DAHL
& Associates, Inc.

Environmental Consultants, Contractors & Engineers

October 28, 1997

Ms. Laura Hysjulien
Project Manager
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155

RE: Fact Sheet 3.26, Annual Monitoring Report, Former Conoco Store #23034, 1126 South Robert, West St. Paul, Minnesota, LEAK#00000858

Dear Ms. Hysjulien:

Enclosed is a copy of the Annual Monitoring Report for the above referenced site. The report brings to date all data collected by DAHL from the site. Also included is the oxygen release compound (ORC) data since the injection in November 1996.

I would also like to inform you that Pam Casey is now the new Conoco project manager for this site. Please direct all future Conoco correspondence to her at Conoco Inc., P.O. Box 2197, Houston, TX 77252-2197.

If I can provide you with any additional information or if you have any questions, please me at our office.

Sincerely,
DAHL & Associates, Inc.

for Mark Smith
Project Manager

mps

RECEIVED
OCT 30 1997
MPCA, HAZARDOUS WASTE DIVISION

enclosure: Annual Monitoring Report

cc: Ms. Pam Casey, Conoco Inc.
Mr. John Ehret, Asst. Fire Chief, City of West St. Paul
Mr. Terry Maruska, Building Inspector, City of West St. Paul

4390 McMenemy Street ◆ St. Paul, Minnesota 55127-6004 ◆ Phone: (612) 490-2905 ◆ Fax: (612) 490-3777 ◆ Toll Free: (800) 747-5325 ◆ E-Mail: dahl@minn.net

DAHL & ASSOCIATES, INC.
Environmental Consultants, Contractors & Engineers

4390 McMENEMY ROAD
SAINT PAUL, MINNESOTA 55127

ANNUAL PROJECT STATUS REPORT

Former Conoco Store # 23034
1126 South Robert Street, West St. Paul, MN

Site ID: LEAK 00000858
DAHL Report #0601-04
October 27, 1997

Copies submitted to:

Ms. Pam Casey, Conoco Inc.
Ms. Laura Hysjulien, MPCA
Mr. John Ehret, Asst. Fire Chief, City of W. St. Paul
Mr. Terry Maruska, Building Inspector, City of W. St. Paul

Tanks and Emergency Response Section
Minnesota Pollution Control Agency

Annual Monitoring Report

Fact Sheet #3.26
April 1996

After the corrective action design (CAD) has been approved, this worksheet should be submitted on an annual schedule. If an active remediation system has been installed, the "Corrective Action Design System Monitoring Worksheet" fact sheet #3.31 should be submitted along with this worksheet. The "Corrective Action Design System Monitoring Worksheet" documents data collection of system emissions and operating parameters, as well as any changes to the system.

Under certain circumstances MPCA staff may request submittal of the monitoring information on a quarterly schedule. This should be conducted according to fact sheet 3.25 "Quarterly Monitoring Report."

Site name and address: **Former Conoco Store # 23034**

1126 South Robert Street, St. Paul, MN

MPCA Leak Number: *LEAK #:* **858**

Date submitted: **10 / 27 / 97**

Section I. DISCUSSION

Discuss the results of the monitoring performed since the remedial investigation (RI) report or the last progress report has been submitted. Include any notable trends in the discussion.

Since the installation of the remedial system, the site has been monitored monthly and the wells have been sampled quarterly. The location of the site is illustrated in Figure 1.

Per MPCA direction January 2, 1996, sampling of MW-1 and MW-5 was discontinued and sampling of MW-4 was reduced from quarterly to annually. MW-2 and MW-3 continue to be sampled quarterly. Results of groundwater sampling indicate that BETX concentrations in MW-2 have been below the MPCA established clean-up goals for the site since December 27, 1994. On March 14, 1996, BETX concentrations in MW-3 dropped below clean-up goals. Concentrations in MW-3 have remained below clean-up goals, with the exception of the June 1996 and June 1997 sampling events. Benzene concentrations of

1,370 ppb and 1,650 ppb, respectively, were observed during these sampling events. Groundwater elevation data is summarized in Table 1 and the associated hydrographs. The groundwater gradient on September 1997 and monitoring well locations are illustrated on Figure 2. Groundwater analytical data is summarized in Table 2 and illustrated on the associated graphs. The associated groundwater laboratory analytical reports are included in Appendix A.

In November 1996, Oxygen Release Compound (ORC) was injected at the site upgradient of MW-3 and the recovery well, per the MPCA approved workplan. In conjunction with the quarterly monitoring well sampling, bi-weekly site visits were performed to evaluate the results of ORC injection. During these bi-weekly visits, groundwater samples were collected and analyzed in cooperation with Matrix Technologies, Corp., (MATRIX) the contractor providing the ORC injection services, to provide additional data on ORC. These samples were analyzed at no charge by MATRIX. The dissolved oxygen concentration in MW-3 increased from an average of 1.1 ppm before ORC injection to an average of 2.0 ppm after ORC injection. In addition, since ORC injection, dissolved BETX concentrations in MW-3 have stabilized. ORC injection points are illustrated on Figure 3 and the monitoring results are summarized in Table 3.

The soil ventilation/air sparge system operated throughout the reporting period. Product removal through September 22, 1997, is estimated to be 489 gallons. Currently, the average product removal rate from the soil ventilation/air sparge system is estimasted to be 0.025 gallons per day (GPD). The soil vent stack effluent sampling results are summarized in Table 4. Dissolved oxygen concentrations in groundwater at the site are included in Table 5. System vacuum measurements, FID readings and sparge flow preassure measurements are contained in Tables 6, 7, and 8, respectively. Soil vent system data and calculations, vent stack laboratory reports and MPCA Form 2: Off Gas Screening Evaluations are included in Appendix B. Soil ventilation system product removal calculations are included in Table 9. The remediation system layout and soil vent system effective radius of influence are illustrated on Figure 3.

The groundwater treatment system at the site operated until March 12, 1997, at which time operation of the system was discontinued to monitor the effectiveness of ORC injection. Based upon field observations, it appeared that ORC was beginning to influence the area in the vicinity of the recovery well. Therefore, the recovery well was shut down to prevent removal of ORC from the subsurface. To date, the system has treated a total of 427,000 gallons of water, removing an estimated 22.84 gallons of dissolved phase petroleum hydrocarbons. Influent and effluent sampling results are summarized in Table 10 and the laboratory reports are included in Appendix A. The groundwater treatment system product removal calculations are included in Table 11.

The soil ventilation and groundwater treatment systems have removed a total of approximately 512.21 gallons of gasoline from the soil and groundwater at the site since start-up.

If vapor impacts were reported during the remedial investigation, discuss the results of the vapor monitoring survey completed during this reporting period. Include in your discussion the sampling instrument and sampling method.

NA

NOTE: If vapor concentrations exceed 10 percent of the lower explosive limit, exit the building and contact the local fire department immediately. Then contact the Minnesota Duty Officer (24 hours) at 612/649-5451 (metro and outside Minnesota) or 1-800-422-0798 (Greater Minnesota). TTY users call 612/297-5353 (V/TTY) or 1-800-627-3529 (V/TTY).

Section II. RECOMMENDATIONS

The recommendations section should present recommendations for additional corrective action, modifications to corrective action, additional monitoring or site closure. If cleanup goals have been achieved at the site, recommendations for termination of corrective actions may be presented.

Based upon the data collected at the site to date, DAHL recommends that active remediation be discontinued. Pending the results of 2 additional quarters of groundwater monitoring according to the current schedule, if concentrations remain stable or decrease, DAHL will request site closure. Should concentrations increase, DAHL will evaluate conducting additional sampling or resuming active remediation.

Section III. TABLES SEE ATTACHED

Table 1

Water table summary.

Well Number	Date Sampled	Depth of Water from Top of Casing	Product Thickness	Depth of Water Below Grade	Relative Groundwater Elevation

Notes: (GW above/below screen, etc.)

Table 2

Indicate the laboratory analytical results for water samples collected from each well. All analytical results collected from each well should be included on this table.

Well #	Date	Benzene	Toluene	Ethylbenzene	Xylene	MTBE	GRO	DRO
MW-1								
MW-2								
MW-3								
MW-								

Notes: show BTEX/MTBE in ppb and DRO/GRO in ppm (e.g., free product, dry well, etc.)

Table 3

Indicate other notable contaminants (either petroleum or non-petroleum derived) detected in water samples.

Well #	Date Analyzed						

Notes: units

Section IV.

FIGURES

1 - Site Location Map
2 - Groundwater Gradient Map
3 - ORC Injection Locations
4 - Remedial System Layout and Soil Vent System Effective Radius of Influence

TABLES

Table 1 - Groundwater Elevation Data (with graphs)
Table 2 - Groundwater Analytical Data (with graphs)
Table 3 - Analytical Data - Post ORC Injection
Table 4 - Soil Vent System Analytical Data
Table 5 - Dissolved Oxygen Data
Tabel 6 - Vacuum Data from soil Vapor Vents
Table 7 - FID Readings from Soil Vapor Vents
Table 8 - Groundwater Vent Performance Data
Table 9 - Soil Vent System Product Removal Data
Table 10 - Influent/Effluent Analytical Data
Table 11 - Groundwater System Product Removal Data

APPENDICES

Appendix A - Groundwater Monitoring/Treatment Documentation
Appendix B - Soil Ventilation/Air Sparge System Documentation

Section VI. CONSULTANT (OR OTHER) PREPARING THIS REPORT

By signing this document, I/we acknowledge that we are submitting this document on behalf of and as agents of the responsible person or volunteer for this leaksite. Information was obtained from a variety of sources including the responsible person or volunteer, public records, published maps, and local and state agencies, and DAHL accepts no liability for the accuracy of the information obtained from these sources. In addition, I/we acknowledge on behalf of the responsible person or volunteer for this leaksite that if this document is determined to contain an intentionally misstated or false material statement, representation, or certification, or if material information is knowingly omitted, the responsible person or volunteer may be found to be in violation of Minn. Stat. § 115.075 (1994) or Minn. Rules 7000.0300 (Duty of Candor), and that the responsible person or volunteer may be liable for civil penalties.

Name and Title:	Signature:	Date signed:
for Mark Smith, Project Manager		10/28/97
Mike Watson, Sr. Project Manager		10/28/97
		/ /

Company and mailing address:

DAHL and Associates, Inc.

4390 McMenemy Street

St. Paul, MN 55127

Phone: (612) 490-3797

Fax: (612) 490-3777

The recommendations and methodologies contained in this report represent DAHL's professional opinions and are based on accepted analytical practices and documented industry standards, and client preferences. Services performed on this project have been conducted in a manner consistent with standards of care practiced by members of this profession in this area, under similar time and budget constraints. Beyond this, no warranty is expressed or implied.

Upon request, this document can be made available in other formats, including Braille, large print and audio tape. TTY users call 612/282-5332 or Greater Minnesota 1-800-657-3864.

TABLES

TABLE 1

GROUNDWATER ELEVATION DATA

Former Conoco Store # 23034

1126 South Robert St., W. St. Paul, Minnesota (24930601)

WELL #	ELEVATION	DATE	D.T.P	D.T.W	P.T.	W.T.E.
MW-1	100.47	10/23/89	0.00	17.99	0.00	82.48
	100.47	12/15/89	0.00	18.89	0.00	81.58
	100.47	01/08/90	0.00	19.15	0.00	81.32
	100.47	02/05/90	0.00	19.61	0.00	80.86
	100.47	03/13/90	0.00	20.12	0.00	80.35
	100.47	03/29/90	0.00	19.81	0.00	80.66
	100.47	04/24/90	0.00	19.94	0.00	80.53
*Resurvey	100.45	05/03/90	0.00	20.07	0.00	80.38
	100.45	05/15/90	0.00	19.66	0.00	80.79
	100.45	06/06/90	0.00	19.40	0.00	81.05
	100.45	06/12/90	0.00	18.75	0.00	81.70
	100.45	06/15/90	0.00	18.66	0.00	81.79
	100.45	06/29/90	0.00	17.82	0.00	82.63
	100.45	07/06/90	0.00	17.52	0.00	82.93
	100.45	07/13/90	0.00	17.30	0.00	83.15
	100.45	07/20/90	0.00	17.04	0.00	83.41
	100.45	08/22/90	0.00	15.90	0.00	84.55
	100.45	09/10/90	0.00	15.90	0.00	84.55
	100.45	10/10/90	0.00	15.90	0.00	84.55
	100.45	11/06/90	0.00	16.64	0.00	83.81
	100.45	01/14/91	0.00	17.77	0.00	82.68
	100.45	02/05/91	0.00	18.29	0.00	82.16
	100.45	03/13/91	0.00	18.76	0.00	81.69
	100.45	04/04/91	0.00	18.51	0.00	81.94
	100.45	05/10/91	0.00	17.81	0.00	82.64
	100.45	06/16/91	0.00	16.32	0.00	84.13
	100.45	07/03/91	0.00	15.56	0.00	84.89
	100.45	08/06/91	0.00	15.22	0.00	85.23
	100.45	09/09/91	0.00	15.15	0.00	85.30
	100.45	09/10/91	0.00	15.30	0.00	85.15
	100.45	10/08/91	0.00	14.68	0.00	85.77
	100.45	11/19/91	0.00	15.32	0.00	85.13
	100.45	12/26/91	0.00	14.93	0.00	85.52
	100.45	01/13/92	0.00	14.79	0.00	85.66
	100.45	02/10/92	0.00	15.02	0.00	85.43
	100.45	03/13/92	0.00	14.56	0.00	85.89
	100.45	04/20/92	0.00	14.27	0.00	86.18
	100.45	05/11/92	0.00	13.94	0.00	86.51
	100.45	06/12/92	0.00	14.11	0.00	86.34
	100.45	09/10/92	0.00	13.72	0.00	86.73
*Resurvey	100.45	12/23/92	0.00	14.30	0.00	86.15
	100.45	03/09/93	0.00	15.87	0.00	84.58
	100.45	06/10/93	0.00	13.90	0.00	86.55
	100.45	07/19/93	0.00	11.99	0.00	88.46
	100.45	07/28/93	0.00	12.08	0.00	88.37
	100.45	09/17/93	0.00	12.55	0.00	87.90
12:00 hrs.	100.45	09/29/93	0.00	12.75	0.00	87.70
14:30 hrs.	100.45	09/29/93	0.00	12.72	0.00	87.73
	100.45	09/30/93	0.00	12.40	0.00	88.05

TABLE 1

GROUNDWATER ELEVATION DATA

Former Conoco Store # 23034

1126 South Robert St., W. St. Paul, Minnesota (24930601)

WELL #	ELEVATION	DATE	D.T.P	D.T.W	P.T.	W.T.E.
MW-1	100.45	10/07/93	0.00	12.79	0.00	87.66
	100.45	10/22/93	0.00	13.51	0.00	86.94
	100.45	12/21/93	0.00	14.59	0.00	85.86
	100.45	01/25/94	0.00	15.46	0.00	84.99
12:00 hrs.	100.45	01/28/94	0.00	15.38	0.00	85.07
2:00 hrs.	100.45	01/28/94	0.00	15.38	0.00	85.07
2:30 hrs.	100.45	01/28/94	0.00	15.38	0.00	85.07
	100.45	02/03/94	0.00	15.65	0.00	84.80
	100.45	02/04/94	0.00	15.70	0.00	84.75
	100.45	02/11/94	0.00	15.93	0.00	84.52
	100.45	02/18/94	0.00	15.87	0.00	84.58
	100.45	03/21/94	0.00	16.48	0.00	83.97
	100.45	04/15/94	0.00	16.54	0.00	83.91
	100.45	05/31/94	0.00	15.37	0.00	85.08
	100.45	06/30/94	0.00	14.78	0.00	85.67
	100.45	07/08/94	0.00	14.71	0.00	85.74
	100.45	07/19/94	0.00	14.62	0.00	85.83
09:30	100.45	08/15/94	0.00	14.92	0.00	85.53
11:50	100.45	08/15/94	0.00	14.92	0.00	85.53
	100.45	08/31/94	0.00	14.91	0.00	85.54
	100.45	10/31/94	0.00	13.92	0.00	86.53
	100.45	11/17/94	0.00	13.83	0.00	86.62
	100.45	12/27/94	0.00	14.94	0.00	85.51
	100.45	01/16/95	0.00	15.22	0.00	85.23
	100.45	02/09/95	0.00	17.74	0.00	82.71
	100.45	03/09/95	0.00	16.51	0.00	83.94
	100.45	04/06/95	0.00	16.24	0.00	84.21
	100.45	05/11/95	0.00	15.52	0.00	84.93
	100.45	06/20/95	0.00	14.78	0.00	85.67
	100.45	07/31/95	0.00	13.82	0.00	86.63
	100.45	08/29/95	0.00	13.62	0.00	86.83
	100.45	09/21/95	0.00	14.11	0.00	86.34
	100.45	10/03/95	0.00	14.44	0.00	86.01
	100.45	11/21/95	0.00	15.02	0.00	85.43
	100.45	12/22/95	0.00	15.67	0.00	84.78
	100.45	01/12/96	0.00	16.10	0.00	84.35
	100.45	02/27/96	0.00	17.47	0.00	82.98
	100.45	03/14/96	0.00	16.92	0.00	83.53
	100.45	04/15/96	0.00	16.27	0.00	84.18
	100.45	05/09/96	0.00	15.99	0.00	84.46
	100.45	06/07/96	0.00	15.74	0.00	84.71
	100.45	07/09/96	0.00	14.90	0.00	85.55
	100.45	08/08/96	0.00	15.15	0.00	85.30
	100.45	09/11/96	0.00	15.60	0.00	84.85
	100.45	10/11/96	0.00	16.04	0.00	84.41
	100.45	11/08/96	0.00	16.36	0.00	84.09
INACCESSABL	100.45	12/10/96				
INACCESSABL	100.45	01/06/97				
INACCESSABL	100.45	02/03/97				

