

Whitman **Environmental Sciences**

5508 35th Avenue NE, Suite 108
Seattle, Washington 98105

Phone: (206) 523-3505 Fax: (206) 523-3753

April 17, 1998

Tacoma Pierce County Health Department
3629 South D Street
Tacoma, WA 98408-6897

Attention: Mr. Mark LaVerne

RE: Underground Storage Tank Closure Review
Darling International, Inc. Facility
2041 Marc Avenue
Tacoma, Washington

Dear Mr. LaVerne:

This letter report is in response to your request letter of March 2, 1998 for information on UST closure at the above referenced facility. Whitman Environmental Sciences, (WES), was retained by Darling International, Inc. (DII) to review and summarize records relating to the 1989 closure of two underground storage tanks at the above referenced site.

As you are aware, underground storage tanks (USTs) have been regulated under state and federal law since 1986. Many USTs were removed from service during the first few years of regulation, but there was little consistency to the documentation which was completed. The Washington Department of Ecology did not release its current guidelines for closure assessments and documentation until 1991. As a result, there does not appear to have been a comprehensive report prepared summarizing the tank closure and cleanup activities at this site.

WES has collected a variety of available documentation which has been useful to review the history of the site. WES requested records from the following sources to complete this review:

- The files of Darling International, Inc.;
- Files of the Tacoma-Pierce County Health Department;
- Files of Don Golden Company, the contractor who removed the tanks in 1989;
- Files of AGRA Earth & Environmental, Inc. (successor company to Rittenhouse-Zeman & Associates, Inc.);
- Files of Sound Analytical Laboratories, Inc.;
- Files of the Tacoma Fire Prevention Bureau.

Pertinent documents regarding the site are included in Appendices A and B. The collected information was used to review the site activities and draw conclusions about the conditions of the site.

UNDERGROUND STORAGE TANK REMOVAL

The DII site is located on the Tacoma tideflats in the area east of the Puyallup River, south of Lincoln Avenue. The site location is indicated in Figure 1. Developments in the area are heavy industrial sites. The DII facilities are constructed over part of the former Old Tacoma Landfill (also known as the Lincoln Avenue Landfill), a municipal dump site until the 1960s.

DII operated two 10,000 gallon underground storage tanks on the site. One tank held bunker C heating oil for use in the plant's boiler, while the other tank held diesel fuel for trucks used by the company. The two underground storage tanks were removed from the area immediately north of the workshop at the DII site on May 11, 1989. The tanks were removed by Don Golden, Inc. A copy of the Tacoma Fire Department's tank removal permit is attached in Appendix A. As part of the removal, the contractor stockpiled contaminated soil from around the tanks into two piles on plastic sheeting. A vacuum truck operated by Airo Services, Inc. was brought to the site to remove water from the excavation after the tanks were removed. Airo disposed of 1000 gallons of wastewater.

Don Golden Co. removed the tanks from the site and had them disposed. The former bunker C oil tank was taken to Northwest EnviroServices, in Seattle. The diesel tank was disposed of at Golden's Tacoma site, which Mr. Golden says meant the tank was cleaned, cut up and scrapped.

Golden also managed the disposal of contaminated soil. A total of 112 cubic yards (about 170 tons) of petroleum impacted soil were taken to a treatment operation being operated by Fife Sand & Gravel. Golden's company records include a summary of the disposal process and receipts for 14 truckloads of contaminated dirt which was hauled to Fife Sand & Gravel on May 23, 1989 (Appendix A).

Apparently, Mr. Norm Payton of the TPCHD was on site for the closure and obtained soil and groundwater samples at that time. Mr. Payton took one composite sample from the north end of the UST excavation, one composite from the south end of the excavation and a sample of groundwater from the seepage in the base of the pit. In addition, Mr. Payton took two composite samples from the stockpiled soil removed from around the tanks. All five samples were submitted to Sound Analytical Services, Inc., an analytical laboratory, for testing. Table 1 summarizes the test results. The laboratory reports are included in Appendix A.

Table 1
UST Removal Sample Analytical Results
 Reported in Parts Per Million (ppm)

Sample I.D.	TPH (EPA 418.1)	TPH (8015-m)	Benzene	Toluene	Ethyl benzene	Xylenes
1B N. End UST Pit	2,854	NA	NA	NA	NA	NA
2B S. End UST Pit	1,874	NA	NA	NA	NA	NA
3B Grab Water Sample from Pit	NA	4,565	<0.05	<0.05	0.5	0.44
4B N. Stockpile of Soil	NA	8,370	<0.05	<0.05	0.41	1.93
5B S. Stockpile of Soil	4,672	NA	NA	NA	NA	NA

- Table 1 Notes: 1.) TPH - Total Petroleum Hydrocarbons
 2.) EPA 418.1 - IR Spectrometry method suited to heavy oil fraction
 3.) 8015-m - EPA Method 8015, modified Flame Ionization technique used to quantify gasoline and diesel range hydrocarbons.
 4.) NA - Not analyzed for the listed parameter.
 5.) <x.xx - Not detected at concentrations at or above the listed detection limit.

As the table indicates, no concentrations of benzene or toluene were detected in the samples which were analyzed for volatile organic compounds.

Based on the sample results, Mr. Enrico Baroga of TPCHD wrote a letter to Puget Sound Byproducts (DII) on May 24, 1989, noting the test results were above the Washington State cleanup levels used at that time. The letter noted that "standard remedial actions may not be effectively implemented at this site due to site specific conditions (site is an old landfill)." Mr. Baroga felt it was necessary to coordinate with other agencies and "reassess what direction this site investigation/cleanup shall proceed in." He gave approval to backfilling the excavation but considered it to be an open case.

On June 19, 1989, Mr. Baroga wrote another letter to DII informing them that a site assessment must be conducted before the site could be closed regarding tank removal operations. He requested that a copy of the assessment report and if necessary, a remedial action proposal be submitted to the Health Department for review. There has been no other communication from the TPCHD regarding the tank until the recent letter of inquiry in March, 1998.

The tank excavation remained open for some time. Mr. Trammel, the plant manager recalls finally backfilling the pit in late 1989, using imported granular fill. The excavated area was repaved and has remained undisturbed up to the present time.

1989 SITE ASSESSMENT

In September, 1989 Rittenhouse -Zeman & Associates (RZA) conducted a Subsurface Petroleum Hydrocarbon Evaluation in the area surrounding the former tanks. RZA prepared a report addressed to Darling-Delaware Corporation dated September 27, 1989. A copy of the report is included in Appendix B. WES was unable to confirm whether or not this report was submitted to TPCHD at the time it was completed.

RZA drilled three soil borings and installed monitoring wells in the shallow groundwater zone. The three borings were drilled to depths of 14 to 16.5 feet below the ground surface. The wells were identified as MW-4, MW-5 and MW-6. (Three other monitoring wells had previously been installed in deeper groundwater zones at locations around the perimeter of the property, to monitor wastewater lagoons which were on the site at that time.) The monitoring well locations are indicated in Figure 2.

Monitoring Well MW-4 was drilled south-southwest of the tank location, along the west side of the work shop. This boring encountered about 12 feet of fill soil, most of which contained wood chips, organic soil, wire, glass and other debris. Groundwater was encountered at a depth of about 9 feet. The soil was not found to contain detectable odors, observable petroleum sheens or organic vapor concentrations detectable by field instruments.

Monitoring Well MW-5 was drilled north of the former tank location, generally in the northern corner of the property. That boring also found fill soil containing organics and debris to a depth of about 12 feet. Groundwater was encountered at a depth of about 9 feet. The soil was not found to contain detectable odors, observable petroleum sheens or organic vapor concentrations detectable by field instruments.

Monitoring Well MW-6 was drilled to the south of the former tank pit, along the eastern side of the workshop. The boring also encountered debris-laden organic fill soil to a depth of about 16 feet.

Several soil samples obtained from the boring gave field indications of volatile organic compounds. Groundwater was encountered at about seven feet below ground surface.

Soil Sampling

One soil sample from each boring was selected for laboratory testing. The samples were analyzed for total petroleum fuel hydrocarbons by a modified EPA Method 8015 test. Two of the three samples tested contained petroleum hydrocarbons. Sample B-4/S-3 (from MW-4) contained a reported concentration of 141 ppm of petroleum. Sample B-6/S-2 (from MW-6) contained a reported concentration of 645 ppm. The detected petroleum was characterized to be aged gasoline or mineral spirits in both samples. This characterization was typically used to explain a laboratory chromatogram with a relatively limited range of mid-weight hydrocarbons. The chromatogram would typically be missing the lighter end volatile components found in fresh gasoline, but did not evidence the "humped" curve typically produced by diesel fuel and heavier oils, such as stored at the site. The testing suggests the detected hydrocarbons may not have been related to the former USTs.

Groundwater Sampling

One groundwater sample was taken from each well as part of the initial subsurface exploration. The groundwater samples were also analyzed for total petroleum fuel hydrocarbons by a modified EPA Method 8015 test. None of the three samples contained petroleum fuel hydrocarbons (hydrocarbons in the gasoline or diesel ranges) above the detection limit of 10 parts per million.

