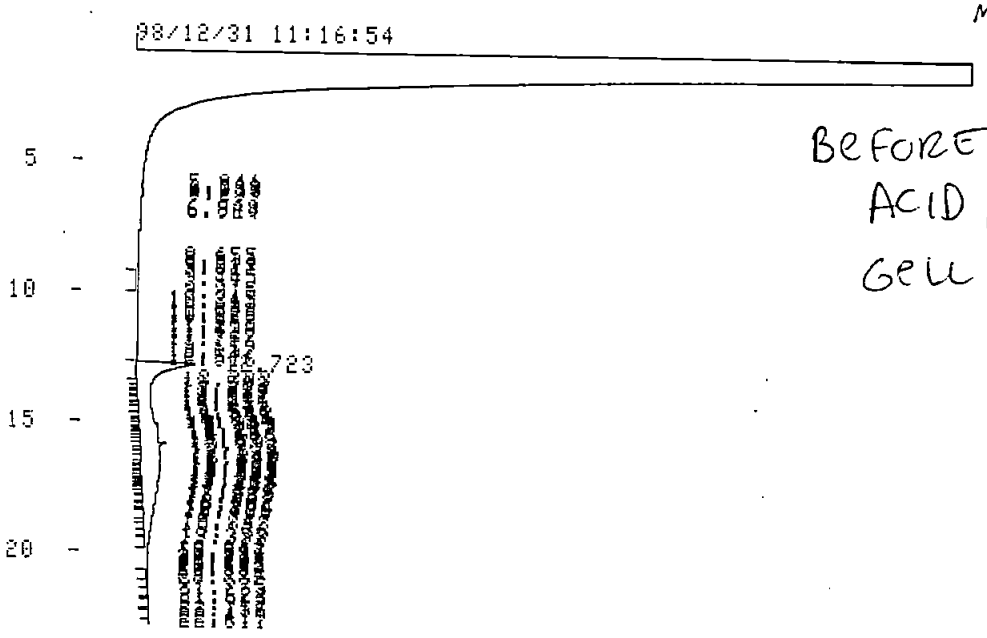
TEG Northwest Labs use analytical methodologies which are in conformity with U. S. Environmental Protection Agency (EPA), Washington DOE, and Oregon DEQ methodologies. When necessary and appropriate due to the nature or composition of the sample, TEG may use variations of the methods which are consistent with recognized standards or variations used by the industry and government laboratories.

TPH-Gasoline, TPH-Diesel
(Gasoline and/or Diesel, Modified EPA 8015, NWTPH-Gx and NWTPH-Dx)

A check standard is run at the beginning of the day. 1) A close standard is run at the end of the day. 2) Both open and close standards must be within 15% of the continuing calibration curve value. All samples are prepared with a surrogate spike, and the recovery must be between 65% and 135% unless high sample concentrations interfere with the determination of the recovery percentage. A duplicate sample is run at a rate of 1 per 10 samples. At least 1 method blank is run per 20 samples analyzed.

36	17.641	43233	V	2.3328
37	17.839	52968	V	2.8581
38	18.067	13807	V	0.745
39	18.137	26071	V	1.4068
40	18.281	14051	V	0.7582
41	18.36	7345	V	0.3963
42	18.421	48320	V	2.6074
43	18.754	13715	V	0.7401
44	18.856	24941	V	1.3458
45	19.168	16968	V	0.9156
46	19.434	15300	V	0.8256
47	19.924	2829	V	0.1526
48	21.663	4017		0.2168
	TOTAL	1853227		100

RS MW 2.10



BEFORE ACID/SILICA GEL Clean-up

CHROMATOGRAM 1 MEMORIZED

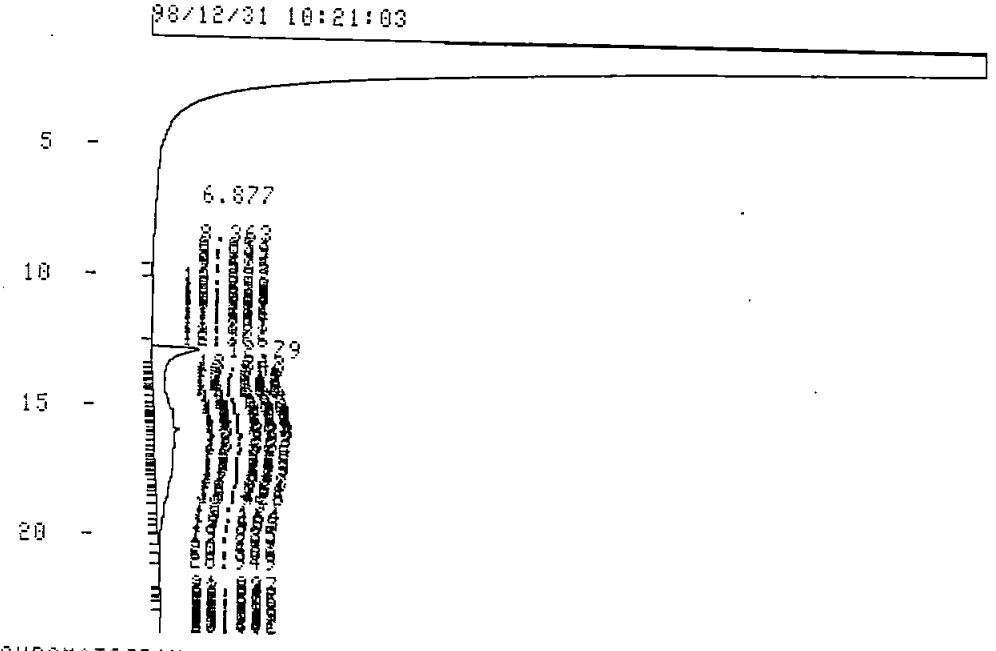
CR501 CHROMATOPAC
CHANNEL NO 1
SAMPLE NO 0
REPORT NO 215