TABLE 1

GROUNDWATER ELEVATION DATA

Former Conoco Store # 23034
1126 South Robert St., W. St. Paul, Minnesota (24930601)

WELL #	ELEVATION	DATE	D.T.P	D.T.W	P.T.	W.T.E.
INACCESSABL	100.45	03/12/97				
	100.45	04/04/97	0.00	15.07	0.00	85.38
	100.45	04/28/97	0.00	14.52	0.00	85.93
	100.45	05/29/97	0.00	14.50	0.00	85.95
	100.45	06/12/97	0.00	14.66	0.00	85.79
	100.45	07/17/97	0.00	13.91	0.00	86.54
	100.45	08/11/97	0.00	12.64	0.00	87.81
	100.45	09/22/97	0.00	13.61	0.00	86.84
	100.45	10/07/97	0.00	13.65	0.00	86.80
MW-2	100.77	10/23/89	0.00	19.23	0.00	81.54
	100.77	12/15/89	0.00	20.14	0.00	80.63
	100.77	01/08/90	0.00	20.40	0.00	80.37
	100.77	02/05/90	0.00	20.93	0.00	79.84
	100.77	03/13/90	0.00	21.30	0.00	79.47
	100.77	03/29/90	0.00	20.87	0.00	79.90
	100.77	04/24/90	0.00	21.18	0.00	79.59
Resurvey	100.74	05/03/90	0.00	21.48	0.00	79.26
MW-2	100.74	05/15/90	0.00	20.89	0.00	79.85
	100.74	06/06/90	0.00	20.62	0.00	80.12
	100.74	06/12/90	0.00	19.92	0.00	80.82
	100.74	06/15/90	0.00	19.85	0.00	80.89
	100.74	06/29/90	0.00	18.93	0.00	81.81
	100.74	07/06/90	0.00	18.63	0.00	82.11
	100.74	07/13/90	0.00	18.39	0.00	82.35
	100.74	07/20/90	0.00	18.15	0.00	82.59
	100.74	08/22/90	0.00	16.93	0.00	83.81
	100.74	09/10/90	0.00	17.00	0.00	83.74
	100.74	10/10/90	0.00	17.13	0.00	83.61
	100.74	11/06/90	0.00	17.81	0.00	82.93
	100.74	01/14/91	0.00	19.00	0.00	81.74
	100.74	02/05/91	0.00	19.50	0.00	81.24
	100.74	03/13/91	0.00	19.92	0.00	80.82
	100.74	04/04/91	0.00	19.51	0.00	81.23
	100.74	05/10/91	0.00	19.30	0.00	81.44
	100.74	06/16/91	0.00	17.38	0.00	83.36
	100.74	07/03/91	0.00	16.55	0.00	84.19
	100.74	08/06/91	0.00	16.29	0.00	84.45
	100.74	09/09/91	0.00	16.23	0.00	84.51
	100.74	09/10/91	0.00	16.36	0.00	84.38
	100.74	10/08/91	0.00	15.68	0.00	85.06
	100.74	11/19/91	0.00	16.30	0.00	84.44
	100.74	12/26/91	0.00	16.03	0.00	84.71
	100.74	01/13/92	0.00	15.94	0.00	84.80
	100.74	02/10/92	0.00	16.20	0.00	84.54
	100.74	03/13/92	0.00	15.65	0.00	85.09
	100.74	04/20/92	0.00	15.30	0.00	85.44
	100.74	05/11/92	0.00	14.85	0.00	85.89
	100.74	06/12/92	0.00	15.00	0.00	85.74

TABLE 1

GROUNDWATER ELEVATION DATA

Former Conoco Store # 23034

1126 South Robert St., W. St. Paul, Minnesota (24930601)

WELL #	ELEVATION	DATE	D.T.P	D.T.W	P.T.	W.T.E.
	100.74	09/10/92	0.00	14.70	0.00	86.04
*Resurvey	100.77	12/23/92	0.00	15.40	0.00	85.37
	100.77	03/09/93	0.00	16.96	0.00	83.81
	100.77	06/10/93	0.00	14.90	0.00	85.87
	100.77	07/19/93	0.00	12.85	0.00	87.92
	100.77	07/28/93	0.00	12.99	0.00	87.78
	100.77	09/17/93	0.00	13.49	0.00	87.28
12:00 hrs.	100.77	09/29/93	0.00	13.73	0.00	87.04
14:30 hrs.	100.77	09/29/93	0.00	13.70	0.00	87.07
	100.77	09/30/93	0.00	13.37	0.00	87.40
	100.77	10/07/93	0.00	13.78	0.00	86.99
	100.77	10/22/93	0.00	14.69	0.00	86.08
	100.77	12/21/93	0.00	15.67	0.00	85.10
	100.77	01/25/94	0.00	16.61	0.00	84.16
12:00 hrs.	100.77	01/28/94	0.00	16.50	0.00	84.27
2:00 hrs.	100.77	01/28/94	0.00	16.50	0.00	84.27
2:30 hrs.	100.77	01/28/94	0.00	16.50	0.00	84.27
MW-2	100.77	02/03/94	0.00	16.86	0.00	83.91
	100.77	02/04/94	0.00	16.99	0.00	83.78
	100.77	02/11/94	0.00	17.17	0.00	83.60
	100.77	02/18/94	0.00	17.11	0.00	83.66
	100.77	03/21/94	0.00	17.74	0.00	83.03
	100.77	04/15/94	0.00	17.94	0.00	82.83
	100.77	05/31/94	0.00	16.53	0.00	84.24
	100.77	06/30/94	0.00	15.95	0.00	84.82
	100.77	07/08/94	0.00	15.86	0.00	84.91
	100.77	07/19/94	0.00	15.76	0.00	85.01
09:30	100.77	08/15/94	0.00	16.00	0.00	84.77
11:50	100.77	08/15/94	0.00	16.00	0.00	84.77
	100.77	08/31/94	0.00	14.92	0.00	85.85
	100.77	10/31/94	0.00	14.97	0.00	85.80
	100.77	11/17/94	0.00	13.75	0.00	87.02
	100.77	12/27/94	0.00	14.91	0.00	85.86
	100.77	01/16/95	0.00	15.56	0.00	85.21
	100.77	02/09/95	0.00	18.07	0.00	82.70
	100.77	03/09/95	0.00	17.88	0.00	82.89
	100.77	04/06/95	0.00	16.73	0.00	84.04
	100.77	05/11/95	0.00	15.64	0.00	85.13
	100.77	06/20/95	0.00	14.69	0.00	86.08
	100.77	07/31/95	0.00	14.32	0.00	86.45
	100.77	08/31/95	0.00	13.78	0.00	86.99
	100.77	09/21/95	0.00	13.72	0.00	87.05
	100.77	10/03/95	0.00	13.94	0.00	86.83
	100.77	11/21/95	0.00	14.56	0.00	86.21
	100.77	12/22/95	0.00	17.16	0.00	83.61
	100.77	01/12/96	0.00	16.22	0.00	84.55
	100.77	02/27/96	0.00	17.50	0.00	83.27
	100.77	03/14/96	0.00	17.01	0.00	83.76
	100.77	04/15/96	0.00	15.38	0.00	85.39

TABLE 1

GROUNDWATER ELEVATION DATA

Former Conoco Store # 23034

1126 South Robert St., W. St. Paul, Minnesota (24930601)

WELL #	ELEVATION	DATE	D.T.P	D.T.W	P.T.	W.T.E.
	100.77	05/09/96	0.00	15.91	0.00	84.86
	100.77	06/07/96	0.00	15.45	0.00	85.32
	100.77	07/09/96	0.00	14.34	0.00	86.43
	100.77	08/08/96	0.00	14.71	0.00	86.06
	100.77	09/11/96	0.00	15.28	0.00	85.49
	100.77	10/11/96	0.00	15.97	0.00	84.80
	100.77	11/08/96	0.00	16.19	0.00	84.58
	100.77	12/10/96	0.00	15.47	0.00	85.30
	100.77	01/06/97	0.00	16.73	0.00	84.04
	100.77	02/03/97	0.00	17.89	0.00	82.88
	100.77	03/12/97	0.00	17.03	0.00	83.74
	100.77	04/04/97	0.00	14.49	0.00	86.28
	100.77	04/28/97	0.00	13.74	0.00	87.03
	100.77	05/29/97	0.00	13.60	0.00	87.17
	100.77	06/12/97	0.00	13.76	0.00	87.01
	100.77	07/17/97	0.00	12.82	0.00	87.95
	100.77	08/11/97	0.00	11.49	0.00	89.28
	100.77	09/22/97	0.00	12.45	0.00	88.32
	100.77	10/07/97	0.00	12.69	0.00	88.08
MW-3	101.05	10/23/89	0.00	20.77	0.00	80.28
	101.05	12/15/89	21.54	22.35	0.81	78.70
	101.05	01/08/90	22.07	22.47	0.40	78.58
	101.05	02/05/90	22.53	22.91	0.38	78.14
	101.05	03/13/90	22.91	23.37	0.46	77.68
	101.05	03/29/90	22.82	23.14	0.32	77.91
	101.05	04/24/90	22.99	23.39	0.40	77.66
*Resurvey	101.05	05/03/90	22.99	23.30	0.31	77.75
	101.05	05/15/90	22.71	22.92	0.21	78.13
	101.05	06/06/90	21.33	22.60	1.27	78.45
	101.05	06/12/90	22.22	23.00	0.78	78.05
	101.05	06/15/90	21.20	21.74	0.54	79.31
	101.05	06/29/90	19.39	20.08	0.69	80.97
	101.05	07/06/90	19.67	19.70	0.03	81.35
MW-3	101.05	07/13/90	0.00	19.41	0.00	81.64
	101.05	07/20/90	0.00	19.22	0.00	81.83
	101.05	08/22/90	0.00	18.04	0.00	83.01
	101.05	09/10/90	0.00	18.27	0.00	82.78
	101.05	10/10/90	0.00	18.49	0.00	82.56
	101.05	11/06/90	0.00	19.24	0.00	81.81
	101.05	01/14/91	20.50	20.58	0.08	80.47
	101.05	02/05/91	21.00	21.05	0.05	80.00
	101.05	03/13/91	21.66	21.68	0.02	79.37
	101.05	04/04/91	0.00	21.28	0.00	79.77
	101.05	05/10/91	0.00	20.42	0.00	80.63
	101.05	06/16/91	0.00	18.26	0.00	82.79
	101.05	07/03/91	0.00	17.62	0.00	83.43
	101.05	08/06/91	0.00	17.36	0.00	83.69
	101.05	09/09/91	0.00	17.51	0.00	83.54

TABLE 1

GROUNDWATER ELEVATION DATA

Former Conoco Store # 23034

1126 South Robert St., W. St. Paul, Minnesota (24930601)

WELL #	ELEVATION	DATE	D.T.P	D.T.W	P.T.	W.T.E.
	101.05	09/10/91	0.00	17.67	0.00	83.38
	101.05	10/08/91	0.00	16.96	0.00	84.09
	101.05	11/19/91	0.00	17.81	0.00	83.24
	101.05	12/26/91	0.00	17.38	0.00	83.67
	101.05	01/13/92	0.00	17.39	0.00	83.66
	101.05	02/10/92	0.00	17.65	0.00	83.40
	101.05	03/13/92	0.00	17.28	0.00	83.77
	101.05	04/20/92	0.00	16.57	0.00	84.48
	101.05	05/11/92	0.00	16.04	0.00	85.01
	101.05	06/12/92	0.00	16.42	0.00	84.63
	101.05	09/10/92	0.00	16.00	0.00	85.05
*Resurvey	101.04	12/23/92	0.00	16.61	0.00	84.43
	101.04	03/09/93	0.00	18.38	0.00	82.66
	101.04	06/10/93	0.00	16.02	0.00	85.02
	101.04	07/19/93	0.00	13.79	0.00	87.25
	101.04	07/28/93	0.00	14.12	0.00	86.92
	101.04	09/17/93	0.00	14.71	0.00	86.33
12:00 hrs.	101.04	09/29/93	0.00	14.97	0.00	86.07
14:30 hrs.	101.04	09/29/93	0.00	15.52	0.00	85.52
	101.04	09/30/93	0.00	15.48	0.00	85.56
	101.04	10/07/93	0.00	15.08	0.00	85.96
	101.04	10/22/93	0.00	16.86	0.00	84.18
	101.04	12/21/93	0.00	17.17	0.00	83.87
	101.04	01/25/94	0.00	18.04	0.00	83.00
12:00	101.04	01/28/94	0.00	17.94	0.00	83.10
02:00	101.04	01/28/94	0.00	18.28	0.00	82.76
02:30	101.04	01/28/94	0.00	18.30	0.00	82.74
	101.04	02/03/94	0.00	19.02	0.00	82.02
	101.04	02/04/94	0.00	19.15	0.00	81.89
	101.04	02/11/94	0.00	19.34	0.00	81.70
	101.04	02/18/94	0.00	19.37	0.00	81.67
	101.04	03/21/94	0.00	19.90	0.00	81.14
	101.04	04/15/94	0.00	20.43	0.00	80.61
	101.04	05/31/94	0.00	18.52	0.00	82.52
MW-3	101.04	06/30/94	0.00	17.88	0.00	83.16
	101.04	07/08/94	0.00	17.78	0.00	83.26
	101.04	07/19/94	0.00	17.70	0.00	83.34
09:30	101.04	08/15/94	0.00	17.34	0.00	83.70
11:50	101.04	08/15/94	0.00	17.35	0.00	83.69
	101.04	08/31/94	0.00	17.51	0.00	83.53
	101.04	10/31/94	0.00	16.66	0.00	84.38
	101.04	11/17/94	0.00	16.93	0.00	84.11
	101.04	12/27/94	0.00	18.04	0.00	83.00
	101.04	01/16/95	0.00	18.41	0.00	82.63
	101.04	02/09/95	0.00	18.84	0.00	82.20
	101.04	03/09/95	0.00	19.84	0.00	81.20
	101.04	04/06/95	0.00	19.81	0.00	81.23
	101.04	05/11/95	0.00	19.08	0.00	81.96
	101.04	06/20/95	0.00	18.20	0.00	82.84

TABLE 1

GROUNDWATER ELEVATION DATA

Former Conoco Store # 23034

1126 South Robert St., W. St. Paul, Minnesota (24930601)

WELL #	ELEVATION	DATE	D.T.P	D.T.W	P.T.	W.T.E.
	101.04	07/31/95	0.00	16.21	0.00	84.83
	101.04	08/31/95	0.00	15.78	0.00	85.26
	101.04	09/21/95	0.00	18.00	0.00	83.04
MW-3	101.04	10/03/95	0.00	17.76	0.00	83.28
	101.04	11/21/95	0.00	18.48	0.00	82.56
	101.04	12/22/95	0.00	19.14	0.00	81.90
	101.04	01/12/96	0.00	19.36	0.00	81.68
	101.04	02/27/96	0.00	20.16	0.00	80.88
	101.04	03/14/96	0.00	20.34	0.00	80.70
	101.04	04/15/96	0.00	20.11	0.00	80.93
	101.04	05/09/96	0.00	19.38	0.00	81.66
	101.04	06/07/96 ***	0.00	18.73	0.00	82.31
	101.04	07/09/96	0.00	18.12	0.00	82.92
	101.04	08/08/96	0.00	18.34	0.00	82.70
	101.04	09/11/96	0.00	19.16	0.00	81.88
	101.04	10/11/96	0.00	19.25	0.00	81.79
	101.04	11/08/96	0.00	19.78	0.00	81.26
	101.04	12/10/96	0.00	19.06	0.00	81.98
	101.04	01/06/97	0.00	19.19	0.00	81.85
	101.04	02/03/97	0.00	19.56	0.00	81.48
	101.04	03/12/97	0.00	20.03	0.00	81.01
	101.04	04/04/97	0.00	17.52	0.00	83.52
	101.04	04/28/97	0.00	16.75	0.00	84.29
	101.04	05/29/97	0.00	17.06	0.00	83.98
	101.04	06/12/97	0.00	17.21	0.00	83.83
	101.04	07/17/97	0.00	16.04	0.00	85.00
	101.04	08/11/97	0.00	14.82	0.00	86.22
	101.04	09/22/97	0.00	15.92	0.00	85.12
	101.04	10/07/97	0.00	16.21	0.00	84.83
MW-4	100.68	10/23/89				
	100.68	12/15/89				
	100.68	01/08/90				
	100.68	02/05/90				
	100.68	03/13/90				
	100.68	03/29/90				
	100.68	04/24/90				
	100.68	05/03/90	0.00	23.93	0.00	76.75
	100.68	05/15/90				
	100.68	06/06/90				
	100.68	06/12/90				
	100.68	06/15/90				
	100.68	06/29/90				
	100.68	07/06/90				
	100.68	07/13/90	0.00	19.82	0.00	80.86
	100.68	07/20/90	0.00	19.65	0.00	81.03
	100.68	08/22/90	0.00	18.60	0.00	82.08
	100.68	09/10/90	0.00	18.94	0.00	81.74
	100.68	10/10/90	0.00	19.22	0.00	81.46

