T-1336-02

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Department of Ecology

# Technical Memorandum 02
# Monitoring Well Installation and Groundwater Sampling Operation
# 2301 Lincoln Avenue
# Tacoma, Washington

*September 1992*

***NORTHWEST Wire Rope and Equipment, Inc.***
*2301 Lincoln Avenue*
*Tacoma, WA 98401*

**SHANNON & WILSON, INC.**
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SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

SEATTLE
EVERETT
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SAINT LOUIS

September 16, 1992

NORTHWEST Wire Rope and Equipment, Inc.
2301 Lincoln Avenue
Tacoma, Washington 98401

Attn: Mr. Ron Kline, Owner

**RE: TECHNICAL MEMORANDUM 02, MONITORING WELL INSTALLATION AND GROUNDWATER SAMPLING OPERATIONS AT 2301 LINCOLN AVENUE, TACOMA, WASHINGTON**

Enclosed you will find Technical Memorandum 02 which presents a summary of soil boring and monitoring well activities as performed by Shannon & Wilson on May 1 and May 18, 1992.

Groundwater samples were obtained from three monitoring wells on May 18, 1992 to test for the presence of benzene, toluene, ethylbenzene, xylenes, total petroleum hydrocarbons, and total lead as requested by Mr. John Hildenbrand of the Tacoma-Pierce County Health Department (TPCHD).

Upon your review, Shannon & Wilson will address each comment or question and submit a final copy to the Tacoma-Pierce County Health Department and Washington State Department of Ecology (Ecology).

Please contact me directly at (206) 633-6899 concerning your questions or comments.

Respectfully,

SHANNON & WILSON, INC.

Kimberly A. L. Fenske
Geoenvironmental Engineer

Robert Colombo
Environmental Project Manager

KLF:RC/klf

T1336-02.LT4/T1336-02-lkd/dgw

T-1336-02

400 NORTH 34TH STREET • SUITE 100
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SEATTLE, WASHINGTON 98103
206 • 632 • 8020 FAX 206 • 633 • 6777

## EXECUTIVE SUMMARY

Shannon & Wilson, Inc. (S&W) has completed the installation of three monitoring wells and initial groundwater sampling to characterize subsurface conditions at the Northwest Wire Rope and Equipment (NWWR), Inc. facility located in Tacoma, Washington. S&W has performed the services outlined in this document in response to the written request, dated April 1, 1992, of Mr. John Hildenbrand, R.S. of the Tacoma-Pierce County Health Department.

Soil and groundwater samples were collected and characterized for the presence of benzene, toluene, ethylbenzene, xylenes, total petroleum hydrocarbons, and total lead in accordance with the requirements of the Washington Model Toxics Control Act (MTCA). Soil sampling data, regulatory cleanup levels, and environmental drilling logs are presented in Table 1 and Appendix A. Groundwater data and analytical results are reported in Table 2 with geostatistically contoured concentration levels presented in Figures 3 through 9.

A single well, identified as MW001, contained a regulated level of total petroleum hydrocarbons as heavy oil (WTPH-418.1) in soil and regulated levels of total xylenes, total petroleum hydrocarbons as gasoline (WTPH-G), and total lead in groundwater. These data exceed the February 1991, MTCA Method 'A' cleanup levels.

Based on assessment activities and approval by the Tacoma-Pierce County Health Department, the owner will institute quarterly groundwater sampling of the three monitoring wells for a period of one year per the department's documentation dated June 12, 1992.

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# TECHNICAL MEMORANDUM 02
# MONITORING WELL INSTALLATION AND GROUNDWATER SAMPLING OPERATIONS AT 2301 LINCOLN AVENUE TACOMA, WASHINGTON

## 1.0 INTRODUCTION

Shannon & Wilson, Inc. has completed an extended site characterization assessment for Northwest Wire Rope and Equipment, Inc. as requested by Mr. John Hildenbrand of the Tacoma-Pierce County Health Department in a letter dated April 1, 1992. This extended assessment was primarily comprised of three monitoring well installations and a groundwater sampling event, which were conducted on May 1, 1992 and May 18, 1992, respectively.

## 2.0 AUTHORIZATION

Shannon and Wilson, Inc. performed this work in accordance with the contract authorized by Mr. Ron Kline, owner of Northwest Wire Rope and Equipment, Inc. on April 24, 1992.

## 3.0 SITE LOCATION

The facility is located at 2301 Lincoln Avenue, Tacoma, Washington. The geographical location of the property is illustrated in Figure 1, Vicinity Map. A U.S. Oil Company storage facility borders this property to the east and other industrial businesses exist in the surrounding area.

## 4.0 FACILITY BACKGROUND

A site closure and UST removal process was conducted by CEcon Corporation from October 23 through 27, 1991. A 600-gallon gasoline UST was removed during this period. Four soil samples were retrieved from the excavation side walls and submitted to Sound Analytical services for analysis by Washington (state) Total Petroleum Hydrocarbon (as) Gasoline (WTPH-G).

Results of the analysis indicated that the samples collected from the east, west, and south excavation walls (i.e., excavation of 20 by 20 by 3 feet) contained less than 1.0 part per million (ppm) petroleum as gasoline. A single soil sample collected from the north excavation wall, approximately 7.6 feet south of the adjacent building structure, contained 330 ppm of petroleum hydrocarbons as gasoline.

Groundwater was reported during excavation to be approximately 4 to 5 feet below grade.

# 5.0 MONITORING WELL INSTALLATIONS AND ASSESSMENT

## 5.1 Soil Boring Operations

Three soil borings and three permanent groundwater monitoring wells were installed by Hollow Stem Auger (HSA) techniques utilized by Environmental Drilling, Inc. of Snohomish, Washington. Drilling equipment consisted of a truck mounted Mobile B-61 HD soil drilling apparatus. Hollow stem auger soil drilling techniques conformed to the Standard Practice for Soil Investigation and Sampling by Auger Borings (American Society for Testing and Materials - ASTM D1452-80).

The drill rig and associated downhole drilling and sampling equipment were steam cleaned prior to arrival at the facility. Each borehole used distinct sets of auger flights. Appendix A contains the soil drilling depths, intervals, and soil descriptions within the environmental field drilling log for each boring. Soil samples were screened visually and with a Photoionization Detector (PID) to test for the presence of detectable volatile organic compounds. Upon completion of the three boreholes, the drill rig and associated downhole drilling and sampling equipment were steam cleaned prior to departure from the facility. Split-spoon samplers were decontaminated by removing loose soil and debris, cleaning with an Alconox and water solution, rinsing with deionized water, and air drying.

### 5.1.1 Soil Sampling

Soil samples were obtained at five-foot intervals from existing ground level. Split spoon techniques were employed in accordance with ASTM DI586-67, Standard Method for Penetration Test and Split-Barrel Sampling Of Soils. Samples are withdrawn from the borehole using the split-spoon sampler, opened for examination and classification, and transferred to laboratory prepared glassware for transport to the laboratory. Soil samples were removed from the split-spoon with a new stainless steel sampling spoon, placed in a new disposable aluminum pan and completely homogenized, and then placed in laboratory prepared sample containers in a such a manner as to assure minimal headspace. Sample containers were uniquely labeled, placed in a cooler, and delivered with an appropriate chain-of-custody to Alden Analytical Laboratories, Inc. located in Seattle, Washington.

### 5.1.2 Monitoring Well Installations

A monitoring well variance request was submitted to Ms. Laurie Morgan of the Washington State Department of Ecology - Southwest Regional Office on April 30, 1992 and approved in a letter dated May 13, 1992 in accordance with the State of Washington Administrative Code, Chapter 173-160-020, Minimum Standards For Construction and Maintenance of Wells.

The variance requested that the general resource protection well design of a 3-foot filter of filter pack material above the well screen, followed by a 2-foot thick (minimum) bentonite plug be reduced. The localized conditions of a shallow, fluctuating (3 to 5 feet below grade) groundwater table required the well screen to be placed closer to the surface, thereby decreasing the design filter pack and bentonite plug thicknesses.

Three monitoring wells were installed utilizing this design, to define the tidal-influenced hydraulic gradient (flow) across the facility and to obtain representative groundwater samples for subsequent petroleum hydrocarbon content analysis as requested by the Tacoma-Pierce County Health Department.

Type 1, Grade 1, 2-inch-diameter, ASTM 1784, schedule 40 polyvinyl chloride (PVC) screen, and threaded, flush-jointed, 2-inch-diameter, ASTM 1784, schedule 40 PVC casings were used for construction of the three groundwater monitoring wells. The wells were installed to approximately thirteen feet below existing grade and constructed with ten lineal feet of 0.010 inch slotted screen with the remaining upper portion consisting of blank casing and flush mounts as detailed in Appendix A. The filter pack was extended approximately 0.8 feet above the screen and approximately one foot of bentonite was installed as a seal.

## 5.2 Groundwater Assessment

A benchmark of 100.00 feet was established at the site, and all well casings were referenced to this elevation. A MCC oil/water interface detection probe was used to measure the depth to groundwater. Measurements were made from the north side of the well casing. Depth to the groundwater ranged from approximately six and one-half feet to eight and one-half feet from the top of the well casing.

Laboratory analyses of groundwater samples from monitoring well No. 1 (MW-001) indicate levels of total xylenes, total petroleum hydrocarbons (as) gasoline, and total lead exceeding the Model Toxics Control Act Method 'A' groundwater cleanup levels (February 1991).

### 5.2.1 Data Interpretation

The groundwater data and associated petroleum compounds reported in Table 2 have been geostatistically contoured utilizing the GOLDEN software package SURFER[R]. Concentrations of benzene, toluene, ethylbenzene, total xylenes, total petroleum hydrocarbons (as) gasoline, and total lead are contoured in Figures 3 through 9. Extreme caution should used when interpreting these figures due to the limited amount of data available.

The groundwater flow was inferred to be in a southeasterly direction as indicated by Figure 3. However, the flow is dependant on tidal mechanisms and therefore the limited data available may not be fully representative of the actual conditions.

Contours of the regulated compounds display similar behavior, decreasing in concentration with distance from the UST excavation area in a southeasterly direction corresponding to the direction of groundwater flow.

## 6.0 RECOMMENDATION

Shannon & Wilson suggests a monitoring period to collect further data from the three monitoring wells in order to more adequately assess the extent and level of petroleum hydrocarbons in the subsurface at this tidally-influenced facility. The Tacoma-Pierce County Health Department, in a letter dated June 12, 1992, has requested quarterly groundwater sampling for a period of one year. The sampling is to be performed according to the MTCA requirements, with laboratory analyses for total petroleum hydrocarbons, organic volatiles, and total lead. A re-evaluation of the conditions at the site will be made at the end of this monitoring period.