FILE 0
METHOD 0421

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	9.445	4151	V		0.2274	
2	12.723	367690	V		20.1395	
3	13.303	49590	V		2.7162	
4	13.503	25835	V		1.415	
5	13.674	18857	V		1.0328	
6	13.739	25509	V		1.3972	
7	13.911	19273	V		1.0556	
8	14.046	28881	V		1.5819	
9	14.151	12925	V		0.708	
10	14.231	24856	V		1.3614	
11	14.456	51744	V		2.8342	
12	14.564	10640	V		0.5828	
13	14.642	43189	V		2.3656	
14	14.81	19934	V		1.0918	
15	14.924	30041	V		1.6454	
16	15.049	40535	V		2.2202	
17	15.115	19661	V		1.0769	
18	15.187	29793	V		1.6319	
19	15.277	17591	V		0.9635	
20	15.366	46544	V		2.5493	
21	15.545	32864	V		1.8001	
22	15.679	53794	V		2.9465	

82	24.809	9618	V		1.1858
83	25.018	5012	V		0.6179
84	25.07	2433	V		0.3
85	25.125	2052	V		0.253
86	25.18	5346	V		0.6591
87	25.299	3877	V		0.478
88	25.463	7445	V		0.9179
89	25.573	7301	V		0.9002
90	25.697	2506	V		0.3089
91	25.75	2181	V		0.2689
92	25.814	3477	V		0.4287
93	25.898	5308	V		0.6545
94	26.206	6406	V		0.7899
95	26.284	2809	V		0.3463
96	26.429	2810	V		0.3464
97	26.538	3108	V		0.3833
98	26.597	3625	V		0.4469
99	26.964	5722	V		0.7055
100	27.169	2993	V		0.369
	TOTAL	811051			99.9999

MW 3-15



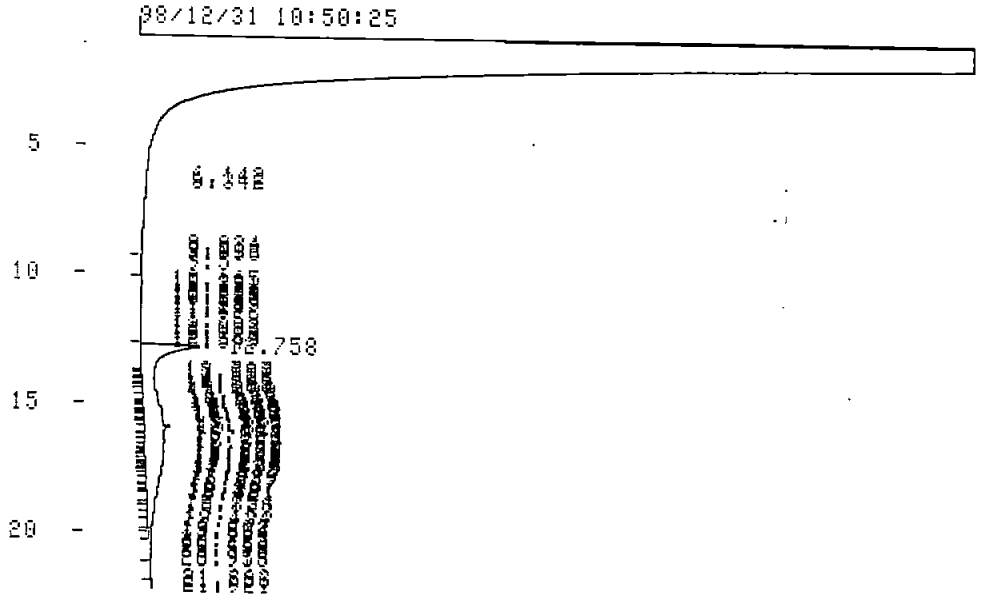
CHROMATOGRAM 1 MEMORIZED

CR501 CHROMATOPAC
CHANNEL NO 1
SAMPLE NO 0
REPORT NO 213

FILE 0
METHOD 0421

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	9.585	2078	V		0.1095	
2	12.79	326676	V		17.2091	
3	13.343	43256	V		2.2787	
4	13.556	33387	V		1.7588	
5	13.711	20872	V		1.0995	
6	13.815	22893	V		1.206	
7	13.943	17971	V		0.9467	
8	14.085	26539	V		1.3981	
9	14.192	20504	V		1.0801	
10	14.246	8464	V		0.4459	
11	14.269	14056	V		0.7405	
12	14.489	53907	V		2.8398	
13	14.677	64405	V		3.3928	
14	14.833	14083	V		0.7419	
15	14.956	37614	V		1.9815	
16	15.084	47483	V		2.5014	
17	15.158	18885	V		0.9948	
18	15.228	27828	V		1.4659	
19	15.303	23240	V		1.2243	