TABLE 1

GROUNDWATER ELEVATION DATA

Former Conoco Store # 23034

1126 South Robert St., W. St. Paul, Minnesota (24930601)

WELL #	ELEVATION	DATE	D.T.P	D.T.W	P.T.	W.T.E.
	100.68	11/06/90	0.00	19.99	0.00	80.69
	100.68	01/14/91	0.00	21.30	0.00	79.38
MW-4	100.68	02/05/91	0.00	21.83	0.00	78.85
	100.68	03/13/91	0.00	22.35	0.00	78.33
	100.68	04/04/91	0.00	22.21	0.00	78.47
	100.68	05/10/91	0.00	21.14	0.00	79.54
	100.68	06/16/91	0.00	18.53	0.00	82.15
	100.68	07/03/91	0.00	18.14	0.00	82.54
	100.68	08/06/91	0.00	18.10	0.00	82.58
	100.68	09/09/91	0.00	18.35	0.00	82.33
	100.68	09/10/91	0.00	18.40	0.00	82.28
	100.68	10/08/91	0.00	17.76	0.00	82.92
	100.68	11/19/91	0.00	17.70	0.00	82.98
	100.68	12/26/91	0.00	18.10	0.00	82.58
	100.68	01/13/92	0.00	18.18	0.00	82.50
	100.68	02/10/92	0.00	18.50	0.00	82.18
	100.68	03/13/92	0.00	17.88	0.00	82.80
	100.68	04/20/92	0.00	17.22	0.00	83.46
	100.68	05/11/92	0.00	16.63	0.00	84.05
	100.68	06/12/92	0.00	17.19	0.00	83.49
	100.68	09/10/92	0.00	16.84	0.00	83.84
*Resurvey	100.66	12/23/92	0.00	17.42	0.00	83.24
	100.66	03/09/93	0.00	19.19	0.00	81.47
	100.66	06/10/93	0.00	16.20	0.00	84.46
	100.66	07/19/93	0.00	14.42	0.00	86.24
	100.66	07/28/93	0.00	14.90	0.00	85.76
	100.66	09/17/93	0.00	15.57	0.00	85.09
12:00 hrs.	100.66	09/29/93	0.00	15.81	0.00	84.85
14:30 hrs.	100.66	09/29/93	0.00	15.78	0.00	84.88
	100.66	09/30/93	0.00	15.49	0.00	85.17
	100.66	10/07/93	0.00	15.96	0.00	84.70
	100.66	10/22/93	0.00	16.96	0.00	83.70
	100.66	12/21/93	0.00	18.07	0.00	82.59
	100.66	01/25/94	0.00	18.89	0.00	81.77
12:00 hrs.	100.66	01/28/94	0.00	18.80	0.00	81.86
2:00 hrs.	100.66	01/28/94	0.00	18.80	0.00	81.86
2:30 hrs.	100.66	01/28/94	0.00	18.80	0.00	81.86
	100.66	02/03/94	0.00	19.14	0.00	81.52
	100.66	02/04/94	0.00	19.15	0.00	81.51
	100.66	02/11/94	0.00	19.40	0.00	81.26
	100.66	02/18/94	0.00	19.40	0.00	81.26
	100.66	03/21/94	0.00	19.88	0.00	80.78
	100.66	04/15/94	0.00	20.15	0.00	80.51
	100.66	05/31/94	0.00	18.47	0.00	82.19
	100.66	06/30/94	0.00	19.93	0.00	80.73
	100.66	07/08/94	0.00	17.90	0.00	82.76
	100.66	07/19/94	0.00	17.79	0.00	82.87
09:30	100.66	08/15/94	0.00	18.17	0.00	82.49
11:50	100.66	08/15/94	0.00	18.17	0.00	82.49

TABLE 1

GROUNDWATER ELEVATION DATA

Former Conoco Store # 23034

1126 South Robert St., W. St. Paul, Minnesota (24930601)

WELL #	ELEVATION	DATE	D.T.P	D.T.W	P.T.	W.T.E.
	100.66	08/31/94	0.00	18.39	0.00	82.27
	100.66	10/31/94	0.00	16.56	0.00	84.10
MW-4	100.66	11/17/94	0.00	16.87	0.00	83.79
	100.66	12/27/94	0.00	18.23	0.00	82.43
	100.66	01/16/95	0.00	18.72	0.00	81.94
	100.66	02/09/95	0.00	19.15	0.00	81.51
	100.66	03/09/95	0.00	19.95	0.00	80.71
	100.66	04/06/95	0.00	19.61	0.00	81.05
	100.66	05/11/95	0.00	18.51	0.00	82.15
	100.66	06/20/95	0.00	17.83	0.00	82.83
	100.66	07/31/95	0.00	16.93	0.00	83.73
	100.66	08/31/95	0.00	16.59	0.00	84.07
	100.66	09/21/95	0.00	17.54	0.00	83.12
	100.66	10/03/95	0.00	17.78	0.00	82.88
	100.66	11/21/95	0.00	18.34	0.00	82.32
	100.66	12/22/95	0.00	19.12	0.00	81.54
	100.66	01/12/96	0.00	19.57	0.00	81.09
	100.66	02/27/96	0.00	20.27	0.00	80.39
	100.66	03/14/96	0.00	20.48	0.00	80.18
	100.66	04/15/96	0.00	19.77	0.00	80.89
	100.66	05/09/96	0.00	19.38	0.00	81.28
	100.66	06/07/96	0.00	18.85	0.00	81.81
	100.66	07/09/96	0.00	17.79	0.00	82.87
	100.66	08/08/96	0.00	18.45	0.00	82.21
	100.66	09/11/96	0.00	19.11	0.00	81.55
	100.66	10/11/96	0.00	19.57	0.00	81.09
	100.66	11/08/96	0.00	19.82	0.00	80.84
	100.66	12/10/96	0.00	19.11	0.00	81.55
	100.66	01/06/97	0.00	19.81	0.00	80.85
	100.66	02/03/97	0.00	20.06	0.00	80.60
	100.66	03/12/97	0.00	20.22	0.00	80.44
	100.66	04/04/97	0.00	17.96	0.00	82.70
	100.66	04/28/97	0.00	17.14	0.00	83.52
	100.66	05/29/97	0.00	17.73	0.00	82.93
	100.66	06/12/97	0.00	17.85	0.00	82.81
	100.66	07/17/97	0.00	16.58	0.00	84.08
	100.66	08/11/97	0.00	15.53	0.00	85.13
	100.66	09/22/97	0.00	16.58	0.00	84.08
	100.66	10/07/97	0.00	17.04	0.00	83.62
MW-5	102.13	12/23/92	0.00	17.03	0.00	85.10
	102.13	03/09/93	0.00	18.73	0.00	83.40
	102.13	06/10/93	0.00	16.53	0.00	85.60
	102.13	07/19/93	0.00	14.40	0.00	87.73
	102.13	07/28/93	0.00	14.62	0.00	87.51
	102.13	09/17/93	0.00	15.15	0.00	86.98
	102.13	09/20/93				
	102.13	09/27/93				
12:00 hrs.	102.13	09/29/93	0.00	15.41	0.00	86.72

TABLE 1

GROUNDWATER ELEVATION DATA

Former Conoco Store # 23034

1126 South Robert St., W. St. Paul, Minnesota (24930601)

WELL #	ELEVATION	DATE	D.T.P	D.T.W	P.T.	W.T.E.
14:30 hrs.	102.13	09/29/93	0.00	15.43	0.00	86.70
	102.13	09/30/93	0.00	15.28	0.00	86.85
	102.13	10/07/93	0.00	15.10	0.00	87.03
	102.13	10/22/93	0.00	16.67	0.00	85.46
	102.13	12/08/93				
	102.13	12/21/93	0.00	17.54	0.00	84.59
	102.13	01/25/94	0.00	18.45	0.00	83.68
12:00 hrs.	102.13	01/28/94	0.00	18.35	0.00	83.78
2:00 hrs.	102.13	01/28/94	0.00	18.37	0.00	83.76
2:30 hrs.	102.13	01/28/94	0.00	18.37	0.00	83.76
	102.13	02/03/94	0.00	18.91	0.00	83.22
	102.13	02/04/94	0.00	19.05	0.00	83.08
	102.13	02/11/94	0.00	19.25	0.00	82.88
	102.13	02/18/94	0.00	19.26	0.00	82.87
	102.13	03/21/94	0.00	19.81	0.00	82.32
	102.13	04/15/94	0.00	20.15	0.00	81.98
	102.13	05/31/94	0.00	18.61	0.00	83.52
	102.13	06/30/94	0.00	17.91	0.00	84.22
	102.13	07/08/94	0.00	17.72	0.00	84.41
MW-5	102.13	07/19/94	0.00	17.73	0.00	84.40
09:30	102.13	08/15/94	0.00	17.77	0.00	84.36
11:50	102.13	08/15/94	0.00	17.78	0.00	84.35
	102.13	08/31/94	0.00	17.78	0.00	84.35
	102.13	10/31/94	0.00	16.82	0.00	85.31
	102.13	11/17/94	0.00	16.87	0.00	85.26
	102.13	12/27/94	0.00	18.17	0.00	83.96
	102.13	01/16/95	0.00	18.44	0.00	83.69
	102.13	02/09/95	0.00	18.97	0.00	83.16
	102.13	03/09/95	0.00	19.88	0.00	82.25
	102.13	04/06/95	0.00	19.64	0.00	82.49
	102.13	05/11/95	0.00	18.85	0.00	83.28
	102.13	06/20/95	0.00	17.99	0.00	84.14
	102.13	07/31/95	0.00	16.49	0.00	85.64
	102.13	08/31/95	0.00	16.14	0.00	85.99
	102.13	09/21/95	0.00	17.22	0.00	84.91
	102.13	10/03/95	0.00	17.40	0.00	84.73
	102.13	11/21/95	0.00	18.30	0.00	83.83
	102.13	12/22/95	0.00	19.12	0.00	83.01
	102.13	01/12/96	0.00	19.54	0.00	82.59
	102.13	02/27/96	0.00	19.83	0.00	82.30
	102.13	03/14/96	0.00	19.97	0.00	82.16
	102.13	04/15/96	0.00	19.92	0.00	82.21
	102.13	05/09/96	0.00	19.17	0.00	82.96
	102.13	06/07/96	0.00	18.99	0.00	83.14
	102.13	07/09/96	0.00	18.02	0.00	84.11
	102.13	08/08/96	0.00	18.39	0.00	83.74
	102.13	09/11/96	0.00	18.94	0.00	83.19
	102.13	10/11/96	0.00	19.51	0.00	82.62
	102.13	11/08/96	0.00	19.59	0.00	82.54

TABLE 1

GROUNDWATER ELEVATION DATA

Former Conoco Store # 23034

1126 South Robert St., W. St. Paul, Minnesota (24930601)

WELL #	ELEVATION	DATE	D.T.P	D.T.W	P.T.	W.T.E.
	102.13	12/10/96	0.00	19.05	0.00	83.08
	102.13	01/06/97	0.00	19.64	0.00	82.49
	102.13	02/03/97	0.00	20.05	0.00	82.08
	102.13	03/12/97	0.00	20.04	0.00	82.09
	102.13	04/04/97	0.00	18.13	0.00	84.00
	102.13	04/28/97	0.00	17.34	0.00	84.79
	102.13	05/29/97	0.00	17.21	0.00	84.92
	102.13	06/12/97	0.00	17.33	0.00	84.80
	102.13	07/17/97	0.00	16.58	0.00	85.55
	102.13	08/11/97	0.00	14.78	0.00	87.35
	102.13	09/22/97	0.00	14.78	0.00	87.35
	102.13	10/07/97	0.00	16.13	0.00	86.00
RW-1	100.61	12/23/92	0.00	16.00	0.00	84.61
	100.61	03/09/93	0.00	17.92	0.00	82.69
	100.61	06/10/93	0.00	15.54	0.00	85.07
	100.61	07/19/93	0.00	13.82	0.00	86.79
	100.61	07/28/93	0.00	14.13	0.00	86.48
	100.61	09/17/93	0.00	14.74	0.00	85.87
	100.61	09/20/93	0.00	16.13	0.00	84.48
	100.61	09/27/93	0.00	14.12	0.00	86.49
12:00 hrs.	100.61	09/29/93	0.00	14.94	0.00	85.67
14:30 hrs.	100.61	09/29/93	0.00	25.40	0.00	75.21
	100.61	09/30/93	0.00	25.64	0.00	74.97
	100.61	10/07/93	0.00	15.10	0.00	85.51
	100.61	10/22/93	0.00	25.72	0.00	74.89
	100.61	12/08/93	0.00	16.65	0.00	83.96
	100.61	12/21/93	0.00	16.92	0.00	83.69
	100.61	01/25/94				
12:00 hrs.	100.61	01/28/94	0.00	17.71	0.00	82.90
2:00 hrs.	100.61	01/28/94	0.00	27.20	0.00	73.41
2:30 hrs.	100.61	01/28/94	0.00	27.35	0.00	73.26
	100.61	02/03/94	0.00	28.20	0.00	72.41
	100.61	02/04/94	0.00	27.05	0.00	73.56
	100.61	02/11/94	0.00	27.35	0.00	73.26
RW-1	100.61	02/18/94	0.00	28.35	0.00	72.26
	100.61	03/21/94	0.00	27.07	0.00	73.54
	100.61	04/15/94	0.00	28.62	0.00	71.99
	100.61	05/31/94	0.00	28.58	0.00	72.03
	100.61	06/30/94	0.00	26.96	0.00	73.65
	100.61	07/08/94	0.00	26.20	0.00	74.41
	100.61	07/19/94	0.00	25.98	0.00	74.63
	100.61	08/15/94				
	100.61	08/15/94	0.00	13.90	0.00	86.71
	100.61	08/31/94	0.00	17.39	0.00	83.22
	100.61	10/31/94	0.00	26.18	0.00	74.43
	100.61	11/17/94	0.00	26.80	0.00	73.81
	100.61	12/27/94	0.00	25.86	0.00	74.75
	100.61	01/16/95	0.00	16.22	0.00	84.39

TABLE 1

GROUNDWATER ELEVATION DATA

Former Conoco Store # 23034

1126 South Robert St., W. St. Paul, Minnesota (24930601)

WELL #	ELEVATION	DATE	D.T.P	D.T.W	P.T.	W.T.E.
	100.61	02/09/95	0.00	27.63	0.00	72.98
	100.61	03/09/95	0.00	26.58	0.00	74.03
	100.61	04/06/95	0.00	26.30	0.00	74.31
	100.61	05/11/95	0.00	27.31	0.00	73.30
	100.61	06/20/95	0.00	26.58	0.00	74.03
	100.61	07/31/95	0.00	14.32	0.00	86.29
	100.61	08/31/95	0.00	15.55	0.00	85.06
	100.61	09/21/95	0.00	26.52	0.00	74.09
	100.61	10/03/95	0.00	26.65	0.00	73.96
	100.61	11/21/95	0.00	26.35	0.00	74.26
	100.61	12/22/95	0.00	26.77	0.00	73.84
	100.61	01/12/96	0.00	20.69	0.00	79.92
	100.61	02/27/96	0.00	25.26	0.00	75.35
	100.61	03/14/96	0.00		0.00	
	100.61	04/15/96	0.00	24.14	0.00	76.47
	100.61	05/09/96	0.00		0.00	
	100.61	06/07/96	0.00		0.00	
	100.61	07/09/96	0.00		0.00	100.61
	100.61	08/08/96	0.00		0.00	
	100.61	09/11/96	0.00		0.00	100.61
	100.61	10/11/96	0.00		0.00	
	100.61	11/08/96	0.00		0.00	
	100.61	12/10/96	0.00	19.05	0.00	81.56
	100.61	01/06/97	0.00	17.72	0.00	82.89
	100.61	02/03/97	0.00	18.71	0.00	81.90
	100.61	03/12/97	0.00	18.72	0.00	81.89
	100.61	04/04/97	0.00	15.87	0.00	84.74
	100.61	04/28/97	0.00	15.54	0.00	85.07
	100.61	05/29/97	0.00	15.98	0.00	84.63
	100.61	06/12/97	0.00	16.02	0.00	84.59
	100.61	07/17/97	0.00	13.19	0.00	87.42
	100.61	08/11/97	0.00	11.71	0.00	88.90
	100.61	09/22/97	0.00	13.00	0.00	87.61
	100.61	10/07/97	0.00	13.10	0.00	87.51