## 7.0 CLOSURE

The findings we have presented within this technical memorandum are based on limited research at the facility. They should not be construed as a definite statement regarding reported conditions. Shannon and Wilson, Inc. performed this work phase within our best judgement to adequately describe site conditions at the facility.

The data presented in this technical memorandum should be considered representative at the time of our observations. Changes in the conditions of the property can occur with time from both natural processes and human activities. In addition, changes in governmental codes, regulations,

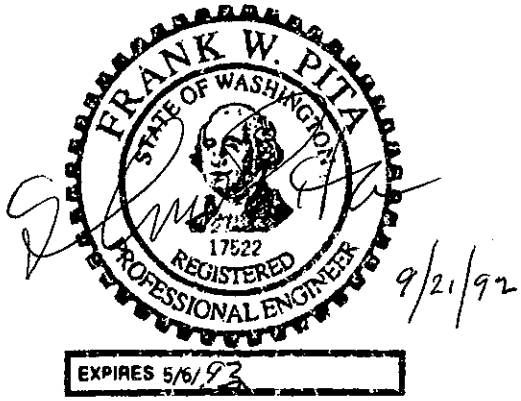
or law may occur. Due to such changes, our observations and recommendations applicable to this facility may need to be revised wholly or in part, due to changes beyond our control.

This technical memorandum was prepared for the exclusive use of Mr. Ron Kline in the study of their facility in Tacoma, Washington, and in no way guarantees that an agency or its staff will reach the same conclusions as Shannon & Wilson, Inc.

SHANNON & WILSON, INC.

Kimberly A. L. Fenske
Geoenvironmental Engineer

Robert Colombo
Environmental Project Manger




Frank W. Pita, P.E., P.G.
Vice President

KLF:RC:FWP/blc

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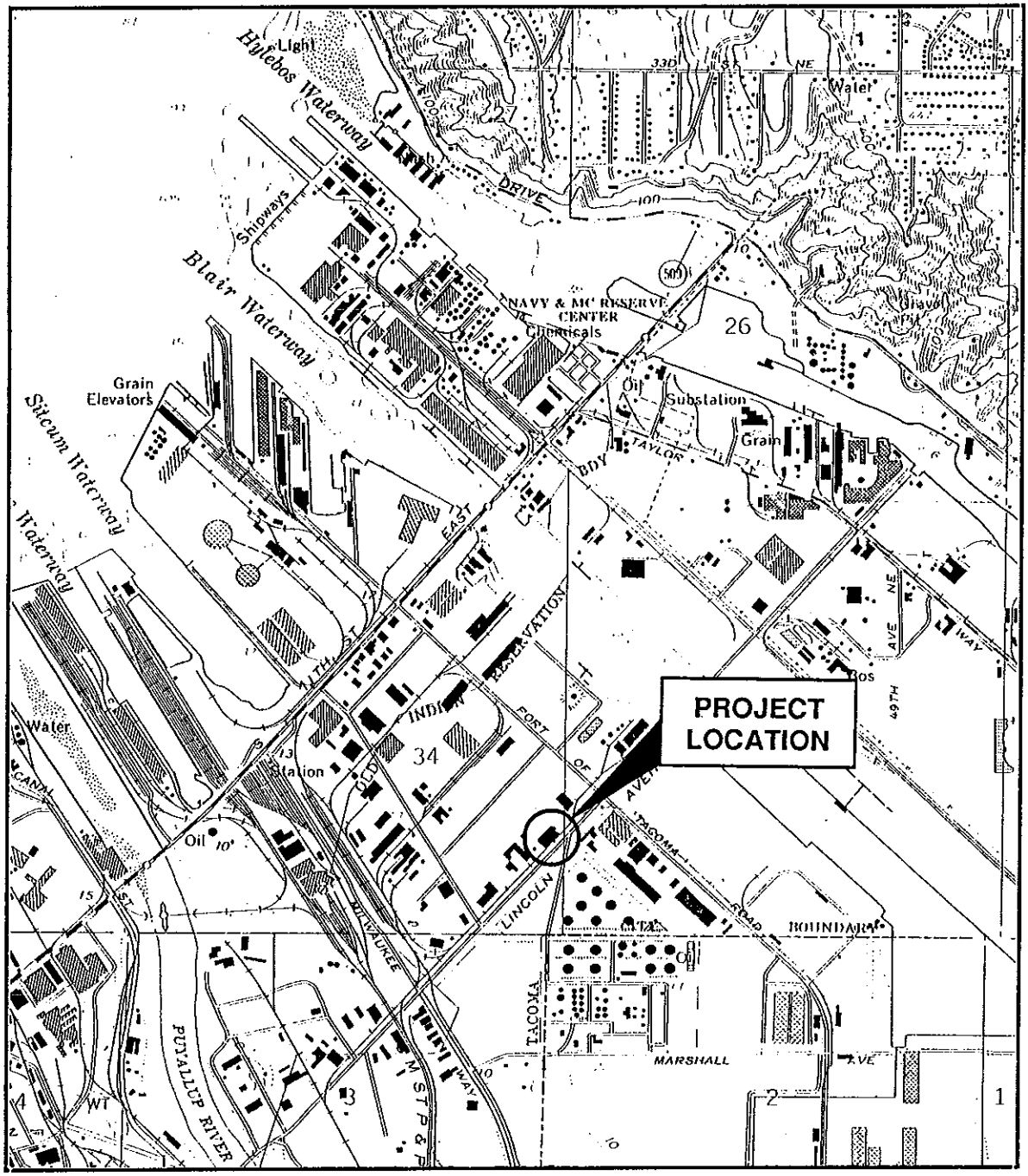



0 1/4 1/2 1

Scale in Miles

NOTE

Map adapted from USGS topographic map of Tacoma North, WA. quadrangle, dated 1981.

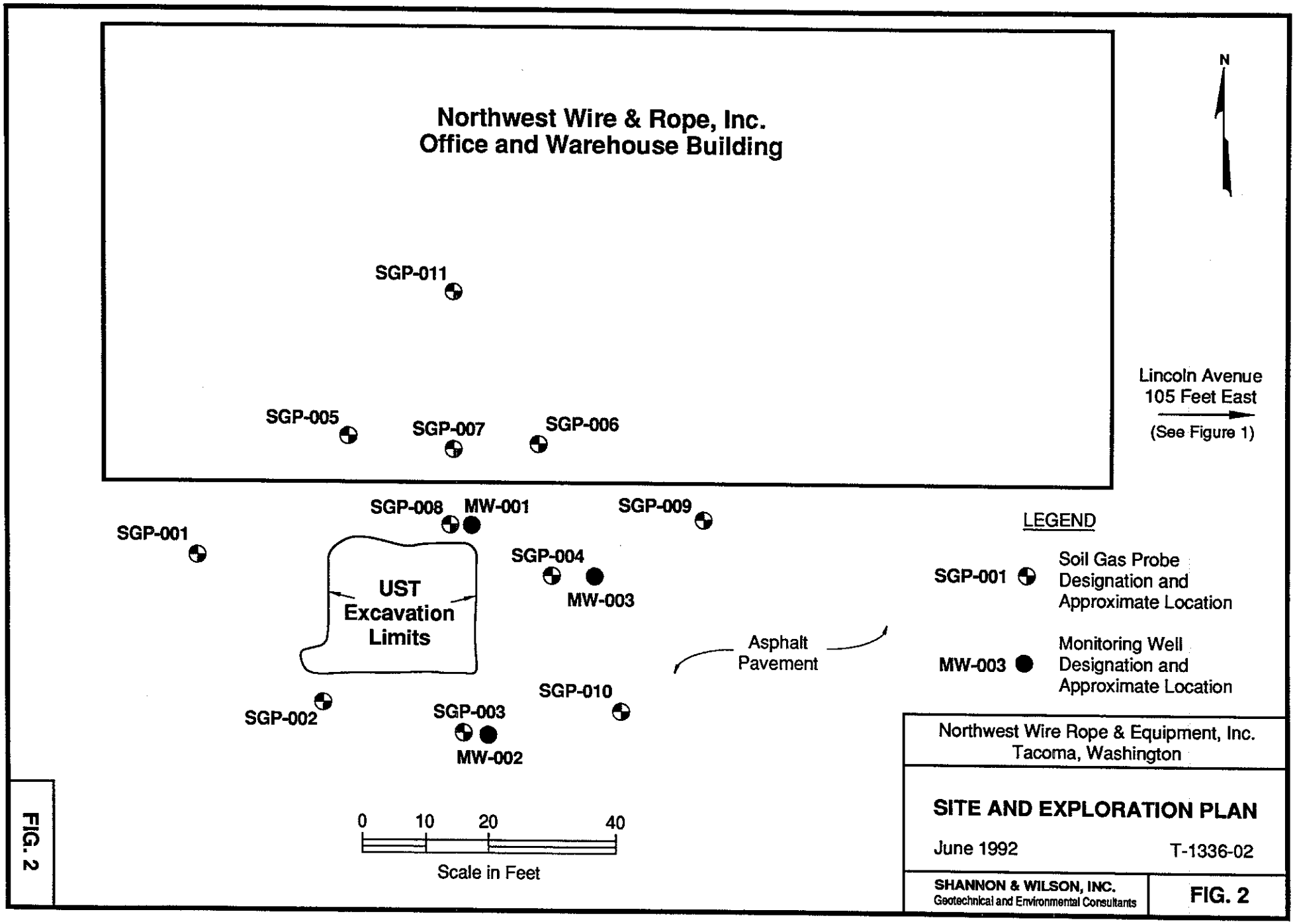
Northwest Wire Rope & Equipment, Inc.
Tacoma, Washington