41	18.161	23940	V		1.2611
42	18.294	27590	V		1.4534
43	18.426	47160	V		2.4844
44	18.751	45270	V		2.3848
45	19.164	15451	V		0.8139
46	19.403	10676	V		0.5624
47	19.555	9559	V		0.5035
48	19.935	3906	V		0.2058
49	20.949	3200	V		0.1686
50	21.897	19749	V		1.0403
51	22.04	2433	V		0.1282
52	22.262	4068	V		0.2143
53	22.505	2519	V		0.1327
54	22.712	4896	V		0.2579
	TOTAL	1898273			100



CHROMATOGRAM 1 MEMORIZED

CR501 CHROMATOPAC
CHANNEL NO 1
SAMPLE NO 0
REPORT NO 214

FILE 0
METHOD 0421

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	9.5	4762	V		0.257	
2	12.758	452286	V		24.4053	
3	13.707	19582	V		1.0567	
4	13.802	25384	V		1.3697	
5	13.938	18959	V		1.023	
6	14.076	31263	V		1.6869	
7	14.183	14930	V		0.8056	
8	14.268	23291	V		1.2568	
9	14.489	50866	V		2.7447	
10	14.679	62588	V		3.3772	
11	14.849	20777	V		1.1211	
12	14.956	29643	V		1.5996	
13	15.079	43840	V		2.3656	
14	15.155	16495	V		0.8901	
15	15.236	29082	V		1.5693	
16	15.305	22534	V		1.2159	
17	15.397	48199	V		2.6008	
18	15.563	31997	V		1.7266	
19	15.713	53543	V		2.8892	
20	15.82	107923	V		5.8235	
21	16.064	6398	V		0.3453	

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES (teg)

CHAIN-OF-CUSTODY RECORD

CLIENT: Nauchi Associates

ADDRESS: 33516 9th Ave S. Bldg #6 Fed

PHONE 253-927-5233 FAX: 253-924-6323

CLIENT PROJECT #: PROJECT MANAGER: Alex

DATE: 12-30-98 PAGE 1 OF 1

PROJECT NAME: KSD-Kent Transportation

LOCATION: Kent

COLLECTOR: Arlene Van Dyke DATE OF COLLECTION 12-30-98

Sample Number	Depth	Time	Sample Type	Container Type	VOA 601/8010	VOA 602/8020	VOA 624/8240	Semi Vol 625/8270	TPH 418.1	TPH 8015 (gasoline)	TPH (8015 (diesel)	TPH 8015 (g & d)	PAH 610/8100	PEST/PCBs 8080	HEX CHROME	ORGANIC LEAD	TOTAL LEAD	pH	ASBESTOS	Dx Best				FIELD NOTES	Total Number of Containers	Laboratory Note Number
KT-MW2-10	10	9:50	soil	4oz																X					1	
KT-MW3-15	15	11:25	soil	4oz																X					1	

RELINQUISHED BY (Signature): [signature] DATE/TIME: RECEIVED BY (Signature): Tim McCall DATE/TIME: 12/31/98 9.20

RELINQUISHED BY (Signature) DATE/TIME RECEIVED BY (Signature) DATE/TIME

SAMPLE DISPOSAL INSTRUCTIONS

☐ TEG DISPOSAL @ $2.00 each ☐ Return ☐ Pickup

SAMPLE RECEIPT

TOTAL NUMBER OF CONTAINERS

CHAIN OF CUSTODY SEALS Y/N/NA

SEALS INTACT? Y/N/NA

RECEIVED GOOD COND./COLD

NOTES:

LABORATORY NOTES:

re-analyze with silica gel cleanup, as per CK/AV 1/8/99

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST, INC.

7110 38th Drive SE
Lacey, Washington 98503

Mobile Environmental Laboratories
Environmental Sampling Services

Telephone: 360-459-4670
Fax: 360-459-3432

January 12, 1999

Arlene Van DeWege
Nowicki and Associates
33516 9th Ave South, Bldg. #6
Federal Way, WA 98003

Dear Ms. Van DeWege:

Please find enclosed the analytical data report for KSD-Transportation Project in Kent, Washington. Soil samples were analyzed for Diesel and Oil by NWTPH-Dx/Dx Extended with Acid/Silica Clean-up on January 11, 1999.

The results of these analyses are summarized in the attached table. All soil values are reported on a dry weight basis. Applicable detection limits and QA/QC data are included. An invoice for this analytical work is also enclosed.

TEG Northwest appreciates the opportunity to have provided analytical services to Nowicki and Associates for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Michael A. Korosec
President

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST INC.

