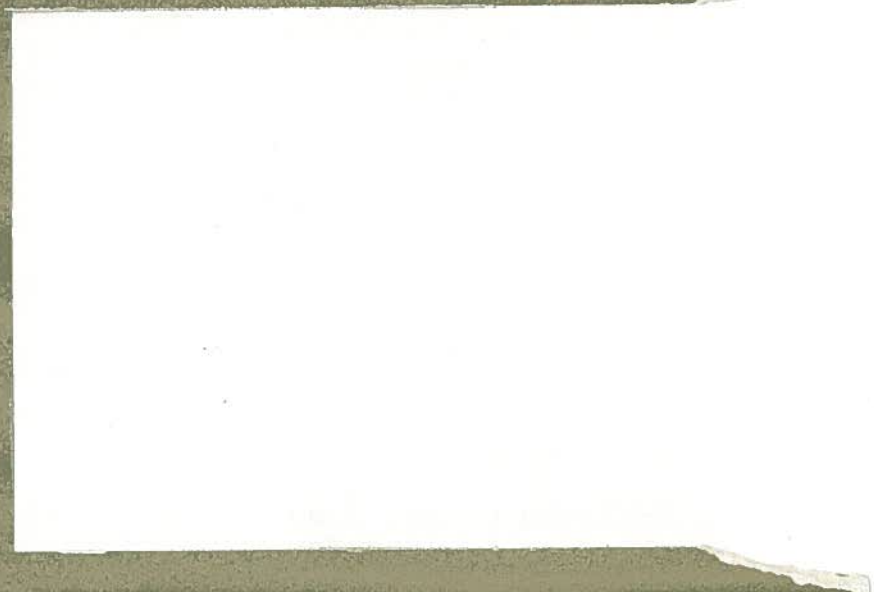


B
13/50



Consulting Geotechnical
Engineers and Geologists

Geo  Engineers



INTERIM
Soils, water

RECEIVED
NOV 16 1990 ✓
DEPT. OF ECOLOGY

November 12, 1990

Mr. Joseph Hickey
Washington Department of Ecology
Northwest Regional Office
4350 150th Avenue, NE
Redmond, WA 98052-5301

Mr. George E. Renale
1640 Vallejo Street, Suite 3
San Francisco, CA 94123

**RE: FORMER CIRCLE K FACILITY #1461
2350 24TH AVENUE, EAST
SEATTLE, WASHINGTON 98112
FILE NO. 1780-B04**

Dear Gentlemen:

Enclosed please find a copy of the Progress Report completed November 9, 1990 for the above referenced facility.

The Circle K Corporation encourages the review of this report and the continuation of the remedial activities at this facility.

Thank you for your anticipated cooperation.

Sincerely,
THE CIRCLE K CORPORATION

cc: Mr. Otto Paris
GEO Engineers, Inc.
2405 140th Ave., NE, Suite 105
Bellevue, WA 98005

THE CIRCLE K CORPORATION

POST OFFICE BOX 52084 • PHOENIX, AZ 85072 • (602) 253-9600

RECEIVED

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DEPT. OF ECOLOGY

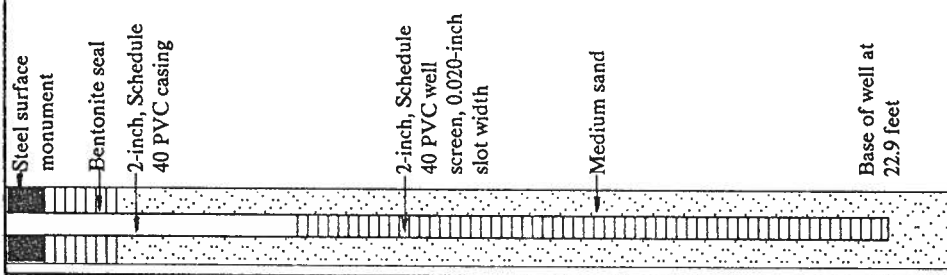
PROGRESS REPORT NO. 2
REMEDIAL MONITORING PROGRAM
CIRCLE K FACILITY 1461
SEATTLE, WASHINGTON
FOR
CIRCLE K CORPORATION

11/16/90

MONITOR WELL NO. MW-3

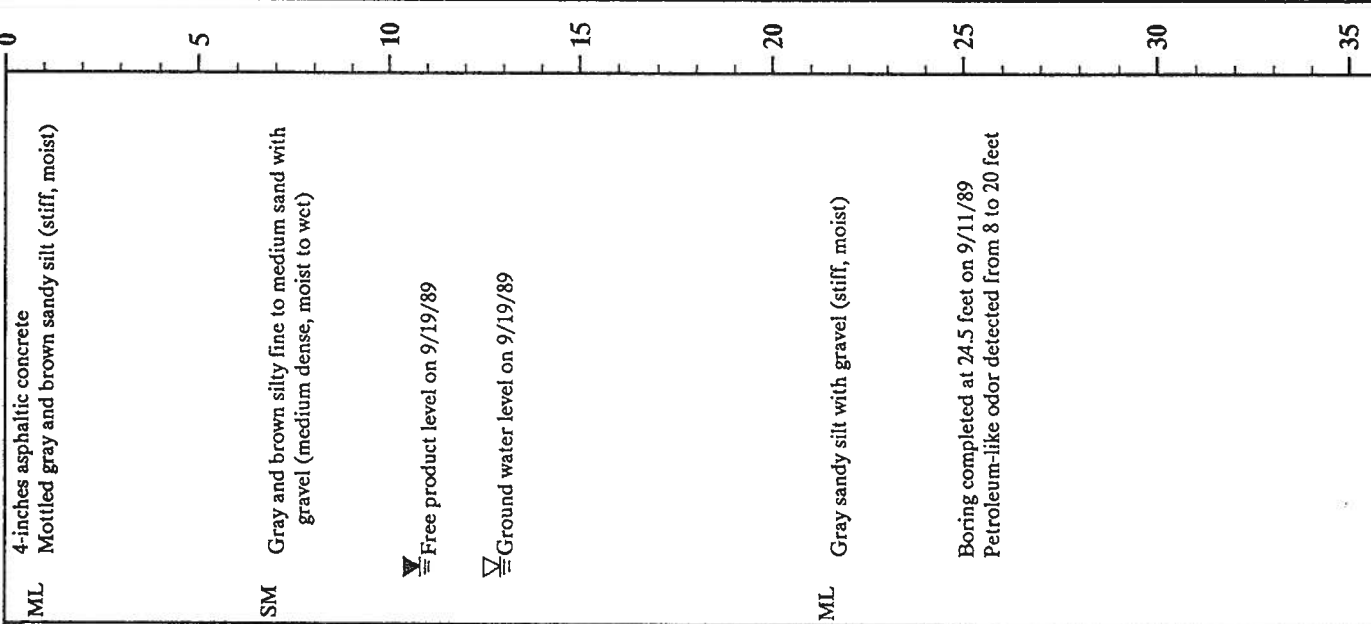
WELL SCHEMATIC

Casing Elevation: 99.63
Casing Stickup: -0.15



DESCRIPTION

Surface Elevation: 99.78



Group Symbol

Vapor Conc. (ppm) Sheen

| Depth (ft) | Group Symbol | Vapor Conc. (ppm) Sheen |
|------------|--------------|-------------------------|
| 11 | 11 | 1000 / NS |
| 25 | 25 CA | >10,000 / HS |
| 50/4" | 50/4" | |
| 15 | 15 | 400 / MS |
| 16 | 16 | 400 / MS |

MONITOR WELL NO. MW-4

WELL SCHEMATIC

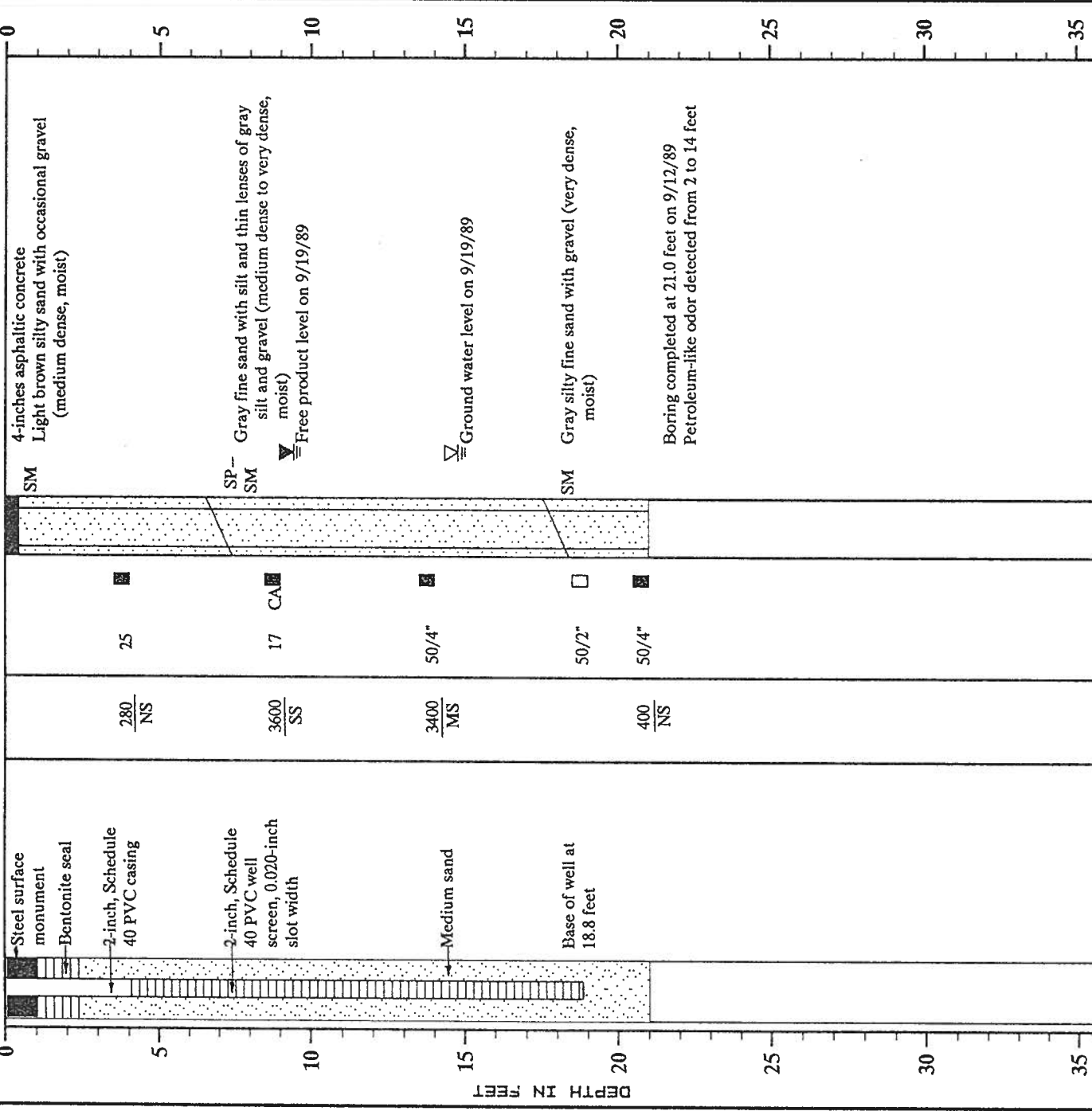
Casing Elevation: 98.38
Casing Stickup: -0.53