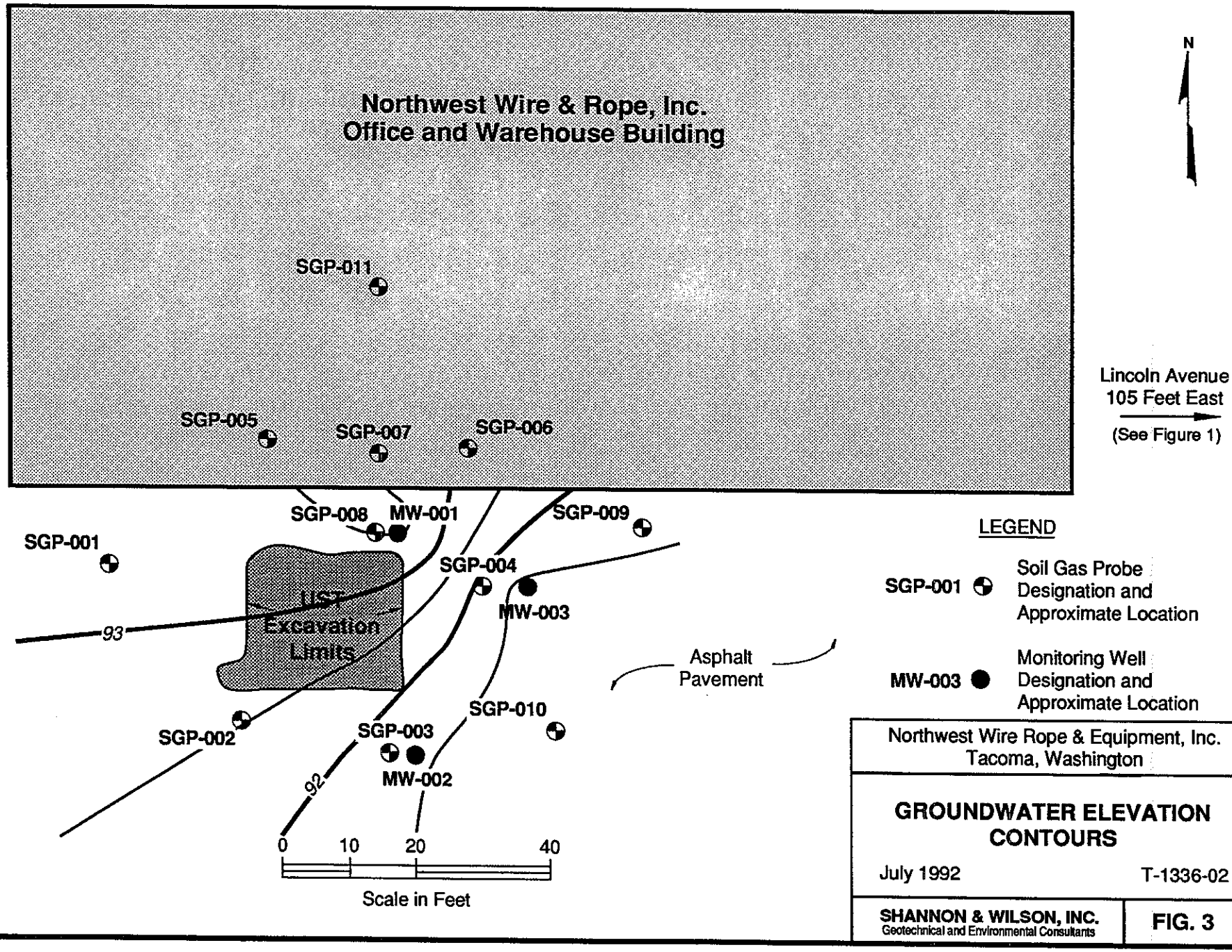
**VICINITY MAP**

June 1992 T-1336-02

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

**FIG. 1**


Northwest Wire & Rope, Inc.
Office and Warehouse Building
N
SGP-011
SGP-005
SGP-007
SGP-006
Lincoln Avenue
105 Feet East
(See Figure 1)
SGP-008
MW-001
SGP-009
SGP-001
SGP-004
MW-003
UST
Excavation
Limits
Asphalt
Pavement
SGP-010
SGP-002
SGP-003
MW-002
0
10
20
40
Scale in Feet
LEGEND
SGP-001
Soil Gas Probe
Designation and
Approximate Location
MW-003
Monitoring Well
Designation and
Approximate Location
Northwest Wire Rope & Equipment, Inc.
Tacoma, Washington
SITE AND EXPLORATION PLAN
June 1992
T-1336-02
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants
FIG. 2
FIG. 2


Northwest Wire & Rope, Inc.
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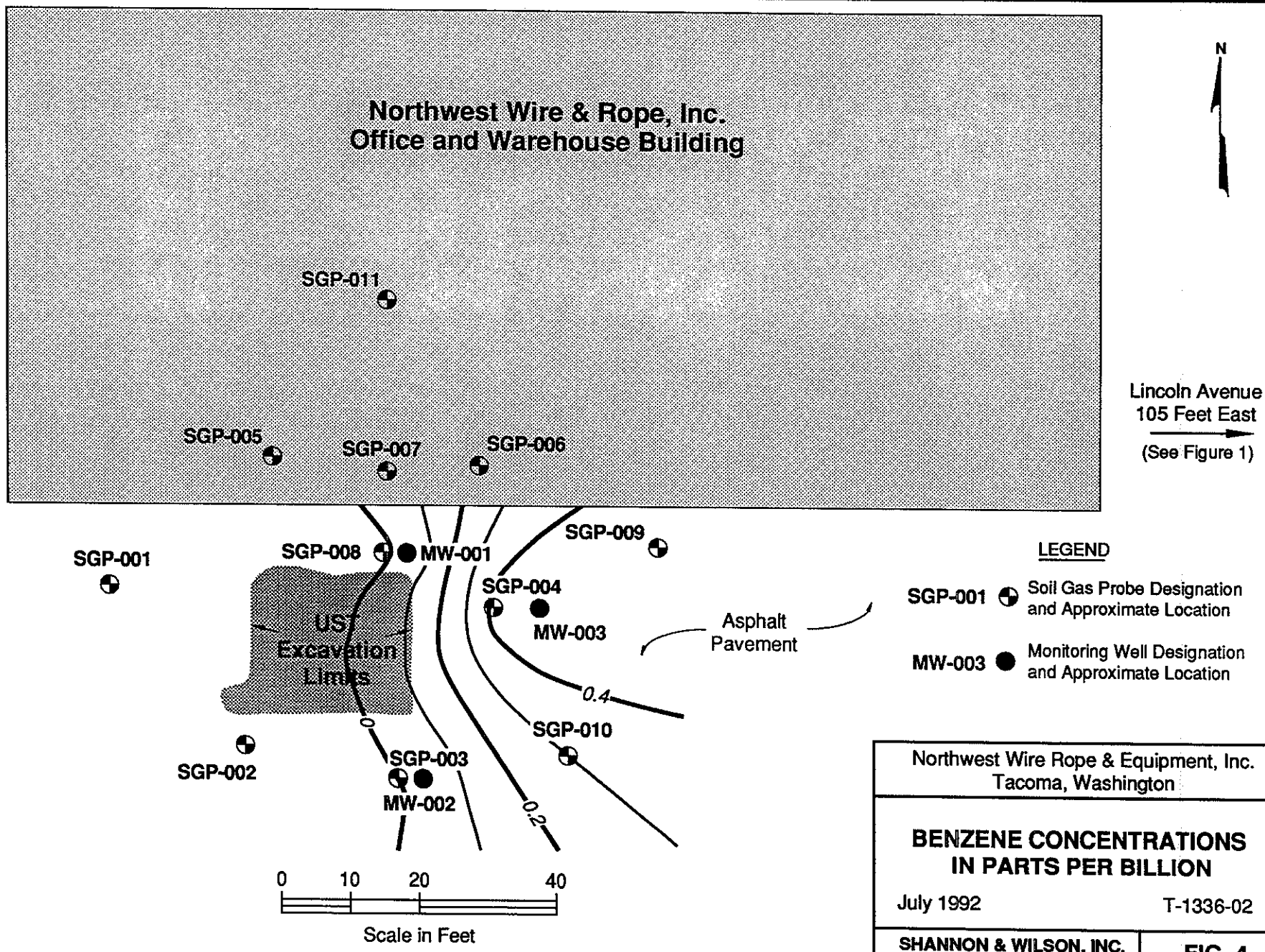
SGP-005
SGP-007
SGP-006
Lincoln Avenue
105 Feet East
(See Figure 1)
SGP-008
MW-001
SGP-009
SGP-001
SGP-004
MW-003
UST
Excavation
Limits
93
Asphalt
Pavement
SGP-010
SGP-002
SGP-003
MW-002
92
0
10
20
40
Scale in Feet
LEGEND
SGP-001
Soil Gas Probe
Designation and
Approximate Location
MW-003
Monitoring Well
Designation and
Approximate Location
Northwest Wire Rope & Equipment, Inc.
Tacoma, Washington
GROUNDWATER ELEVATION
CONTOURS
July 1992
T-1336-02
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants
FIG. 3
FIG. 3