KSD TRANSPORTATION PROJECT PROJECT
Kent, Washington
Nowicki & Associates, Inc.

Diesel and Oil in Soil by NWTPH-Dx/Dx-Extended

Sample Number	Date	Recovery %	Diesel mg/kg	Heavy Oil mg/kg
Meth. Blank	01/11/99	99	nd	nd
MW - 2	01/11/99	88	nd	nd
MW - 3	01/11/99	105	nd	nd
MDL			20	40

"nd" Indicates not detected at the listed detection limit.
"int" Indicates that interference peaks prevent determination.

QA/QC FOR ANALYTICAL METHODS

GENERAL

The TEG Northwest Laboratory quality assurance and quality control (QA/QC) procedures are conducted following the guidelines and objectives which meet or exceed certification/-accreditation requirements of California DOHS, Washington DOE, and Oregon DEQ. The Quality Control Program is a consistent set of procedures which assures data quality through the use of appropriate blanks, replicate analyses, surrogate spikes, and matrix spikes, and with the use of reference standards that meet or exceed EPA standards.

When analyses are taking place on-site with the mobile lab, the need for Field Blanks or Travel/Trip Blanks is eliminated. If there is going to be a delay before sample preparation for analysis, the sample is stored at 4^{o} C.

ANALYTICAL METHODS

TEG Northwest Labs use analytical methodologies which are in conformity with U. S. Environmental Protection Agency (EPA), Washington DOE, and Oregon DEQ methodologies. When necessary and appropriate due to the nature or composition of the sample, TEG may use variations of the methods which are consistent with recognized standards or variations used by the industry and government laboratories.

TPH-Gasoline, TPH-Diesel
(Gasoline and/or Diesel, Modified EPA 8015, NWTPH-Gx and NWTPH-Dx)

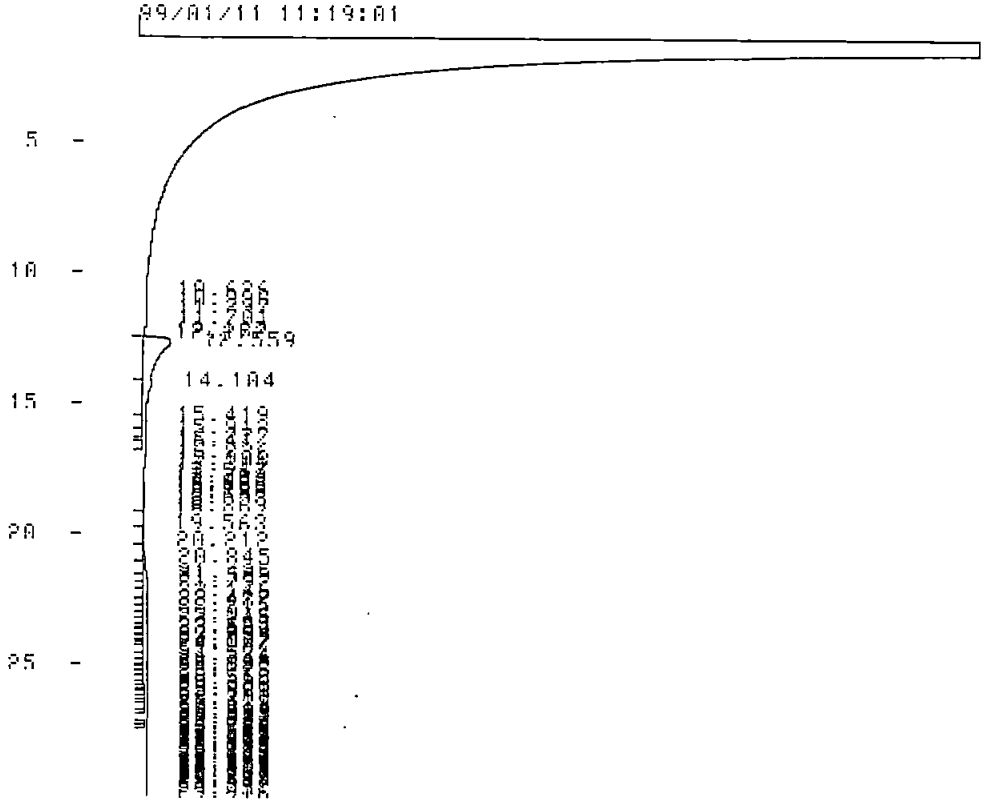
A check standard is run at the beginning of the day. 1) A close standard is run at the end of the day. 2) Both open and close standards must be within 15% of the continuing calibration curve value. All samples are prepared with a surrogate spike, and the recovery must be between 65% and 135% unless high sample concentrations interfere with the determination of the recovery percentage. A duplicate sample is run at a rate of 1 per 10 samples. At least 1 method blank is run per 20 samples analyzed.