Assessment Conclusions

The report concluded that contamination was not widespread and may not have been related to the former on-site tanks. RZA recommended that the three new wells be monitored periodically, when other site monitoring was conducted.

ADDITIONAL GROUNDWATER MONITORING

Laboratory reports from Sound Analytical Services, Inc. document subsequent laboratory testing on samples from the three new wells dating from November 1989 to February 1993. The groundwater monitoring test results are summarized in Table 2. Laboratory reports and summaries are included in Appendix C.

Table 2
Periodic Groundwater Sampling Results, 1989 to 1993
Total Petroleum Hydrocarbons in ppm, by EPA Method 418.1

Date Sampled	MW-4	MW-5	MW-6
9-12-89	<10	<10	<10
11-8-89	7.2	10	82
1-10-90	20	7	10
4-10-90	9.4	12.7	19.0
7-10-90	7.0	5.0	43.0
10-5-90 (report date)	5.6	ND	9.2
1-15-91	2.2	1.1	23

4-5-91	<1.0	<1.0	36
7-9-91	3.4	3.5	43
11-12-91	1.7	2.3	9.4
1-9-92	2.0	3.0	20
8-26-92	NR	10	4.6
12-14-92	NR	44	32
1-27-93	NR	8.5	2.2

Notes: ND - Not detected. Laboratory detection limit not specified.
<x.x - Not detected at concentrations above the noted detection limit.
NR - Not reported. If sampled, the laboratory report is no longer readily available.

The reported groundwater monitoring indicates concentrations of petroleum hydrocarbons were regularly detected in groundwater samples obtained from all three wells. Samples from monitoring well MW-4 evidenced concentrations ranging from less than 1.0 to 20 ppm. Samples from MW-5 evidenced concentrations ranging from less than 1.0 to 44 ppm. Samples from MW-6 evidenced concentrations ranging from 2.2 to 82 ppm. MW-6, south of the former tank location, has shown widely variable results, but often evidenced higher TPH concentrations than the other two wells. There is a trend of decreasing overall concentrations and peak concentrations evident over the time it was monitored.

Groundwater level measurements from the assessment calculated a generally westward direction of groundwater flow. This appears to be consistent with the direction of flow which would be anticipated, based on the location of the site and surrounding surface water features. MW-5 should be considered an upgradient monitoring well. The concentrations of TPH in MW-5 (ranging up to 44 ppm) represent background concentrations from other upgradient sources or the municipal waste which the site is built on. The reported concentrations in MW-4, in a downgradient location, are similar to the concentrations in MW-5 and also likely represent background levels.

Since analyses were conducted by EPA Method 418.1, the reported TPH cannot be characterized in the way that chromatographic analyses on soil samples were. In addition, organic materials such as the organic soil and debris observed in the borings can interfere with Method 418.1 analyses, elevating the results.

In 1997, all of the monitoring wells at the site were permanently abandoned by a licensed water well driller following procedures outlined in the Washington water well construction code. The former wastewater lagoons had been closed several years earlier and groundwater monitoring was no longer required by the TPCHD.

CONCLUSIONS

The removal of the tanks has removed the source of petroleum contaminants from the site. No further fuel handling occurs on the property and the excavation area is paved, which limits surface water infiltration.

The excavated soil which had been removed from around the tanks contained higher concentrations of TPH than the excavation sidewalls, indicating the worst soil contamination was also removed. Drilling around the former fuel area detected only limited concentrations of TPH in soil, indicating little migration of contaminants had occurred over the life of the fueling systems. Long term groundwater monitoring found area background concentrations of TPH to be elevated either due to upgradient sources or the municipal landfill on which the site is constructed. The one well which had frequently evidenced TPH concentrations higher than the other wells showed widely variable results, but a trend of decreasing peak concentrations over the time it was monitored.

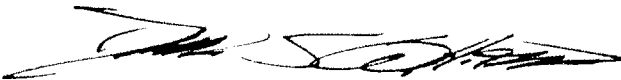
The wells have since been abandoned and are no longer available for testing.

Based on the cleanup which has been completed to date and the location of the site in an industrial area overlying the old landfill, no further action to cleanup or monitor is recommended.

CLOSURE / LIMITATIONS

WES obtained, reviewed and evaluated information available from various sources. Our conclusions and opinions are based, in part, on this information. No warrantee is expressed or implied. If you have any questions regarding the information contained in this letter, or if I may be of any further service, please feel free to contact me.

Respectfully submitted,
Whitman Environmental Sciences



Daniel S. Whitman
Principal

Figure 1 - Site Location Map

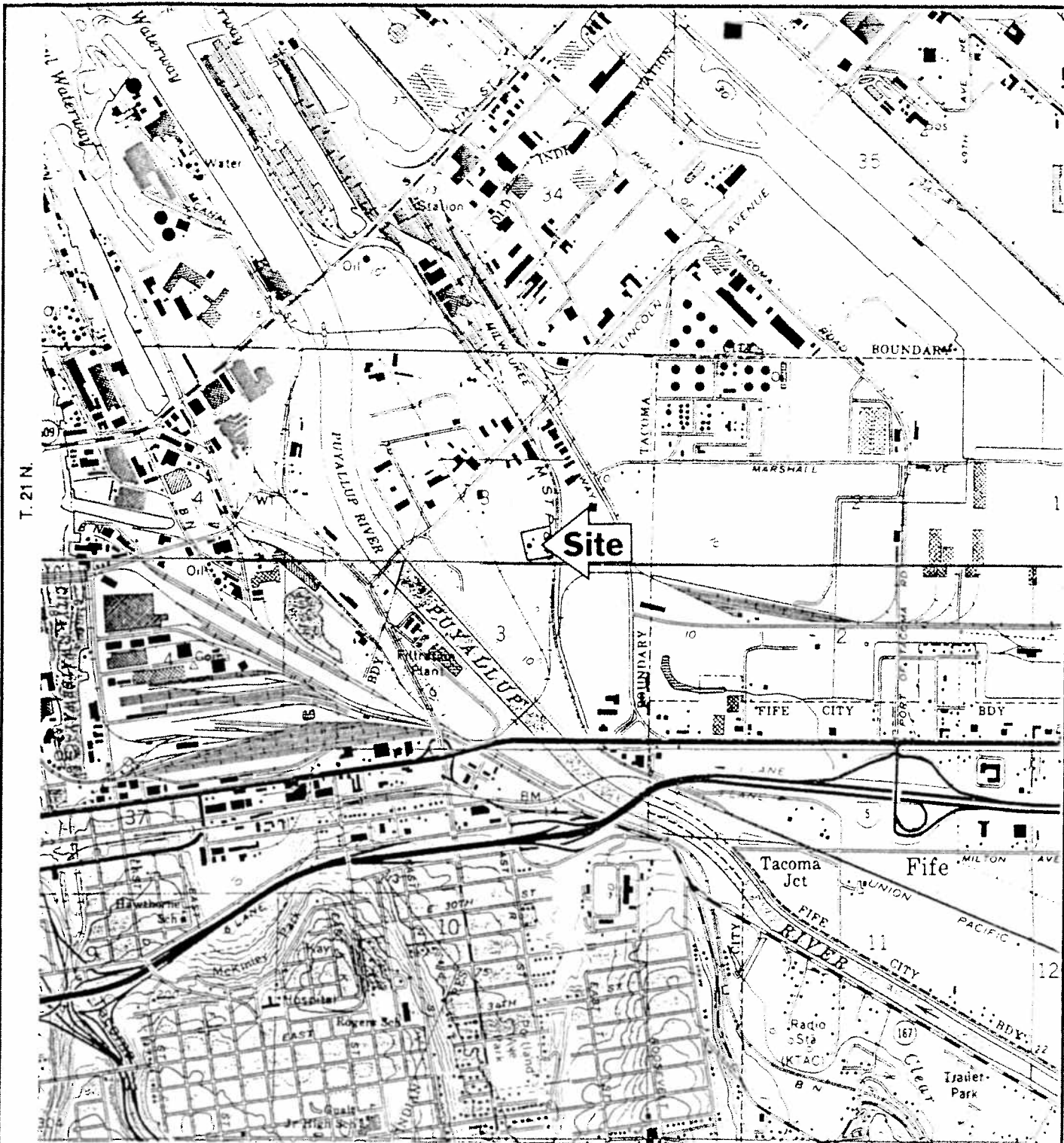
Figure 2 - UST and Monitoring Well Location Plan (from RZA 1989 Report)

Appendix A - UST Closure Documents

- 1.) TPCHD UST Removal Permit
- 2.) Tacoma Fire Prevention Bureau Permit
- 3.) Airo Services, Inc. Excavation Water Disposal Receipt
- 4.) Sound Analytical Services, Inc - Laboratory Analytical Report, Excavation and Stockpile Samples
- 5.) Notes from Don Golden Co. File about Soil Disposal and Disposal Transportation Receipts (2 pages)
- 6.) Tank Disposal Certificate, Northwest EnviroService Inc.
- 7.) TPCHD Letters dated May 24, 1989 and June 19, 1989