Northwest Wire Rope & Equipment, Inc.
Tacoma, Washington

**BENZENE CONCENTRATIONS IN PARTS PER BILLION**

July 1992 T-1336-02

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. 4

FIG. 4

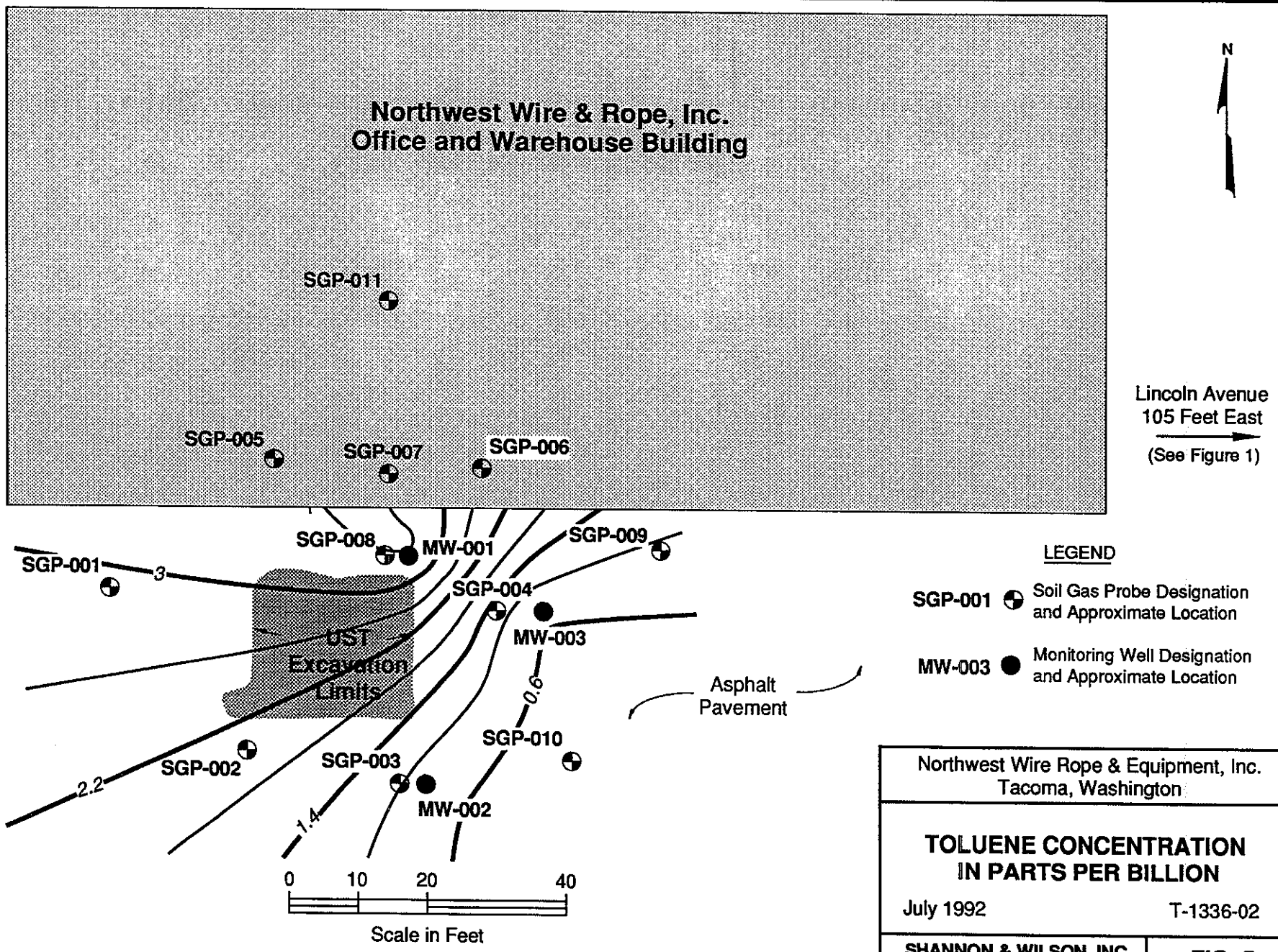



FIG. 5

Northwest Wire Rope & Equipment, Inc.
Tacoma, Washington

**TOLUENE CONCENTRATION IN PARTS PER BILLION**

July 1992 T-1336-02

**SHANNON & WILSON, INC.**
Geotechnical and Environmental Consultants

**FIG. 5**

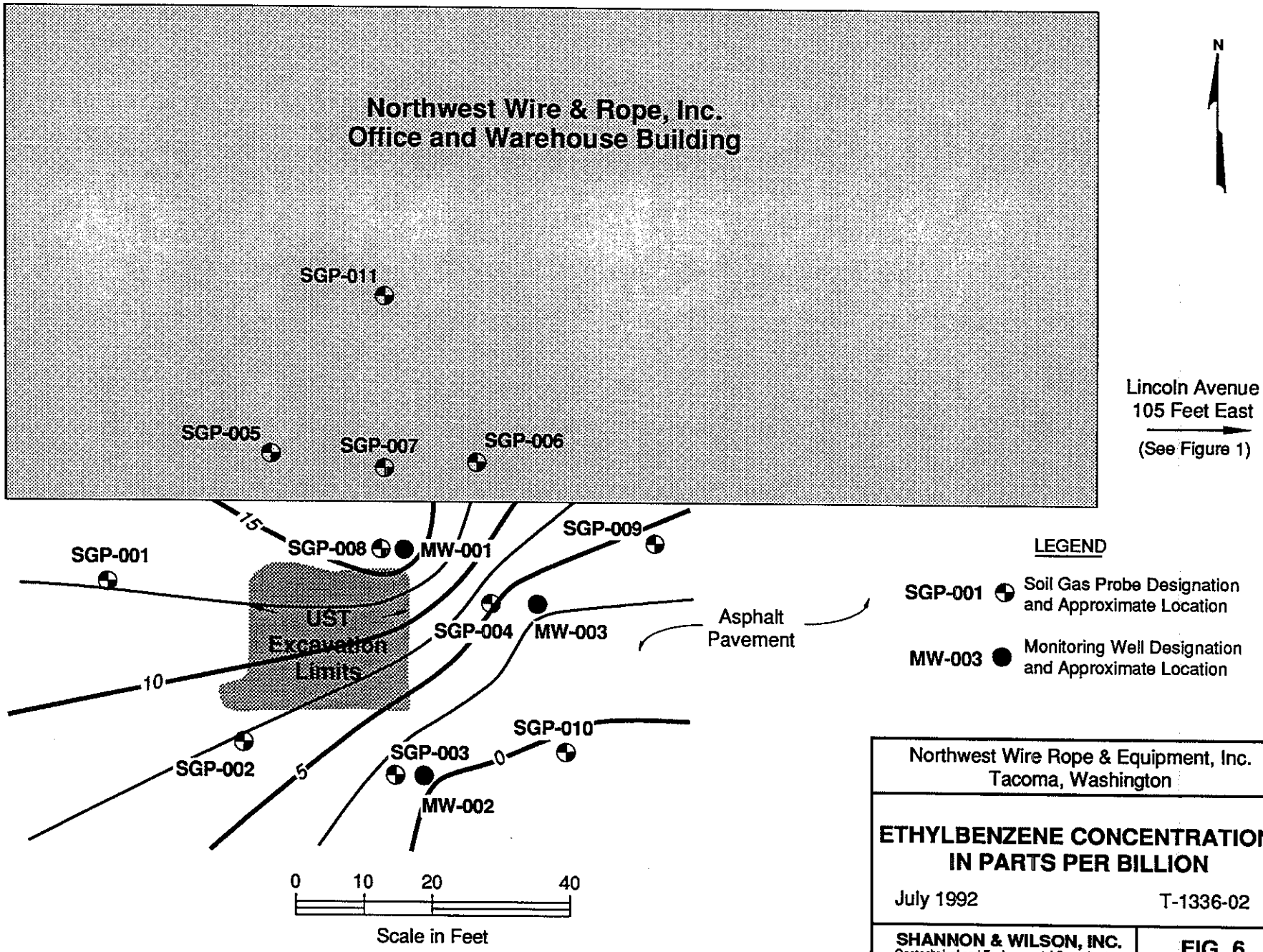



FIG. 6

Northwest Wire Rope & Equipment, Inc.
Tacoma, Washington

**ETHYLBENZENE CONCENTRATION IN PARTS PER BILLION**

July 1992 T-1336-02

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. 6

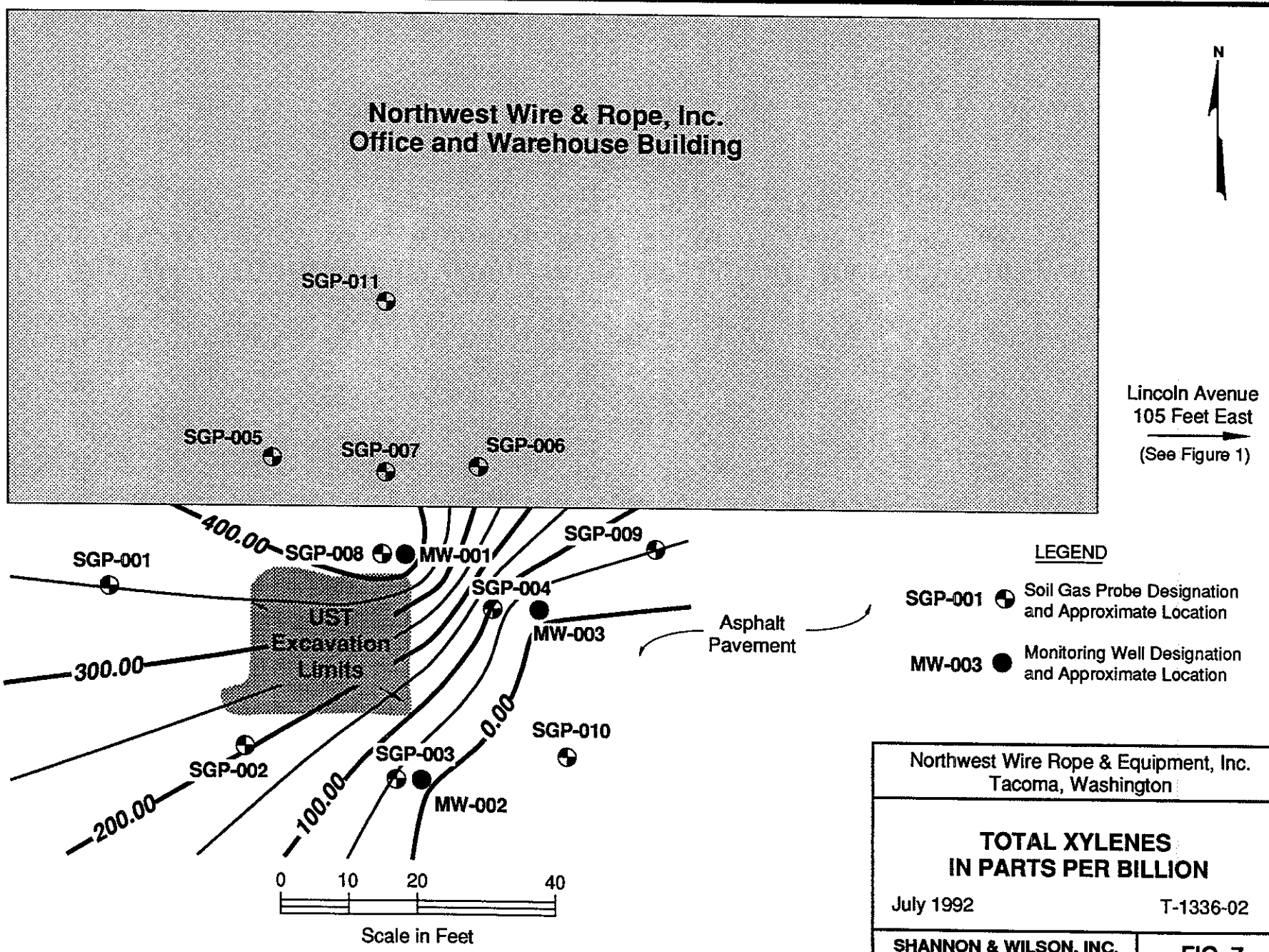



FIG. 7

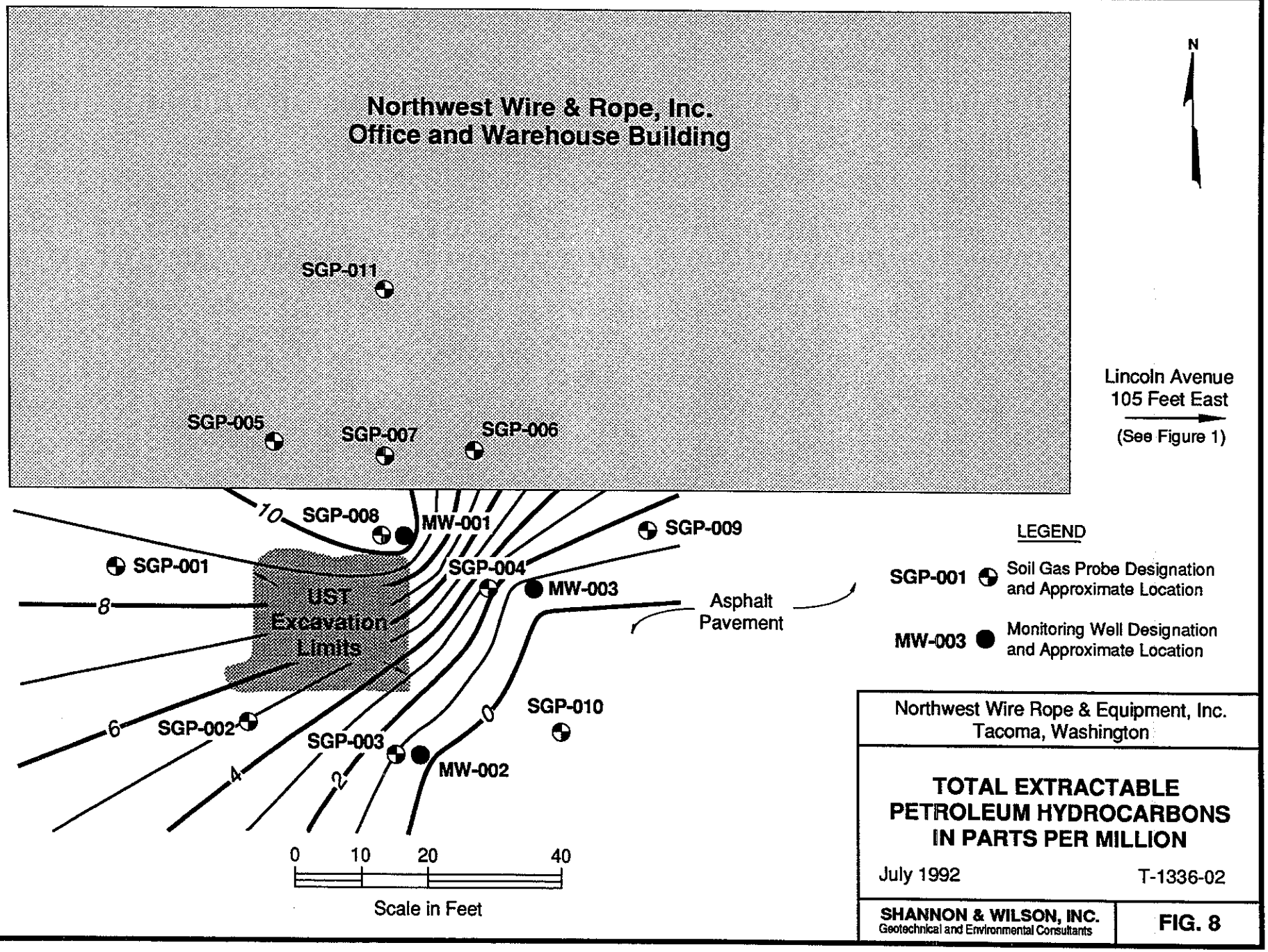
Northwest Wire Rope & Equipment, Inc.
Tacoma, Washington

**TOTAL XYLENES IN PARTS PER BILLION**

July 1992 T-1336-02

**SHANNON & WILSON, INC.**
Geotechnical and Environmental Consultants

**FIG. 7**


Northwest Wire & Rope, Inc.
Office and Warehouse Building
N
SGP-011
SGP-005
SGP-007
SGP-006
Lincoln Avenue
105 Feet East
(See Figure 1)
10
SGP-008
MW-001
SGP-009
SGP-001
SGP-004
MW-003
8
UST
Excavation
Limits
Asphalt
Pavement
LEGEND
SGP-001 Soil Gas Probe Designation and Approximate Location
MW-003 Monitoring Well Designation and Approximate Location
6
SGP-002
SGP-003
MW-002
4
2
0
SGP-010
0 10 20 40
Scale in Feet
Northwest Wire Rope & Equipment, Inc.
Tacoma, Washington
TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS IN PARTS PER MILLION
July 1992
T-1336-02
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants
FIG. 8
FIG. 8

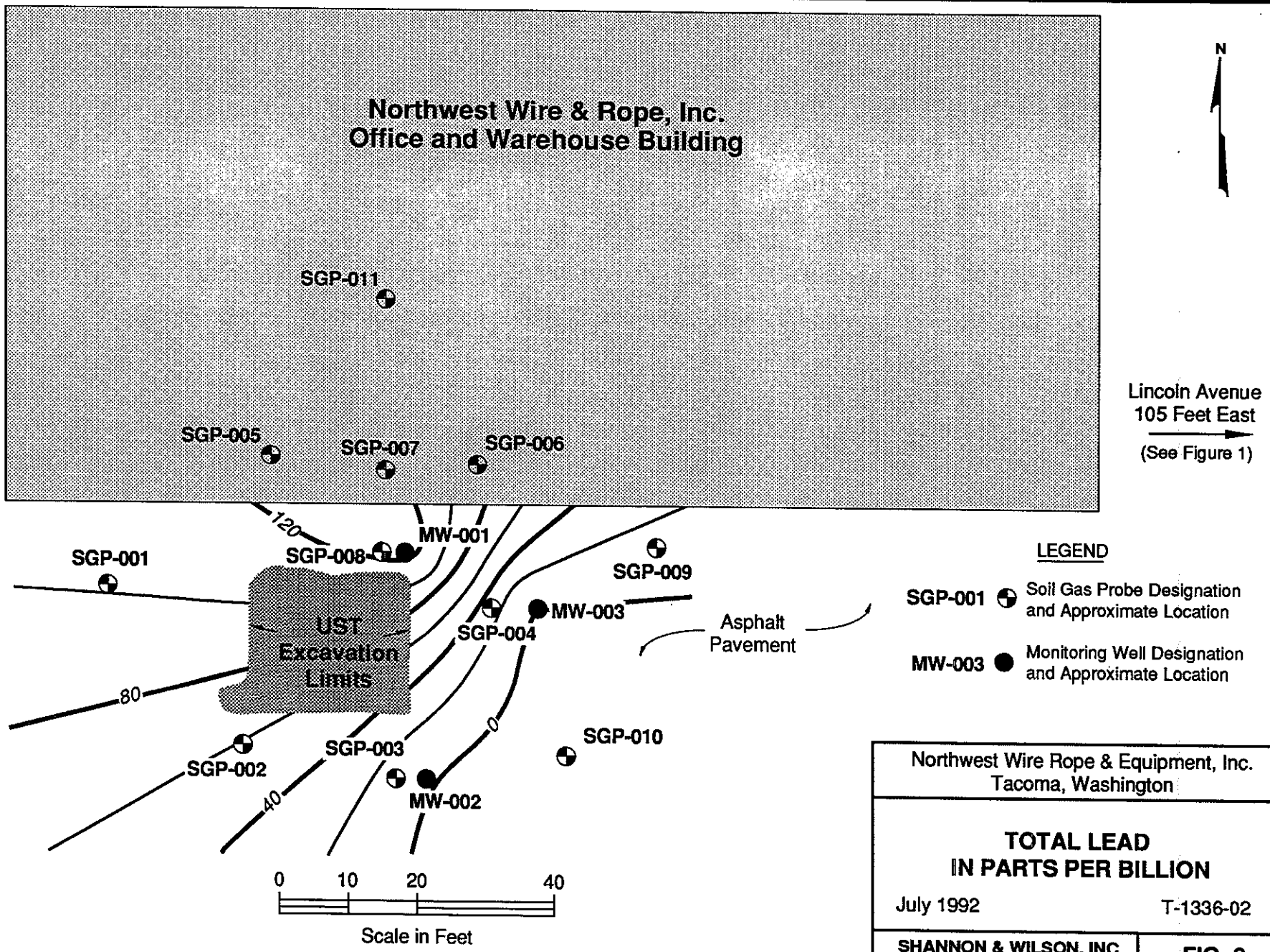



FIG. 9

Northwest Wire Rope & Equipment, Inc.
Tacoma, Washington