82	16.799	97571	V		A.8858
83	17.011	122849	V		1.1179
84	17.189	169218	V		1.3974
85	17.546	56141	V		A.4636
86	17.888	73881	V		A.6095
87	18.482	7658			A.0632
88	18.955	2758			A.0228
89	19.966	3452			A.0285
90	20.176	2633	V		A.0217
91	20.594	2411	V		A.0199
92	20.79	4055	V		A.0335
93	20.92	8458	V		A.0698
94	21.39	13002	V		A.1074
95	21.58	7608	V		A.0628
96	21.865	3230	V		A.0267
97	22.095	4912	V		A.0406
	TOTAL	12109325			100

RY MW2

AFTER ACID / SICILC GEL Cleanup

09/01/11 11:19:01

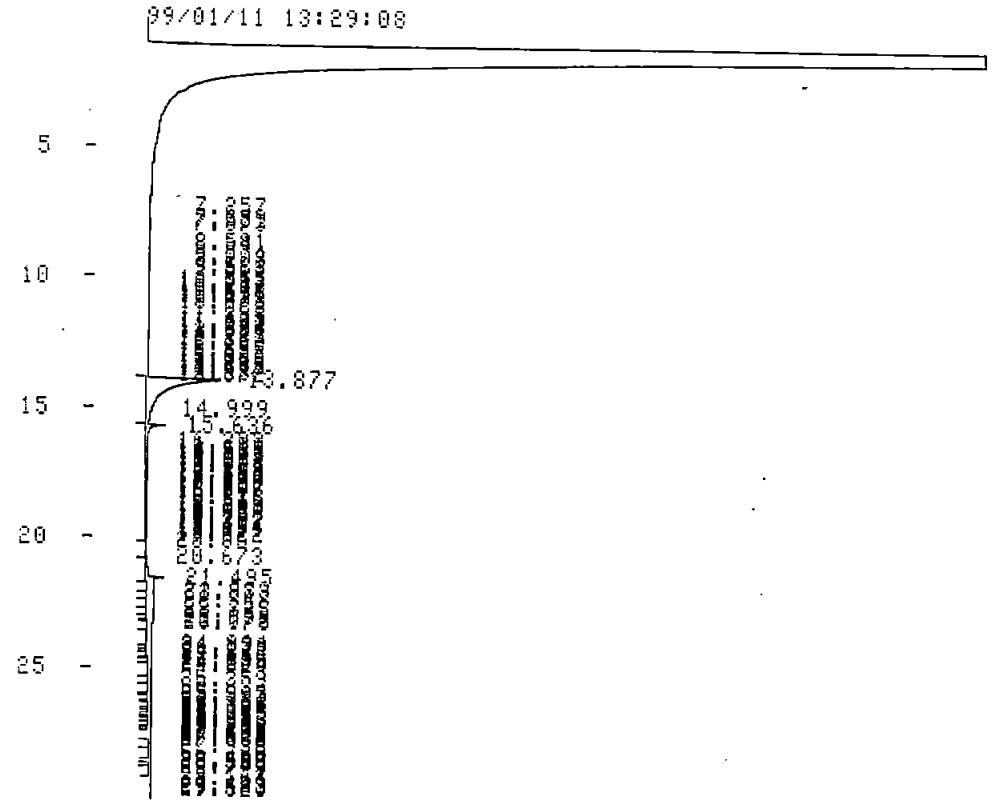


CHROMATOGRAM 1 MEMORIZED

CR5A1 CHROMATOPAC
CHANNEL NO 1 FILE A
SAMPLE NO A METHOD 0421
REPORT NO 141

PKNO	TIME	AREA	MK	TONO	CONC	NAME
1	12.559	424531	V		49.0001	
2	14.104	98448	V		11.377	
3	15.419	11134	V		1.2867	
4	15.912	4685	V		0.5415	
5	16.41	3266	V		0.3774	
6	19.563	4020	V		0.4645	
7	20.212	15663	V		1.81....	

K6
MW3



CHROMATOGRAM 1 MEMORIZED

CR501 CHROMATOPAC
CHANNEL NO 1
SAMPLE NO 0
REPORT NO 300

FILE 0
METHOD 0421

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	13.877	505927	S		51.374	
2	15.636	37044	SV		3.7616	
3	20.673	6061			0.6154	
4	21.495	66344	V		6.7369	
5	21.989	41564	V		4.2206	
6	22.07	29745	V		3.0205	
7	22.348	32616	V		3.312	
8	22.725	22358	V		2.2703	
9	22.959	14284	V		1.4504	
10	23.078	5168	V		0.5248	
11	23.178	24418	V		2.4796	
12	24.034	41411	V		4.2051	
13	24.122	8859	V		0.8995	
14	24.272	7320	V		0.7433	
15	24.317	12763	V		1.296	
16	24.555	3825	V		0.3884	
17	24.69	10137	V		1.0294	
18	24.745	2093	V		0.2125	
19	24.824	28536	V		2.8976	

teg TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES

CHAIN-OF-CUSTODY RECORD

CLIENT: [illegible]

ADDRESS: [illegible]

PHONE [illegible] FAX: [illegible]

CLIENT PROJECT #: _____ PROJECT MANAGER: [illegible]