Vapor
Conc.(ppm)
Sheen

Group
Symbol

DESCRIPTION

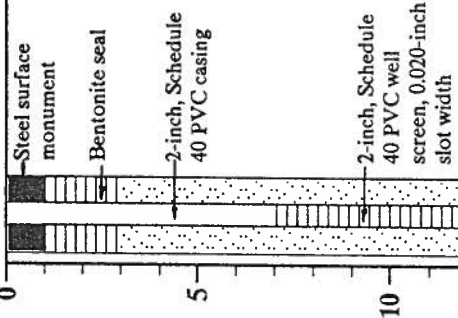
Surface Elevation: 98.91



MONITOR WELL NO. MW-5

WELL SCHEMATIC

Casing Elevation: 90.94
Casing Stickup: -0.30



Vapor
Conc.(ppm)
Sheen

100
NS

100
NS

<100
NS

<100
NS

100
NS

100
NS

Blot
Count

39

29

20

50/4"

50/6"

50/4.5"

50/5"

Group
Symbol

SM

SM

SM

ML

DESCRIPTION

Surface Elevation: 91.24

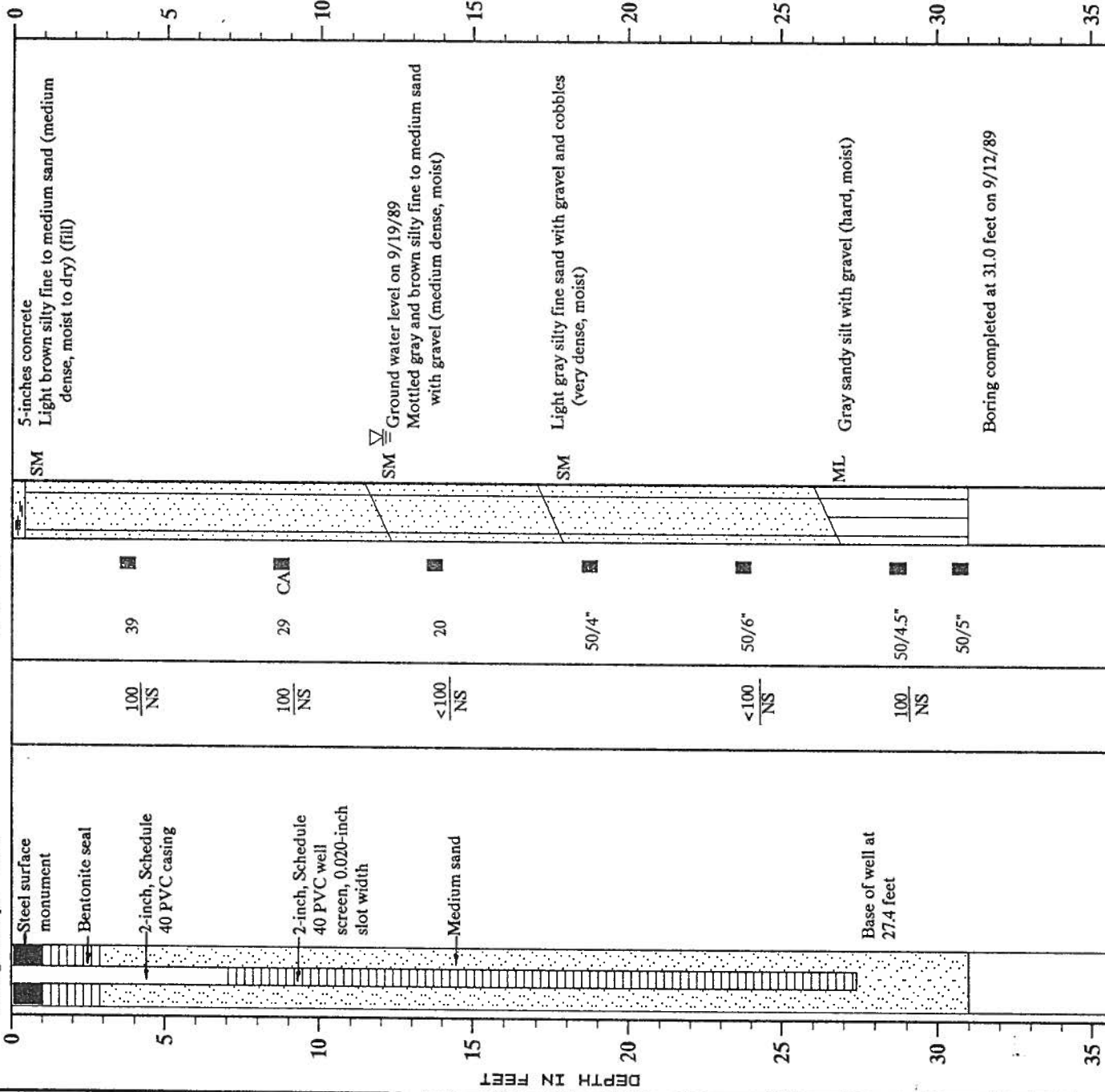
5-inches concrete
Light brown silty fine to medium sand (medium dense, moist to dry) (fill)

Ground water level on 9/19/89
Mottled gray and brown silty fine to medium sand with gravel (medium dense, moist)

Light gray silty fine sand with gravel and cobbles (very dense, moist)

Gray sandy silt with gravel (hard, moist)

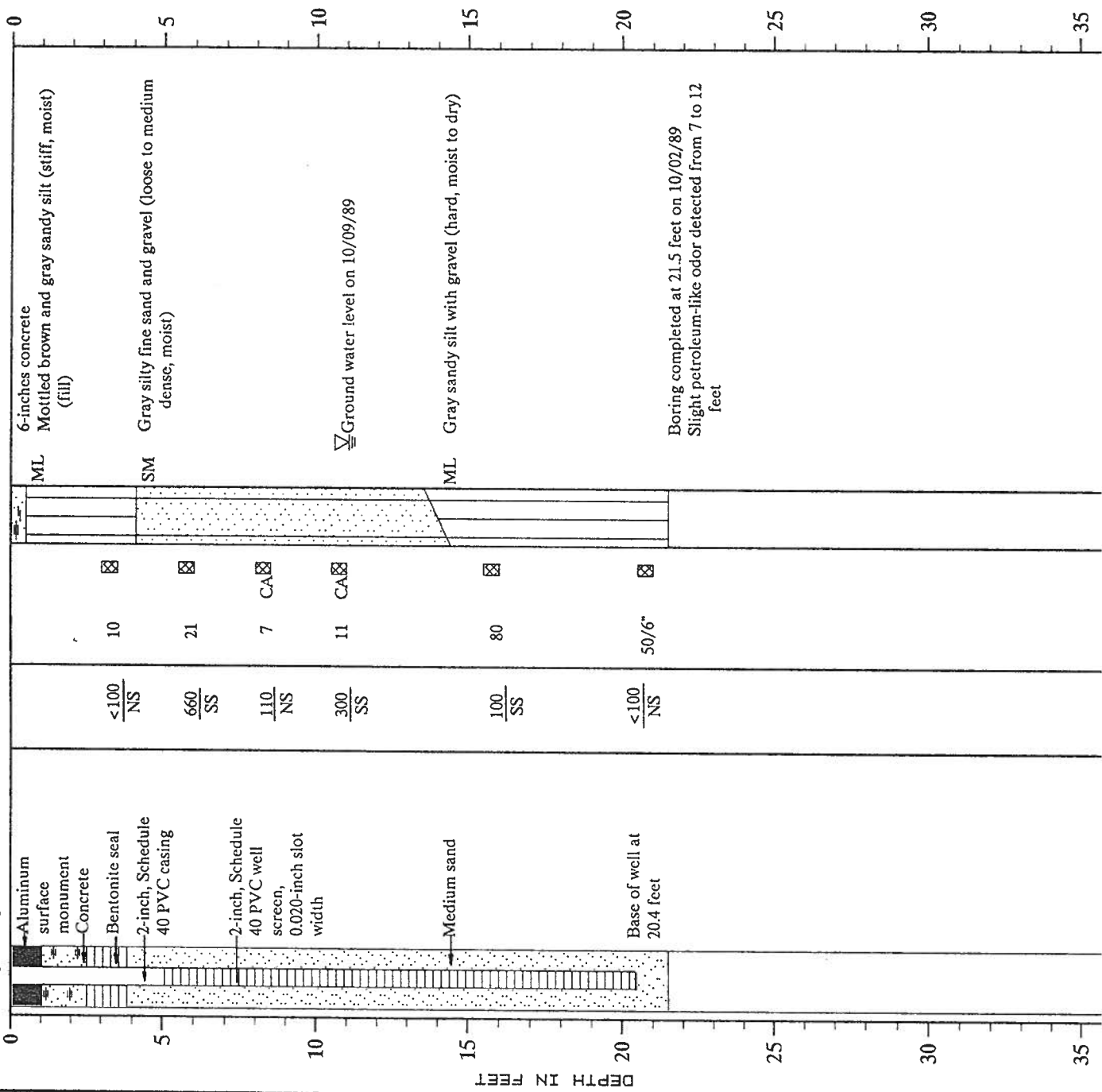
Boring completed at 31.0 feet on 9/12/89