Appendix B - 1989 RZA Subsurface Petroleum Hydrocarbon Evaluation Report

Appendix C - Sound Analytical Services, Inc. Groundwater Sample Analytical Reports and Summaries



R. 3 E.

From U.S.G.S. 7.5'
Tacoma N. & S., WA Quads.
Photorevised 1981

North



0 2000'



Scale 1 : 24,000

Figure 1 - Site Location Map

Darling International, Inc.
2041 Marc Avenue
Tacoma, Washington

Project No. WES - 1144

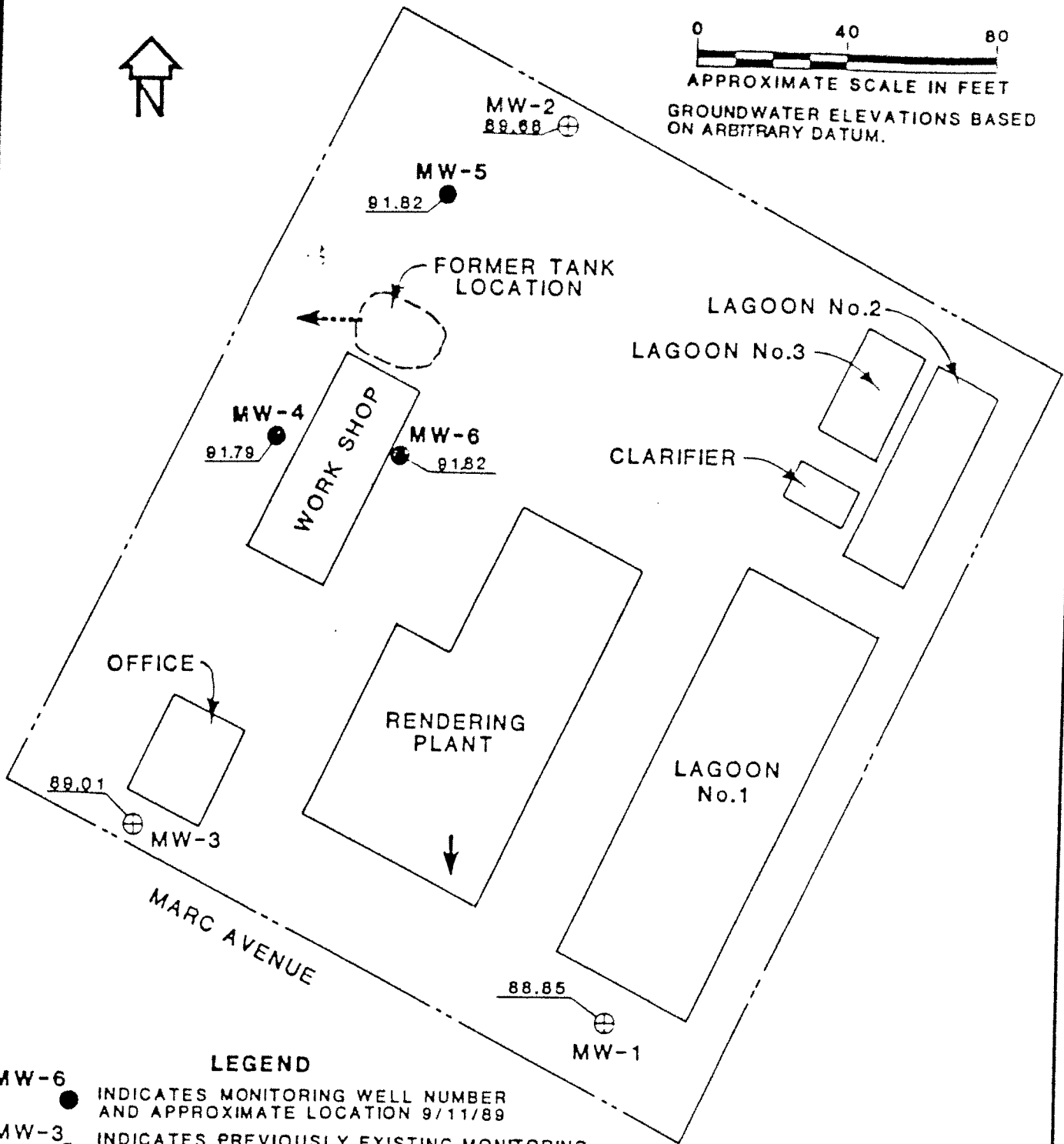
Date Apr 4, 1998

File ID. 1144F1





APPROXIMATE SCALE IN FEET
GROUNDWATER ELEVATIONS BASED ON ARBITRARY DATUM.



LEGEND

- MW-6 ● INDICATES MONITORING WELL NUMBER AND APPROXIMATE LOCATION 9/11/89
- MW-3 ⊕ INDICATES PREVIOUSLY EXISTING MONITORING WELL NUMBER AND APPROXIMATE LOCATION
- ←... INFERRED DIRECTION OF GROUNDWATER MIGRATION - UPPER WATER-BEARING ZONE
- ← INFERRED DIRECTION OF GROUNDWATER MIGRATION - LOWER WATER-BEARING ZONE.

PUGET SOUND BY-PRODUCTS

SITE & EXPLORATION PLAN

FIGURE 1

WO W-6364
 BY SME
 DATE SEP 1989
 SCALE NOTED

RITTENHOUSE-ZEMAN & ASSOCIATES, INC.
Geotechnical & Hydrogeological Consultants
 1400 140th Avenue N.E.
 Bellevue, WA 98005



APPENDIX A

UST Closure Documents

Tacoma-Pierce County
Health Department

Alfred M. Allen, M.D., M.P.H.
Director of Health

Permit #

VALIDATION **APPROVED**

JAN 20 1989

TACOMA-PIERCE COUNTY HEALTH DEPT.
ENVIRONMENTAL HEALTH DIV.

Expires 180 days from validation date

UNDERGROUND STORAGE TANK REMOVAL PERMIT

Tacoma-Pierce County Health Department
3629 South "D" Street, EH-3126
Tacoma, WA 98408 (591-6450)

Removal Firm Don Golden Co. Phone # 474-0148

Site Location Puget Sound By-Products
2041 Main Street

Owner Puget Sound By-Products

All work must be performed in accordance with current laws, ordinances, resolutions and rules and regulations.

Approval Signature *Alfred M. Allen*

TO BE POSTED ON SITE — DO NOT ALTER OR DEFACE

TACOMA FIRE DEPARTMENT

NON TRANSFERABLE

FIRE PREVENTION BUREAU

PERMIT

PHONE: 591-5740

ANNUAL

Tacoma, Washington

SPECIAL

DATE 3-31-89 EXPIRATION DATE 5-31-89

ISSUED TO: Don Golden 474-0148

ADDRESS: 4704 So Washington Tacoma

FOR: Removal of 2 19000 gallon diesel tanks

LOCATION: 2041 Mac St

- CONDITIONS:
1. Comply with Article 79 UFC (1985).
 2. Comply with NFPA #30.
 3. Comply with TFD abandonment or removal of underground tank procedures.
 4. Comply with API Bulletin #1604.
 5. Pay \$5.00 permit fee per tank.
 6. Call for inspection at least 48 hours before tanks are removed from ground. Need to inspect tank and open hole.
 7. Acquire permit from Pierce County Health Department, 3629 South D Street.

Received
By: [Signature]

FIRE MARSHAL
By: [Signature]

It is understood and agreed that this permit may be revoked for cause at any time.

AIRO SERVICES INC.

4110 EAST 11TH STREET
TACOMA, WASHINGTON 98421
(206) 383-4916

Don Golden
4704 S. Washington
Tacoma, WA 98409

NO. 10988

DATE

89-10371

May 11, 1989

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
<u>May 11, 1989</u>				
Skim water off excuvation				
1 Tractor & 130 BBL Vacuum trailer w/ operator	2 ot 1.5	HR HR	72.50 90.50	145.00 135.75
1 Wash truck w/ operator	ot 1	HR	84.50	84.50
Disposal -- 1000 gallons	1000	GAL	.30	300.00
Total Due				665.25

Puget Sound By-Products

24 HOUR SERVICE
 MARINE & INDUSTRIAL CLEANING • HYDROBLASTING
 HAZARDOUS WASTE TRANSPORTATION

Service Charge TERMS: 1 1/2 % Per Month on any sum not paid within 30 days of delivery.

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: Puget Sound By-Products Date: May 16, 1989

Report On: Analysis of Soil & Water Lab No.: A 6204
Page 1 of 2

IDENTIFICATION:

Samples Received on 5-11-89

Sampled by Norman Payton, TPCHD on 5-11-89

ANALYSIS:

Laboratory Sample No. 1

Client ID: Sample 1B - Comp. Soil Sample North End of UST Pit

Total Petroleum Hydrocarbons, mg/kg
by EPA Method 418.1 2,854

Laboratory Sample No. 2

Client ID: Sample 2B - Comp. Soil Sample South End of UST Pit

Total Petroleum Hydrocarbons, mg/kg
by EPA Method 418.1 1,874

Laboratory Sample No. 3

Client ID: Sample 5B - Comp. Soil Sample South Pile from UST Pit

Total Petroleum Hydrocarbons, mg/kg
by EPA Method 418.1 4,672

Continued

This report is issued solely for the use of the person or company to whom it is addressed. This laboratory accepts responsibility only for the due performance of analysis in accordance with industry acceptable practice. In no event shall Sound Analytical Services, Inc. or its employees be responsible for consequential or special damages in any kind or in any amount.