DATE: 1-6-99 PAGE 1 OF 1

PROJECT NAME: KSD-Transportation

LOCATION: Kent

COLLECTOR: [illegible] DATE OF COLLECTION 1-6-99

Sample Number	Depth	Time	Sample Type	Container Type	ANALYSES: VOA 601/8010	VOA 602/8020	VOA 624/8240	Semi Vol 625/8270	TPH 418.1	TPH 8015 (gasoline)	TPH (8015 (diesel)	TPH 8015 (g & d)	PAH 610/8100	PEST/PCBs 8080	HEX CHROME	ORGANIC LEAD	TOTAL LEAD	pH	ASBESTOS	D 10 12 +	FIELD NOTES	Total Number of Containers	Laboratory Note Number
AT MW1	[illegible]	[illegible]	[illegible]	[illegible]															X			2	
AT MW2	[illegible]	[illegible]	[illegible]	[illegible]															X			2	
AT MW3	[illegible]	[illegible]	[illegible]	[illegible]															X			2	

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME
[illegible]		Jim McCall	1/7/99
RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME

SAMPLE DISPOSAL INSTRUCTIONS

☐ TEG DISPOSAL @ $2.00 each ☐ Return ☐ Pickup

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	
CHAIN OF CUSTODY SEALS Y/N/NA	
SEALS INTACT? Y/N/NA	
RECEIVED GOOD COND./COLD	
NOTES:	

LABORATORY NOTES:

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST, INC.

7110 38th Drive SE
Lacey, Washington 98503

Mobile Environmental Laboratories
Environmental Sampling Services

Telephone: 360-459-4670
Fax: 360-459-3432

January 7, 1999

Arlene Van DeWege
Nowicki and Associates
33516 9th Ave South, Bldg. #6
Federal Way, WA 98003

Dear Ms. Van DeWege:

Please find enclosed the analytical data report for KSD-Transportation Project in Kent, Washington. Soil samples were analyzed for Diesel and Oil by NWTPH-Dx/Dx Extended on January 7, 1999.

The results of these analyses are summarized in the attached table. All soil values are reported on a dry weight basis. Applicable detection limits and QA/QC data are included. An invoice for this analytical work is also enclosed.

TEG Northwest appreciates the opportunity to have provided analytical services to Nowicki and Associates for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST INC.

KSD-TRANSPORTATION PROJECT
Kent, Washington
Nowicki & Associates, Inc.

Diesel and Oil in Water by NWTPH-Dx/Dx-Extended

Sample Number	Date	Recovery %	Diesel ug/l	Heavy Oil ug/l
Meth. Blank	1/7/99	84	nd	nd
KT-MW1	1/7/99	116	nd	nd
KT-MW2	1/7/99	91	nd	nd
KT-MW3	1/7/99	92	nd	nd
MDL			200	400

"nd" Indicates not detected at the listed detection Limit.
"int" Indicates that interference peaks prevent determination.

QA/QC FOR ANALYTICAL METHODS

GENERAL

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TPH-Gasoline, TPH-Diesel
(Gasoline and/or Diesel, Modified EPA 8015, NWTPH-Gx and NWTPH-Dx)

A check standard is run at the beginning of the day. 1) A close standard is run at the end of the day. 2) Both open and close standards must be within 15% of the continuing calibration curve value. All samples are prepared with a surrogate spike, and the recovery must be between 65% and 135% unless high sample concentrations interfere with the determination of the recovery percentage. A duplicate sample is run at a rate of 1 per 10 samples. At least 1 method blank is run per 20 samples analyzed.

KENT SCHOOL DISTRICT
TRANSPORTATION FACILITY
GROUNDWATER MONITORING WELL INSTALLATION AND SAMPLING
Quality Assurance/Quality Control Review

The purpose of the Quality Assurance/Quality Control (QA/QC) program is to ensure representative soil and groundwater samples and reliable results. Sampling techniques and laboratory analytical procedures are assessed for validity to achieve this purpose.

I. SAMPLING TECHNIQUES

Soil samples were collected using a split-spoon sampler and hand tools. Soil was placed in laboratory-supplied precleaned 4-oz glass jars with Teflon lids. Groundwater samples were collected using a stainless steel bailer. Wells were either purged dry or a minimum of three casing volumes of water were removed prior to collecting a sample. Water was placed in voas. The voas were checked for air bubbles prior to placing in an ice-filled cooler. Samples were kept in the cooler or in the refrigerator until delivery to the lab.

All soil and groundwater were delivered to Transglobal Environmental Geosciences, Inc. (TEG) laboratories within one working day of collection. All holding times as specified by Department of Ecology (DOE) were met. (Refer to Holding Times in the next section.)

II. LABORATORIES ANALYTICAL PROCEDURES

Upon receipt of the analytical results, a review of the QA/QC data was performed to assess the validity of the analytical results. TEG, Inc. is a DOE accredited laboratory. Nowicki & Associates, Inc collected all samples.

In summary, the analytical results were found to be acceptable with respect to this QA/QC program. The results were found to meet or exceed guidelines and objectives of Washington DOE, Environmental Protection Agency (EPA) Method specifications and project acceptable requirements.