**TOTAL LEAD**
**IN PARTS PER BILLION**

July 1992 T-1336-02

**SHANNON & WILSON, INC.**
Geotechnical and Environmental Consultants

**FIG. 9**

TABLE 1
NORTHWEST Wire Rope and Equipment, Inc.
SOIL BORING ANALYSES AND RESULTS, (1)
SAMPLED DURING MAY 1, 1992.

| SAMPLE NUMBER | VOLATILE ORGANICS (ppm), (2), (3) | | | | TEPH | TOTAL LEAD | WTPH-HCID ppm, (8) | | |
|---|---|---|---|---|---|---|---|---|---|
| | BENZENE | TOLUENE | ETHYL BENZENE | TOTAL XYLENES | (ppm), (7) | (ppm) | GASOLINE | DIESEL | HEAVY OIL |
| NWR-MW01-001-SL-0, (6) | | | | | 210, (4) - 34, (5) | 10 | | | |
| NWR-MW01-002-SL-1, (6), (10) | <0.01 | <0.01 | <0.01 | 1.06 | 94, (4) - <20, (5) | 9 | >20 | <50 | >100 |
| NWR-MW01-003-SL-0, (6) | | | | | | | <20 | <50 | <100 |
| NWR-MW01-004-SL-0, (6) | | | | | | | <20 | <50 | <100 |
| NWR-MW02-007-SL-0, (6) | | | | | | | <20 | <50 | <100 |
| NWR-MW02-008-SL-0, (6) | | | | | | | <20 | <50 | <100 |
| NWR-MW03-012-SL-0, (6) | | | | | | | <20 | <50 | <100 |
| NWR-MW03-014-SL-0, (6) | | | | | | | <20 | <50 | <100 |
| Cleanup Levels - Method A - Soil, (9) | 0.5 | 40 | 20 | 20 | 200, (4) - 100, (5) | | 100 | 200 | 200 |

NOTES

1) As reported by Alden Analytical Laboratories, Inc.
2) E.P.A. Method 8240 ; Parts Per Million (ppm)
3) m-Xylene and p-Xylene cannot be separated and are reported here as a total of the the two isomers.
4) Total Petroleum Hydrocarbons (WTPH 418.1).
5) Total Petroleum Hydrobarbons as Gasoline (WTPH-G).
6) Original laboratory report and correspondence available at the Shannon and Wilson (S&W) Seattle office.
7) TEPH is the abbreviation for Total Extractable Petroleum Hydrocarbons as determined by EPA Method 8015.
8) WTPH-HCID - Hydrocarbon Identification.
9) Model Toxic Control Act, Method A, February 1991.
10) Field Duplicate for QA/QC.