MONITOR WELL NO. MW-6

WELL SCHEMATIC

Casing Elevation: 97.92
 Casing Stickup: -0.43

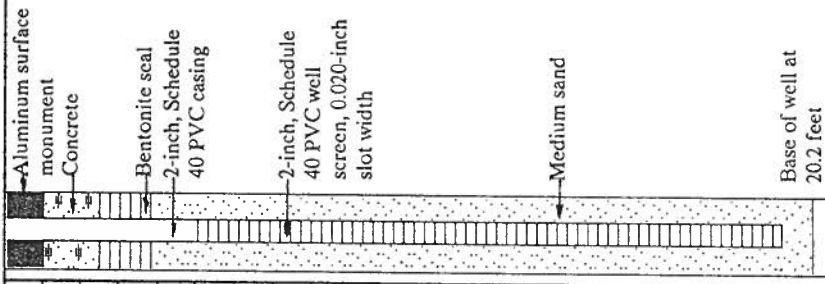


TEP:OKP:CDO 2/8/90

MONITOR WELL NO. MW-7

WELL SCHEMATIC

Casing Elevation: 97.43
Casing Stickup: -0.29



Vapor Conc. (ppm)
Sheen



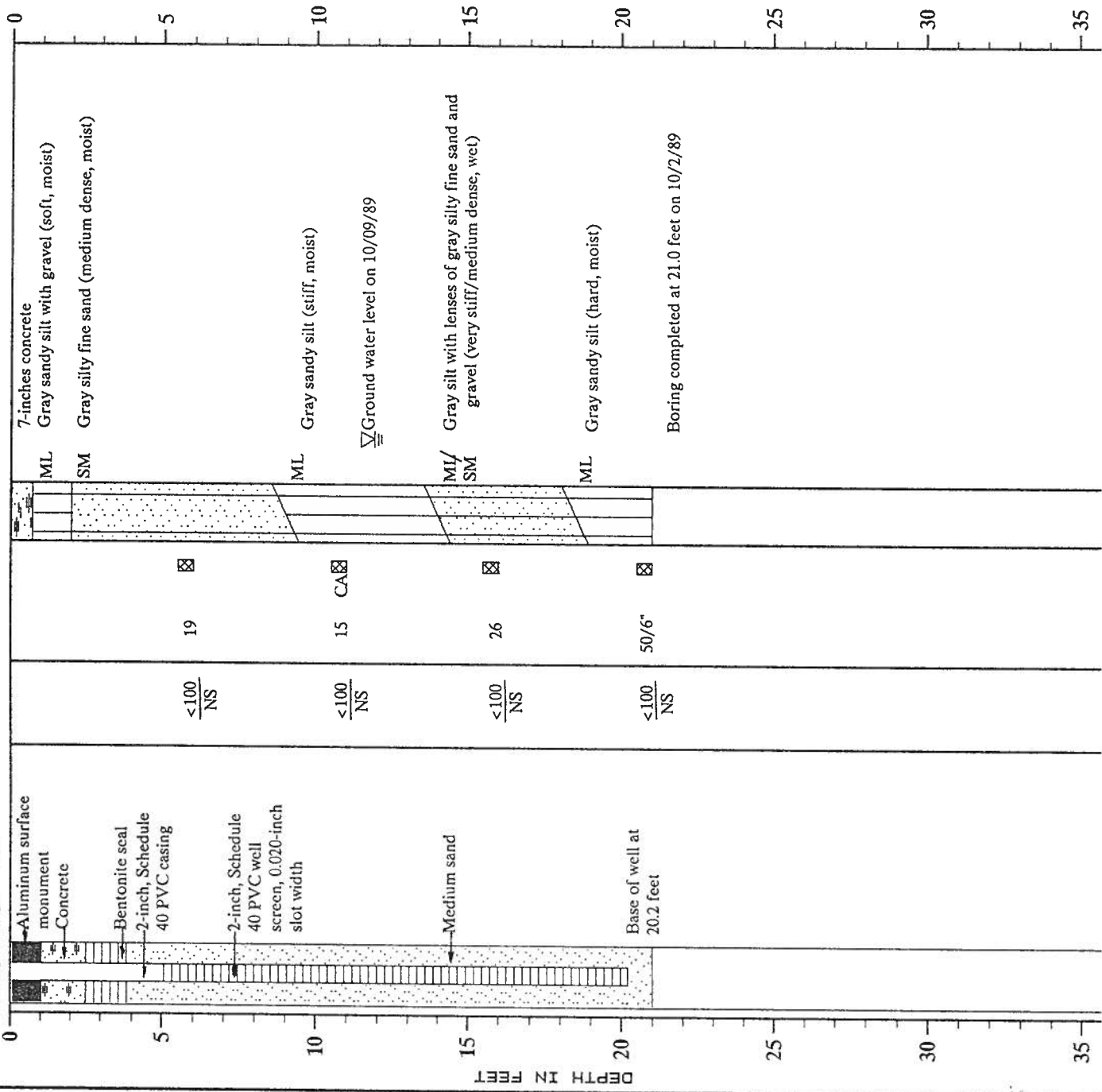
<100 / NS
19
<100 / NS
15 CA
<100 / NS
26
<100 / NS
50/6"

Group Symbol



7-inches concrete
ML Gray sandy silt with gravel (soft, moist)
SM Gray silty fine sand (medium dense, moist)
ML Gray sandy silt (stiff, moist)
Ground water level on 10/09/89
ML/SM Gray silt with lenses of gray silty fine sand and gravel (very stiff/medium dense, wet)
ML Gray sandy silt (hard, moist)

Boring completed at 21.0 feet on 10/2/89



Geo Engineers

November 9, 1990

Consulting Geotechnical
Engineers and Geologists

The Circle K Corporation
P.O. Box 52084
Phoenix, Arizona 85072

Attention: Mr. Robert F. Staab

We are submitting three copies of "Progress Report No. 2" regarding remedial actions at the site of Circle K Facility 1461 in Seattle, Washington. The general scope of our services is described in our proposal dated January 18, 1990. Our services were authorized by Mr. Robert F. Staab of the Circle K Corporation on January 24, 1990.

We appreciate the opportunity to be of service to the Circle K Corporation. Please call if you have any questions regarding this report.

Yours very truly,

GeoEngineers, Inc.



James A. Miller
Principal

OKP:JAM:cs

File No. 1780-002-B04



T A B L E O F C O N T E N T S

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PROGRESS REPORT NO. 2
REMEDIAL MONITORING PROGRAM
CIRCLE K FACILITY 1461
SEATTLE, WASHINGTON
FOR
CIRCLE K CORPORATION

INTRODUCTION

This report summarizes the results of the subsurface fuel recovery and ground water monitoring programs at the site of former Circle K Facility 1461 between June 28 and October 5, 1990. Facility 1461 was located in Seattle, Washington and consisted of a convenience store which marketed leaded and unleaded gasoline. The Circle K Corporation filed for bankruptcy (Chapter 11, Title 11, United States Code) on May 15, 1990 and closed Facility 1461 on July 31, 1990. We received a letter from the Circle K Corporation on September 26, 1990 stating that Circle K had rejected the lease of Facility 1461 and would discontinue their remediation program at the site effective October 5, 1990. On October 9, 1990 we received a follow-up letter requesting immediate termination of our services at the site.

This report presents data from the monitoring of remediation activities and site conditions and evaluates the effectiveness of the remedial plan. The results of our subsurface remedial monitoring prior to June 28, 1990 are presented in our reports dated March 6 and August 23, 1990.

The free product recovery and ground water treatment systems started operating on a full-time basis on December 6, 1989. Glacier Environmental (Glacier Environmental Services, Inc.) has been responsible for the operation and maintenance of the recovery and treatment systems. Glacier Environmental has not monitored or serviced the recovery and treatment systems since September 25, 1990. It is our understanding that the property owner of the site has continued to operate the recovery and treatment



MONITORING ACTIVITIES

MONITOR WELL MEASUREMENTS

The locations of all existing monitor wells at the site are shown in Figure 1. Free product thicknesses, ground water elevations and well casing hydrocarbon vapor concentrations were measured monthly in each well during this reporting period.

Product Thickness: Free product was detected in wells MW-4, MW-8, MW-9 and MW-15. Product thicknesses in wells MW-4, MW-8 and MW-9 ranged from 0.22 feet to 1.00 feet between July 8 and September 10, 1990. Product thicknesses in well MW-15 ranged from 0.01 feet to 3.22 feet during the same period. The greatest thickness of free product in each of the four wells measured during this reporting period was detected during our September monitoring episode. Free product thicknesses measured in the monitor wells are listed in Table 1. Free product was bailed monthly from the monitor wells as part of our monitoring activities at the site.

Water Levels: Ground water elevations were measured monthly in each of the monitor wells. Ground water elevations measured during the period covered by this report are presented in Table 2. As discussed in our previous reports, shallow ground water in the vicinity of the site flows toward the northeast, except where water levels are influenced by pumping in the recovery well.

Ground water elevations in all wells except MW-16 decreased during this reporting period. From July 8 to September 10, 1990, ground water elevations in individual wells decreased by approximately 0.1 to 1.7 feet. The ground water elevation in MW-16 increased by 0.34 feet from July to September 1990.

Hydrocarbon Vapor Concentrations: Hydrocarbon vapor concentrations in the monitor well casings were measured monthly using a Bacharach TLV Sniffer calibrated to hexane. Table 3 lists the hydrocarbon vapor concentrations measured in the well casings during this reporting period.