The following summarized the findings of the QA/QC review:

1. **Methodology:** ACCEPTABLE
   Samples were analyzed using acceptable EPA and Washington DOE standard methods as listed on each page of the analytical results. The methods used correspond to those required on each chain-of-custody form.

2. **Holding Times:** ACCEPTABLE
   The holding times were met for all analyses. All samples were placed in an ice-filled cooler immediately after collection and delivered to TEG laboratories within one day. Samples were extracted within one working day of arrival at the lab.

3. **SURROGATE SPIKES:** ACCEPTABLE
Surrogate spikes are known concentrations of compounds not normally found in samples that are added to check for analytical interference in every sample. Surrogates were added to all samples for all analyses. All surrogate percent recoveries are within the acceptable range.

4. **Duplicate Analysis:** ACCEPTABLE
Duplicate analysis is a second analysis of the same sample (i.e. two aliquots for one sample). The acceptable relative standard deviation is 35%. Duplicates were analyzed at a rate of one per ten samples. All duplicate samples met criteria.

5. **Method Blanks:** ACCEPTABLE
Method blanks were run by the laboratory to check for possible laboratory contamination. Blanks were analyzed for all analytes in the analytical batches at a rate of at least one in twenty. No laboratory contamination was detected.

6. **Method Detection Limits:** ACCEPTABLE
Method report limits were found to be lower or equivalent to those required by the analytical methods.

7. **Chain-of-Custody:** ACCEPTABLE
Chain-of-custody procedures were followed for all samples and are considered acceptable.

SOUND ANALYTICAL SERVICES, INC.
ANALYTICAL & ENVIRONMENTAL CHEMISTS

4813 Pacific Hwy. East
Tacoma, Washington 98424
(253) 922-2310 • FAX (253) 922-5047

211 78184

CHAIN OF CUSTODY / REQUEST FOR LABORATORY ANALYSIS

CLIENT:

PROJECT NAME:

CONTACT:

PHONE NO:

LAB #	SAMPLE I.D.	DATE	TIME	MATRIX	# of Containers	Halogenated Volatiles EPA 601/8010	Aromatic Volatiles EPA 602/8020	Chlorinated Pest., PCB's EPA 608/8080	PAH's	Volatile Organics EPA 624/8240 (GC/MS)	Semi-volatiles EPA625/8270 (GC/MS)	TPH 418.1	Oil & Grease	Total Metals (Specify below)	TCLP Extraction: 8 Metals	TCLP Extraction: Volatiles	TCLP Extraction: Semi-volatiles	TCLP Extraction: Pesticides & Herbicides	B	M							
																			Chlorine	Fluoride							
																			X	X							
																			X	X							
																			X	X							

	Signature	Printed Name	Firm	Time / Date
Relinquished By				
Received By			SAS	3:05 1/6/99
Relinquished By				
Received By				
Relinquished By				
Received By				

SPECIAL INSTRUCTIONS/COMMENTS:

These samples will be disposed of 45 days after receipt.
Check this box to have samples returned ☐.

call w/ verbals

Sound Analytical Services, Inc.
ANALYTICAL & ENVIRONMENTAL CHEMISTS
4813 Pacific Hwy East • Tacoma, WA 98424
(253) 922-2310 • FAX (253) 922-5047
e-mail: SoundL@aol.com

TRANSMITTAL MEMORANDUM

DATE: January 11, 1999

TO: Arlene VanDeWege
Nowicki & Assoc.
33516 9th Ave. S., Bldg. 6
Federal Way, WA 98003

PROJECT: KSD - Transportation

REPORT NUMBER: 78184

Enclosed are the test results for three samples received at Sound Analytical Services on January 6, 1999.

The report consists of this transmittal memo, analytical results, quality control reports, a copy of the chain-of-custody, a list of data qualifiers and analytical narrative when applicable, and a copy of any requested raw data.

Should there be any questions regarding this report, please contact me at (253) 922-2310.

Sincerely,

Darla Powell
Project Manager

SOUND ANALYTICAL SERVICES, INC.

ANALYTICAL & ENVIRONMENTAL CHEMISTS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (253)922-2310 - FAX (253)922-5047

Report To: Nowicki & Assoc. Date: January 11, 1999

Report On: Analysis of Liquid Report No.: 78184

IDENTIFICATION:
Samples received on 01-06-99
Project: KSD - Transportation

ANALYSIS:

Lab Sample No. 78184-1 Client ID: KT-MW1

Fluoride per EPA Method 300.0
Date Analyzed: 01-08-99
Units: mg/L

Parameter	Result	PQL
Fluoride	0.03	0.03

Residual Chlorine per SM 4500-Cl-G
Date Analyzed: 01-06-99
Units: mg/L

Parameter	Result	PQL
Residual Chlorine	0.24	0.05

ND - Not Detected
PQL - Practical Quantitation Limit

SOUND ANALYTICAL SERVICES, INC.