SOUND ANALYTICAL SERVICES, INC.

Puget Sound By-Products
Page 2 of 2
Lab No. A 6204
May 16, 1989

Laboratory Sample No. 4

Client ID: Sample 4B - Comp. Soil Sample North Pile from UST Pit

Total Petroleum Hydrocarbons, mg/kg by EPA SW-846 Modified Method 8015	8,370
Benzene, mg/kg	< 0.05
Toluene, mg/kg	< 0.05
Ethyl Benzene, mg/kg	0.41
Toluene, mg/kg	1.93

(BETX by EPA SW-846 Method 8020)

Laboratory Sample No. 5

Client ID: Sample 3B - Grab Water Sample of UST Pit

Total Petroleum Hydrocarbons, mg/l by EPA SW-846 Modified Method 8015	4,565
Benzene, mg/l	< 0.05
Toluene, mg/l	< 0.05
Ethyl Benzene, mg/l	0.50
Xylenes, mg/l	0.44

(BTEX by EPA SW-846 Method 8020)

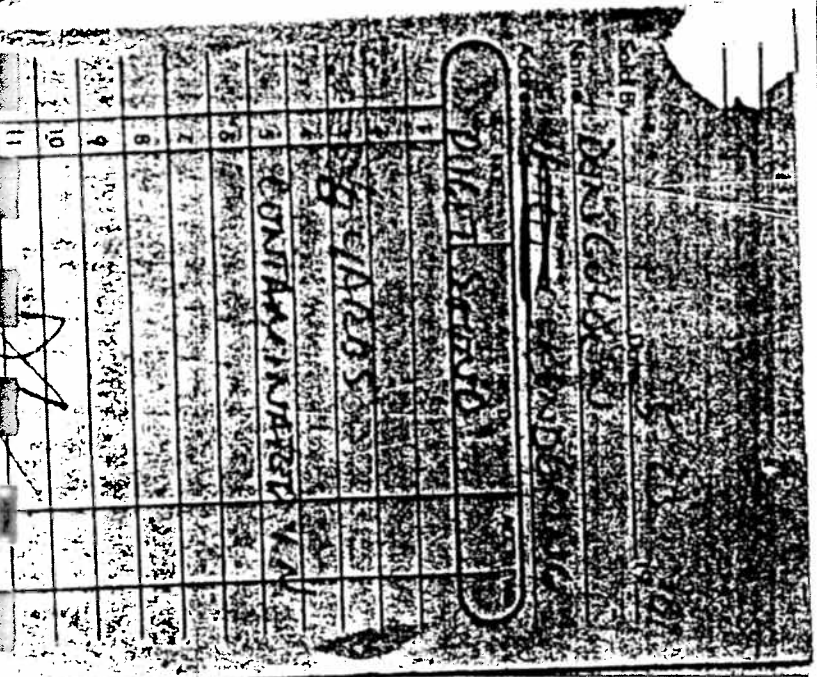
SOUND ANALYTICAL SERVICES



STAN P. PALMQUIST

4 rolls plastic @ 15.00 ea

56 yds contaminated



Attachment for job 9-060 Date

	Explanation of contaminated soil:
	The 112 yards of contaminated soil hauled to
	Pife Sand and Gravel will be credited down the
	Pierce County Health Department will make
	inspection and order soil samples and when
	soil samples pass test the 112 yards will be
	transported to a land fill. Upon completion
	of transportation of soil a final statement
	of total expense will be made. (At the
	present time it is approx \$33.00 @ yard).
	If you have a credit due you will be re-
	imbursed and if there is an amount due you
	will be billed. Whatever the total is our
	mark up is 10%. A copy of their (Pife Sand
	and Gravel Invoice) will be furnished.
	In regard to your tank disposal
	One Tank (10,000 Bunker "C" was cleaned and
	disposed of at Northwest Enviro Service
	in Seattle, Washington)
	One Tank (10,000 Diesel was disposed of at our
	Tacoma Disposal Site).

56 yds contaminated

5-11-89
 Name: Don Golden Co
 Address: Puget Sound By Products
 8 yds
 diesel contaminated
 MAB

1	2	3	4	5	6	7	8	9	10	11	12	13	14
---	---	---	---	---	---	---	---	---	----	----	----	----	----

DATE 5/11/89 CONTROL# _____ DEPARTED _____ RETURNED _____

() COMPLETE () INCOMPLETE CLASSIFICATION () M () I () T () O _____

CUSTOMER Don Golden ORDER # _____

LOCATION Puget Sound By Products

CONTACT _____ PHONE # _____

SHIPPER Don Golden SHIPPER # _____

ORIGIN Puget Sound By Products

DATE/TIME ARRIVED 5-11-89 DEPARTED: _____

SHIPPER'S SIGNATURE James Haggard

CONSIGNEE: _____ RECEIPT # _____

DESTINATION: _____

DATE/TIME ARRIVED _____ DEPARTED: _____

CONSIGNEE'S SIGNATURE _____



UNIT# _____

ODOMETER OUT _____

ODOMETER IN _____

TOTAL MILES _____

IFTA: _____ ORE: _____

FUEL _____ GLS _____ GLS

U.S. D.O.T. DESCRIPTION	PLACARD#	CONTAINERS NO. TYPE	QUANTITY WT./VOL.
<u>WASTE WATER 8011</u>	<u>N/A</u>	<u>7/7</u>	<u>1200 G</u>

SPECIAL HANDLING INSTRUCTIONS AND/OR ADDITIONAL INFORMATION _____

CUSTOMER _____



**Northwest
EnviroService
Inc.**

Date: May 30, 1989

To: Don Golden
4704 S. Washington
Tacoma, Wa 98409

Dear Sir:

This to certify that Northwest EnviroService, Inc. has received the following tanks for cleaning and disposal in accordance with all Federal, State and Local rules and regulations:

- 1. 1- 10,000 gallon Bunker C
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____

Date received: 5-12-89

Date cleaned : 5-17-89

Date of disposal: 5-22-89

Location of tank origin: Puget Sound Rendering
Tacoma, Wa

If you have any questions or requests for service, feel free to contact this office at 622-1090.

Thank you for your business.

Sincerely,
Northwest EnviroService, Inc.

Thomas R. Gremel
Thomas R. Gremel

Tacoma-Pierce County Health Department



Alfred M. Allen, M.D., M.P.H.
Director of Health

- JOE STORTINI — Pierce County Executive
- DOUG SUTHERLAND — Tacoma Mayor
- BARBARA SKINNER — Pierce County Councilmember
- GREG MYKLAND — Tacoma Councilmember
- M. JAMES WICKS, M.D. — Member-at-Large
- ALAN NYGAARD — Ex-officio Member, Sumner City Administrator
- Representing Pierce County Cities & Towns Association

May 24, 1989

Puget Sound By-Products
P.O. Box 1716
2041 Marc Avenue
Tacoma, WA 98401

Attn: Jake Trammell

Re: Underground Storage Tank Removal - Puget Sound By-Products, 2041 Marc Ave., Tacoma, WA

*Placed
sent to
Bill*

Dear Mr. Trammell:

This letter serves to inform you that the Tacoma-Pierce County Health Department has reviewed test results of soil samples from the above project. The results showed the contaminant levels to be above the Washington State cleanup levels for fuel-contaminated soil. Standard remedial actions for leaking underground storage tanks may not be effectively implemented at this site due to site-specific conditions (site is an old municipal landfill).

The Health Department feels it is necessary to coordinate with all appropriate agencies to re-assess what direction this site investigation/cleanup shall proceed in. You may backfill the underground storage tank pit for safety purposes; however, this is considered an "open" case until a final decision can be made regarding the remaining contamination.

Thank you for your cooperation. If you have any further questions regarding this matter, please call me at 591-6469.

Sincerely,
Enrico Baroga

Enrico Baroga
Environmental Health Specialist
Waste Management Section
Environmental Health Division

EB:pf

cc: Doug Pierce, TPCHD
Dom Reale, DOE
Dick Walker, DOE

RECEIVED MAY 26 1989

~~RECEIVED~~ MAY 26 1989

**Tacoma Pierce County
Health Department**

Alfred M. Allen, M.D., M.P.H.
Director of Health

- JOE STORTINI — Pierce County Executive
 - DOUG SUTHERLAND — Tacoma Mayor
 - BARBARA SKINNER — Pierce County Councilmember
 - GREG MYKLAND — Tacoma Councilmember
 - M. JAMES WICKS, M.D. — Member-at-Large
 - ALAN INGRAM — Executive Member, Summit City Administration
- Representing Pierce County Cities & Towns Association

*Tacoma-
US* *Subba*

June 19, 1989

Puget Sound By-Products
P.O. Box 1716
2041 Marc Avenue
Tacoma, WA 98401

Attn: Jake Trammell

Re: Underground Storage Tank Removal - Puget
Sound By-Products, 2041 Marc Ave., Tacoma, WA

Dear Mr. Trammell:

This letter serves to inform you that before the above site can be closed regarding tank removal operations, an assessment of the extent of hydrocarbon contamination must be performed. A site assessment is necessary as the initial soil samples which were taken during the tank removal showed very high levels of petroleum contamination.