TABLE 2
NORTHWEST Wire Rope and Equipment, Inc.
GROUNDWATER ANALYSES AND RESULTS, (1)
SAMPLED DURING MAY 18, 1992.

| SAMPLE NUMBER | VOLATILE ORGANICS (ppb), (2), (3), (5) | | | | TEPH - AS GASOLINE | TOTAL LEAD |
|---|---|---|---|---|---|---|
| | BENZENE | TOLUENE | ETHYL BENZENE | TOTAL XYLENES | (ppm) , (4), (5) | (ppb), (9) |
| NWR-MW001-017-GW-0, (7) | N.D. | 3.5 | 17 | 440 | 11 | 130 |
| NWR-MW001-018-GW-1, (7), (8) | N.D. | N.D. | 17 | 450 | 11 | 33 |
| NWR-MW002-015-GW-0, (7) | N.D. | 0.75 | N.D. | N.D. | N.D. | N.D. |
| NWR-MW003-016-GW-0, (7) | 0.51 | 0.64 | 3.0 | 6.9 | 0.41 | N.D. |
| Cleanup Levels - Groundwater, (6) | 5.0 | 40.0 | 30.0 | 20.0 | 1.0 | 5.0 |

NOTES

1) As reported by Alden Analytical Laboratories, Inc.
2) Parts Per Billion (ppb).
3) m-Xylene and p-Xylene cannot be separated and are reported here as a total of the the two isomers.
4) Parts Per Million (ppm).
5) TEPH is the abbreviation for Total Extractable Petroleum Hydrocarbons as determined by WTPH-G with BTE and X distinction.
6) Model Toxic Control Act, Method A, February 1991.
7) Original laboratory report and correspondence available at the Shannon and Wilson (S&W) Seattle office.
8) Field duplicate for QA/QC.
9) E.P.A. Method 7421.

N.D. - Not Detected within method reporting limits.

# APPENDIX A

## ENVIRONMENTAL FIELD DRILLING LOGS

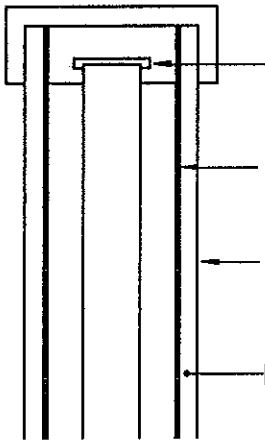
| | | | |
|---|---|---|---|
| Project Name: Northwest Wire Rope and Equipment, Inc. | | Project Number: T-1336-02 | Well Number: **BH-001/MW-001** |
| Logged By: KLF | | Surface Elevation: Existing Grade Level | Well Location: T21N Twnshp R3E Range 34 Section SE1/4 1/4, 1/4 |
| Drilling Method: HSA | Hole Diameter: 8" O.D. | Casing Size/Type: 2" PVC | Depth to Water: ≈ 3 Feet Encountered / Static |
| Date Started: 5-1-92<br>Date Completed: 5-1-92 | Drilling Company: Environmental Drilling, Inc.<br>Driller: Bruce McCall | | Methods of Decontamination Prior to Drilling: Steam Clean |

| Depth in Feet | Sample Type & No. | Sample Depth Interval | Time | Concentration PID Readings | Blow Count Per 6 Inches | Recovery Length / % | *USCS | Soil Sample Description |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ground Surface |
| | | | | | | | | 6" Asphalt |
| ▽ | | | | | | | | 0 - 4"-Brown FILL |
| 5 | 1,2 | 5-6.5' | 0848 | 450 ppm | 4/4/3 | 18" | SW | 4-18"-Loose, dark gray SAND; wet; slight odor |
| | | | | | | | SW | 0-2"-Very loose, dark gray SAND; wet |
| 10 | 3 | 10-11.5' | 0900 | 35 ppm | 1/.5/.5 | 18" | OL | 2-18"-Very loose, dark gray, clayey SILT; traces of fine SAND and organic debris; wet |
| | 4 | 11.5-13' | 0905 | 5.8 ppm | 2/3/6 | 16" | SW | Loose, dark gray SAND; wet |
| 15 | | | | | | | | Bottom of Hole ≈13 Feet (Heaving Fine Sands) |

18" Split-Spoon Sampler

* Based on visual observation.

☒ Flush Mount ☐ Locking Steel Cover ☐ Protective Posts



Top of Casing at 0.4 Feet

____ Inch Diameter Steel Conductor Casing

____ Inch Diameter Borehole ____ to ____ Feet

☐ Bentonite Chip Seal _____ ____ to ____ Feet

## MATERIALS USED

2 Sacks of CSSI #10/20 Sand

2 Sacks of Quickcrete

_____ Sacks of Grout Used

_____ Sacks of Bentonite Chips 50 lb. bag

_____ Sacks of Bentonite Chips

2.4 Feet of 2 Inch PVC Sch. 40 Blank Casing

10 Feet of 2 Inch PVC 0.01" Slotted Screen

_____ Feet of _____ Inch Steel Conductor Casing

_____ Yard Cement-Sand (Redi-Mix) Ordered

_____ Yard Cement-Sand (Redi-Mix) Used

Concrete Pumper Used? ☐ No ☐ Yes

Name _____

DTW After Installation: _____ Feet

Total Well Depth After Installation: _____ Feet

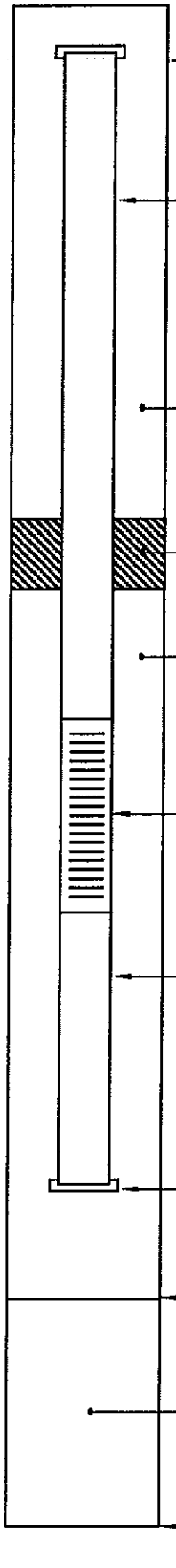
## ADDITIONAL INFORMATION

BH-001/MW-001

PID = Photoionization Detector

HSA = Hollow Stem Auger

PVC = Polyvinyl Chloride



8 Inch Diameter Borehole

0 to ~13 Feet

2 Inch Diameter (Schedule 80 PVC) ( Sch. 40 ) Blank Casing

2.8 to 0.4 Feet

☒ Cement Seal Quickcrete

1 to 0.4 Feet

Bentonite Pellet Seal

2 to 1 Feet

CSSI #10/20 (Name) (Number) Sand Pack

~13 to 2 Feet

2 Inch Diameter Slotted 0.01 Inch Screen

12.8 to 2.8 Feet

2 Inch Diameter (Schedule 40 PVC) ( _____ ) Blank Silt Trap

☐

____ to ____ Feet

Bottom Well Cap

12.8 Feet

Hole Backfilled to

____ Feet

Backfill Material

_____

Bottom of Borehole

~13 Feet

Not to Scale

| | | | |
|---|---|---|---|
| Project Name: Northwest Wire Rope and Equipment, Inc. | | Project Number: T-1336-02 | Well Number: **BH-002/MW-002** |
| Logged By: KLF | | Surface Elevation: Existing Grade Level | Well Location: T21N Twnshp R3E Range 34 Section SE1/4 1/4, 1/4 |
| Drilling Method: HSA | Hole Diameter: 8" O.D. | Casing Size/Type: 2" PVC | Depth to Water: ≈ 3 Feet Encountered / Static |
| Date Started: 5-1-92<br>Date Completed: 5-1-92 | Drilling Company: Environmental Drilling, Inc.<br>Driller: Bruce McCall | | Methods of Decontamination Prior to Drilling: Steam Clean |

| Depth in Feet | Sample Type & No. | Sample Depth Interval | Time | Concentration PID Readings | Blow Count Per 6 Inches | Recovery Length / % | *USCS | Soil Sample Description |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ground Surface |
| | | | | | | | | 6" Asphalt |
| ▽ | | | | | | | | |
| 5 | 5,6 | 5-6.5' | 1030 | 3 ppm | 6/6/8 | 16" | SW | Medium, grayish brown SAND; moist |
| 10 | 7 | 10-11.5' | 1035 | | 1/1/1 | 5" | MH | Very loose, mottled tan and dark gray, clayey, sandy SILT; wet |
| | 8,9 | 11.5-13' | 1040 | | 2/5/7 | 18" | SW | Medium, dark gray SAND; wet |
| 15 | | | | | | | | Bottom of Hole ≈13 Feet (Heaving Fine Sands) |

18" Split-Spoon Sampler

* Based on visual observation.