Nowicki & Assoc.
Project: KSD - Transportation
Report No. 78184
January 11, 1999

Lab Sample No. 78184-2 Client ID: KT-MW2

Fluoride per EPA Method 300.0
Date Analyzed: 01-08-99
Units: mg/L

Parameter	Result	POL
Fluoride	0.04	0.03

Residual Chlorine per SM 4500-Cl-G
Date Analyzed: 01-06-99
Units: mg/L

Parameter	Result	POL
Residual Chlorine	0.41	0.05

ND - Not Detected
PQL - Practical Quantitation Limit

SOUND ANALYTICAL SERVICES, INC.

Nowicki & Assoc.
Project: KSD - Transportation
Report No. 78184
January 11, 1999

Lab Sample No. 78184-3 Client ID: KT-MW3

Fluoride per EPA Method 300.0
Date Analyzed: 01-08-99
Units: mg/L

Parameter	Result	PQL
Fluoride	0.2	0.06

Residual Chlorine per SM 4500-Cl-G
Date Analyzed: 01-06-99
Units: mg/L

Parameter	Result	PQL
Residual Chlorine	0.21	0.05

ND - Not Detected
PQL - Practical Quantitation Limit

SOUND ANALYTICAL SERVICES, INC.

ANALYTICAL & ENVIRONMENTAL CHEMISTS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (253)922-2310 - FAX (253)922-5047

QUALITY CONTROL REPORT

General Chemistry

Client: Nowicki & Assoc.
Lab No: 78184q1
Units: mg/L

QC Batch No. 66
Sample No. 78184-1
Date Analyzed: 01-06-99

METHOD BLANK

Parameter	Result	PQL
Residual Chlorine	ND	0.05

ND = Not Detected
PQL = Practical Quantitation Limit

DUPLICATE

Parameter	Sample Result	Duplicate Result	RPD	Flag
Residual Chlorine	0.24	0.24	0.0	

RPD = Relative Percent Difference
NC = Not Calculated

SOUND ANALYTICAL SERVICES, INC.

ANALYTICAL & ENVIRONMENTAL CHEMISTS

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QUALITY CONTROL REPORT

General Chemistry

Client: Nowicki & Assoc.
Lab No: 78184q2
Units: mg/L

QC Batch No. 1039
Sample No. 78230-1 (Batch QC)
Date Analyzed: 01-08-99

METHOD BLANK

Parameter	Result	PQL
Fluoride	ND	0.03

ND = Not Detected
PQL = Practical Quantitation Limit

DUPLICATE

Parameter	Sample Result	Duplicate Result	RPD	Flag
Fluoride	ND	ND	NC	

RPD = Relative Percent Difference
NC = Not Calculated

MATRIX SPIKE

Parameter	Sample Result	MS Result	MS Amount	%R	Flag
Fluoride	ND	2.09	2.00	105	

MS = Matrix Spike %R = Percent Recovery

SOUND ANALYTICAL SERVICES, INC.

ANALYTICAL & ENVIRONMENTAL CHEMISTS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE: (253) 922-2310 - FAX: (253) 922-5047

DATA QUALIFIERS AND ABBREVIATIONS

B1: This analyte was detected in the associated method blank. The analyte concentration was determined not to be significantly higher than the associated method blank (less than ten times the concentration reported in the blank).

B2: This analyte was detected in the associated method blank. The analyte concentration in the sample was determined to be significantly higher than the method blank (greater than ten times the concentration reported in the blank).

C1: Second column confirmation was performed. The relative percent difference value (RPD) between the results on the two columns was evaluated and determined to be $\leq 40\%$.

C2: Second column confirmation was performed. The RPD between the results on the two columns was evaluated and determined to be $> 40\%$. The higher result was reported unless anomalies were noted.

M: GC/MS confirmation was performed. The result derived from the original analysis was reported.

D: The reported result for this analyte was calculated based on a secondary dilution factor.

E: The concentration of this analyte exceeded the instrument calibration range and should be considered an estimated quantity.

J: The analyte was analyzed for and positively identified, but the associated numerical value is an estimated quantity.

MCL: Maximum Contaminant Level

MDL: Method Detection Limit

N: See analytical narrative.

ND: Not Detected

PQL: Practical Quantitation Limit

X1: Contaminant does not appear to be "typical" product. Elution pattern suggests it may be _____ .

X2: Contaminant does not appear to be "typical" product.

X3: Identification and quantitation of the analyte or surrogate was complicated by matrix interference.

X4: RPD for duplicates was outside advisory QC limits. The sample was re-analyzed with similar results. The sample matrix may be nonhomogeneous.

X4a: RPD for duplicates outside advisory QC limits due to analyte concentration near the method practical quantitation limit/detection limit.

X5: Matrix spike recovery was not determined due to the required dilution.

X6: Recovery and/or RPD values for matrix spike(/matrix spike duplicate) outside advisory QC limits. Sample was re-analyzed with similar results.

X7: Recovery and/or RPD values for matrix spike(/matrix spike duplicate) outside advisory QC limits. Matrix interference may be indicated based on acceptable blank spike recovery and/or RPD.

X7a: Recovery and/or RPD values for this spiked analyte outside advisory QC limits due to high concentration of the analyte in the original sample.

X8: Surrogate recovery was not determined due to the required dilution.

X9: Surrogate recovery outside advisory QC limits due to matrix interference.