A site assessment has been completed, please submit a copy of the assessment report along with a remedial action proposal, if needed, to Health Department for review. Thank you for your cooperation.

If you have any further questions regarding this matter, please call me at 501-6460.

Sincerely,

Enrico Baroga, R.S.
Environmental Health Specialist
Waste Management Section
Environmental Health Division

206 511 6469

EB:pf

cc: Dom Randle, DOE
Dick Walker, DOE

RECEIVED JUN 21 1989

Baroga

APPENDIX B

***Rittenhouse-Zeman & Associates, Inc.
1989 Subsurface Petroleum Hydrocarbon Evaluation Report***



RITTENHOUSE-ZEMAN & ASSOCIATES, INC.
Geotechnical & Environmental Consultants

*1400 140th Avenue N.E.
Bellevue, Washington 98005-4594
(206) 746-8020/FAX (206) 746-6364*

27 September 1989

W-6364

Darling-Delaware Corporation
8737 King George Drive
Dallas, Texas 75235

Attention: Mr. Subba Rao

Subject: Subsurface Petroleum Hydrocarbon Evaluation
Puget Sound By Products Site
2041 Marc Avenue
Tacoma, Washington

Gentlemen:

We are pleased to present herein the results of our subsurface petroleum hydrocarbon evaluation for the above referenced site. Verbal authorization to proceed with this study was provided by Mr. Subba Rao in accordance with our revised proposal numbered P-3182B dated 4 August 1989. We appreciate this opportunity to be of service to you and would be pleased to discuss the contents of this report and other aspects of the project with you at your convenience.

Respectfully submitted,

RITTENHOUSE-ZEMAN & ASSOCIATES, INC.

Daniel S. Whitman
Senior Environmental Geologist

SUBSURFACE PETROLEUM HYDROCARBON EVALUATION

Puget Sound By-Products Site

2041 Marc Avenue

Tacoma, Washington

Prepared For

Darling-Delaware Corporation

8737 King George Drive

Dallas, Texas 75235

Prepared by

RITTENHOUSE-ZEMAN & ASSOCIATES, INC

1400 140th Avenue N.E.

Bellevue, Washington 98005

September 1989

W-6364

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Figure 1: Site and Exploration Plan

Table 1: Summary of Groundwater Measurements

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SUBSURFACE PETROLEUM HYDROCARBON EVALUATION
PUGET SOUND BY-PRODUCT SITE
2041 MARC AVENUE
TACOMA, WASHINGTON

W-6364

1.0 SUMMARY

The following report presents the results of our subsurface exploration program and analytical laboratory testing of soils and groundwater at the subject site. The purpose of this evaluation was to provide information pertaining to qualitative and quantitative site characterization with respect to subsurface petroleum hydrocarbon concentrations. The scope of work consisted of field explorations and sampling, installation of three 2-inch diameter monitoring wells, surveying of well casings and measurement of water depths, analytical laboratory testing, data interpretation, and report preparation. A brief summary of the significant findings outlined in this report is presented below:

- Subsurface soils encountered in our exploratory borings consisted of fill soils extending to depths of 12 to 16 $\frac{1}{4}$ feet below the existing ground surface, underlain by what was interpreted to be native soils. Fill soils consisted of medium dense, gray to brown silty sand containing some gravel, to a depth of approximately 5 feet, underlain by loose to medium dense, black silty sand with abundant wood chip waste extending to depths of 12 to 16 $\frac{1}{4}$ feet. Glass, metal, and organics were also present in this material. These fill soils were underlain by soft to medium stiff, gray silt interpreted to be native.
- Groundwater is apparently present at the site in two water bearing zones separated by a silt layer present at an average depth of approximately 12 feet. Static water levels were measured at depths of 7-8 feet in the upper, perched zone, as indicated by the three monitoring wells installed for this study. Water levels in existing deeper wells were generally lower, indicating a hydrologic control which results in a perched ground water condition. The inferred groundwater migration direction of the upper zone is generally to the west.
- Monitoring wells MW-1, MW-2, and MW-3 were installed in a previous study by others to a depth of approximately 30 feet. The groundwater depth in these wells was approximately 10 $\frac{1}{2}$ to 11 $\frac{1}{2}$ feet and the inferred direction of groundwater migration is generally to the south. Although this water-bearing

zone appears to be separated from the upper perched water, there may be some intercommunication between these two water-bearing zones.

- Analytical test results indicate that soil samples B-4/S-3 and B-6/S-2 contain total petroleum hydrocarbon (TPH) concentrations of 141 mg/kg and 645 mg/kg, respectively. Laboratory results indicate that petroleum hydrocarbons present in these samples may be aged gasoline or mineral spirits.
- Analytical test results indicate that water samples from monitoring wells MW-4, MW-5, MW-6 contain TPH concentrations below the 10 mg/kg laboratory detection limit.

This summary is presented for introductory purposes only and should be used in conjunction with the full text of this report. The project description, site conditions, investigative techniques, and evaluation results are presented within the remainder of this report.

2.0 PROJECT DESCRIPTION

The subject site is a rectangular parcel located on the northeast side of Marc Avenue southeast of Lincoln Avenue in Tacoma, Washington. The site has approximately 210 feet of frontage on Marc Avenue and is approximately 235 feet long on its northeast side. The site is currently occupied by an operating rendering plant, a work shop, an office, and three small waste water treatment lagoons. An underground storage tank reportedly containing diesel oil was formerly present just northeast of the work shop building. This tank had recently been removed and some residual soil contamination was suspected in the soils surrounding the excavation area. The purpose of our evaluation was to determine if soil and groundwater impacts extended a significant distance beyond the immediate tank area.

3.0 SUBSURFACE CONDITIONS

The subsurface exploration program for this project consisted of advancing 3 borings at the approximate locations shown on the Site and Exploration Plan, Figure 1. The borings were drilled on 11 September 1989 and were advanced to depths of approximately 14 to 16¹/₂ feet below the existing ground surface and were continuously observed and logged in the field by an experienced hydrogeologist from our firm. The

approximate boring locations shown on the Site and Exploration Plan, Figure 1, were obtained by pacing from existing site features. The indicated locations are accurate to the degree implied by the method used.

The exploration logs enclosed in Appendix A are based on interpretations made in the field and include as-built diagrams of the monitoring wells. The logs indicate the various types of soils and materials encountered in the borings. The relative densities indicated in the logs are based on the drilling action and the advancement rate of the drill rig, as well as the driving resistance measured during sampling (N-values). The logs also indicate the depths where the strata or characteristics of the strata change, although changes may be gradual. If the change occurred between sample intervals, the depth to the change was interpreted.

3.1 Subsurface Soils

Subsurface soils encountered in our exploratory borings consisted of fill soils extending to depths of 12 to 16¹/₄ feet below the existing ground surface, underlain by what was interpreted to be native soils. Fill soils present consisted of medium dense, gray to brown silty sand with some gravel to a depth of approximately 5 feet, underlain by loose to medium dense, black silty sand with abundant wood chip waste to depths of 12 to 16¹/₄ feet. Glass, metal, and organics were also present in this horizon. These fill soils were underlain by stiff to medium stiff, gray silt interpreted to be native.

3.2 Groundwater

Groundwater conditions on the site were evaluated utilizing data from previously existing monitoring wells, monitoring wells installed for our investigation, and conditions noted during drilling. Elevations of the wells installed for this study were surveyed relating to the measuring point on one of the existing wells in order to correlate water level data. A summary of the groundwater level measurements obtained during our evaluation is presented in Table 1.

Water level measurements obtained from monitoring wells on the site indicate that two water bearing zones may be present at the site, controlled by a silt layer present at a depth of 12 to 16¹/₄ feet. Monitoring wells MW-4, MW-5, and MW-6 were installed to a depth of approximately 15 feet, into the first groundwater encountered and were

terminated in the silt layer. The groundwater depth in these wells was approximately 7 to 8 feet below the surface and the inferred direction of groundwater migration is generally to the west.

Monitoring wells MW-1, MW-2, and MW-3 were installed in a previous study by others to a depth of approximately 30 feet. The groundwater depth in these wells was approximately 10 $\frac{1}{2}$ to 11 $\frac{1}{2}$ feet and the inferred direction of groundwater migration is generally to the south.

Although this water-bearing zone appears to be separated from the upper perched water, there may be some intercommunication between these two water-bearing zones. Given the location of the site on the Tacoma tide flats it is possible this lower groundwater condition is tidally influenced, which could result in significant variations in ground water flow direction and gradient.

The groundwater gradients and inferred flow directions are based on simplified assessments, and should be viewed as a generalized estimation based on limited data. More long-term monitoring data would be required to determine the interrelationship of the water bearing zones.