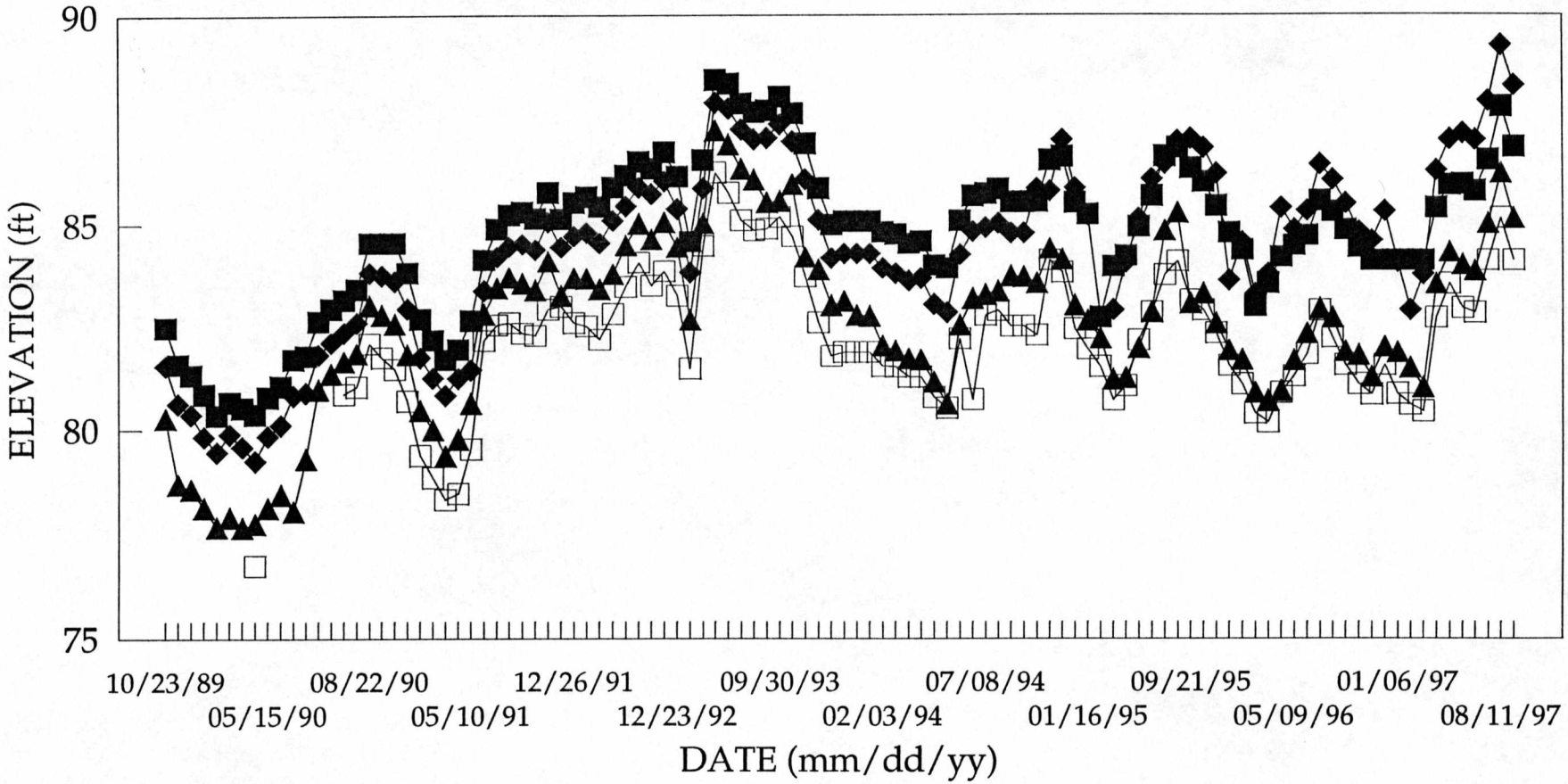
Explanation:

All measurments are recorded in feet (ft).
D.T.P = Depth to product
D.T.W = Depth to water
P.T. = Product thickness
W.T.E = Water table elevation

DAHL

GROUNDWATER ELEVATION DATA

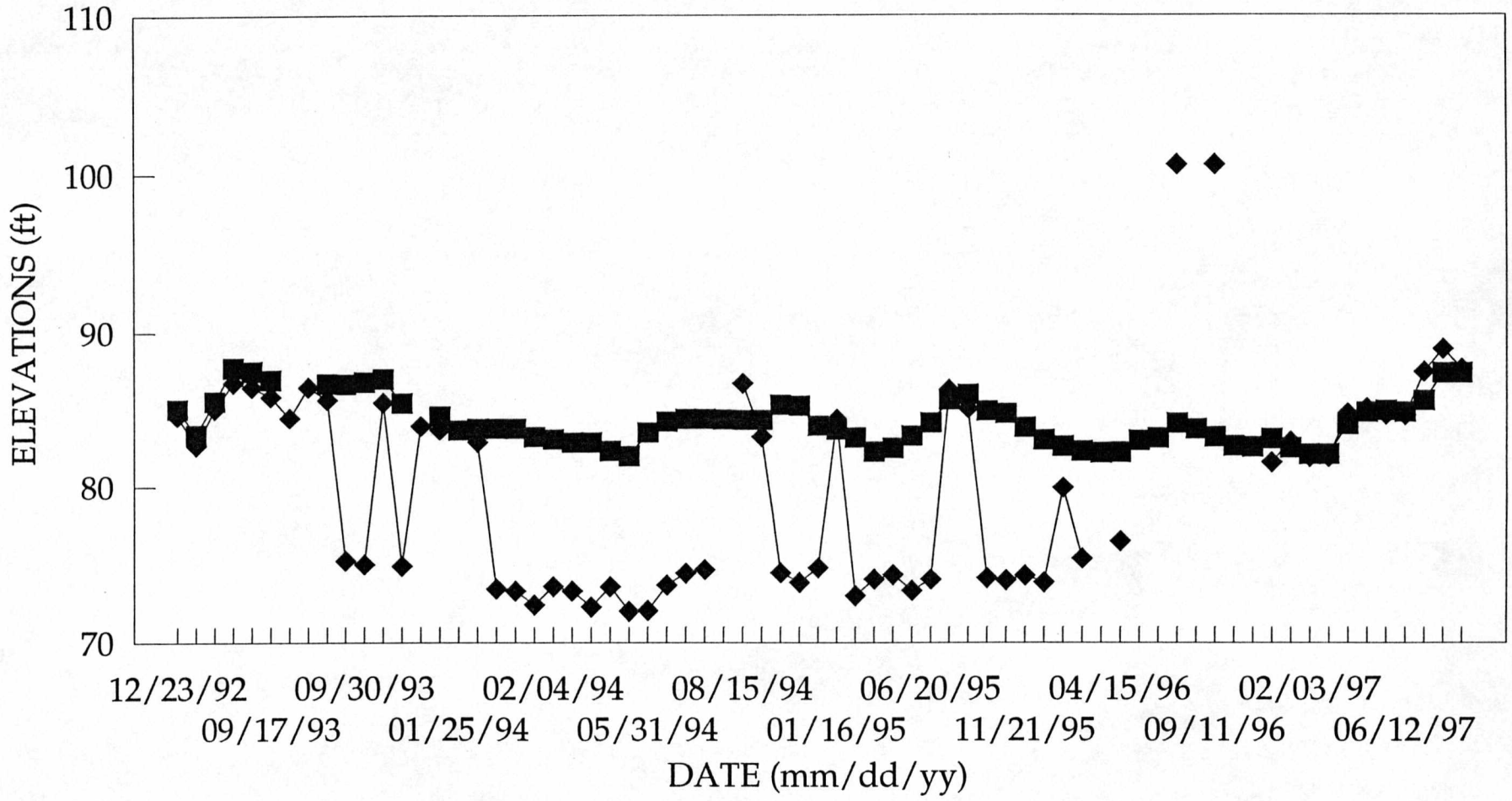
Former Conoco Store # 23034, W. St. Paul, MN (24930601)



0601WTE.ALL

GROUNDWATER ELEVATIONS, MW-5 & RW-1

Former Conoco Store # 23034, W. St. Paul, MN (24930601)



0601MW5.RW1

TABLE 2

GROUNDWATER ANALYTICAL DATA

Former Conoco Store # 23034

1126 South Robert St., W. St. Paul, Minnesota (24930601)

WELL #	DATE	B	E	T	X	THG/GRO	MTBE
MW-1	05/03/90	ND	ND	ND	ND	ND	ND
	09/10/90	ND	ND	ND	ND	ND	ND
	03/13/91	ND	ND	ND	ND	ND	ND
	09/09/91	ND	ND	ND	ND	ND	ND
	12/26/91	ND	ND	ND	ND	ND	ND
	03/13/92	ND	ND	ND	ND	ND	ND
	06/12/92	ND	ND	ND	ND	ND	ND
	09/10/92	ND	ND	ND	ND	ND	ND
	12/23/92	ND	ND	ND	ND	ND	ND
	03/09/93	ND	ND	ND	ND	ND	ND
	06/10/93	ND	ND	ND	ND	ND	ND
	09/17/93	ND	ND	ND	ND	ND	ND
	12/21/93	ND	ND	ND	ND	ND	ND
	03/21/94	ND	ND	ND	ND	ND	ND
	06/30/94	ND	ND	ND	ND	ND	ND
	08/31/94	ND	ND	ND	ND	ND	ND
	12/27/94	ND	ND	ND	ND	36	ND
	03/09/95	ND	ND	ND	ND	ND	ND
	06/20/95	ND	ND	ND	ND	ND	ND
	09/21/95	ND	ND	ND	ND	ND	ND
	12/22/95	ND	ND	ND	ND	ND	ND
MW-2	05/03/90	6600	4	12	6900	27000	1600
	09/10/90	7300	950	17000	9600	48000	1600
	03/13/91	8200	1200	13000	10000	68000	3000
	09/09/91	8500	1300	9300	10000	48000	3000
	12/26/91	3800	1200	1100	4400	23000	ND
	03/13/92	2100	800	1200	2300	11000	ND
	06/12/92	2500	1100	1000	2600	17000	220
	09/10/92	4200	1300	1400	3100	19000	ND
	12/23/92	5800	1500	2800	4000	27000	ND
	03/09/93	5300	1300	3800	4500	21000	ND
	06/10/93	240	ND	120	230	1200	ND
	09/17/93	210	250	ND	370	3100	ND
	12/21/93	4100	1500	360	1900	15000	ND
	03/21/94	5300	1800	2800	4800	29000	270
	06/30/94	5700	1800	3700	6500	31000	200
	08/31/94	2700	630	1900	3400	15000	ND
	12/27/94	42	8	31	67	400	ND
	03/09/95	550	160	210	610	2700	ND
	06/20/95	170	59	240	480	1800	ND
	09/21/95	7	5.7	7.3	23	120	ND
	12/22/95	43.5	20	39	74.1	540	ND
	03/14/96	117	86	167	422	1980	ND
	06/07/96	102	98	164	612	2480	49.9
	09/11/96	17.7	25	38	142	670	10
	12/10/96	28.6	44	102	370	1110	14.1
	03/12/97	8.45	17.7	21.5	84.1	690	42.8

TABLE 2

GROUNDWATER ANALYTICAL DATA

Former Conoco Store # 23034

1126 South Robert St., W. St. Paul, Minnesota (24930601)

WELL #	DATE	B	E	T	X	THG/GRO	MTBE
MW-2	06/12/97	23.3	21.3	45.1	115	580	16.4
	09/22/97	9	13.9	31.3	62.4	270	<10
MW-3	05/03/90						
	09/10/90	9700	2000	23000	16000	82000	1500
	03/13/91	9200	3900	23000	26000	110000	2600
	09/09/91	11000	3000	22000	20000	79000	4900
	12/26/91	7700	2300	10000	14000	77000	1600
	03/13/92	10000	2800	17000	15000	64000	ND
	06/12/92	8100	2500	16000	14000	72000	290
	09/10/92	9800	ND	22000	17000	75000	ND
	12/23/92	8100	2700	16000	15000	82000	ND
	03/09/93	6500	3000	20000	17000	74000	ND
	06/10/93	6400	2700	11000	13000	52000	ND
	09/17/93	4300	2200	14000	11000	40000	ND
	12/21/93	5900	3100	20000	16000	64000	ND
	03/21/94	9700	3500	24000	18000	79000	ND
	06/30/94 *	5600	2600	14000	14000	57000	ND
	08/31/94	3100	1800	3100	7900	28000	ND
	12/27/94	ND	ND	ND	ND	ND	ND
	03/09/95	3100	3000	1000	11000	53000	ND
	06/20/95	2000	3100	230	9300	43000	ND
	09/21/95	3140	2810	509	6490	38000	ND
	12/22/95	1650	3580	1730	6340	77500	<250
	03/14/96	889	2650	BDL	3790	21000	<100
	06/07/96	1370	26	<25	3790	24200	1190
	09/11/96	730	2030	31	3400	22900	67.8
	12/10/96	825	1830	69	3370	21900	95.9
	03/12/97	931	2070	101	3350	24600	306
	06/12/97	1650	2920	1980	5660	29000	144
	09/22/97	824	1860	929	3620	19200	<100
MW-4	05/03/90	ND	ND	ND	2	41	ND
	09/10/90	ND	ND	ND	ND	19	ND
	03/13/91	ND	ND	ND	1	40	ND
	09/09/91	ND	ND	ND	ND	ND	16
	12/26/91	ND	ND	ND	ND	ND	ND
	03/13/92	ND	ND	ND	ND	ND	ND
	06/12/92	ND	ND	ND	ND	ND	ND
	09/10/92	ND	ND	ND	ND	ND	ND
	12/23/92	ND	ND	ND	ND	ND	ND
	03/09/93	ND	ND	ND	ND	ND	ND
	06/10/93	ND	ND	ND	ND	ND	ND
	09/17/93	ND	ND	ND	ND	ND	ND
	12/21/93	ND	ND	ND	ND	ND	ND
	03/21/94	ND	ND	ND	ND	ND	ND
	06/30/94	ND	ND	ND	ND	ND	ND
	08/31/94	ND	ND	ND	ND	ND	ND

TABLE 2

GROUNDWATER ANALYTICAL DATA

Former Conoco Store # 23034
1126 South Robert St., W. St. Paul, Minnesota (24930601)

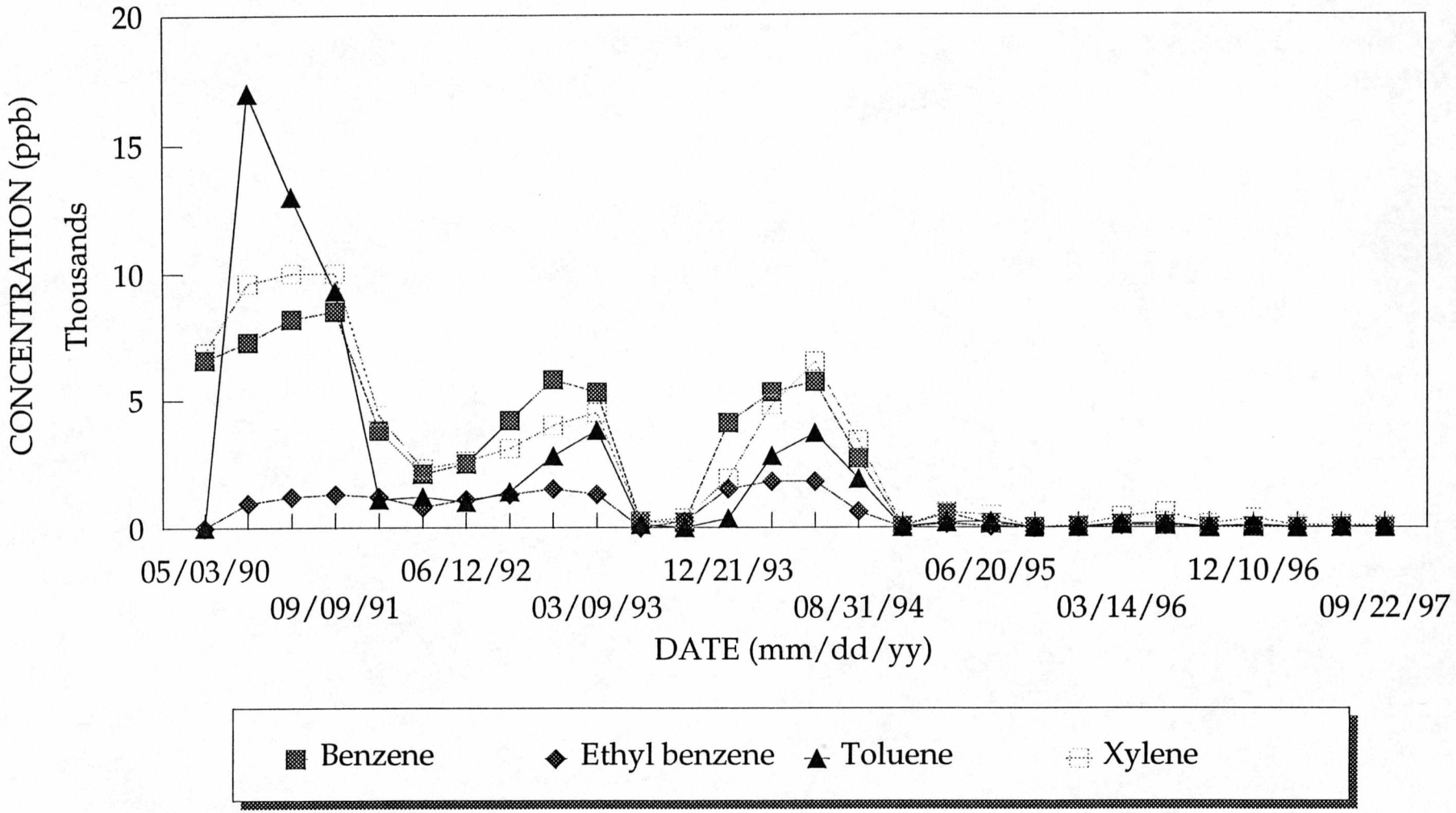
WELL #	DATE	B	E	T	X	THG/GRO	MTBE
MW-4	12/27/94	ND	ND	ND	ND	ND	ND
	03/09/95	ND	ND	ND	ND	ND	ND
	06/20/95	ND	ND	ND	ND	ND	ND
	09/21/95	ND	ND	ND	ND	ND	ND
	12/22/95	ND	ND	4	ND	ND	ND
	12/10/96	BDL	BDL	BDL	BDL	BDL	BDL
MW-5	12/23/92	ND	ND	ND	ND	ND	ND
	03/09/93	ND	ND	ND	ND	ND	ND
	06/10/93	ND	ND	ND	ND	ND	ND
	09/17/93	ND	ND	ND	ND	ND	ND
	12/21/93	ND	ND	ND	ND	ND	ND
	03/21/94	ND	ND	ND	ND	60	ND
	06/30/94	ND	ND	ND	ND	47	ND
	08/31/94	ND	ND	ND	ND	ND	ND
	12/27/94	ND	ND	ND	ND	56	ND
	03/09/95	ND	ND	ND	ND	ND	ND
	06/20/95	ND	ND	ND	ND	ND	ND
	09/21/95	ND	ND	ND	ND	ND	ND
	12/22/95	ND	ND	ND	ND	ND	ND
RW-1	06/12/97	15.5	22.9	17.6	60.1	370	ND