Hydrocarbon vapors were detected at concentrations greater than



FREE PRODUCT RECOVERY SYSTEM

The volume of free product recovered at the site using the Filter Scavenger pumping system was measured weekly by Glacier Environmental personnel as part of the routine monitoring of the recovery and treatment systems. Product was pumped to an aboveground storage drum prior to removal from the site. The Filter Scavenger recovery system has been operating continuously at the site since December 6, 1989, except for several pump maintenance and repair episodes totaling about 10 to 20 days.

Approximately 36 gallons of product were pumped from the recovery well between June 25 and September 25, 1990. A total of 538 gallons of product has been recovered at the site since pumping began on December 6, 1989. The product recovery rate averaged 0.4 gallons per day during this report period. Product recovery data are summarized in Table 4.

GROUND WATER TREATMENT SYSTEM

The ground water depression pump has operated almost continuously since December 6, 1989. The pump was shut down during demolition of the service island between March 21 and March 23, 1990. The ground water treatment system was turned off from June 10 to June 12, 1990 for equipment maintenance.

Approximately 42,000 gallons of water were pumped, treated and discharged to the Metro sewer from June 8 to September 12, 1990. Ground water was recovered at an average rate of about 450 gallons per day during this period. The recovery well appears to be drawing shallow ground water from the vicinity of all wells containing free product. The ground water cone of depression has remained relatively stable since the recovery system began continuous operation in December 1989. The depth to ground water in the recovery well is approximately 15.5 feet below ground surface.

Three rounds of water samples were collected from the water treatment system sampling ports during this reporting period. The samples were analyzed for BETX (benzene, ethylbenzene, toluene and xylenes) by EPA Method 8000 to evaluate the effectiveness of the two carbon filters in



treatment system. Laboratory data sheets and chain-of-custody records for the samples collected from the water treatment system are included in Appendix A.

Benzene concentrations in untreated ground water samples collected from Sampling Port No. 1 ranged from 16,000 to 35,000 $\mu\text{g}/\text{l}$ (micrograms per liter). As shown in Table 5, the benzene concentrations detected in the samples collected from Sampling Port No. 2 fluctuated between 57 and 640 $\mu\text{g}/\text{l}$ during this reporting period. Based on the chemical data obtained from Sampling Port No. 2, the primary carbon filter was replaced on August 20, 1990 with the secondary (polishing) carbon filter, and a new carbon filter was installed as the polishing filter. The primary carbon filters appear to have a life span of approximately six weeks before significant concentrations of BETX are discharged into the polishing filter. The polishing filter was effective in removing any remaining BETX compounds from the treated water prior to discharge into the sanitary sewer line (Table 5).

The discharge from the water treatment system to the Metro (Municipality of Metropolitan Seattle) sanitary sewer was monitored and sampled in accordance with the requirements outlined in the Metro Authorization for Discharge. Samples of the treated discharge water were collected monthly from Sampling Port No. 3. BETX and oil and grease were not detected in the discharge water. The pH of the discharge water is typical of clean ground water. Laboratory data obtained from the sampling of the treated discharge water are included in Table 5. Laboratory data sheets for these samples are included in Appendix A.

Hydrocarbon vapor concentrations were measured monthly at the point of discharge to the lateral sanitary sewer line using a Bacharach TLV Sniffer calibrated to hexane. Hydrocarbon vapor concentrations ranged from 800 ppm to 1,000 ppm (7% to 9% LEL) during this reporting period.

Results of our monthly sampling and monitoring of the discharge from the ground water treatment system were submitted to Metro on July 31 and



DISCUSSION OF RESULTS

ASSESSMENT OF SUBSURFACE CONTAMINATION

Free product was observed floating on shallow ground water in four monitor wells between July and September 1990. Product thicknesses in wells MW-4, MW-8 and MW-9 ranged from 0.22 to 1.00 feet during this period. Product thicknesses in these three wells did not change significantly from the thicknesses measured prior to July 1990.

Product was first detected in MW-15 on July 8, 1990. As stated in our September 17, 1990 letter to Circle K, product thickness in MW-15 increased from trace amounts in mid-July to 3.22 feet on September 10, 1990. ~~No~~ monitor wells exist downgradient of MW-15.

Ground water quality samples were not collected from the monitor wells during this reporting period. Chemical data resulting from our most recent round of monitor well sampling on June 11, 1990 showed that fuel-contaminated ground water was present in the monitor wells located immediately outside of the edge of the free product plume. Several of the monitor wells contained BETX concentrations which exceeded draft MTCA (Model Toxics Control Act) Compliance Cleanup Levels (July 18, 1990). The lateral extent of ground water contamination north of MW-15 and west of MW-13 is not known because no downgradient monitor wells exist in these areas.

High concentrations of hydrocarbon vapors were measured in the monitor well casings located in and adjacent to the free product plume. The low concentrations of hydrocarbon vapors measured in outlying wells indicate that subsurface hydrocarbon vapors in the soil probably have not migrated a significant distance laterally from the edge of the free product plume. Residents in the vicinity of the site have not reported any problems with hydrocarbon vapors during this reporting period.

REMEDIAL ACTION PERFORMANCE

The ground water remediation system has been operating almost continuously during this reporting period. Our remedial monitoring indicates that



The rate of free product recovery decreased from approximately 0.8 gpd (gallons per day) in July to 0.3 gpd in August and September 1990. Factors which likely control the product recovery rate at this site include: (1) the decreasing volume of free product in the subsurface, (2) seasonal fluctuations in the ground water table elevation, and (3) the relative permeability of the subsurface soils. Based on our monitor well measurements, a significant volume of free product likely remains in the subsurface.

The ground water remediation system effectively treated 42,000 gallons of fuel-contaminated ground water recovered at the site between June 8 and September 12, 1990. Because water samples were not collected from the monitor wells during this reporting period, it is not possible to fully evaluate the effectiveness of the ground water remediation system.

RECOMMENDATIONS

The presence of free product in MW-15 warrants additional studies to evaluate the downgradient extent of free product and ground water contamination in the vicinity of MW-15. The following regulations require a complete assessment of the occurrence of free product in the ground water and immediate containment and recovery of the product:

- o The U.S. Environmental Protection Agency's underground storage tank regulations (40 CFR Parts 280.64 and 280.65).
- o State of Washington, Water Pollution Control Law (Sections RCW 90.48.320 and RCW 90.48.325).
- o State of Washington, Model Toxics Control Act Cleanup Regulation (Section 173-340-450, July 18, 1990 DRAFT).

Explorations may be necessary to determine if the plume of free product extends beneath the private residences in the vicinity of MW-15. A risk to human health may exist if the plume of free product has migrated to the locations of the private residences. We recommend that the presence of free product in MW-15 be addressed by (1) installing additional downgradient



Continued operation and monitoring of the existing free product recovery and ground water treatment system is recommended. The ground water elevation, free product thickness and concentration of hydrocarbon vapors should be measured monthly in each of the fourteen existing monitor wells. Quarterly water quality samples should be collected from the wells located near the edge of the free product plume, and the samples should be analyzed for BETX.

The Metro Discharge Authorization was revised by Metro on September 11, 1990. The revised authorization requires sampling of the treated water for BETX and oil and grease twice yearly. Monthly reports containing results from any sampling and analyses outlined in the Authorization continue to be required by Metro. Additional samples should be collected from the three water sampling ports on a routine basis and analyzed for BETX to evaluate the effectiveness of the treatment system and whether the carbon filters need replacement.

The existing remedial installation was designed to accommodate a VES (vapor extraction system) to treat gasoline contamination in the vadose (unsaturated) zone. We recommend installation and operation of the VES as soon as possible. VES design and installation details are presented in our March 6, 1990 report.

LIMITATIONS

We have prepared this report for use by the Circle K Corporation. The report may be made available to regulatory agencies and other parties interested in this site. This report is not intended for use by others, and the information contained herein may not be applicable to other sites.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in this area at the time this report was prepared. No other conditions, express or implied, should be understood.



Please call if you have questions regarding this report.

Respectfully submitted,

GeoEngineers, Inc.

James G. Roth
James G. Roth
Hydrogeologist

Otto K. Paris

Otto K. Paris
Project Geologist

James A. Miller
James A. Miller, P.E.
Principal

JGR:OKP:JAM:cs



TABLE 1
PRODUCT THICKNESS IN GROUND WATER
MONITOR WELLS

| Well Number | Measurement Date | Product Thickness (feet) |
|-------------|------------------|--------------------------|
| MW-04 | 07/08/90 | 0.68 |
| | 08/07/90 | 0.71 |
| | 08/13/90 | 0.22 |
| | 09/10/90 | 1.00 |
| MW-08 | 07/08/90 | 0.34 |
| | 08/07/90 | 0.42 |
| | 08/13/90 | 0.24 |
| | 09/10/90 | 0.76 |
| MW-09 | 07/08/90 | 0.42 |
| | 08/07/90 | 0.41 |
| | 08/13/90 | 0.25 |
| | 09/10/90 | 0.46 |
| MW-15 | 07/08/90 | 0.08 |
| | 07/12/90 | 0.01 |
| | 07/18/90 | 0.03 |
| | 07/24/90 | 0.30 |
| | 08/07/90 | 0.94 |
| | 08/13/90 | 1.00 |
| | 09/10/90 | 3.22 * |

Note: Product thickness equals the elevation of the product/air interface minus the elevation of the product/water interface.



**TABLE 2
GROUND WATER ELEVATIONS IN MONITOR WELLS**

| Monitor Well No. | TOC Elevation (feet) | Ground Water Surface Elevations (feet) | | |
|------------------|----------------------|--|----------|----------|
| | | 07/08/90 | 08/07/90 | 09/10/90 |
| MW-01 | 100.94 | 88.38 | 88.10 | 87.78 |
| MW-04* | 98.38 | 84.32 | 84.34 | 84.23 |
| MW-05 | 90.94 | 80.39 | 79.99 | 79.48 |
| MW-06 | 97.92 | 85.96 | 85.69 | 85.35 |
| MW-07 | 97.43 | 87.23 | 86.33 | 85.63 |
| MW-08* | 98.36 | 85.92 | 85.70 | 85.47 |
| MW-09* | 99.03 | 87.13 | 86.93 | 86.73 |
| MW-10 | 97.55 | 86.79 | 86.29 | 85.86 |
| MW-11 | 98.62 | 88.58 | 88.22 | 86.92 |
| MW-12 | 96.56 | 86.09 | 85.63 | 85.12 |
| MW-13 | 99.95 | 87.04 | 86.86 | 86.67 |
| MW-14 | 98.07 | 87.34 | 86.73 | 86.34 |
| MW-15* | 99.04 | 87.83 | 87.35 | 87.05 |
| MW-16 | 99.04 | 87.97 | 87.61 | 88.31 |

Notes:

"TOC" = top of well casing; elevations based on assumed datum of 100.00 feet.
 * = free product present in well; reported water surface elevations are corrected for the equivalent column height of water.