4.0 PETROLEUM HYDROCARBON OCCURRENCE

4.1 Field Test Procedures

Qualitative field observations were performed by documenting recovered sample characteristics such as odor, sheen, and obvious discoloration. In addition to visual and olfactory sensing, field screening was performed with the aid of direct reading instruments. All samples were evaluated utilizing an Organic Vapor Meter (OVM) by means of the "head space" method. No obvious petroleum odors or discoloration were noted from the recovered samples. Head space measurements taken on recovered samples were generally less than 1.0 ppm, with the exception of samples S-2 and S-4 from boring B-6. These samples exhibited head space readings of 52 and 32 ppm, respectively. Head space measurements are presented on the boring logs, Appendix A. Head space measurements yield a semi-quantitative measurement of a volatile gas concentration in the volume of a closed container occupied with soil. The measured concentration is generally used as a screening aid to indicate the presence of volatile

organic compounds. The air quality in the head space of a container and olfactory sensing can vary, due to factors including temperature, moisture content, soil gradation, and olfactory fatigue.

4.2 Quantitative Analyses of Soil

All laboratory analyses were subcontracted to Sound Analytical Services, Inc., of Tacoma, Washington. The laboratory results are reported in milligrams per kilogram (mg/kg) and milligrams per liter (mg/l) units which are equivalent to parts per million (ppm) concentrations. The analytical results are summarized in Table 2 and the laboratory analytical results are presented in Appendix B.

One soil sample was selected for analysis from each boring on the basis of noticeable hydrocarbon staining, odor, depth, and or head space measurements. The procedure used to obtain head space readings is described above.

Selected soil samples were analyzed for total petroleum hydrocarbons (TPH) by EPA Method 8015 (Modified), a gas chromatography/flame ionization technique. The analytical results indicate that sample S-3 obtained from boring B-4 at a depth of approximately 7 1/2 feet contained a TPH concentration of 141 mg/kg, sample S-2 from boring B-5 at 5 feet did not contain TPH concentrations above the laboratory detection limit of 10 mg/kg, and sample S-2 from boring B-6 at 5 feet contained a TPH concentration of 645 mg/kg. Laboratory results indicate that petroleum hydrocarbons present in B-4/S-3, and B-6/S-2 may be aged gasoline or mineral spirits.

4.3 Quantitative Analyses of Groundwater

Water samples obtained from monitoring wells MW-4, MW-5, MW-6 installed for this study were also analyzed by EPA Method 8015-Modified. Quantitative analytical results as performed by this method indicated TPH concentrations of all water samples tested are below the laboratory detection limit of 10 mg/kg.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Analytical test results indicate that soil samples B-4/S-3 and B-6/S-2 contained TPH concentrations of 141 mg/kg and 645 mg/kg, respectively. Laboratory results indicate that petroleum hydrocarbons present in these samples may be aged gasoline or mineral

spirits. This finding generally indicates the former on-site diesel fuel tank was apparently not the source of the noted hydrocarbons. No contaminants which could be directly attributed to the tank system were encountered, suggesting residual contamination from the removed system is not widespread.

Analytical test results indicate that water samples from monitoring wells MW-4, MW-5, and MW-6 contained TPH concentrations below the 10 mg/kg laboratory detection limit. The groundwater noted in these wells may be somewhat isolated from the lower groundwater conditions on-site by the silty native materials encountered in the borings.

We recommend that the next routine sampling round for monitoring wells MW-1 through MW-3 also include the three new wells MW-4 through MW-6. All wells should be analyzed for TPH by EPA Method 8015-Modified, in addition to the routine parameters for the site.

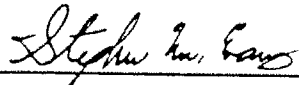
6.0 CLOSURE

The information in this report is based on the explorations and laboratory analyses accomplished for this study. The presented conclusions are professional opinions and reflect our interpretation of the analytical laboratory test results, as well as our experience and observation during project field studies. The number, locations, and depths of the explorations, including the analytical testing scope, were completed within the site and proposal constraints so as to yield the information required to formulate our conclusions.

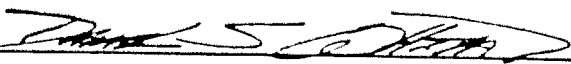
We appreciate this opportunity to be of service to Darling-Delaware Corporation. If you have any questions, please do not hesitate to call at your earliest convenience.

Respectfully submitted,

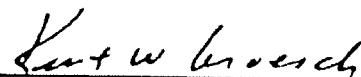
RITTENHOUSE-ZEMAN & ASSOCIATES, INC.



Stephen M. Evans
Engineering Geologist



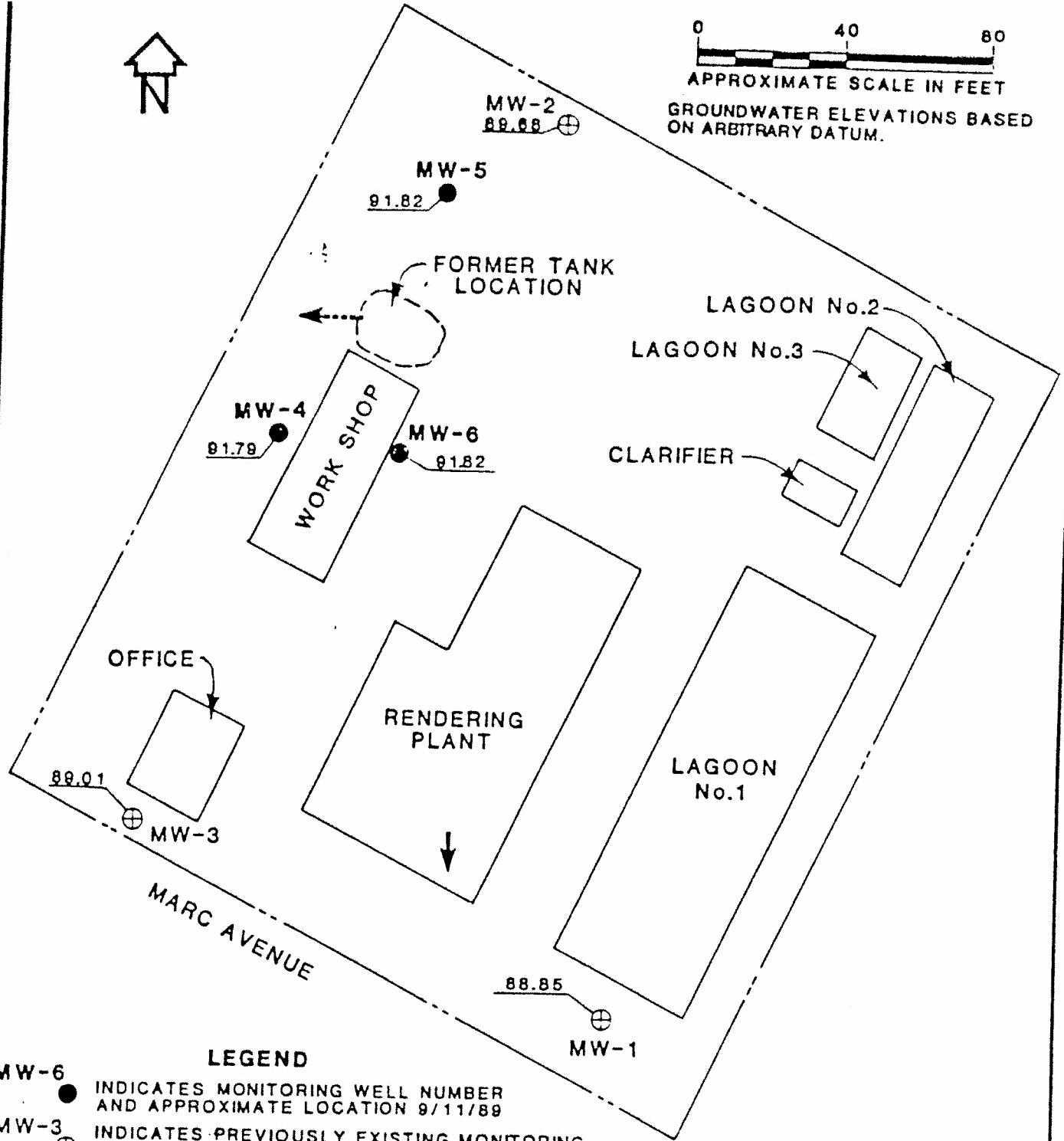
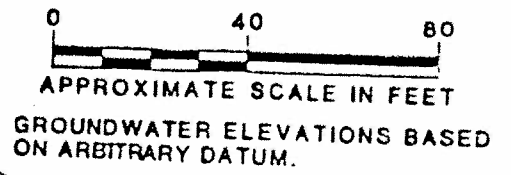
Daniel S. Whitman
Senior Environmental Geologist



Kurt W. Groesch P.E.
Associate



SME:cao1



- LEGEND**
- MW-6 ● INDICATES MONITORING WELL NUMBER AND APPROXIMATE LOCATION 9/11/89
 - MW-3 ⊕ INDICATES PREVIOUSLY EXISTING MONITORING WELL NUMBER AND APPROXIMATE LOCATION
 - ←...← INFERRED DIRECTION OF GROUNDWATER MIGRATION - UPPER WATER-BEARING ZONE
 - ← INFERRED DIRECTION OF GROUNDWATER MIGRATION - LOWER WATER-BEARING ZONE.