Explanation:

B=benzene
E=ethyl benzene
T=toluene
X=total xylenes
THG=total hydrocarbons as gasoline
MTBE=methyl-tert-butyl-ether
GRO=gasoline range organics
** = indicates sample contains higher boiling hydrocarbons*

GROUNDWATER ANALYTICAL DATA MW-2

Former Conoco Store # 23034, W. St. Paul, MN (24930601)



0601LABANAL

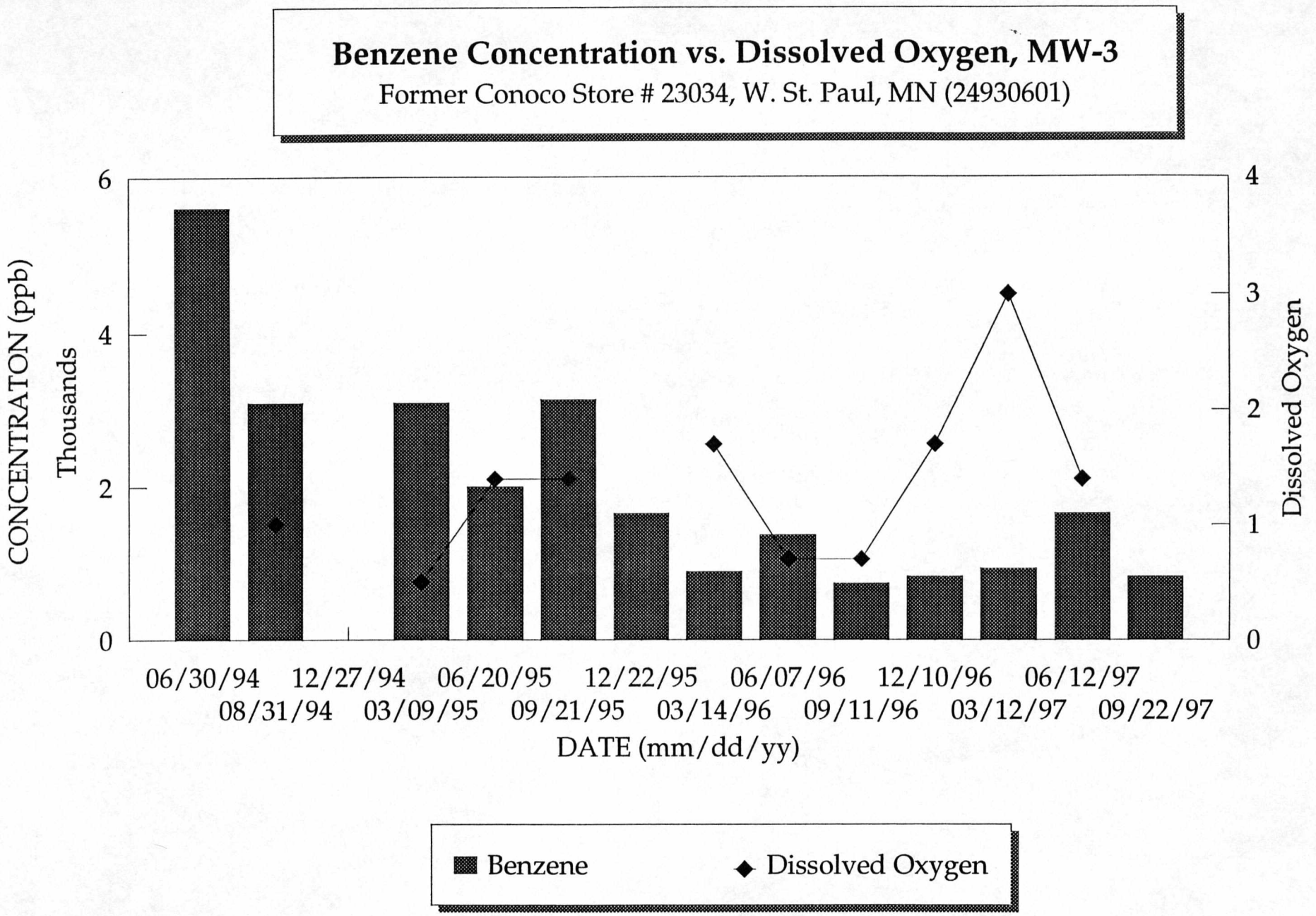

Benzene Concentration vs. Dissolved Oxygen, MW-3
Former Conoco Store # 23034, W. St. Paul, MN (24930601)
CONCENTRATON (ppb)
Thousands
6
4
2
0
4
3
2
1
0
Dissolved Oxygen
06/30/94
08/31/94
12/27/94
03/09/95
06/20/95
09/21/95
12/22/95
03/14/96
06/07/96
09/11/96
12/10/96
03/12/97
06/12/97
09/22/97
DATE (mm/dd/yy)
Benzene
Dissolved Oxygen

TABLE 3

ANALYTICAL DATA - POST ORC INJECTION

Former Retail Facility
St. Paul, Minnesota

Sample Location	Date	B	(MAS)	E	(MAS)	T	(MAS)	X	(MAS)	GRO (mg/L)	(MAS)	DO (mg/L)	TEMP C
MW-3	12/10/96		825		1830		69		3370		21.9	1.7	12.7
	01/22/97	660		2400		110		3900		27		2	12
	02/03/97	660		2500		110		4000		27		2.4	10
	02/19/97	770		2600		230		3800		23		2.7	10
	02/26/97	720		2400		170		3700		19		2.3	6.78
	03/12/97	830	931	2200	2070	180	101	3200	3350	24	24.6	3	10.6
	03/26/97	1000		2800		1700		4400		26		2.1	13.2
	04/04/97	830		2600		1300		4500		23		1.1	12.2
	04/16/97	680		2100		1100		3700		23		2.3	7.6
	04/28/97	1100		2700		1400		4800		25		2.4	9.8
	05/21/97	1900		2800		2200		5700		34		3.7	12.4
	06/12/97	1300	1650	2700	2920	1900	1980	5200	5660	26	29	1.4	
	06/30/97	1700		3200		2500		5900		31		1.7	11
	07/17/97	810		1500		920		3400		17		1.5	
	07/29/97	210		540		290		1500		8.6		4.4	
	08/11/97	580		1100		500		2200		8.6		3.4	16.3
	08/25/97	580		1800		990		4200		15		1.9	
	09/22/97	1100	824	2200	1860	1100	929	4400	3620	18	19.2		
	10/07/97	1200		2500		1300		5400		21		0.9	
Influent/RW-1	12/10/96		204		170		148		953		29.5	1	14.1
	01/22/97	34		19		27		180		0.85		2.3	12
	02/03/97	72		97		31		360		1.6		6	11.6
	02/19/97	260		170		250		1200		4		4.7	11
	02/26/97	64		74		64		320		1.1		4.8	8.9
	03/12/97	200	303	240	309	240	299	1200	1480	5.3	7.53	3.9	11
	03/26/97	62		260		56		730		3.3		1.2	11.1
	04/04/97	12		32		6		85		0.43		5.3	11
	04/16/97	14		38		19		92		0.49		3.2	8.9
	04/28/97	15		26		7		73		0.36		2.9	10
	05/21/97	260		67		100		370		2.9		3.4	15.5
	06/12/97	9	15.5	24	22.9	18	17.6	62	60.1	0.28	370	4.3	
	06/30/97	5		3		<1		10		0.11		1.6	11.5
	07/17/97	5.9		14		3.9		52		0.48		3.4	
	07/29/97	8.5		31		12		130		0.91		3.6	
	08/11/97	9.8		250		42		600		2.6		3.5	16.4
	08/25/97	14		28		26		210		1.2		1.9	
	09/22/97	ND		13		7		55		0.51			
	10/07/97	ND		18		4		43		0.28		5.7	

Explanation:

Results are reported in micrograms per liter (ug/L) which is equivalent to parts per billion (ppb), unless otherwise indicated.
B = benzene
E = ethyl benzene
T = toluene
X = xylene
GRO = gasoline range organics
DO = dissolved oxygen
Results under each parameter are Matrix results.
Results presented in columns to the right of each parameter are Midwest Analytical Services (MAS) results.

TABLE 4

SOIL VENT SYSTEM ANALYTICAL DATA

Conoco Store # 23034

1126 South Robert St., W. St. Paul, Minnesota (24930601)

DATE	B	E	T	X	THG/GRO
02/04/94	21	24	63	73	3900
02/11/94	8.7	17	36	56	2000
02/18/94	7.7	23	46	77	2200
03/21/94	6.9	11	30	36	2400
06/30/94	9.6	26	68	120	1400
08/31/94	0.21	0.28	0.99	1.1	39
12/27/94	1.8	3.4	15	12	430
06/20/95	1.6	1.5	1.7	14	290
09/21/95	1.8	6.1	7.7	25	570
12/22/95	5.2	3.5	4.7	13	220
03/14/96	10	<4.0	7.7	8.3	619
06/07/96	1	3.5	3.8	15	180
09/18/96	4	1.2	1.4	5.8	63
12/10/96	0.4	1.1	1.5	6.7	59
03/12/97	0.48	2.4	1.7	13	250
06/12/97	2.1	2.1	0.84	13	120
09/22/97	<1.5	0.48	<1.5	5.4	24

EXPLANATION:

B=benzene
E=ethyl benzene
T=toluene
X=xylene
THG/GRO=total hydrocarbons as gasoline/gasoline range organics
All values in ug/L

TABLE 5

DISSOLVED OXYGEN DATA

Conoco Store # 23034
1126 South Robert St., W. St. Paul, Minnesota (24930601)

DATE	MW-1	MW-2	MW-3	MW-4	MW-5	SVV-1	SVV-4	SVV-5	SVV-8	SVV-10	SVV-11	RW-1
07/08/94	2	1.5	2.1	3	6.5	7.5	1.4	2.2	1.9	*	1.8	*
08/15/94	0.6	0.6	1	2.5	2.5	7	*	1.5	1	*	1.5	*
08/15/94	0.7	0.7	1	2.6	2.7	7.2	*	1.5	1	*	1.4	*
01/16/95	*	1	*	*	*	1	4	6.2	0.8	*	1	*
03/09/95	0.5	0.4	0.5	0.5	1.3	*	2.4	*	*	*	*	*
04/06/95	*	*	*	*	*	*	*	1.6	*	*	*	*
05/11/95	*	*	*	*	*	3.6	2.6	9.2	1.6	2.1	2.4	*
06/20/95	1.5	1.2	1.4	1.8	1.5	1.6	2.8	1.4	1	1	0.9	*
08/02/95	0.9	0.8	1	1.2	1.4	1	2.2	1.4	0.8	1	0.8	*
08/29/95	1.4	1.5	1.6	1.6	4.2	2.6	2.2	3.2	1.3	1.6	1.3	*
09/21/95	1.2	1.2	1.4	1.5	2.8	2.8	3	3.8	1.5	2	1.2	*
10/03/95	0.6	1.4	1.1	1.4	1.5	0.7	1	*	*	*	*	*
11/21/95	1.0	1.0	1.3	1.1	3.0	1.0	1.0	1.8	*	*	*	*
12/22/95	*	*	*	*	*	0.6	2.2	*	*	*	*	*
01/12/96	*	*	*	*	*	*	6.2	9.8	*	*	*	*
02/27/96	*	*	*	*	*	5.5	10.4	*	*	*	*	*
03/14/96	2.0	1.2	1.7	1.0	9.3	*	*	*	*	*	*	*
04/15/96	1	*	*	*	*	5.8	7	10.2	*	*	*	*
05/09/96	3.8	1.1	0.9	1.3	8.1	*	*	*	*	*	*	*
06/07/96	3.4	2.7	0.7	0.9	7.1	*	*	*	*	*	*	*
10/31/96	*	*	0.7	*	*	*	*	*	0.9	0.5	0.4	1.5
11/08/96	1.3	1.9	0.8	1.7	4.9	*	*	*	0.5	0.5	0.4	1.5
11/15/96	*	*	0.3	*	*	*	*	*	1.1	0.6	0.8	0.6
11/27/96	*	*	1.8	*	*	*	*	*	5.9	0.7	DRY	0.6
12/10/96	*	2.9	1.7	4.1	5.0	*	*	*	4.7	0.9	DRY	1
12/17/96	*	*	0.5	*	*	*	*	*	7.4	2.3	DRY	1.5
12/23/96	*	*	1.0	*	*	*	*	*	1.6	1.5	*	0.9
01/06/97	*	1.9	0.8	1.1	8.2	*	*	*	5.3	0.7	*	6.7
01/15/97	*	*	1.8	*	*	*	*	*	4.1	1.2	*	2
01/22/97	*	*	2.0	*	*	*	*	*	4.4	1.8	*	2.3
02/03/97	*	1.5	2.4	0.9	6.9	*	*	*	1.3	0.6	*	6
02/19/97	*	*	2.7	*	*	*	*	*	1.5	0.9	*	4.7
02/26/97	*	*	2.3	*	*	*	*	*	*	1.6	*	4.8
03/12/97	*	2.2	3.0	1.2	8.1	*	*	*	*	1.1	*	3.9
03/26/97	*	*	2.1	*	*	*	*	*	4.4	1.5	*	1.2
04/04/97	*	*	1.1	*	*	*	*	*	4.7	2.8	*	5.3
04/16/97	*	*	2.3	*	*	*	*	*	5.1	4.1	*	3.2
04/28/97	6.7	3.0	2.4	2.5	7.5	*	*	*	4.7	6.8	*	2.9
05/21/97	*	*	3.7	*	*	*	*	*	5.3	4.8	*	3.4
05/29/97	*	*	1.2	*	*	*	*	*	4.5	6.1	*	5.1
06/12/97	4.5	3.1	1.4	5.5	7.0	*	*	*	4.5	6.1	*	4.3
06/30/97	2.4	*	1.7	*	*	*	*	*	5.0	*	3.0	1.6
07/17/97	0.5	2.2	1.5	0.6	9.0	*	*	*	2.6	3.8	*	3.4
07/29/97	*	*	4.4	*	*	*	*	*	4.7	1.4	*	3.6
08/11/97	0.8	3.8	3.4	1.1	10.6	*	*	*	3.5	1.9	*	3.5
08/25/97	*	*	1.9	*	*	*	*	*	3.0	3.5	*	1.9
09/22/97	*	*	*	*	*	*	*	*	*	*	*	*
10/07/97	1.2	2.1	0.9	0.9	6.1	*	*	*	3.3	2.5	*	5.7

Explaination:

Measurements in mg/l
** = Data not collected*

TABLE 6

VACUUM DATA from SOIL VAPOR VENTS

Former Conoco Store # 23034

1126 South Robert St., W. St. Paul, Minnesota (24930601)

DATE	SVV-1	SVV-2	SVV-3	SVV-4	SVV-5	SVV-6	SVV-7	SVV-8	SVV-9	SVV-10	SVV-11	SVP-1(W)	SVP-1(E)	SVP-2(W)	SVP-2(E)	SVP-3(W)	SVP-3(E)	SVP-4(W)	SVP-4(E)
02/03/94	-23	-23	-24	-22	-19	-30	-21	-20	-24	-23	-23	-3.5	-6	-2.5	-0.7	-4	-4	-3.8	-3.6
02/04/94	-22	-20	-25	-23	-20	-19	-30	-19	-25	-24	-23	-4.6	-3.2	0	-2	-3.5	-3.5	-3.2	-3.2
02/11/94	-47	-47	-39	-46	-47	-18	-50	-51	-30	-24	-45	-1	-2.6	-0.6	0	-0.41	-0.85	-3.1	-2.9
02/18/94	-30	-40	-46	-20	-44	-24	-41	-22	-49	-21	-12	-0.07	12	-0.54	-0.52	*	*	*	*
03/21/94	-48	-48	-48	-48	-26	-10	-45	-48	-35	-20	-14	-1.2	-1.4	-0.62	-0.61	-0.66	-0.28	-2.9	-3.1
04/15/94	-10	-9	-15	-11	-22	-7	-30	-60	-19	-22	-14	-1.1	-1.2	0	-0.42	-0.22	-0.54	-2.5	-2.9
05/31/94	-46	-46	-39	-46	-50	-46	-40	-51	-39	-50	-42	-4.3	-4.8	-0.22	-3.1	-5.4	-3.4	-4	-4.1
06/30/94	-45	-47	-40	-49	-51	-46	-22	-52	-38	-51	-44	-3.8	-2.8	-2.7	0.03	-4.5	0	-2.2	-2.3
07/08/94	-43	-47	-20	-46	-28	-46	-19	-15	-48	-8	-43	-2.1	-2.2	-3	0	0	-4.6	-2.1	-2.1
08/15/94	-42	-48	-17	-44	-12	-44	-17	-31	-48	-14	-44	-3.9	-2.5	-2.4	0	-4.5	0	-2.4	-2.2
08/15/94	-42	-48	-17	-44	-12	-44	-17	-31	-48	-14	-44	-4	-2.8	-2.5	-0.1	-4.5	0	-2.4	-2.5
08/31/94	-20	-20	-20	-20	-20	-30	-20	-20	-20	-20	-20	-2.5	0	18	-1	-2.2	0	-1.8	-1.6
10/31/94	-21	-25	-24	-26	-25	-34	-41	-28	-29	-25	-19	-2.6	-0.05	-1.7	0	0	-2.4	0	-0.9
11/17/94	-22	-24	-22	-22	-38	-29	-44	-25	-20	-15	-15	-2	-0.02	-0.4	-0.02	-0.04	-1.6	-0.49	-0.48
12/27/94	-18	-24	-24	-18	-29	-34	-42	-11	-10	-12	-16	0	3.1	3.4	0	8.2	-2.2	-0.72	-0.74
01/16/95	-35	-39	-36	-20	-30	-13	-52	-4	-10	-16	-11	*	*	2.8	-1.6	-2.6	0	-0.08	-0.03
02/09/95	-30	-26	-36	-22	-32	-50	-50	-4	-7	-18	-8	*	*	*	*	*	*	*	*
03/09/95	SYSTEM SHUT DOWN																		
04/06/95	-26	-14	-26	-25	-27	-16	-16	-15	-20	-20	-19	-3.9	-4.5	-1.7	-1.5	-2.3	-1.8	-5	-4.4
05/11/95	-30	-15	-28	-28	-28	-26	-18	-16	-21	-22	-20	-3.8	-3.2	-1.4	-1.2	-1.8	-1	-4.8	-4
06/20/95	-24	-25	-16	-15	-15	-29	-24	-16	-18	-14	-20	-0.08	0.02	-1.6	1	0.02	-0.12	-0.16	-0.16
07/31/95	-34	-28	-20	-29	-27	-37	-33	-20	-34	-30	-30	-2.4	-0.4	-0.78	0.7	0	1.9	-1.4	0
08/31/95	-40	-44	-30	-36	-30	-41	-39	-38	-32	-27	-36	-1	0	0.16	0.3	0	-0.02	0	-0.49
09/21/95	-18	0	-10	-11	0	-13	-15	-10	-9	-2	-8	-0.8	0	-0.1	0.18	0	0	0	-0.4
10/03/95	-18	-15	-13	-12	-13	-16	-20	-28	-15	-14	-15	*	*	*	*	*	*	*	*
11/21/95	-20	-15	-16	-12	-14	-18	-34	-25	-15	-15	-9	-0.82	0	-1.1	0.1	0	0.02	*	*
12/22/95	-46	-14	-12	-13	-12	-15	-4	-25	-9	-12	-20	-1.5	-0.9	-0.8	-0.5	-1.7	-1.7	-1	-1.2
01/12/96	-46	-13	-15	-8	-9	-30	-8	-24	-10	-13	-26	*	*	*	*	*	*	*	*
02/27/96	-40	-48	-21	-49	-27	-22	-48	-51	-26	-18	-26	-2.1	-1.2	-1.0	-1.2	-0.72	-1.0	-3.0	-3.0
03/14/96	-26	-52	-28	-49	-4.1	-1.5	-50	-49	-1	-9	-8	*	*	*	*	*	*	*	*
04/15/96	-20	-15	-15	-15	-15	-15	-20	-18	-15	-15	-15	-1.4	-1	-.63	-1	-.41	-.86	-2.5	-2.2
05/09/96	-35	-21	-20	-25	-40	-25	-17	-11	-11	-20	-13	*	*	*	*	*	*	*	*
06/07/96	-22	-18	-20	-27	-40	-25	-19	-12	-12	-24	-6	*	*	*	*	*	*	*	*
07/09/96	-25	-20	-23	-25	-43	-25	-19	-11	-15	-30	-7	*	*	*	*	*	*	*	*
08/08/96	-22	-19	-20	-27	-40	-24	-18	-11	-13	-25	-5	*	*	*	*	*	*	*	*
09/11/96	-20	-16	-18	-29	-39	-22	-17	-10	-11	-22	-5	*	*	*	*	*	*	*	*
10/11/96	-19	-15	-15	-17	-36	-20	-15	-10	-11	-20	-4	*	*	*	*	*	*	*	*
11/08/96	-20	-22	-18	-21	-40	-25	-33	-28	-11	-2	-5	*	*	*	*	*	*	*	*
12/10/96	-17	-20	-25	-25	-43	-26	-38	-31	-31	-23	-20	*	*	*	*	*	*	*	*
01/26/97	-13	-21	-48	-29	-46	-27	-47	-32	-30	-22	-15	*	*	*	*	*	*	*	*
02/03/97	-49	-45	-51	-30	-51	-49	-52	-32	-22	-22	-17	*	*	*	*	*	*	*	*
03/12/97	-25	-17	-22	-14	-44	-44	-50	-22	-13	-24	-26	*	*	*	*	*	*	*	*
04/04/97	-9	-24	-27	-19	-37	-28	-27	-1	-13	-26	-19	*	*	*	*	*	*	*	*
04/28/97	-12	-23	-22	-20	-39	-25	-17	-8	-21	-30	-18	*	*	*	*	*	*	*	*
05/29/97	-16	-26	-22	-18	-38	-24	-18	-9	-18	-28	-14	*	*	*	*	*	*	*	*
06/12/97	-18	-18	-19	-19	-37	-22	-17	-8	-15	-22	-16	*	*	*	*	*	*	*	*
07/17/97	-30	-37	-36	-20	-44	-30	-25	-10	-30	-39	-18	*	*	*	*	*	*	*	*
08/11/97	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09/22/97	-36	-42	-38	-22	-42	-33	-32	-8	-20	-30	-18	*	*	*	*	*	*	*	*

Readings are measured in Inches of Water Column (IWCG)

** - indicates measurement not taken*

TABLE 7

FID READINGS from SOIL VAPOR VENTS

Former Conoco Store # 23034

1126 South Robert St., W. St. Paul, Minnesota (24930601)

DATE	SVV-1	SVV-2	SVV-3	SVV-4	SVV-5	SVV-6	SVV-7	SVV-8	SVV-9	SVV-10	SVV-11	SVP-1(W)	SVP-1(E)	SVP-2(W)	SVP-2(E)	SVP-3(W)	SVP-3(E)	SVP-4(W)	SVP-4(E)
02/03/94	2800	10000	5000	1000	10000	180	290	150	800	10000	10000	10000	10000	10000	10000	10000	10000	30	50
02/04/94	400	10000	800	400	10000	290	250	110	330	10000	10000	8000	8500	10000	10000	10000	10000	20	35
02/11/94	325	3600	500	225	9500	250	240	65	130	2000	2000	3000	3200	10000	10000	7000	7500	38	42
02/18/94	300	10000	2000	175	10000	500	225	210	150	3000	9500	42	45	80	1250	*	*	*	*
03/21/94	120	1000	4200	900	10000	3500	700	16	190	10000	10000	125	600	10000	150	10000	10000	20	50
04/15/94	150	3200	400	45	4000	70	200	14	18	1200	1250	*	*	*	*	*	*	*	*
05/31/94	40	1100	55	35	475	12	75	125	16	175	200	10	25	7	8	8	7	5	5
06/30/94	50	1200	38	10	400	10	50	80	10	175	175	7	25	18	8	12	15	6	6
07/08/94	40	500	12	12	150	10	30	50	5	135	90	15	20	30	1000	20	0	5	6
08/15/94	40	450	20	10	350	20	33	19	25	58	60	15	40	30	12	15	20	10	10
08/15/94	40	450	20	10	350	20	33	19	25	58	60	10	35	30	10	15	18	6	6
08/31/94	80	1200	200	250	450	10	18	14	12	48	95	22	70	10000	80	40	28	14	20
10/31/94	45	550	45	50	200	15	30	25	22	50	65	14	14	24	260	24	10	9	10
11/17/94	25	230	50	42	100	4	10	3	6	15	25	60	140	5100	9000	1000	18	5	4
12/27/94	16	375	68	60	100	12	15	10	8	36	30	75	200	10000	10000	1750	280	12	15
01/16/95	60	490	90	90	160	10	50	80	10	60	60	*	*	*	*	*	*	*	*
02/09/95	40	600	60	45	280	75	48	40	50	50	65	*	*	*	*	*	*	*	*
03/09/95	SYSTEM SHUT DOWN																		
04/06/95	100	700	125	65	350	30	35	14	20	100	150	30	25	450	1000	32	55	16	21
05/11/95	100	400	100	70	210	18	30	11	20	32	75	25	20	400	850	26	40	12	20
06/20/95	125	600	170	90	310	70	45	40	30	72	87	20	20	450	650	50	65	17	20
07/31/95	100	580	86	40	350	2	6	2	5	26	25	66	98	260	450	1000	18	2	1
08/31/95	150	700	90	38	650	75	27	30	39	36	20	45	120	660	600	10000	200	15	14
10/03/93	200	275	110	40	160	7	16	8	8	20	32	40	100	600	550	10000	180	20	22
09/21/95	55	300	35	21	160	17	7	7	10	14	14	*	*	*	*	*	*	*	*
11/21/95	60	250	40	30	150	14	14	8	10	12	20	40	80	500	500	10000	140	*	*
12/22/95	5	25	15	3	15	3	3	3	3	3	5	5	3	1	15	3	7	1.5	1.5
01/12/96	23	125	50	36	60	30	22	70	28	35	24	*	*	*	*	*	*	*	*
02/27/96	16	100	44	32	78	6	8	3	6	35	25	5	12	60	30	150	300	6	6
03/14/96	35	510	630	38	54	36	25	14	15	350	125	*	*	*	*	*	*	*	*
04/15/96	850	2000	890	59	160	55	30	28	19	2500	525	7	10	75	35	160	340	7	7
05/09/96	120	360	55	21	180	2	5	1	1	16	58	*	*	*	*	*	*	*	*
06/07/96	89	325	39	13	220	11	7	9	7	13	15	*	*	*	*	*	*	*	*
07/09/96	30	11	12	4	58	3	3	3	3	4	9	*	*	*	*	*	*	*	*
08/08/96	25	90	13	10	65	9	7	6	9	7	7	*	*	*	*	*	*	*	*
09/11/96	60	200	26	21	120	2.5	3	3	3	5	17	*	*	*	*	*	*	*	*
10/11/96	40	175	42	13	88	6	7	5	6	5	18	*	*	*	*	*	*	*	*
11/08/96	49	260	44	3	140	9	8	3	6	3	17	*	*	*	*	*	*	*	*
12/10/96	3	100	9	3	77	11	7	6	8	7	1	*	*	*	*	*	*	*	*
01/06/97	14	77	18	9	28	2	2	3	3	4	4	*	*	*	*	*	*	*	*
02/03/97	30	36	8	9	20	3	4	2	3	13	5	*	*	*	*	*	*	*	*
03/12/97	25	78	11	7	37	2	9	2	4	24	8	*	*	*	*	*	*	*	*
04/04/97	15	125	24	15	165	7	7	6	6	10	8	*	*	*	*	*	*	*	*
04/28/97	21	88	16	9	90	5	5	5	5	5	7	*	*	*	*	*	*	*	*
05/29/97	4	180	1	1	82	1	1	3	1	2	1	*	*	*	*	*	*	*	*
06/12/97	24	121	5	3	8	6	5	5	6	5	1	*	*	*	*	*	*	*	*
07/17/97	10	30	4	4	11	2	1	2	2	2	3	*	*	*	*	*	*	*	*
08/11/97	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09/22/97	3	2	2	2	2	2	2	2	2	2	2	*	*	*	*	*	*	*	*

EXPLANATION:

Readings are measured in parts-per-million (ppm)

** - indicates measurement not taken*

TABLE 8

GROUNDWATER VENT PERFORMANCE DATA

Former Conoco Store #23034
1126 South Robert St., W. St. Paul, Minnesota (24930601)

Monitoring Point	Date	Pressure 1 (PSI)	Pressure 2 (PSI)	Flow (Initial)	Flow (Adjusted)	Temperature (C)
GWV-1	08/15/94	11	11.8	2	2	50
	08/15/94	8	8.8	2	2	55
	08/31/94	9	9	2	2	57
	11/17/94	8.9	9.5	2.5	2.5	50
	12/27/94	9.3	9	2.5	2	52
	01/16/95	9.5	7.9	2	2	52
	02/09/95	9.2	0	2.5	2.5	49
	03/27/95	9		2.5		
	04/06/95	9.5	8.2	2.5	3.5	54
	05/11/95	9.6	8.2	3	2.5	58
	06/20/95	10	9.5	3.2	3.2	77
	07/31/95	10.4	9.4	3.4	3.4	74
	08/31/95	10	10	3	3.5	70
	09/21/95	11.4	10	4	3.5	67
	10/03/95	12.2	10.6	3	4	69
	11/21/95	11	10.7	4	3.5	62
	12/22/95	12.3	10.4	3.1	3.1	60
	01/12/96	12	10	3	3.5	64
	02/27/96	12	9.6	3.6	3.5	62
	03/14/96	12.25	9.5	3.25	3.5	
	04/15/96	12.3	11.2	3.5	3.5	58
	05/09/96	12.7	9.4	4	4	75
	06/07/96	12.80	10.6	3.0	3.0	74
	09/11/96	12.90	10.0	3.0		80
	10/11/96	13.20	10.3	3.5	4.0	68
	11/08/96	13.20	9.7	4.0	4.5	66
	12/10/96	13.20	10.2	3.8	4.5	66
	01/06/97	13.3	8.1	5	4	58
	02/03/97	13.5	6.2	4		66
	03/12/97	13.5	7.2	3.75		66
	04/04/97	13.0	9.2	4		75
	04/28/97	13.0	11.4	5		71
	05/29/97	12.9	10.4	5.5		74
	06/12/97	12.9	11.1	5		84
	07/17/97	12.5	10.8	5.5		85
	08/11/97			NA		
	09/22/97			NA		

Explanation:

GWV = Groundwater vent
PSI = Pounds per square inch
Flow rates are measured in standard cubic feet per minute (SCFM).
Temperature is measured in degrees Celcius (C).

TABLE 9

SOIL VENT SYSTEM PRODUCT REMOVAL DATA

Former Conoco Store # 23034
1126 South Robert St., W. St. Paul, Minnesota (24930601)

DATE	Days of Operation	Stack Sample (THG)	Flow Rate (SCFM)	Product Removed (GPD)	Total Product Removed (gal)
02/03/94	0	0	0	0	
02/04/94	1	3900	103	6.066	3.032835
02/11/94	7	2000	83	2.507	33.03578
02/18/94	7	2200	47	1.561	47.27357
03/21/94	31	2400	51	1.848	100.12206
06/30/94	101	1400	57	1.205	254.30967
08/31/94	62	39	75	0.044	293.0332425
12/27/94	118	430	34	0.221	308.664083
03/01/95	64	0	0	0.000	308.664083
06/20/95	111	290	66	0.289	340.744637
09/21/95	93	570	32	0.275	366.359069
12/22/95	92	220	36	0.120	377.361533
03/14/96	83	610	61	0.562	423.996826
06/07/96	85	180	68	0.185	439.706866
09/11/96	96	63	80	0.076	447.01285
12/10/96	90	59	62	0.055	451.984072
03/12/97	92	250	62	0.234	473.516672
06/12/97	92	120	80	0.145	486.852992
09/22/97	102	24	68	0.025	489.3665984

TOTAL DAYS 1327

AVE. PRODUCT REMOVED 0.369 GPD

TOTAL PRODUCT REMOVED **489.37 GALLONS**

Explanation:

THG=total hydrocarbons as gasoline in ug/L.
SCFM=standard cubic feet per minute
GPD=gallons per day
gal=gallons