TABLE 3
HYDROCARBON VAPOR CONCENTRATIONS IN
GROUND WATER MONITOR WELL CASINGS

| Monitor Well No. | Hydrocarbon Vapor Concentrations (ppm) | | |
|------------------|--|----------|----------|
| | 07/08/90 | 08/07/90 | 09/10/90 |
| MW-01 | 160 | 120 | 100 |
| MW-04 | >10,000 | 500 | >10,000 |
| MW-05 | <100 | 160 | <100 |
| MW-06 | 1,000 | 180 | <100 |
| MW-07 | 180 | 120 | <100 |
| MW-08 | >10,000 | >10,000 | >10,000 |
| MW-09 | >10,000 | >10,000 | >10,000 |
| MW-10 | 110 | 320 | <100 |
| MW-11 | 290 | 200 | <100 |
| MW-12 | 160 | 240 | <100 |
| MW-13 | >10,000 | 2,100 | 1,000 |
| MW-14 | 800 | 120 | 200 |
| MW-15 | >10,000 | >10,000 | 5,000 |
| MW-16 | 100 | 100 | 100 |

Notes:

ppm = parts per million

Hydrocarbon vapor concentrations were measured in the monitor well casings using a Bacharach TLV Sniffer calibrated to hexane (110 ppm = 1% LEL)



TABLE 4
SUMMARY OF FREE PRODUCT RECOVERY DATA

| Date | Free Product Recovered (gallons) | Free Product Recovery Rate (gpd) | Cumulative Free Product Recovered (gallons) |
|-----------|----------------------------------|----------------------------------|---|
| *07/02/90 | 0.0 | 0.0 | 501.9 |
| 07/09/90 | 5.3 | 0.8 | 507.2 |
| 07/16/90 | 8.8 | 0.5 | 516.0 |
| 07/23/90 | 3.2 | 0.5 | 519.2 |
| 07/30/90 | 4.0 | 0.6 | 523.2 |
| 08/08/90 | 2.9 | 0.3 | 526.1 |
| 08/13/90 | 1.6 | 0.3 | 527.7 |
| 08/20/90 | 3.0 | 0.4 | 530.7 |
| 08/27/90 | 2.2 | 0.3 | 532.9 |
| 09/11/90 | 2.1 | 0.1 | 535.0 |
| 09/18/90 | 0.4 | 0.1 | 535.4 |
| 09/25/90 | 2.6 | 0.4 | 538.0 |

Notes:

"gpd" = gallons per day

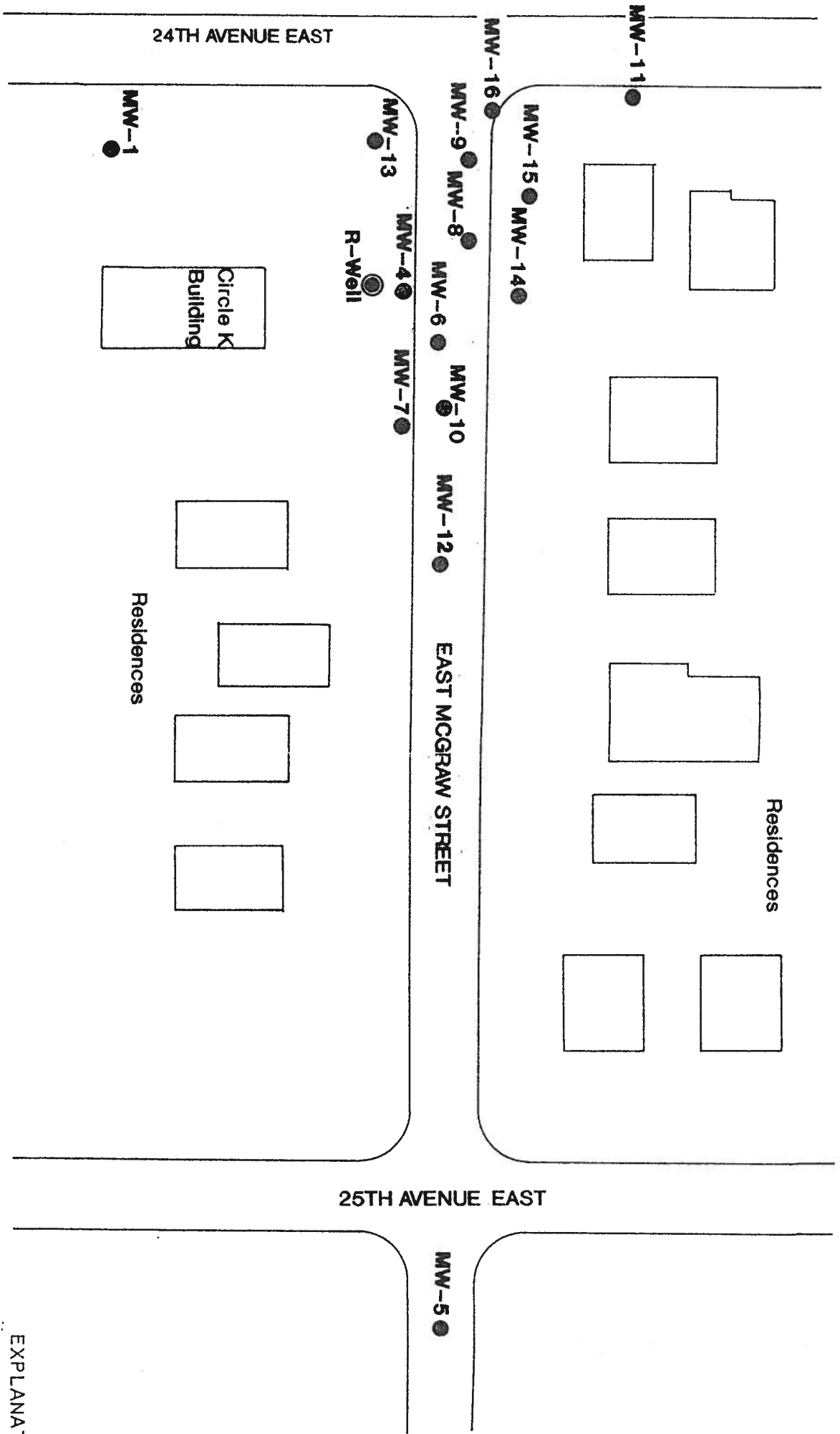
* = Product pump was inoperative for part of this period

= WATER QUALITY DATA,
TREATMENT SYSTEM SAMPLES

| Date | EPA Method 8020 (ug/l) | | | | EPA Method 150.1 | EPA Method 413.2 |
|------|------------------------|--------------|---------|---------------|------------------|------------------|
| | Benzene | Ethylbenzene | Toluene | Total Xylenes | | |
| 9/0 | 33,000 | 2,500 | 41,000 | 21,000 | NA | NA |
| 9/0 | 16,000 | ND | 18,000 | 9,600 | NA | NA |
| 9/0 | 35,000 | 1,700 | 41,000 | 12,000 | NA | NA |
| 9/0 | 57 | 0.5 | 6.0 | 4.6 | NA | NA |
| 9/0 | 640 | ND | 27 | ND | NA | NA |
| 9/0 | 120 | ND | 15 | ND | NA | NA |
| 9/0 | 0.5 | ND | 1.3 | 1.0 | 6.8 | <1 |
| 9/0 | ND | ND | ND | ND | 6.7 | <1 |
| 9/0 | ND | ND | ND | ND | NA | NA |

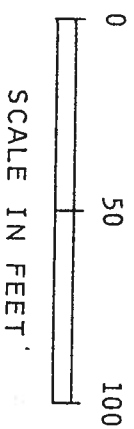
per liter

see laboratory data sheets in Appendix A for analyte detection limits.



EXPLANATION:

- MW-1 ● MONITOR WELL LOCATION AND NUMBER
- R-Well ● RECOVERY WELL LOCATION



APPENDIX A



Analytical Technologies, Inc.