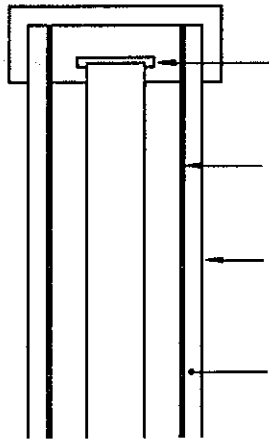
SEATTLE, WASHINGTON
(206) 632-8020
**SHANNON & WILSON, INC.**
Geotechnical and Environmental Consultants

Northwest Wire, Rope, and Equipment, Inc.
Tacoma, Washington

**LOG OF BORING BH-002/MW-002**

May 1992
T-1336-02
**FIG. 2**

☒ Flush Mount ☐ Locking Steel Cover ☐ Protective Posts



Top of Casing at 0.4 Feet

____ Inch Diameter Steel Conductor Casing

____ Inch Diameter Borehole ____ to ____ Feet

☐ Bentonite Chip Seal _____ ____ to ____ Feet

## MATERIALS USED

2 Sacks of CSSI #10/20 Sand

2 Sacks of Quickcrete

_____ Sacks of Grout Used

_____ Sacks of Bentonite Chips 50 lb. bag

_____ Sacks of Bentonite Chips

2.4 Feet of 2 Inch PVC Sch. 40 Blank Casing

10 Feet of 2 Inch PVC 0.01" Slotted Screen

_____ Feet of _____ Inch Steel Conductor Casing

_____ Yard Cement-Sand (Redi-Mix) Ordered

_____ Yard Cement-Sand (Redi-Mix) Used

Concrete Pumper Used? ☐ No ☐ Yes

Name _____

DTW After Installation: _____ Feet

Total Well Depth After Installation: _____ Feet

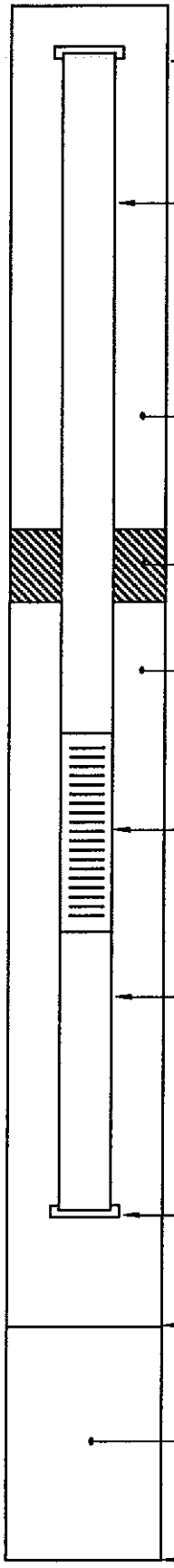
## ADDITIONAL INFORMATION

BH-002/MW-002

PID = Photoionization Detector

HSA = Hollow Stem Auger

PVC = Polyvinyl Chloride



8 Inch Diameter Borehole

0 to ~13 Feet

2 Inch Diameter (Schedule 80 PVC) ( Sch. 40 ) Blank Casing

2.8 to 0.4 Feet

☒ Cement Seal Quickcrete

1 to 0.4 Feet

Bentonite Pellet Seal

2 to 1 Feet

CSSI #10/20 (Name) (Number) Sand Pack

~13 to 2 Feet

2 Inch Diameter Slotted 0.01 Inch Screen

12.8 to 2.8 Feet

2 Inch Diameter (Schedule 40 PVC) ( Sch. 40 ) Blank Silt Trap

☐

____ to ____ Feet

Bottom Well Cap

12.8 Feet

Hole Backfilled to

____ Feet

Backfill Material

_____

Bottom of Borehole

~13 Feet

Not to Scale

| | | | |
|---|---|---|---|
| Project Name: Northwest Wire Rope and Equipment, Inc. | | Project Number: T-1336-02 | Well Number: **BH-003/MW-003** |
| Logged By: KLF | | Surface Elevation: Existing Grade Level | Well Location: T21N Twnshp R3E Range 34 Section SE1/4 1/4, 1/4 |
| Drilling Method: HSA | Hole Diameter: 8" O.D. | Casing Size/Type: 2" PVC | Depth to Water: ≈ 3 Feet Encountered / Static |
| Date Started: 5-1-92<br>Date Completed: 5-1-92 | Drilling Company: Environmental Drilling, Inc.<br>Driller: Bruce McCall | | Methods of Decontamination Prior to Drilling: Steam Clean |

| Depth in Feet | Sample Type & No. | Sample Depth Interval | Time | Concentration PID Readings | Blow Count Per 6 Inches | Recovery Length / % | *USCS | Soil Sample Description |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ground Surface |
| | Soil | | | | | | | 6" Asphalt |
| ▽ | | | | | | | | |
| 5 | 10, 11 | 5-6.5' | 1301 | | 3/5/6 | 18" | SW | Medium, dark gray SAND; moist |
| 10 | 12, 13 | 10-11.5' | 1306 | | 1/1/1 | 18" | MH | Very loose, mottled tan and dark gray, clayey, sandy SILT; wet; organic debris |
| | 14 | 11.5-13' | 1313 | 3.2 ppm | 3/5/6 | 17" | SW | Medium, dark gray SAND; wet |
| 15 | | | | | | | | Bottom of Hole ≈13 Feet (Heaving Fine Sands) |

18" Split-Spoon Sampler

* Based on visual observation.

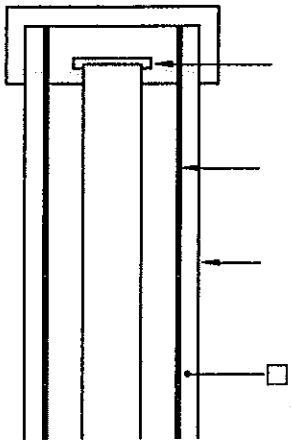
SEATTLE, WASHINGTON
(206) 632-8020
**SHANNON & WILSON, INC.**
Geotechnical and Environmental Consultants

Northwest Wire, Rope, and Equipment, Inc.
Tacoma, Washington

**LOG OF BORING BH-003/MW-003**

May 1992
T-1336-02
**FIG. 3**

☒ Flush Mount ☐ Locking Steel Cover ☐ Protective Posts



Top of Casing at 0.4 Feet

____ Inch Diameter Steel Conductor Casing

____ Inch Diameter Borehole ____ to ____ Feet

☐ Bentonite Chip Seal ____ ____ to ____ Feet

## MATERIALS USED

2 Sacks of CSSI #10/20 Sand

2 Sacks of Quickcrete

____ Sacks of Grout Used

1 Sacks of Bentonite Chips 50 lb. bag

____ Sacks of Bentonite Chips

2.4 Feet of 2 Inch PVC Sch. 40 Blank Casing

10 Feet of 2 Inch PVC 0.01" Slotted Screen

____ Feet of ____ Inch Steel Conductor Casing

____ Yard Cement-Sand (Redi-Mix) Ordered

____ Yard Cement-Sand (Redi-Mix) Used

Concrete Pumper Used? ☐ No ☐ Yes

Name ____

DTW After Installation: ____ Feet

Total Well Depth After Installation: ____ Feet

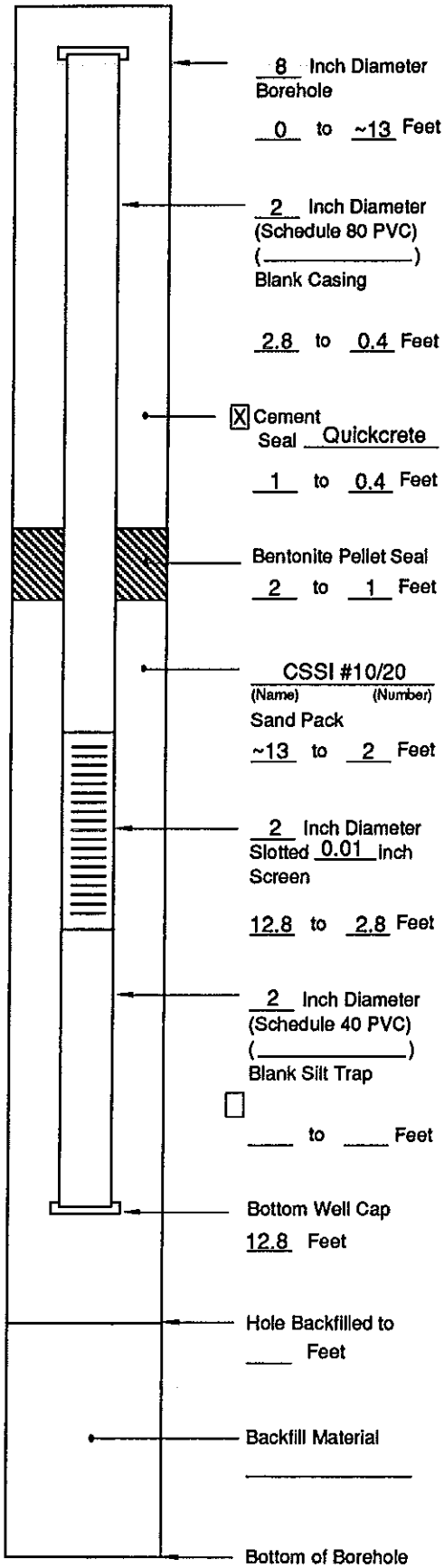
## ADDITIONAL INFORMATION

BH-003/MW-003

PID = Photoionization Detector

HSA = Hollow Stem Auger

PVC = Polyvinyl Chloride



8 Inch Diameter Borehole 0 to ~13 Feet

2 Inch Diameter (Schedule 80 PVC) (____) Blank Casing 2.8 to 0.4 Feet

☒ Cement Seal Quickcrete 1 to 0.4 Feet

Bentonite Pellet Seal 2 to 1 Feet

CSSI #10/20 (Name) (Number) Sand Pack ~13 to 2 Feet

2 Inch Diameter Slotted 0.01 Inch Screen 12.8 to 2.8 Feet

2 Inch Diameter (Schedule 40 PVC) (____) Blank Silt Trap ☐ ____ to ____ Feet

Bottom Well Cap 12.8 Feet

Hole Backfilled to ____ Feet

Backfill Material ____

Bottom of Borehole ~13 Feet

Not to Scale

# APPENDIX B

## TACOMA-PIERCE COUNTY HEALTH DEPARTMENT CORRESPONDENCE

*TACOMA-PIERCE COUNTY*
*HEALTH DEPARTMENT*



April 1, 1992

Mr. Ron Kline
President
Northwest Wire Rope and Equipment, Inc.
PO Box 1806
Tacoma, Washington 98401

RE: Site Characterization Assessment of Former Underground Storage Tank Area
Located at 2301 Lincoln AV, Tacoma, Washington

Dear Mr. Kline:

The Tacoma-Pierce County Health Department (TPCHD) has completed review of the report detailing the above-referenced investigation. Based on the review conducted, the TPCHD has determined that additional investigation is necessary.

Although, the Soil Gas Survey does not indicate extensive contamination, the data provided by the survey is not sufficient enough to allow closure of this site. In order to obtain the necessary data, additional information as described below must be obtained. The additional investigation shall include:

1. Soil and groundwater must be characterized for the presence of benzene, toluene, ethylbenzene, xylene and total petroleum hydrocarbons (WTPHG). This characterization must be accomplished by placing not less than three borings and not less than one monitoring well in the vicinity of the underground storage tank excavation. The borings shall be distributed as needed to assess the potential impacts to soil and groundwater as indicated by the soil gas survey. At least one boring and one monitoring well shall be located proximal to the area between the north wall of the excavation and the building.