DAHL

TABLE 10

INFLUENT/EFFLUENT ANALYTICAL DATA

Former Conoco Store # 23034

1126 South Robert St., W. St. Paul, Minnesota (24930601)

	DATE	B	E	T	X	THG/GRO	MTBE	COD (ppm)	TSS (ppm)
Influent	10/15/93	730	530	3700	3900	14000	ND		
	10/22/93	1100	440	4200	4600	16000	ND		
	02/04/94	120	14	270	600	2900	ND		
	03/21/94	56	ND	50	230	910	ND		
	06/30/94	ND	ND	ND	ND	190	ND		
	12/27/94	970	280	700	1200	7000	ND		
	03/09/95	510	170	740	1300	9200	ND		
	06/20/95	390	41	270	990	11000	ND		
	09/21/95	545	420	423	1910	7840	<50		
	12/22/95	266	163	239	985	4800	<20		
	03/14/96	159	152	147	425	2780	<10		
	06/07/96	311	204	410	1000	6840	366		
	09/11/96	291	215	349	1930	NA	42.6		
	12/10/96	204	170	148	953	2950	69.9		
	03/12/97	303	309	299	1480	7530	163		
Effluent	10/15/93	ND	ND	21	30	210	ND		
	10/22/93	8	ND	32	47	310	ND		
	02/04/94	ND	ND	ND	ND	ND	ND	7	21
	02/11/94	ND	ND	ND	5	ND	ND	ND	26
	03/21/94	ND	ND	ND	ND	ND	ND	31	ND
	04/15/94	ND	ND	ND	ND	63	ND	27	ND
	06/01/94	ND	ND	ND	ND	ND	ND	100	12
	06/30/94	ND	ND	ND	ND	ND	ND	68	10
	07/19/94	ND	ND	ND	ND	ND	ND	61	ND
	10/31/94	ND	ND	ND	6	60	ND	ND	6
	11/17/94	ND	ND	ND	7	50	ND	39	4
	12/27/94	ND	ND	ND	ND	35	ND	85	20
	01/16/95	ND	ND	1.7	ND	11	ND	50	10
	02/09/95	ND	ND	ND	8.4	92	ND	490	ND
	03/09/95	2.3	ND	ND	20	160	ND	ND	ND
	04/08/95	ND	ND	ND	2.8	ND	ND	74	ND
	05/11/95	ND	ND	ND	3.6	46	ND	50	ND
	06/20/95	ND	ND	ND	28	ND	ND	ND	ND
	09/21/95	ND	ND	ND	6.7	ND	ND	53	7.2
	10/03/95	ND	ND	1.1	ND	ND	ND	30	17.6
	11/21/95	BDL	BDL	BDL	BDL	BDL	BDL	36	8.4
	12/22/95	1.3	BDL	2.2	BDL	BDL	BDL	30	11.6
	01/12/96	BDL	BDL	1.3	BDL	BDL	BDL	22	6.4
	02/27/96	BDL	BDL	BDL	BDL	BDL	BDL	32	9.2
	03/14/96	BDL	BDL	BDL	BDL	BDL	BDL	26	11.2
	04/15/96	BDL	BDL	BDL	BDL	BDL	BDL	39	9.6
	05/09/96	BDL	BDL	BDL	BDL	BDL	BDL	39	20.8
	06/07/96	BDL	BDL	BDL	BDL	BDL	BDL	27	21.6
	07/09/96	BDL	BDL	BDL	BDL	BDL	BDL	52	11.2
	08/08/96	BDL	BDL	BDL	BDL	BDL	BDL	43	28.0
	09/11/96	BDL	BDL	BDL	BDL	NA	BDL	26	16.4
	10/11/96	BDL	BDL	BDL	BDL	180	BDL	33	46.0

TABLE 10

INFLUENT/EFFLUENT ANALYTICAL DATA

Former Conoco Store # 23034
1126 South Robert St., W. St. Paul, Minnesota (24930601)

	DATE	B	E	T	X	THG/GRO	MTBE	COD (ppm)	TSS (ppm)
Effluent	11/21/96	BDL	BDL	BDL	BDL	BDL	BDL	19	9.8
	12/10/96	BDL	BDL	BDL	BDL	BDL	BDL	32	11.0
	01/06/97	BDL	BDL	BDL	BDL	BDL	BDL	33	24.0
	02/03/97	25.7	BDL	BDL	61.9	440.0	6.2	36.0	25.0
	03/12/97	BDL	BDL	BDL	BDL	BDL	BDL	33.0	9.2

Explanation:

All values are expressed in ug/L which is equivilant to parts-per-billion (ppb) unless otherwise specified.
B = benzene
E = ethyl benzene
T = toluene
X = xylenes
THG = total hydrocarbons as gasoline
GRO = gasoline range organics
BDL= Below Detection Limit
MTBE = methyl-tert-butyl ether

DAHL

TABLE 11

GROUNDWATER SYSTEM PRODUCT REMOVAL DATA

Former Conoco Store # 23034
1126 South Robert St., W. St. Paul, Minnesota (24930601)

DATE	Influent Conc.(ug/L)	Days of Operation	Geffluent (gal)	COEF	Product Removed (gal)
01/28/94	0	0	0	1.400E-09	0.000
02/04/94	2,900	7	18,892	1.400E-09	0.077
02/11/94	2,900	14	27,493	1.400E-09	0.188
03/21/94	910	45	58,072	1.400E-09	0.262
06/30/94	190	139	119,173	1.400E-09	0.294
12/27/94	7,000	180	141,103	1.400E-09	1.677
03/09/95	9,200	72	186,272	1.400E-09	4.076
06/20/95	11,000	103	210,554	1.400E-09	7.319
09/21/95	7,840	93	223,965	1.400E-09	9.777
12/22/95	4,800	92	288,989	1.400E-09	11.719
03/14/96	2,780	83	320,500	1.400E-09	12.966
06/07/96	6,840	85	350,000	1.400E-09	16.318
09/11/96		96	397,700	1.400E-09	16.318
12/10/96	2,950	90	429,895	1.400E-09	18.093
03/12/97	7,530	92	450,000	1.400E-09	22.837

Groundwater System Shut Down March 12, 1997

TOTAL DAYS	1191	
AVERAGE EFFLUENT GPM	0.233	GPM
AVERAGE PRODUCT REMOVED	0.019	GPD
TOTAL PRODUCT REMOVED	**22.84**	**GALLONS**

Explanation:

gal = gallons
GPD = gallons per day

DAHL

FIGURES

1 - Site Location Map
2 - Groundwater Gradient Map
3 - ORC Injection Locations
4 - Remedial System Layout and Soil Vent System Effective Radius of Influence

DAIRY QUEEN

BUTLER AVENUE

SOUTH ROBERT STREET

TRAFFIC LIGHT PANEL

BENCH

SIGN

FORMER DISPENSER ISLAND

FORMER USTs

FORMER DISPENSER ISLAND

BUILDING

NANCY RADDATZ DANCE

STOFFEL'S CHIRO

NORTH

W E S

EXPLANATION

NOTE :
This drawing (including property lines, structures, and locations of buried utilities) is not exact. For precise locations, consult a registered land surveyor and appropriate utility company.

SCALE:

0 1" 0 10' 20'

DAHL & ASSOCIATES, INC.
Environmental Consultants, Contractors & Engineers
4390 McMenemy Road
Saint Paul, MN. 55127
Phone (612)490-2905
FAX (612)490-3777

DAHL STD NO: VEMN0601-B-00-B

SITE PLAN

1126 ROBERT STREET SOUTH
WEST ST. PAUL, MINNESOTA

PLOT SCALE 1" = 20'

AutoCAD FILE NAME 0601-03A

PLOT DATE 2/16/94

DATE DRAWN	10/26/93
DRAWN BY	Jim N.
APPROVED BY	
DRAWING NUMBER	B-03A-A
PROJECT NUMBER	VEMN0601
FIGURE NUMBER	2

DAIRY QUEEN

BUTLER AVENUE

SOUTH ROBERT STREET

NANCY RADDATZ DANCE

STOFFEL'S CHIRO

FORMER CONOCO STORE #23034

FORMER DISPENSER ISLAND

FORMER DISPENSER ISLAND

FORMER USTs

TRAFFIC LIGHT PANEL

BENCH

SIGN

MW-1 86.84

MW-2 88.32

MW-3 85.12

MW-4 84.08

MW-5 87.35

RW-1

87.50

87.00

86.50

86.00

85.50

85.00

88.00

NORTH

W E S

EXPLANATION

NOTE :
This drawing (including property lines, structures, and locations of buried utilities) is not exact. For precise locations, consult a registered land surveyor and appropriate utility company.

⊙ MW- MONITORING WELL

GROUNDWATER GRADIENT DATA:
* BASED ON DATA COLLECTED ON 09/22/97
AVERAGE GRADIENT= 3.82×10^{-2} ft/ft

SCALE:
0 1"
0 10' 20'

DAHL & Associates, Inc.
Environmental Consultants, Contractors & Engineers
Offices: Santa Barbara, CA – Bettendorf, IA – Ann Arbor, MI
St.Paul, MN – Ponca City, OK – Tulsa, OK – Fort Worth, TX

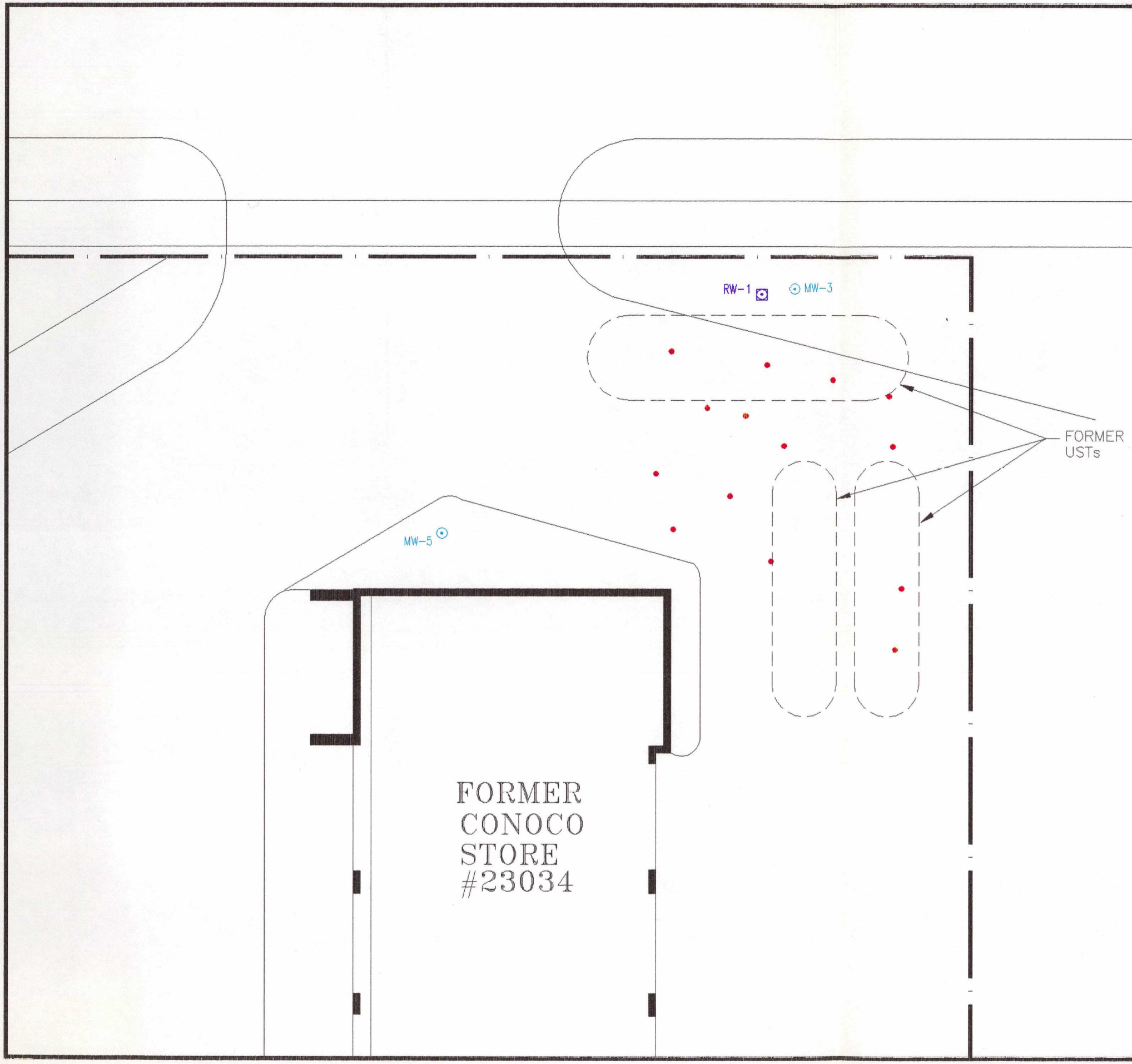
DAHL STD NO: N:\VEMN0601\

GROUNDWATER GRADIENT 09/22/97

FORMER CONOCO – STORE #23034
1126 ROBERT STREET SOUTH
WEST ST. PAUL, MINNESOTA

PLOT SCALE 1" = 20'
AutoCAD FILE NAME 0601-15Q
PLOT DATE 06/10/97

DATE DRAWN	10/27/97
DRAWN BY	Don
REVISION DATE	
DRAWING NUMBER	B- 15 -Q
PROJECT NUMBER	24930601
FIGURE NUMBER	



NORTH

W E S

EXPLANATION

NOTE :
This drawing (including property lines, structures, and locations of buried utilities) is not exact. For precise locations, consult a registered land surveyor and appropriate utility company.

- ⊙ MW- MONITORING WELL
- ⊡ RW- RECOVERY WELL
- ● - ORC INJECTION PT.

SCALE:

0 1"
0 5' 10'

DAHL & Associates, Inc.
Environmental Consultants, Contractors & Engineers
Offices: Santa Barbara, CA - Bettendorf, IA - Ann Arbor, MI
St.Paul, MN - Ponca City, OK - Tulsa, OK - Fort Worth, TX

DAHL STD NO: N:\VEMN0601\

"ORC INJECTION LOCATIONS"

FORMER CONOCO - STORE #23034
1126 ROBERT STREET SOUTH
WEST ST. PAUL, MINNESOTA

PLOT SCALE 1" = 10'
PLOT DATE 12/02/96
AutoCAD FILE NAME 0601-22C

DATE DRAWN	12/02/96
DRAWN BY	Rick
REVISION DATE	
DRAWING NUMBER	B- 22 -C
PROJECT NUMBER	24930601
FIGURE NUMBER	

DAIRY QUEEN

MW-4

BUTLER AVENUE

SOUTH ROBERT STREET

35'-0"

TRAFFIC LIGHT PANEL

BENCH

SIGN

MW-2

SW-6

FORMER DISPENSER ISLAND

SW-8

SW-7

MW-5

12"

8"

5'

RW-1

MW-3

12'

5'

SW-11

FORMER USTs

SW-10

SVP-4

SW-9

SW-3

SVP-2

SVP-3

SVP-1

GWV-1

SW-2

SW-5

FORMER DISPENSER ISLAND

SW-1

SW-4

BUILDING

SYSTEM BUILDING

MW-1

NANCY RADDATZ DANCE

STOFFEL'S CHIRO

NORTH

W E S

EXPLANATION

NOTE :
This drawing (including property lines, structures, and locations of buried utilities) is not exact. For precise locations, consult a registered land surveyor and appropriate utility company.

MW-	MONITORING WELL
RW-	RECOVERY WELL
SVV-	SOIL VAPOR VENT
SVP-	SOIL VAPOP PROBE
GWV-	GROUND-WATER VENT

SCALE:

0 1" 0 10' 20'

DAHL & Associates, Inc.
Environmental Consultants, Contractors & Engineers
Offices: Santa Barbara, CA – Bettendorf, IA – Ann Arbor, MI
St.Paul, MN – Ponca City, OK – Tulsa, OK – Fort Worth, TX

RECOVERY SYSTEM AREA OF INFLUENCE

SOUTH ROBERT STREET
WEST ST. PAUL, MINNESOTA

DAHL STD NO: N:\VEMN0601\

PLOT SCALE 1" = 20'

AutoCAD FILE NAME 0601-26C

PLOT DATE 10/27/97

DATE DRAWN	10/27/97
DRAWN BY	Don
REVISION DATE	
DRAWING NUMBER	B- 26 -C
PROJECT NUMBER	24930601
FIGURE NUMBER	

APPENDIX A

Groundwater Monitoring/Treatment Documentation

Form 1 - Air Stripper Screening Evaluation

DRAFT 4/26/91

Site Name: South Robert	Responsible Party Contact		Form Completed By:	MPS
Address: 1126 S. Robert St.	Name:	Keith Coffman	Dahl & Associates, Inc.	
W. St. Paul, MN	Affiliation:	Conoco Inc.	Date Form Completed:	09/25/97
MPCA Leak #:0000858	Phone#:	(281) 293-3568	Sampling Date:	03/12/97

	A	B	C	D	E	
CONTAMINANT (CAS #)	Groundwater Concentration (ug/liter)	Stripper Influent Flow Rate (liters/sec)	Removal Factor	Emission Rate (ug/sec)	Significant Emission Rate (ug/sec)	Is ER > SER?
	GC	IFR	RF	ER	SER	(yes/no)
Benzene (71-43-2)	303	1.57	1	475.71	4,600	NO
Chloroform (67-66-3)					1,600	
Dichlorodifluoromethane (75-71-8)					767,200	
1,1-Dichloroethane (75-34-3)					1,918,000	
1,2-Dichloroethane (107-06-2)					1,500	
1,1-Dichloroethylene (75-35-4)					800	
1,2-Dichloroethylene (540-59-0)					2,083,900	
Dichlorofluoromethane (75-43-4)					105,300	
Ethylbenzene (100-41-4)	309	1.57	1	485.13	497,700	NO
Methylene Chloride (75-09-2)					80,600	
1,1,2,2-Tetrachloroethane (79-34-5)					700	
Tetrachloroethylene (127-18-4)					65,200	
1,1,1-Trichloroethane (71-55-6)					3,835,800	
1,1,2-Trichloroethane (79-00-5)					2400	
Trichloroethylene (79-01-6)					22600	
Trichlorofluoromethane (75-69-4)					2,685,100	
1,1,2-Trichlorotrifluoroethane (76-13-1)					20,048,000	
Toluene (108-88-3)	299	1.57	1	469.43	429,800	NO
Vinyl Chloride (75-01-4)					9,200	
Xylene (mixed) (1330-20-7)	1480	1.57	1	2323.6	497,700	NO
Other 1						