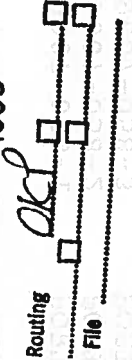
560 Naches Avenue, S.W., Suite 101, Renton, WA 98055, (206) 228-8335

ATI I.D. # 9007-058

GeoEngineers

August 2, 1990

AUG 3 1990



GeoEngineers, Inc.
 2405 140th Avenue N.E.
 Suite 105
 Bellevue, WA 98005

Attention : Otto Paris

Project Number : 1780-02-B4

Project Name : Circle K

On July 10, 1990 Analytical Technologies, Inc. received three water samples for analysis. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Dana M. Walker
 Dana M. Walker
 Project Manager

Frederick W. Grothkopp
 Frederick W. Grothkopp
 Technical Manager

| ATI # | CLIENT DESCRIPTION | DATE SAMPLED | MATRIX |
|------------|--------------------|--------------|--------|
| 9007-058-1 | PORT 1 | 07/09/90 | WATER |
| 9007-058-2 | PORT 2 | 07/09/90 | WATER |
| 9007-058-3 | PORT 3 | 07/09/90 | WATER |

----- TOTALS -----

| MATRIX | # SAMPLES |
|--------|-----------|
| WATER | 3 |

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

ANALYTICAL SCHEDULE

CLIENT : GEOENGINEERS, INC.
PROJECT # : 1780-02-B4
PROJECT NAME : CIRCLE K

| ANALYSIS | TECHNIQUE | REFERENCE | LAB |
|--------------|-----------|-----------|-----|
| BETX | GC/PID | EPA 8020 | R |
| OIL & GREASE | IR | EPA 413.2 | R |
| PH | ELECTRODE | EPA 150.1 | R |

EPA METHOD : 8020 (BETX)

DILUTION FACTOR : 1

COMPOUND

RESULT

BENZENE <0.5
ETHYLBENZENE <0.5
TOLUENE <0.5
TOTAL XYLENES <0.5

SURROGATE PERCENT RECOVERY

BROMOFUOROBEZENE

103

Accepted - TWA = B
operated - TWA = GB
e.g. - TWA =
Benzene - TWA =
Toluene - TWA =
Xylene - TWA =
Total Xylenes - TWA =
Surrogate - TWA =



PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT : GEOENGINEERS, INC. DATE SAMPLED : 07/09/90
 PROJECT # : 1780-02-B4 DATE RECEIVED : 07/10/90
 PROJECT NAME : CIRCLE K DATE EXTRACTED : N/A
 CLIENT I.D. : PORT 1 DATE ANALYZED : 07/22/90
 SAMPLE MATRIX : WATER UNITS : ug/L
 EPA METHOD : 8020 (BETX) DILUTION FACTOR : 1000

 COMPOUND RESULT

BENZENE 33,000
 ETHYLBENZENE 2,500
 TOLUENE 41,000
 TOTAL XYLENES 21,000

SURROGATE PERCENT RECOVERY
 BROMOFLUOROBENZENE 103

EPA METHOD : 8020 (BETX)

DILUTION FACTOR : 1

COMPUND

TOUJESZ

RESULF

CONDUQDQD

BENZENE
ETHYLBENZENE
TOLUENE
TOTAL XYLLENES

000 / 2 E
000 / 5
000 / 11
000 / 25

57 *
0.5
6.0
4.6

BHEVNER
ZKXNMYRUPRIS
ZKXNMYRUPRIS
ZKXNMYRUPRIS

SURROGATE PERCENT RECOVERY

BROMOFLUOROBENZENE

411

102

ZKXNMYRUPRIS

* Dilution factor = 10.

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT : GEOENGINEERS, INC. DATE SAMPLED : 07/09/90
PROJECT # : 1780-02-B4 DATE RECEIVED : 07/10/90
PROJECT NAME : CIRCLE K DATE EXTRACTED : N/A
CLIENT I.D. : PORT 3 DATE ANALYZED : 07/22/90
SAMPLE MATRIX : WATER UNITS : ug/L
EPA METHOD : 8020 (BETX) DILUTION FACTOR : 1

COMPOUND : SURROGATE PERCENT RECOVERY RESULT

BENZENE 0.5
ETHYLBENZENE <0.5
TOLUENE 1.3
TOTAL XYLENES 1.0

SURROGATE PERCENT RECOVERY

BROMOFLUOROBENZENE 106

| COMPOUND | SAMPLE RESULT | SPIKE ADDED | SPIKED SAMPLE | % REC | DUP | |
|---------------|---------------|-------------|---------------|-------|---------------|-----------|
| | | | | | SPIKED SAMPLE | % REC RPD |
| BENZENE | <0.5 | 12.0 | 10.1 | 84 | 10.0 | 83 |
| TOLUENE | <0.5 | 12.0 | 10.0 | 83 | 9.79 | 82 |
| TOTAL XYLENES | <0.5 | 16.6 | 13.1 | 79 | 12.4 | 75 |

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

PURGEABLE AROMATICS
QUALITY CONTROL DATA

CLIENT : GEOENGINEERS, INC. SAMPLE I.D. : 9007-058-2
 PROJECT # : 1780-02-B4 DATE ANALYZED : 07/22/90
 PROJECT NAME : CIRCLE K MATRIX : WATER
 EPA METHOD : 8020 (BETX) UNITS : ug/L

| COMPOUND | SAMPLE RESULT | SPIKE ADDED | SPIKED SAMPLE | % REC | DUP | | REC | RPD |
|---------------|---------------|-------------|---------------|-------|--------|-----|-----|-----|
| | | | | | SAMPLE | % | | |
| BENZENE | 57.0 | 12.0 | 66.5 | 79 | 68.3 | 94 | 3 | |
| TOLUENE | 6.0 | 12.0 | 20.0 | 117 | 19.4 | 112 | 3 | |
| TOTAL XYLENES | 4.6 | 16.6 | 23.4 | 113 | 22.2 | 106 | 5 | |

| ITEM | DESCRIPTION | QTY | UNIT PRICE | TOTAL PRICE | REMARKS |
|------|-------------|-----|------------|-------------|---------|
| 1 | ... | ... | ... | ... | ... |
| 2 | ... | ... | ... | ... | ... |
| 3 | ... | ... | ... | ... | ... |
| 4 | ... | ... | ... | ... | ... |
| 5 | ... | ... | ... | ... | ... |
| 6 | ... | ... | ... | ... | ... |
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| 8 | ... | ... | ... | ... | ... |
| 9 | ... | ... | ... | ... | ... |
| 10 | ... | ... | ... | ... | ... |
| 11 | ... | ... | ... | ... | ... |
| 12 | ... | ... | ... | ... | ... |
| 13 | ... | ... | ... | ... | ... |
| 14 | ... | ... | ... | ... | ... |
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| 18 | ... | ... | ... | ... | ... |
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| 21 | ... | ... | ... | ... | ... |
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| 23 | ... | ... | ... | ... | ... |
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| 25 | ... | ... | ... | ... | ... |
| 26 | ... | ... | ... | ... | ... |
| 27 | ... | ... | ... | ... | ... |
| 28 | ... | ... | ... | ... | ... |
| 29 | ... | ... | ... | ... | ... |
| 30 | ... | ... | ... | ... | ... |

TOTAL
GRAND TOTAL

001 X (Address address - address address) = address address

002 X (Address address - address address) = address address

GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : WATER
PROJECT # : 1780-02-B4
PROJECT NAME : CIRCLE K UNITS : -

ATI I.D. # CLIENT I.D. PH

9007-058-3 PORT 3 6.8

| PARAMETER | UNITS | I. D. | RESULT | RESULT | RPD | RESULT | ADDED | REC |
|-----------------|-------|------------|--------|--------|-----|--------|-------|------|
| OIL & GREASE | mg/L | 9006-227-4 | 19 | 25 | 27 | 37 | 10 | 180* |
| PH | - | 9007-063-1 | 8.07 | 8.66 | 7 | N/A | N/A | N/A |

* Out of limits due to matrix interference.

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Chain of Custody 9007-058

DATE 7/90 PAGE 1 OF 1

LABORATORY NUMBER: 9007-058

| DATE | TIME | MATRIX | LAB ID |
|------|------|--------|--------|
| 7/9 | ↑ | ↑ | ↑ |
| 7/9 | ↑ | ↑ | ↑ |
| 2 | 2 | 2 | 4 |

| | | | | | | | |
|--------------------------------|-----------------------|--|--|--|--|--|--|
| 8010 | Halogenated Volatiles | | | | | | |
| 8020 | Aromatic Volatiles | | | | | | |
| BETX ONLY | | | | | | | |
| 8240 | GCMS Volatiles | | | | | | |
| 8270 | GCMS BNA | | | | | | |
| 8310 | HPLC PNA | | | | | | |
| 8080 | Pesticides & PCBs | | | | | | |
| PCBs ONLY | | | | | | | |
| 8140 | Phosphate Pesticides | | | | | | |
| 8150 | Herbicides | | | | | | |
| WDOE PAH/HH (WAC 173) | | | | | | | |
| 418.1 (TPH) | | | | | | | |
| 4132 Grease & Oil | | | | | | | |
| 8015 (Modified) | | | | | | | |
| TOC 9060 | | | | | | | |
| TOX 9020 | | | | | | | |
| % Moisture | | | | | | | |
| TCLP | | | | | | | |
| Priority Pollutant Metals (13) | | | | | | | |
| EPTOX Metals (9) Total | | | | | | | |
| EP TOX Metals (9) EP EXT | | | | | | | |
| PH | | | | | | | |
| ANALYSIS REQUEST | | | | | | | |
| NUMBER OF CONTAINERS | | | | | | | |

| SAMPLE RECEIPT | | | |
|--|------------------------|------------------------|--|
| RELINQUISHED BY: 1. | RECEIVED BY: 1. | RECEIVED BY: (LAB) 3. | |
| Signature: [Signature] | Signature: [Signature] | Signature: [Signature] | |
| Date: 7/10 | Date: [Date] | Date: [Date] | |
| Company: [Company] | Company: [Company] | Company: [Company] | |
| RELINQUISHED BY: 2. | RECEIVED BY: 2. | RECEIVED BY: (LAB) 3. | |
| Signature: [Signature] | Signature: [Signature] | Signature: [Signature] | |
| Date: [Date] | Date: [Date] | Date: [Date] | |
| Company: [Company] | Company: [Company] | Company: [Company] | |
| TOTAL NUMBER OF CONTAINERS | | 8 | |
| CHAIN OF CUSTODY SEALS Y/N/A | | Y | |
| INTACT? Y/N/A | | Y | |
| RECEIVED GOOD COND./COLD | | Y | |
| <input type="checkbox"/> 72 HRS <input type="checkbox"/> 1 WK <input checked="" type="checkbox"/> 2 WKS (Normal) | | 4/0 | |
| D FOR RUSH DATA | | | |

11:3

7-11

duplicate preserved

September 4, 1990

SEP 05 1990

Routing
File

GeoEngineers, Inc.
2405 140th Avenue N.E.
Suite 105
Bellevue, WA 98005

Attention : Otto Paris

Project Number : 1780-02-B4

Project Name : Circle K

On August 14, 1990 Analytical Technologies, Inc. received three water samples for analysis. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Mary F. Silva
Mary F. Silva
Senior Project Manager
FWG/hbb