**PUGET SOUND BY-PRODUCTS
SITE & EXPLORATION PLAN**

FIGURE 1

WO W-6364
BY SME
DATE SEP 1989
SCALE NOTED

**RITTENHOUSE-ZEMAN &
ASSOCIATES, INC.**
*Geotechnical & Hydrogeological
Consultants*
1400 140th Avenue N.E.
Bellevue, WA 98005



TABLE 1

GROUNDWATER MEASUREMENTS IN WELLS

Puget Sound By-Products

W-6364

Well Number	Casing Elevation(Ft)*	Measured Water Depth(Ft) (Below Well Casing)	Groundwater Elevation(Ft)*
MW-1	100.47	11.62	88.85
MW-2	100.14	10.46	89.68
MW-3	99.98	10.97	89.01
MW-4	99.49	7.70	91.79
MW-5	100.20	8.38	91.82
MW-6	98.82	7.00	91.82

* - Based on an arbitrary datum of 100.00

TABLE 2

SUMMARY OF ANALYTICAL LABORATORY RESULTS (PPM)

Puget Sound By-Products

W-6364

Soil Samples	Sample Number	Depth(ft)	TPH
B-4	S-3	3.0	141*
B-5	S-2	5.5	<10
B-6	S-2	8.0	645*

Water Samples	Sample Number	TPH
MW-4	W-1	<10
MW-5	W-2	<10
MW-6	W-3	<10

APPENDIX A
SUBSURFACE EXPLORATION PROCEDURES AND LOGS

APPENDIX A

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SUBSURFACE EXPLORATION

The field exploration program conducted for this study consisted of advancing a series of 3 hollow stem auger borings. The approximate locations are illustrated on the Site and Exploration Plan, Figure 1. These locations were obtained in the field by taping and pacing from existing features.

The borings were drilled on 11 September 1989 by a local exploration drilling company under subcontract to our firm. Each boring consisted of advancing a 4-inch inside diameter hollow-stem auger with a truck mounted Mobile M-61 drill rig. During the drilling process, samples were generally obtained at 2¹/₂ foot depth intervals. Borings were continuously observed and logged by a hydrogeologist from our firm.

CHARACTERIZATION OF SOIL

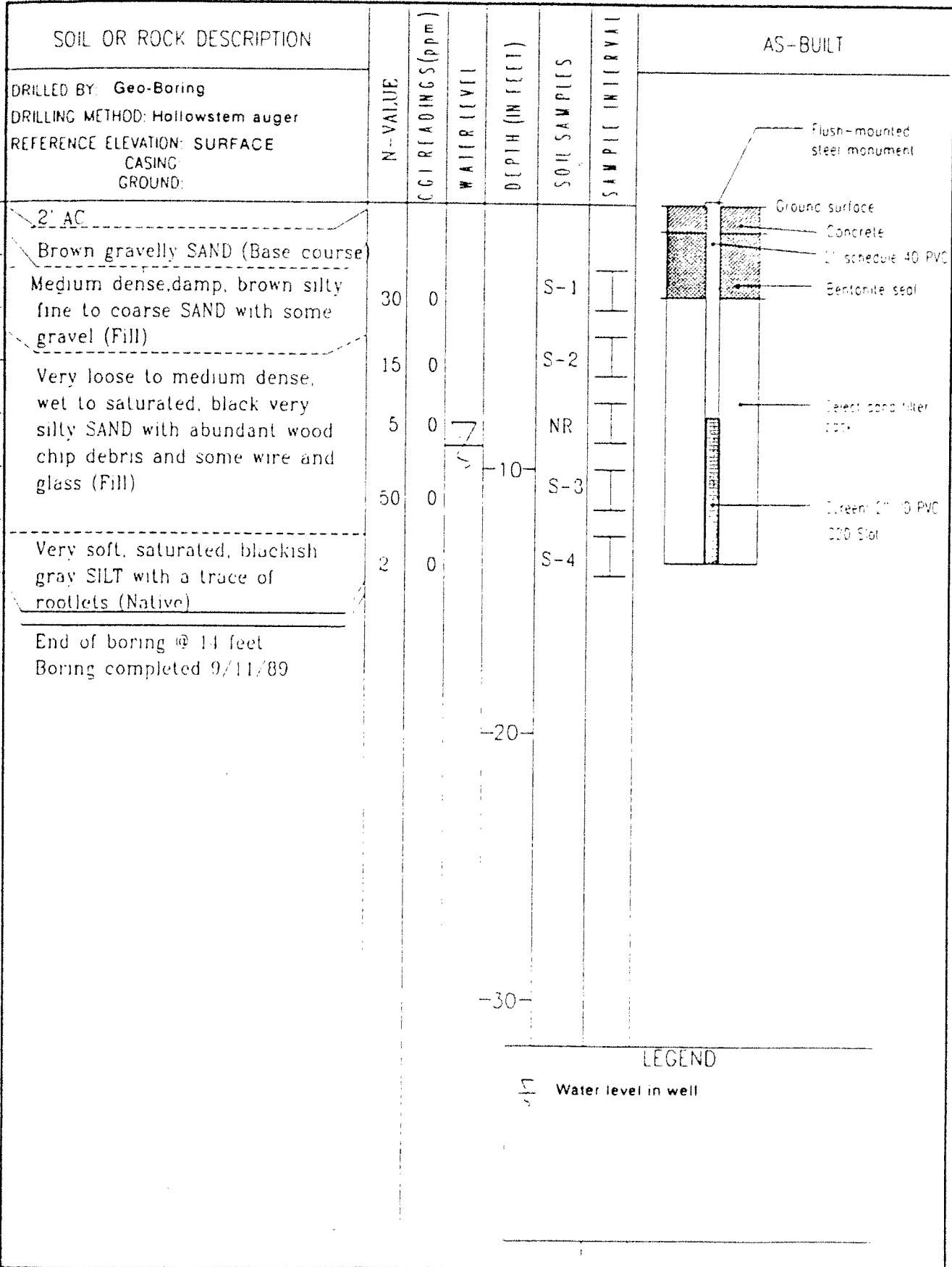
Disturbed soils were obtained by using the Standard Penetration Test procedure as described in ASTM:D 1586. This test and sampling method consists of driving a standard 2-inch outside diameter split barrel sampler a distance of 18 inches into the soil with a 140 pound hammer free falling a distance of 30 inches. The number of blows for each 6-inch interval is recorded. The number of blows required to drive a sampler the final 12 inches is considered the Standard Penetration resistance ("N") or blow count. The blow count is presented graphically on the boring logs in this Appendix. If a total of 50 blows is recorded within one 6 inch interval, the blow count is recorded as 50 blows for the actual number of inches of penetration. The blow count, or "N" value, provides a measure of the relative density or granular soils with a relative consistency of cohesive soil.