2. Prior to initiation of the additional investigation, a work plan must be submitted to the TPCHD for review and approval. The work plan shall include a detailed work schedule.

3. A written report of the investigation must be submitted within thirty days of completion of all investigative activities. This report shall include details of any additional investigation required to address any concerns generated by the data to be presented. If the data verifies that ground water quality data exceeds clean-up levels, a Remedial Investigation and Feasibility Study (RI/FS) will required.

If you have any questions, please contact me at 596-2849.

Sincerely,

John Hildenbrand, R. S., EHS II
Water Resources Section
ENVIRONMENTAL HEALTH DIVISION

JH:jw
cc: Lynn Gooding, Department of Ecology
Robert Colombo, Shannon & Wilson, Inc.

TACOMA-PIERCE COUNTY
HEALTH DEPARTMENT



June 12, 1992

Mr. Ron Kline, President
Northwest Wire Rope and Equipment, Inc.
P.O. Box 1806
Tacoma, Washington 98401

RE: Results of Groundwater Investigation

Dear Mr. Kline:

The Tacoma-Pierce County Health Department (TPCHD) has reviewed the preliminary results of the above referenced groundwater investigation. The TPCHD has also reviewed the proposal submitted by your consultant for a period of groundwater monitoring prior to design of additional site investigation/remediation.

The TPCHD agrees that a monitoring period will assist in completing the data collection activities. Therefore the TPCHD has determined that the monitoring proposal would be acceptable if modified to quarterly sampling for a period of one year.

The progress of the monitoring shall be reported quarterly to the TPCHD. The reports shall include depth to groundwater, flow direction, analytical results and discussion of the results. After the end of the monitoring period, the status of your site will be assessed and any additional action required will be stipulated by the TPCHD.

The requirements this letter are stipulated in anticipation of agreement with the final report of the initial groundwater monitoring investigation. Should the results therein dispute the preliminary results, the TPCHD may alter the determinations stated herein. If you have any questions, please contact me at 596-2849.

Sincerely,

John Hildenbrand, R.S.
Environmental Health Specialist II
Hazardous Waste Program
Water Resources Section
ENVIRONMENTAL HEALTH DIVISION

JH:jh

# APPENDIX C

## STATE OF WASHINGTON DEPARTMENT OF ECOLOGY CORRESPONDENCE

CHRISTINE O. GREGOIRE
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
7272 Cleanwater Lane, LU-11 • Olympia, Washington 98504-6811 • (206) 753-2353

May 13, 1992

Robert Colombo
Shannon and Wilson, Inc.
400 North 34th Street, Suite 100
P.O. Box 300303
Seattle WA 98103-8600

Re: Approval of Your Variance Request for Installation of Three Monitoring Wells for an Environmental Site Investigation at Northwest Wire Rope and Equipment, Inc., 2301 Lincoln Avenue, Tacoma, Pierce County.

Dear Mr. Colombo:

I have received your variance request dated April 24, 1992, to Chapters 173-160-540 and 550 WAC of the Minimum Standards for Construction and Maintenance of Wells.

Based on the information you provided in your variance request, and phone conversations with Mr. J. Hildenbrand, Tacoma-Pierce County Health Department, a variance is hereby granted to construct these wells per your proposal. The facts on which this approval is based are attached.

In accordance with Chapter 173-160-020 (2), please submit any future variance requests at least fourteen days in advance of well construction.

This approval is granted subject to the following provisions:

1. The filter pack must extend at least ½ foot above the screen.

2. The bentonite seal must extend a minimum of ½ foot above the top of the filter pack. You should increase this interval, if possible.

3. These wells shall be constructed according to your proposed design. If it becomes necessary to change your proposed design, this office shall be contacted before changes are made.

4. These wells shall be constructed by a drilling contractor licensed in the State of Washington.

5. You must provide a copy of this variance to the driller who will construct these wells.

6. The well driller shall submit a notice of intent (start card) to this regional office at least seventy-two (72) hours prior to construction, reconstruction, or abandonment of wells.

7. The well driller shall submit a detailed well report to this regional office no later than thirty (30) days after well construction or abandonment.

8. The seal should be installed using one-quarter inch or larger granular, chip, or pellet style bentonite. The bentonite should be added dry, then slowly hydrated. The cement should be added in a manner that will not disturb the bentonite seal, thus insuring that the bentonite and/or cement will not interfere with the top of the screened interval.

9. When these wells are no longer in use, they must be abandoned in accordance with Chapter 173-160-560, Abandonment of Resource Protection Wells.

10. Other than as provided for in this variance, these wells must be constructed in accordance with the Minimum Standards for Construction and Maintenance of Wells, Chapter 173-160 WAC.

Chapter 173-160-125 WAC provides that all final written decisions of the Department of Ecology made pursuant to this chapter may be appealed to the Pollution Control Hearings Board in accordance with Chapter 43-21B RCW. Procedures for appealing this variance may be obtained by writing the Department of Ecology at the following address:

Department of Ecology
P.O. Box 47775 MS: 7775
Olympia, WA 98504-7775

Failure to comply with the conditions of this variance or any other provision of Chapter 173-160 WAC or Chapter 18.104 RCW constitutes a violation, subject to regulatory order or civil or criminal penalties.

If you have any questions concerning this variance, please feel free to call Laurie Morgan at (206) 586-6377.

Sincerely,

Gale Blomstrom

Gale Blomstrom
Water Resources Supervisor

GB:LM:pz

cc: Laurie Morgan
Dick Szymarek
J. Hildenbrand, Tacoma-Pierce County Health Department

# APPENDIX D

## IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants



Dated: September 16, 1992

To: NW Wire Rope and Equipment, Inc.
Attn: Mr. Ron Kline

# Important Information About Your Geotechnical Engineering/ Subsurface Waste Management (Remediation) Report

## AN ENGINEERING REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical engineering/subsurface waste management (remediation) report is based on a subsurface exploration plan designed to incorporate a unique set of project-specific factors. These typically include: the general nature of the structure and property involved, its size and configuration; historical use and practice; the location of the structure on the site and its orientation; physical concomitants such as access roads, parking lots, and underground utilities; and the level of additional risk which the client assumed by virtue of limitations imposed upon the exploratory program. To help avoid costly problems, have the consulting engineer/ scientists determine how any factors (which change subsequent to the date of the report) may affect the recommendations.

Unless your consulting geotechnical/civil engineer and/or scientist indicates otherwise, your report should not be used:

- ❑ when the nature of the proposed project is changed; for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one; or chemicals are discovered on or near the site;
- ❑ when the size or configuration of the proposed project is altered;
- ❑ when the location or orientation of the proposed project is modified;
- ❑ when there is a change of ownership; or
- ❑ for application to an adjacent site.

Geotechnical/civil engineers and/or scientists cannot accept responsibility for problems which may develop if they are not consulted after factors considered in their reports have changed.

## MOST GEOTECHNICAL AND SUBSURFACE WASTE MANAGEMENT "FINDINGS" ARE PROFESSIONAL ESTIMATES.

Site exploration identifies subsurface conditions only at those points where samples are taken and when they are taken, but the physical means of obtaining subsurface data precludes the determination of precise conditions. Consequently, the information obtained is intended to be sufficiently accurate for design, but is subject to interpretation. Additionally, data derived through sampling and subsequent laboratory testing are extrapolated by the geotechnical/civil engineer and/or scientist who then renders an opinion about overall subsurface conditions, their likely reaction to proposed construction activity, and/or appropriate design. Even under optimal circumstances actual conditions may differ from those opined to exist, because no geotechnical/civil engineer and/or scientist, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. For example, the actual interface between materials and/or chemicals may be far more gradual or abrupt than the report indicates, and actual conditions in areas not sampled may differ from predictions. Nothing can be done to prevent the unanticipated, but steps can be taken to help minimize their impact. For this reason, most experienced owners retain their geotechnical/waste management consultant through the construction stage to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site. Prudent owners establish contingencies to account for such variations in subsurface conditions as exposed during construction.

## SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural changes or human influence. Because a geotechnical/waste management engineering report is based on conditions which existed at the time of subsurface exploration, construction decisions should not be

based on an engineering report whose adequacy may have been affected by time. Speak with the geotechnical/waste management consultant to learn if additional tests are advisable before construction starts. For example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/waste management report. The geotechnical/civil engineer and/or scientist should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

## THE GEOTECHNICAL ENGINEERING/SUBSURFACE WASTE MANAGEMENT (REMEDIATION) REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical engineering/subsurface management (remediation) report. To help avoid these problems, the geotechnical/civil engineer and/or scientist should be retained to work with other appropriate design professionals to explain relevant geotechnical, geological, hydrogeological and waste management findings and to review the adequacy of their plans and specifications relative to these issues.

## BORING LOGS SHOULD NOT BE SEPARATED FROM THE ENGINEERING/WASTE MANAGEMENT REPORT.

Final boring logs are developed by the geotechnical/civil engineer and/or scientist based upon interpretation of field logs (assembled by site personnel) and laboratory evaluation of field samples. Only final boring logs customarily are included in geotechnical engineering/waste management reports. These logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process. Although photographic reproduction eliminates this problem, it does nothing to minimize the possibility of contractors misinterpreting the logs during bid preparation. When this occurs, delays, disputes and unanticipated costs are the all-too-frequent result.

To minimize the likelihood of boring log misinterpretation, contractors should be given ready access to the complete geotechnical engineering/waste management report. Those who do not provide such access may proceed under the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes which aggravate them to a disproportionate scale.

## READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical engineering/subsurface waste mangement (remediation) is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against geotechnical/waste management consultants. To help prevent this problem, geotechnical/civil engineers and/or scientists have developed model clauses for use in written transmittals. These are not exculpatory clauses designed to foist the engineer's or scientist's liabilities onto someone else. Rather, they are definitive clauses which identify where the engineer's or scientist's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your engineer/scientist will be pleased to give full and frank answers to your questions.

## OTHER STEPS YOU CAN TAKE TO REDUCE RISK.

Your consulting engineer/scientist will be pleased to discuss other techniques which can be employed to mitigate risk and to provide a variety of materials which may be beneficial.

Contact your engineer/scientist for further information.

The preceding paragraphs are based on information provided by the
Association of Soil and Foundation Engineers, Silver Spring, Maryland