Frederick W. Grothkopp
Frederick W. Grothkopp
Technical Manager

SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
PROJECT # : 1780-02-B4
PROJECT NAME : CIRCLE K

| ATI # | CLIENT DESCRIPTION | DATE SAMPLED | MATRIX |
|------------|--------------------|--------------|--------|
| 9008-099-1 | Port 1 | 08/13/90 | WATER |
| 9008-099-2 | Port 2 | 08/13/90 | WATER |
| 9008-099-3 | Port 3 | 08/13/90 | WATER |

----- TOTALS -----

MATRIX # SAMPLES

2

ANALYSIS

TECHNIQUE

REFERENCE

LAB

| ANALYSIS | TECHNIQUE | REFERENCE | LAB |
|--------------|-----------|-----------|-----|
| BETX | GC/PID | EPA 8020 | R |
| OIL & GREASE | IR | EPA 413.2 | R |
| PH | ELECTRODE | EPA 150.1 | R |

R Yash = ATI - Renton
 SD = ATI - San Diego
 T = ATI - Tempe
 PNR = ATI - Pensacola
 FC = ATI - Fort Collins
 SUB = Subcontract

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT : GEOENGINEERS, INC. DATE SAMPLED : N/A
PROJECT # : 1780-02-B4 DATE RECEIVED : N/A
PROJECT NAME : CIRCLE K DATE EXTRACTED : N/A
CLIENT I.D. : REAGENT BLANK DATE ANALYZED : 08/15/90
SAMPLE MATRIX : WATER UNITS : ug/L
EPA METHOD : 820 (BETX) DILUTION FACTOR : 1

COMPOUND RESULT

BENZENE <0.5
ETHYLBENZENE <0.5
TOLUENE <0.5
TOTAL XYLENES <0.5

SURROGATE PERCENT RECOVERY
BROMOFLUOROBENZENE 81

SAMPLE MATRIX : WATER
EPA METHOD : 8020 (BETX)

UNITS : ug/L
DILUTION FACTOR : 5000

| COMPOUND | RESULT |
|---------------|--------|
| BENZENE | 16,000 |
| ETHYLBENZENE | <2500 |
| TOLUENE | 18,000 |
| TOTAL XYLENES | 9,600 |

SURROGATE PERCENT RECOVERY : 91
BROMOFLUOROBENZENE

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT : GEOENGINEERS, INC. DATE SAMPLED : 08/13/90
PROJECT # : 1780-02-B4 DATE RECEIVED : 08/14/90
PROJECT NAME : CIRCLE K DATE EXTRACTED : N/A
CLIENT I.D. : PORT 2 DATE ANALYZED : 08/15/90
SAMPLE MATRIX : WATER UNITS : ug/L
EPA METHOD : 8020 (BETX) DILUTION FACTOR : 50

COMPOUND RESULT

BENZENE 640
ETHYLBENZENE <25
TOLUENE 27
TOTAL XYLENES <25

SURROGATE PERCENT RECOVERY
BROMOFLUOROBENZENE 88

SAMPLE MATRIX : WATER
EPA METHOD : 8020 (BETX)

UNITS : ug/L
DILUTION FACTOR : 1

COMPOUND

RESULT

BENZENE
ETHYLBENZENE
TOLUENE
TOTAL XYLENES

<0.5
<0.5
<0.5
<0.5

SURROGATE PERCENT RECOVERY

BROMOFLUOROBENZENE

84

PURGEABLE AROMATICS
QUALITY CONTROL DATA

CLIENT : GEOENGINEERS, INC. SAMPLE I.D. : 9008-097-1
 PROJECT # : 1780-02-B4 DATE ANALYZED : 08/14/90
 PROJECT NAME : CIRCLE K MATRIX : WATER
 EPA METHOD : 8020 (BETX) UNITS : ug/L

| COMPOUND | SAMPLE RESULT | SPIKE ADDED | SPIKE SAMPLE | % REC | DUP SAMPLE | SPIKE REC | % REC | DUP REC |
|---------------|---------------|-------------|--------------|-------|------------|-----------|-------|---------|
| BENZENE | <0.5 | 12.0 | 12.3 | 102 | 102 | 12.3 | 102 | 0 |
| TOLUENE | <0.5 | 12.0 | 12.3 | 102 | 102 | 12.3 | 102 | 0 |
| TOTAL XYLENES | <0.5 | 16.6 | 17.5 | 105 | 105 | 17.4 | 105 | 1 |

ATI I.D. #

CLIENT I.D.

OIL & GREASE

9008-099-3

Port 3

<1

| QTY | UNIT | QTY | UNIT | QTY | UNIT | QTY | UNIT | QTY | UNIT |
|-----|------|-----|------|-----|------|-----|------|-----|------|
| 1 | SOI | 1 | SOI | 1 | SOI | 1 | SOI | 1 | SOI |
| 1 | SOI | 1 | SOI | 1 | SOI | 1 | SOI | 1 | SOI |
| 1 | SOI | 1 | SOI | 1 | SOI | 1 | SOI | 1 | SOI |

001 X (Please attach - signed copy) - reviewed & approved
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 001 X (Please attach - signed copy) - reviewed & approved

GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : WATER
PROJECT # : 1780-02-B4
PROJECT NAME : CIRCLE K UNITS : mg/L

| PARAMETER | ATI I.D. | SAMPLE DUP RESULT | RPD RESULT | SPIKED RESULT | SPIKE ADDED | % TYP REC |
|--------------|------------|-------------------|------------|---------------|-------------|-----------|
| OIL & GREASE | 9008-087-1 | <1 | 0 | 6.2 | 10 | 62 |

GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : GEOENGINEERS, INC.
 PROJECT # : 1780-02-B4
 PROJECT NAME : CIRCLE K

SAMPLE MATRIX : WATER
 UNITS : -

| PARAMETER | ATI I.D. | SAMPLE RESULT | DUP RESULT | RPD | SPIKED RESULT | SPIKE ADDED | % REC |
|-----------|------------|---------------|------------|-----|---------------|-------------|-------|
| PH | 9008-099-3 | 6.68 | 6.70 | 0 | N/A | N/A | N/A |

LABORATORY RECEIPT

DATE: 1/15/03

TIME: 1:00 PM

ANALYST: JHP

PROJECT: 1780-02-B4

CLIENT: GEOENGINEERS, INC.

PROJECT NAME: CIRCLE K

RECEIVED GOOD CONTROLS

CHAIN OF CUSTODY

TOTAL NUMBER OF CONTAINERS: 1

CHAIN OF CUSTODY STARTS HERE

LABORATORY NUMBER: 1070

LABORATORY NAME: ANALYTICAL TECHNOLOGIES, INC.

12 HOURS DAY WEEK MONTH YEAR

DATE: 1/15/03

TIME: 1:00 PM

ANALYST: JHP

PROJECT: 1780-02-B4

CLIENT: GEOENGINEERS, INC.

PROJECT NAME: CIRCLE K

RECEIVED GOOD CONTROLS

CHAIN OF CUSTODY

TOTAL NUMBER OF CONTAINERS: 1

CHAIN OF CUSTODY STARTS HERE

LABORATORY NUMBER: 1070

LABORATORY NAME: ANALYTICAL TECHNOLOGIES, INC.

12 HOURS DAY WEEK MONTH YEAR



Analytical Technologies, Inc.

560 Naches Avenue SW, Suite 101 Renton, WA 98055

Chain of Custody

9008-099

PROJECT MANAGER: O. Paris
 COMPANY: GEE
 ADDRESS: _____
 PHONE: 715-5206 SAMPLED BY: JGR

LABORATORY NUMBER:

ANALYSIS REQUEST

SAMPLE DISPOSAL INSTRUCTIONS
 ATI Disposal @ \$5.00 each Return Pickup (will call)

| SAMPLE ID | DATE | TIME | MATRIX | LAB ID |
|-----------|------|------|------------------|--------|
| Part 1 | 8/17 | | H ₂ O | -1 |
| Part 2 | ↓ | | ↓ | -2 |
| Part 3 | ↓ | | ↓ | -3 |
| | | | | |
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|----------------------------|-------------------------|-----------|---------------------|---------------|---------------|-------------------------|------------|---------------------------|-----------------|-----------------------|-------------|--------------------|-----------------|----------|----------|------------|------|--------------------------------|
| 8010 Halogenated Volatiles | 8020 Aromatic Volatiles | BETX ONLY | 8240 GCMS Volatiles | 8270 GCMS BNA | 8310 HPLC PNA | 8080 Pesticides & PCB's | PCB's ONLY | 8140 Phosphate Pesticides | 8150 Herbicides | WDOE PAH/HH (WAC 173) | 418.1 (TPH) | 413.2 Grease & Oil | 8015 (Modified) | TOC 9060 | TOX 9020 | % Moisture | TCLP | Priority Pollutant Metals (13) |
| | | X | NORM | | | | | | | | | | | | | | | |
| | | X | 2 | | | | | | | | | | | | | | | |
| | | X | 5 | 72HR | | | | | | | X | NORM | | | | | | |

A - 26

| PROJECT INFORMATION | | SAMPLE RECEIPT | | RELINQUISHED BY: | | RELINQUISHED BY: | |
|---|---|---|---------------------------|-------------------------------|-------------------|---------------------|-------------|
| PROJECT NUMBER: <u>1780-02-BY</u> | TOTAL NUMBER OF CONTAINERS: <u>7</u> | CHAIN OF CUSTODY SEALS Y/N/NA: <u>N</u> | INTACT? Y/N/NA: <u>NA</u> | Signature: <u>[Signature]</u> | Time: <u>0810</u> | Signature: _____ | Time: _____ |
| PROJECT NAME: <u>(K)</u> | RECEIVED GOOD COND./COLD: <u>Y/N</u> | Company: <u>GEE</u> | | Printed Name: <u>Jim Roth</u> | Date: <u>8/17</u> | Printed Name: _____ | Date: _____ |
| PURCHASE ORDER NUMBER: | | | | Company: _____ | | Company: _____ | |
| VIA: <u>Carrier</u> | | | | RECEIVED BY: | | RECEIVED BY: | |
| TAT: <input type="checkbox"/> 24HR <input type="checkbox"/> 48 HRS <input checked="" type="checkbox"/> 72 HRS <input type="checkbox"/> 1 WK <input checked="" type="checkbox"/> 2 WKS (Normal) | PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA | | Signature: _____ | | Time: _____ | Signature: _____ | Time: _____ |
| SPECIAL INSTRUCTIONS: <u>LOGS & 72 hr. Turn-around on Part 2 & 3 BETX.</u> <u>NO HERCULES</u> <u>All other analyses are 2 week turn-around.</u> <u>Fax: 72 hr. Results to O. Paris ASAP</u> | | | | Printed Name: _____ | | Printed Name: _____ | |
| | | | | Company: _____ | | Company: _____ | |



Analytical Technologies, Inc.