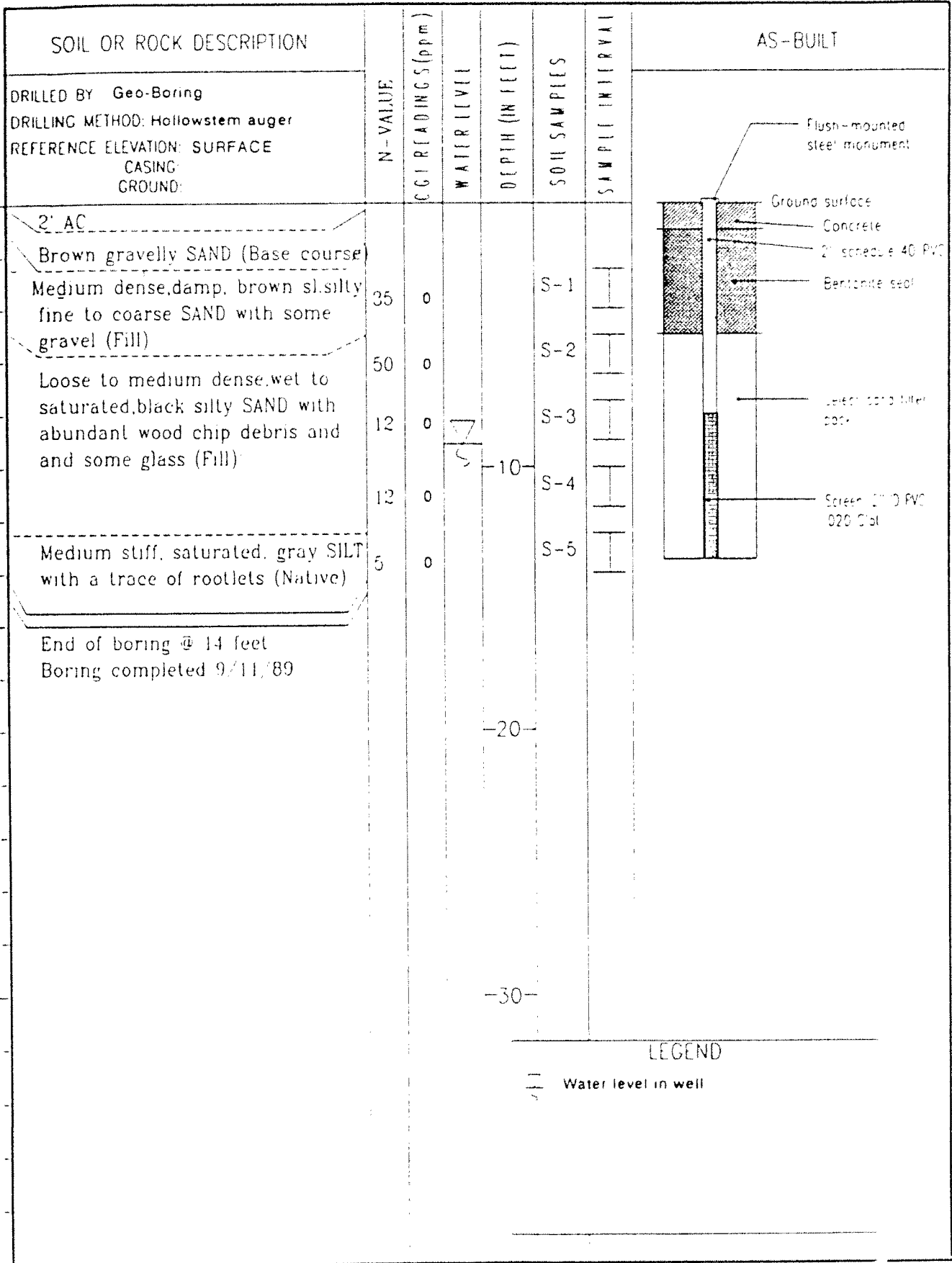
SOIL SAMPLING PROCEDURES

The soil samples were recovered at each interval using procedures designed to minimize the risk of cross contamination. Prior to each boring, the drilling equipment and sampling tools were steam cleaned. Between each sampling attempt, sampling tools were scrubbed with a stiff brush and a detergent solution consisting of Alconox and warm water, and then rinsed with potable water and liberal quantities of deionized water. The samples were classified in the field and immediately transferred to laboratory treated glass bottles, and tightly sealed with a Teflon lined threaded cap. Samples were stored and transported in a chilled chest throughout the field program. Selected soil samples were subsequently transferred to the chemical testing laboratory in accordance with RZA chain-of-custody procedures.

Field Analysis of Soil Contaminants

Each soil sample was screened for the presence of volatile organic compounds, to facilitate selecting an appropriate soil sample to submit for chemical analysis. The screening involved placing approximately 4 ounces of sampled soil directly into an 8 ounce glass jar with an aluminum foil cover secured by a lid band. The sample was then shaken vigorously for about 15 seconds and a head space reading was taken after plunging the probe of a combustible gas indicator through the foil cover. Field head space analysis was performed on each sample utilizing an Organic Vapor Meter (OVM). The highest dial value displayed by the instrument was recorded for each sample. The OVM is not capable of determining the species of these compounds or their actual concentrations in the soil samples. This method is considered a rough screening tool that aids in detecting the presence of soil contaminants.





LEGEND

Water level in well

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: Rittenhouse-Zeman

Date: September 21, 1989

Report On: Analysis of Soil & Water

Lab No.: 7610

IDENTIFICATION:

Samples Received on 9-12-89

Project: W-6364 PSBP

ANALYSIS:

<u>Lab Sample No.</u>	<u>Client ID</u>	<u>Matrix</u>	<u>Total Petroleum Fuel Hydrocarbons, ppm</u>
1	B-4, S-3	Soil	141*
2	B-5, S-2	Soil	< 10
3	B-6, S-2	Soil	645*
4	MW-4, W-1	Water	< 10
5	MW-5, W-2	Water	< 10
6	MW-6, W-3	Water	< 10

(TPH by EPA SW-846 Modified Method 8015)

* = Aged Gasoline or Mineral Spirits

SOUND ANALYTICAL SERVICES



STAN P. PALMQUIST

APPENDIX C

***Sound Analytical Services, Inc.
Groundwater Sample Analytical Reports and Summaries***

SOUND ANALYTICAL SERVICES, INC.

ANALYTICAL & ENVIRONMENTAL CHEMISTS

1833 ACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 TELEPHONE (253) 922-2333 FAX (253) 922-8047

Report To: Darling International, Tacoma

Date: March 20, 1998

Report On: Compilation of TPH Data


Report No: 71439

The following table compiles historical analytical data from monitoring wells 4, 5, and 6 located at Darling International's Tacoma facility. The well water samples were analyzed for Total Petroleum Hydrocarbons in accordance with EPA Method 418.1

Lab No	Date Sampled	Total Petroleum Hydrocarbons, mg/L		
		Well #4	Well #5	Well #6
8431-2	11-8-89	7.2	10	82
9247-2	1-10-90	20	7	10
12153-3	7-10-90	7.0	5.0	43
21441*	1-15-91	2.2	1.1	23
21441*	4-5-91	1.0	1.0	36
21441*	7-9-91	3.4	3.5	43
21441*	11-12-91	1.7	2.3	9.4
22004-2	1-9-92	2.0	3.0	20

* Compilation report

SOUND ANALYTICAL SERVICES, INC.


Tom Boyden
Project Manager

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-3047

Report To: Darling-Delaware Tacoma

Date: April 20, 1990

Report On: Analysis of Well Water

Lab No.: 10729-2

IDENTIFICATION:

Monitoring wells sampled at Puget Sound By-Products plant in Tacoma, Washington, on April 10, 1990.

ANALYSIS:

Well No.	4	5	6
Total Petroleum Hydrocarbons, mg/l by EPA Method 418.1	9.4	12.7	19.0

SOUND ANALYTICAL SERVICES

Thomas Boyden

THOMAS BOYDEN

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

Report To: Darling-Delaware Tacoma

Date: July 17, 1990

Report On: Analysis of Well Water

Lab No.: 12153-3

IDENTIFICATION:

Monitoring wells sampled at Puget Sound By-Products plant in Tacoma, Washington, on July 10, 1990.

ANALYSIS:

Well No.	4	5	6
Total Petroleum Hydrocarbons, mg/l by EPA Method 418.1	7.0	5.0	43.0

SOUND ANALYTICAL SERVICES


THOMAS BOYDEN

Angie: The following Table is not a part of annual report. This is for your records on summary of TPH levels in groundwater at Tacoma.

Table 2: Total Petroleum Hydrocarbons (mg/L) in Monitoring Well Samples

WELL #	11/13/89	1/11/90	4/20/90	7/17/90	10/5/90	AVE
#4	7.20	20.0	9.4	7.0	5.6	9.84
#5	10.40	7.00	12.70	5.00	ND	8.77
#6	82.0	10.0	19.0	43.0	9.2	32.64

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

Report To: Darling-Delaware Tacoma

Date: April 24, 1991

Report On: Analysis of Well Water

Lab No.: 16901-2

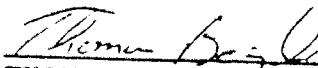
IDENTIFICATION:

Monitoring wells sampled at Puget Sound By-Products plant in Tacoma, Washington, on April 5, 1991.

ANALYSIS:

Well No.	4	5	6
Total Petroleum Hydrocarbons, mg/l by EPA Method 418.1	< 1.0	< 1.0	36

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SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

Report To: Darling-Delaware Tacoma

Date: September 25, 1992

Report On: Analysis of Well Water

Lab No.: 26749b


IDENTIFICATION:

Monitoring wells sampled at Puget Sound By-Products plant in Tacoma, Washington, on August 26, 1992.

ANALYSIS:

Lab Sample No.	26749-5	26749-6	26749-7
Well No.	5	6	7
Depth from well head to water level in inches	102.5	111.2	94.3
Total Petroleum Hydrocarbons by EPA Method 418.1 (mg/l)	10	4.6	46

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SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

Report To: Darling-Delaware Tacoma

Date: January 13, 1993

Report On: Analysis of Well Water

Lab No.: 28966b

IDENTIFICATION:

Monitoring wells sampled by Sound Analytical Services, Inc. at Puget Sound By-Products plant in Tacoma, Washington, on 12-14-92.

ANALYSIS:

Lab Sample No.	28966-5	28966-6	28966-7
Well No.	5	6	7
Depth from well head to water level in inches	93.9	102.2	86.6
Total Petroleum Hydrocarbons by EPA Method 418.1 (mg/l)	44	32	11

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SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

Report To: Darling-Delaware Tacoma

Date: February 16, 1993

Report On: Analysis of Water

Lab No.: 29795b

IDENTIFICATION:

Monitoring wells sampled at Puget Sound By-Products plant in Tacoma, Washington, on 1-27-93.

ANALYSIS:

Total Petroleum Hydrocarbons Per EPA Method 418.1

Date Extracted: 2-1-93

Date Analyzed: 2-1-93

<u>Lab Sample No.</u>	<u>Well No.</u>	<u>Total Petroleum Hydrocarbons, mg/l</u>
29695-5	5	8.5
29795-6	6	2.2
20795-7	7	36

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