560 Noches Avenue, S.W., Suite 101, Renton, WA 98055, (206) 228-8335

ATI I.D. # 9009-091

GeoEngineers

October 5, 1990

GeoEngineers, Inc.
2405 140th Avenue
Suite 105
Bellevue, WA 98005

Attention : Otto Paris

Project Number : 1780-002-B04

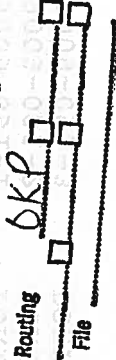
Project Name : Circle K

On September 14, 1990, Analytical Technologies, Inc. received three water samples for analysis. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Mary C. Silva
Mary C. Silva

Frederick W. Grothkopp
Frederick W. Grothkopp

OCT 05 1990



| ATI # | CLIENT DESCRIPTION | DATE SAMPLED | MATRIX |
|------------|--------------------|--------------|--------|
| 9009-091-1 | PORT 1 | 09/12/90 | WATER |
| 9009-091-2 | PORT 2 | 09/12/90 | WATER |
| 9009-091-3 | PORT 3 | 09/12/90 | WATER |

| MATRIX | # SAMPLES |
|--------|-----------|
| WATER | 3 |

----- TOTALS -----

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

ANALYTICAL SCHEDULE

CLIENT : GEOENGINEERS, INC.
PROJECT # : 1780-002-B04
PROJECT NAME : CIRCLE K

| ANALYSIS | TECHNIQUE | REFERENCE | LAB |
|----------|-----------|-----------|-----|
| ----- | | | |

BETX GC/PID EPA 8020 R

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 99. ID
 100. ID

PREVIOUS ANALYSIS

ANALYTICAL SCHEDULE

CLIENT I.D. : REAGENT BLANK
SAMPLE MATRIX : WATER
EPA METHOD : 8020 (BETX)

DATE ANALYZED : 02/24/20
UNITS : ug/L
DILUTION FACTOR : 1

COMPOUND

RESULT

BENZENE <0.5
ETHYLBENZENE <0.5
TOLUENE <0.5
TOTAL XYLENES <0.5

SURROGATE PERCENT RECOVERY

BROMOFLUOROBENZENE 96

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT : GEOENGINEERS, INC. DATE SAMPLED : N/A
 PROJECT # : 1780-002-B04 DATE RECEIVED : N/A
 PROJECT NAME : CIRCLE K DATE EXTRACTED : N/A
 CLIENT I.D. : REAGENT BLANK DATE ANALYZED : 09/29/90
 SAMPLE MATRIX : WATER UNITS : ug/L
 EPA METHOD : 8020 (BETX) DILUTION FACTOR : 1

| COMPOUND | RESULT |
|---------------|--------|
| BENZENE | <0.5 |
| ETHYLBENZENE | <0.5 |
| TOLUENE | <0.5 |
| TOTAL XYLENES | <0.5 |

SURROGATE PERCENT RECOVERY
 BROMOFLUOROBENZENE 113

CLIENT :
SAMPLE MATRIX : WATER
EPA METHOD : 8020 (BETX)

UNITS : ug/L
DILUTION FACTOR : 1

COMPOUND

RESULT

BENZENE <0.5
ETHYLBENZENE <0.5
TOLUENE <0.5
TOTAL XYLENES <0.5

SURROGATE PERCENT RECOVERY

BROMOFLUOROBENZENE 81

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT : GEOENGINEERS, INC.
PROJECT # : 1780-002-B04
PROJECT NAME : CIRCLE K
CLIENT I.D. : PORT 1
SAMPLE MATRIX : WATER
EPA METHOD : 8020 (BETX)
DATE SAMPLED : 09/12/90
DATE RECEIVED : 09/14/90
DATE EXTRACTED : N/A
DATE ANALYZED : 09/25/90
UNITS : ug/L
DILUTION FACTOR : 100

| COMPOUND | RESULT |
|---------------|----------|
| BENZENE | 35,000 * |
| ETHYLBENZENE | 1,700 |
| TOLUENE | 41,000 * |
| TOTAL XYLENES | 12,000 |

SURROGATE PERCENT RECOVERY

BROMOFLUOROBENZENE

90

* Dilution factor = 10,000.

CLIENT I.D. : FUKI 2
 SAMPLE MATRIX : WATER
 EPA METHOD : 8020 (BETX)

DATE ANALYZED : 03/20/2000
 UNITS : ug/L
 DILUTION FACTOR : 10

 COMPOUND

RESULT

BENZENE 120
 ETHYLBENZENE <5.0
 TOLUENE 15
 TOTAL XYLENES <5.0

SURROGATE PERCENT RECOVERY

BROMOFUOROBEZENE

80

* Analyzed past the 14 day hold time. The initial analysis was run on 9/25/90 at dilution factor = 100. Results are listed below in ug/L units.

BENZENE 110
 ETHYLBENZENE <50
 TOLUENE <50
 TOTAL XYLENES <50

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT : GEOENGINEERS, INC. DATE SAMPLED : 09/12/90
PROJECT # : 1780-002-B04 DATE RECEIVED : 09/14/90
PROJECT NAME : CIRCLE K DATE EXTRACTED : N/A
CLIENT I.D. : PORT 3 DATE ANALYZED : 09/29/90*
SAMPLE MATRIX : WATER UNITS : ug/L
EPA METHOD : 8020 (BETX) DILUTION FACTOR : 1

COMPOUND RESULT

BENZENE <0.5
ETHYLBENZENE <0.5
TOLUENE <0.5
TOTAL XYLENES <0.5

SURROGATE PERCENT RECOVERY
BROMOFLUOROBENZENE 118

* Analyzed past the 14 day hold time.

| COMPOUND | SAMPLE RESULT | SPIKE ADDED | SPIKED SAMPLE | % REC | DUP SAMPLE | % REC | DUP SAMPLE | RPD |
|---------------|---------------|-------------|---------------|-------|------------|-------|------------|-----|
| BENZENE | <0.5 | 12.0 | 12.4 | 103 | 12.1 | 101 | 2 | |
| TOLUENE | 0.6 | 12.0 | 12.8 | 102 | 12.5 | 99 | 2 | |
| TOTAL XYLENES | 4.4 | 16.6 | 20.8 | 99 | 20.0 | 94 | 4 | |

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

PURGEABLE AROMATICS
QUALITY CONTROL DATA

CLIENT : GEOENGINEERS, INC. SAMPLE I.D. : 9009-164-1
 PROJECT # : 1780-002-B04 DATE ANALYZED : 09/29/90
 PROJECT NAME : CIRCLE K MATRIX : WATER
 EPA METHOD : 8020 (BETX) UNITS : ug/L

| COMPOUND | SAMPLE RESULT | SPIKE ADDED | SPIKE SAMPLE | % REC | DUP SPIKE SAMPLE | DUP % REC |
|---------------|---------------|-------------|--------------|-------|------------------|-----------|
| BENZENE | <0.5 | 12.0 | 12.0 | 100 | 12.7 | 106 |
| TOLUENE | <0.5 | 12.0 | 11.7 | 97 | 12.3 | 103 |
| TOTAL XYLENES | <0.5 | 16.6 | 15.5 | 93 | 16.5 | 99 |

| DATE | TIME | MATRIX | LAB ID |
|------|------|--------|--------|
| 9/12 | 1759 | WATER | -1 |
| 9/12 | 1752 | WATER | -2 |
| 9/12 | 1750 | WATER | -3 |

| ANALYSIS REQUEST | NUMBER OF CONTAINERS |
|--------------------------------|----------------------|
| 8010 Halogenated Volatiles | |
| 8020 Aromatic Volatiles | |
| BETX ONLY | |
| 8240 GCMS Volatiles | |
| 8270 GCMS BNA | |
| 8310 HPLC PNA | |
| 8080 Pesticides & PCBs | |
| PCBs ONLY | |
| 8140 Phosphate Pesticides | |
| 8150 Herbicides | |
| WDOE PAHHH (MAC 173) | |
| 418.1 (TPH) | |
| 413.2 Grease & Oil | |
| 8015 (Modified) | |
| TOC 9060 | |
| TOX 9020 | |
| % Moisture | |
| EP TOX Metals (8) EP EXT | |
| Priority Pollutant Metals (13) | |
| 8080 Pesticide (4) | |
| 8240 ZH-EXT | |
| 8270 | |
| 8150 Herbicides (2) | |
| Metals (8) | |
| TC-P ONLY | |

| | | | |
|--|--|--|--|
| TOTAL NUMBER OF CONTAINERS COC SEALS/INTACT? Y/N/NA RECEIVED GOOD COND/COLD RECEIVED VIA: | | YES <input type="checkbox"/> NO <input type="checkbox"/> (LAB USE ONLY) | |
| ATTENTION IS REQUIRED FOR RUSH PROJECTS 48 HRS <input type="checkbox"/> 72 HRS <input type="checkbox"/> 1 WK <input type="checkbox"/> | | RECEIVED BY: LYNN MILLER 9/14 COMPANY: GEI | |
| REMOVED BY: 1. SIGNATURE: [Signature] TIME: 0945 DATE: 9/14 | | REMOVED BY: 2. SIGNATURE: [Signature] TIME: 1030P DATE: 9/14 | |
| REMOVED BY: 3. SIGNATURE: [Signature] TIME: [Blank] DATE: [Blank] | | REMOVED BY: 3. SIGNATURE: [Signature] TIME: [Blank] DATE: [Blank] | |