1 Contact MPCA Division of Air Quality Staff (296-7757) regarding contaminants not on this list.

Form 1 - Air Stripper Screening Evaluation

DRAFT 4/26/91

Site Name: South Robert	Responsible Party Contact		Form Completed By:	MPS
Address: 1126 S. Robert St.	Name:	Keith Coffman	Dahl & Associates, Inc.	
W. St. Paul, MN	Affiliation:	Conoco Inc.	Date Form Completed:	09/25/97
MPCA Leak #:0000858	Phone#:	(281) 293-3568	Sampling Date:	12/10/96

	A	B	C	D	E	
CONTAMINANT (CAS #)	Groundwater Concentration (ug/liter)	Stripper Influent Flow Rate (liters/sec)	Removal Factor	Emission Rate (ug/sec)	Significant Emission Rate (ug/sec)	Is ER > SER?
	GC	IFR	RF	ER	SER	(yes/no)
Benzene (71-43-2)	204	1.57	1	320.28	4,600	NO
Chloroform (67-66-3)					1,600	
Dichlorodifluoromethane (75-71-8)					767,200	
1,1-Dichloroethane (75-34-3)					1,918,000	
1,2-Dichloroethane (107-06-2)					1,500	
1,1-Dichloroethylene (75-35-4)					800	
1,2-Dichloroethylene (540-59-0)					2,083,900	
Dichlorofluoromethane (75-43-4)					105,300	
Ethylbenzene (100-41-4)	170	1.57	1	266.9	497,700	NO
Methylene Chloride (75-09-2)					80,600	
1,1,2,2-Tetrachloroethane (79-34-5)					700	
Tetrachloroethylene (127-18-4)					65,200	
1,1,1-Trichloroethane (71-55-6)					3,835,800	
1,1,2-Trichloroethane (79-00-5)					2400	
Trichloroethylene (79-01-6)					22600	
Trichlorofluoromethane (75-69-4)					2,685,100	
1,1,2-Trichlorotrifluoroethane (76-13-1)					20,048,000	
Toluene (108-88-3)	148	1.57	1	232.36	429,800	NO
Vinyl Chloride (75-01-4)					9,200	
Xylene (mixed) (1330-20-7)	953	1.57	1	1496.21	497,700	NO
Other 1						

1 Contact MPCA Division of Air Quality Staff (296-7757) regarding contaminants not on this list.

Form 1 - Air Stripper Screening Evaluation

DRAFT 4/26/91

Site Name: South Robert	Responsible Party Contact		Form Completed By:	MPS
Address: 1126 S. Robert St.	Name:	Keith Coffman	Dahl & Associates, Inc.	
W. St. Paul, MN	Affiliation:	Conoco Inc.	Date Form Completed:	09/25/97
MPCA Leak #:0000858	Phone#:	(281) 293-3568	Sampling Date:	09/11/96

	A	B	C	D	E	
CONTAMINANT (CAS #)	Groundwater Concentration (ug/liter)	Stripper Influent Flow Rate (liters/sec)	Removal Factor	Emission Rate (ug/sec)	Significant Emission Rate (ug/sec)	Is ER > SER?
	GC	IFR	RF	ER	SER	(yes/no)
Benzene (71-43-2)	291	1.57	1	456.87	4,600	NO
Chloroform (67-66-3)					1,600	
Dichlorodifluoromethane (75-71-8)					767,200	
1,1-Dichloroethane (75-34-3)					1,918,000	
1,2-Dichloroethane (107-06-2)					1,500	
1,1-Dichloroethylene (75-35-4)					800	
1,2-Dichloroethylene (540-59-0)					2,083,900	
Dichlorofluoromethane (75-43-4)					105,300	
Ethylbenzene (100-41-4)	215	1.57	1	337.55	497,700	NO
Methylene Chloride (75-09-2)					80,600	
1,1,2,2-Tetrachloroethane (79-34-5)					700	
Tetrachloroethylene (127-18-4)					65,200	
1,1,1-Trichloroethane (71-55-6)					3,835,800	
1,1,2-Trichloroethane (79-00-5)					2400	
Trichloroethylene (79-01-6)					22600	
Trichlorofluoromethane (75-69-4)					2,685,100	
1,1,2-Trichlorotrifluoroethane (76-13-1)					20,048,000	
Toluene (108-88-3)	349	1.57	1	547.93	429,800	NO
Vinyl Chloride (75-01-4)					9,200	
Xylene (mixed) (1330-20-7)	1930	1.57	1	3030.1	497,700	NO
Other 1						

1 Contact MPCA Division of Air Quality Staff (296-7757) regarding contaminants not on this list.

Form 1 - Air Stripper Screening Evaluation

DRAFT 4/26/91

Site Name: South Robert	Responsible Party Contact		Form Completed By:	MPS
Address: 1126 S. Robert St.	Name:	Keith Coffman	Dahl & Associates, Inc.	
W. St. Paul, MN	Affiliation:	Conoco Inc.	Date Form Completed:	09/25/97
MPCA Leak #:0000858	Phone#:	(281) 293-3568	Sampling Date:	06/07/96

	A	B	C	D	E	
CONTAMINANT (CAS #)	Groundwater Concentration (ug/liter)	Stripper Influent Flow Rate (liters/sec)	Removal Factor	Emission Rate (ug/sec)	Significant Emission Rate (ug/sec)	Is ER > SER?
	GC	IFR	RF	ER	SER	(yes/no)
Benzene (71-43-2)	311	1.57	1	488.27	4,600	NO
Chloroform (67-66-3)					1,600	
Dichlorodifluoromethane (75-71-8)					767,200	
1,1-Dichloroethane (75-34-3)					1,918,000	
1,2-Dichloroethane (107-06-2)					1,500	
1,1-Dichloroethylene (75-35-4)					800	
1,2-Dichloroethylene (540-59-0)					2,083,900	
Dichlorofluoromethane (75-43-4)					105,300	
Ethylbenzene (100-41-4)	204	1.57	1	320.28	497,700	NO
Methylene Chloride (75-09-2)					80,600	
1,1,2,2-Tetrachloroethane (79-34-5)					700	
Tetrachloroethylene (127-18-4)					65,200	
1,1,1-Trichloroethane (71-55-6)					3,835,800	
1,1,2-Trichloroethane (79-00-5)					2400	
Trichloroethylene (79-01-6)					22600	
Trichlorofluoromethane (75-69-4)					2,685,100	
1,1,2-Trichlorotrifluoroethane (76-13-1)					20,048,000	
Toluene (108-88-3)	410	1.57	1	643.7	429,800	NO
Vinyl Chloride (75-01-4)					9,200	
Xylene (mixed) (1330-20-7)	1000	1.57	1	1570	497,700	NO
Other 1						

1 Contact MPCA Division of Air Quality Staff (296-7757) regarding contaminants not on this list.

Form 1 - Air Stripper Screening Evaluation

DRAFT 4/26/91

Site Name: South Robert	Responsible Party Contact		Form Completed By:	MPS
Address: 1126 S. Robert St.	Name:	Keith Coffman	Dahl & Associates, Inc.	
W. St. Paul, MN	Affiliation:	Conoco Inc.	Date Form Completed:	09/25/97
MPCA Leak #:0000858	Phone#:	(281) 293-3568	Sampling Date:	03/14/96

	A	B	C	D	E	
CONTAMINANT (CAS #)	Groundwater Concentration (ug/liter)	Stripper Influent Flow Rate (liters/sec)	Removal Factor	Emission Rate (ug/sec)	Significant Emission Rate (ug/sec)	Is ER > SER?
	GC	IFR	RF	ER	SER	(yes/no)
Benzene (71-43-2)	159	1.57	1	249.63	4,600	NO
Chloroform (67-66-3)					1,600	
Dichlorodifluoromethane (75-71-8)					767,200	
1,1-Dichloroethane (75-34-3)					1,918,000	
1,2-Dichloroethane (107-06-2)					1,500	
1,1-Dichloroethylene (75-35-4)					800	
1,2-Dichloroethylene (540-59-0)					2,083,900	
Dichlorofluoromethane (75-43-4)					105,300	
Ethylbenzene (100-41-4)	152	1.57	1	238.64	497,700	NO
Methylene Chloride (75-09-2)					80,600	
1,1,2,2-Tetrachloroethane (79-34-5)					700	
Tetrachloroethylene (127-18-4)					65,200	
1,1,1-Trichloroethane (71-55-6)					3,835,800	
1,1,2-Trichloroethane (79-00-5)					2400	
Trichloroethylene (79-01-6)					22600	
Trichlorofluoromethane (75-69-4)					2,685,100	
1,1,2-Trichlorotrifluoroethane (76-13-1)					20,048,000	
Toluene (108-88-3)	147	1.57	1	230.79	429,800	NO
Vinyl Chloride (75-01-4)					9,200	
Xylene (mixed) (1330-20-7)	425	1.57	1	667.25	497,700	NO
Other 1						

1 Contact MPCA Division of Air Quality Staff (296-7757) regarding contaminants not on this list.

Form 1 - Air Stripper Screening Evaluation

DRAFT 4/26/91

Site Name: South Robert	Responsible Party Contact		Form Completed By:	MPS
Address: 1126 S. Robert St.	Name:	Keith Coffman	Dahl & Associates, Inc.	
W. St. Paul, MN	Affiliation:	Conoco Inc.	Date Form Completed:	09/25/97
MPCA Leak #:0000858	Phone#:	(281) 293-3568	Sampling Date:	12/22/95

	A	B	C	D	E	
CONTAMINANT (CAS #)	Groundwater Concentration (ug/liter)	Stripper Influent Flow Rate (liters/sec)	Removal Factor	Emission Rate (ug/sec)	Significant Emission Rate (ug/sec)	Is ER > SER?
	GC	IFR	RF	ER	SER	(yes/no)
Benzene (71-43-2)	266	1.57	1	417.62	4,600	NO
Chloroform (67-66-3)					1,600	
Dichlorodifluoromethane (75-71-8)					767,200	
1,1-Dichloroethane (75-34-3)					1,918,000	
1,2-Dichloroethane (107-06-2)					1,500	
1,1-Dichloroethylene (75-35-4)					800	
1,2-Dichloroethylene (540-59-0)					2,083,900	
Dichlorofluoromethane (75-43-4)					105,300	
Ethylbenzene (100-41-4)	163	1.57	1	255.91	497,700	NO
Methylene Chloride (75-09-2)					80,600	
1,1,2,2-Tetrachloroethane (79-34-5)					700	
Tetrachloroethylene (127-18-4)					65,200	
1,1,1-Trichloroethane (71-55-6)					3,835,800	
1,1,2-Trichloroethane (79-00-5)					2400	
Trichloroethylene (79-01-6)					22600	
Trichlorofluoromethane (75-69-4)					2,685,100	
1,1,2-Trichlorotrifluoroethane (76-13-1)					20,048,000	
Toluene (108-88-3)	239	1.57	1	375.23	429,800	NO
Vinyl Chloride (75-01-4)					9,200	
Xylene (mixed) (1330-20-7)	985	1.57	1	1546.45	497,700	NO
Other 1						

1 Contact MPCA Division of Air Quality Staff (296-7757) regarding contaminants not on this list.

Form 1 - Air Stripper Screening Evaluation

DRAFT 4/26/91

Site Name: South Robert	Responsible Party Contact		Form Completed By:	MPS
Address: 1126 S. Robert St.	Name:	Keith Coffman	Dahl & Associates, Inc.	
W. St. Paul, MN	Affiliation:	Conoco Inc.	Date Form Completed:	09/25/97
MPCA Leak #:0000858	Phone#:	(281) 293-3568	Sampling Date:	09/21/95

	A	B	C	D	E	
CONTAMINANT (CAS #)	Groundwater Concentration (ug/liter)	Stripper Influent Flow Rate (liters/sec)	Removal Factor	Emission Rate (ug/sec)	Significant Emission Rate (ug/sec)	Is ER > SER?
	GC	IFR	RF	ER	SER	(yes/no)
Benzene (71-43-2)	545	1.57	1	855.65	4,600	NO
Chloroform (67-66-3)					1,600	
Dichlorodifluoromethane (75-71-8)					767,200	
1,1-Dichloroethane (75-34-3)					1,918,000	
1,2-Dichloroethane (107-06-2)					1,500	
1,1-Dichloroethylene (75-35-4)					800	
1,2-Dichloroethylene (540-59-0)					2,083,900	
Dichlorofluoromethane (75-43-4)					105,300	
Ethylbenzene (100-41-4)	420	1.57	1	659.4	497,700	NO
Methylene Chloride (75-09-2)					80,600	
1,1,2,2-Tetrachloroethane (79-34-5)					700	
Tetrachloroethylene (127-18-4)					65,200	
1,1,1-Trichloroethane (71-55-6)					3,835,800	
1,1,2-Trichloroethane (79-00-5)					2400	
Trichloroethylene (79-01-6)					22600	
Trichlorofluoromethane (75-69-4)					2,685,100	
1,1,2-Trichlorotrifluoroethane (76-13-1)					20,048,000	
Toluene (108-88-3)	423	1.57	1	664.11	429,800	NO
Vinyl Chloride (75-01-4)					9,200	
Xylene (mixed) (1330-20-7)	1910	1.57	1	2998.7	497,700	NO
Other 1						

1 Contact MPCA Division of Air Quality Staff (296-7757) regarding contaminants not on this list.

Form 1 - Air Stripper Screening Evaluation

DRAFT 4/26/91

Site Name: South Robert	Responsible Party Contact		Form Completed By:	MPS
Address: 1126 S. Robert St.	Name:	Keith Coffman	Dahl & Associates, Inc.	
W. St. Paul, MN	Affiliation:	Conoco Inc.	Date Form Completed:	09/25/97
MPCA Leak #:0000858	Phone#:	(281) 293-3568	Sampling Date:	06/20/95

	A	B	C	D	E	
CONTAMINANT (CAS #)	Groundwater Concentration (ug/liter)	Stripper Influent Flow Rate (liters/sec)	Removal Factor	Emission Rate (ug/sec)	Significant Emission Rate (ug/sec)	Is ER > SER?
	GC	IFR	RF	ER	SER	(yes/no)
Benzene (71-43-2)	390	1.57	1	612.3	4,600	NO
Chloroform (67-66-3)					1,600	
Dichlorodifluoromethane (75-71-8)					767,200	
1,1-Dichloroethane (75-34-3)					1,918,000	
1,2-Dichloroethane (107-06-2)					1,500	
1,1-Dichloroethylene (75-35-4)					800	
1,2-Dichloroethylene (540-59-0)					2,083,900	
Dichlorofluoromethane (75-43-4)					105,300	
Ethylbenzene (100-41-4)	41	1.57	1	64.37	497,700	NO
Methylene Chloride (75-09-2)					80,600	
1,1,2,2-Tetrachloroethane (79-34-5)					700	
Tetrachloroethylene (127-18-4)					65,200	
1,1,1-Trichloroethane (71-55-6)					3,835,800	
1,1,2-Trichloroethane (79-00-5)					2400	
Trichloroethylene (79-01-6)					22600	
Trichlorofluoromethane (75-69-4)					2,685,100	
1,1,2-Trichlorotrifluoroethane (76-13-1)					20,048,000	
Toluene (108-88-3)	270	1.57	1	423.9	429,800	NO
Vinyl Chloride (75-01-4)					9,200	
Xylene (mixed) (1330-20-7)	990	1.57	1	1554.3	497,700	NO
Other 1						

1 Contact MPCA Division of Air Quality Staff (296-7757) regarding contaminants not on this list.

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

October 7, 1997

Mike Watson
Dahl & Associates
4390 McMenemy Street
St. Paul, MN 55127

Project ID:	24930601	
Chain of Custody:	20783	
Date Sampled:	09-22-97	
Date Received:	09-26-97	
Date Analyzed:	10-02-97	
Matrix:	Water	
Sample Identification:		
Lab ID:	21127	MW-2
	21128	MW-3
	21129	Dup.
	21130	Trip Blank

Samples were analyzed for GRO by the Wisconsin Modified GRO procedure. The results are reported on the following page.

Sincerely,

Chad Holznagel
Chemist

10/7/97

Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Hydrocarbons as GRO
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
MDL:	10.0	1.0	1.0	1.0	3.0	0.1
21127BDL MW-2	BDL	9.0	31.3	13.9	62.4	0.27
21128 MW-3	< 100	824	929	1860	3620	19.2
21129 Dup.		7.6	27.9	11.8	67.1	
21130 Trip Blank	BDL	BDL	BDL	BDL	BDL	BDL

BDL = Below Detection Limit, MDL = Method Detection Limit

MIDWEST ANALYTICAL SERVICES

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

CHAIN OF CUSTODY RECORD
AND
REQUEST FOR ANALYSIS
(Instructions on Back of Form)

№ 20783

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

CLIENT: Dahl & Assoc.

SAMPLER NAME: D. Roggy

PROJECT I.D.: 24930601

SAMPLER SIGNATURE: [signature]

REPORTS TO BE SENT TO: Mike Watson

REMARKS:

SHADED AREAS FOR LABORATORY USE ONLY

NO. OF CONTAINERS	COMP.	GRAB	DATE	TIME	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE	SAMPLE NO.	LABORATORY I.D. NO.	GRO (Includes BTEX)	DRO	BTEX	VOC (465-D)	pH	Pb (DISS. OR TOTAL)	RCRA 8 METALS	BOD OR CBOD	TSS	FCOL OR TCOL	MTBE	~~METHOD 18~~	PRESERVATIVE: HCl	HNO3	H2SO4	ICE	OTHER
3			9/22		✓			MW-2		21127	✓										✓		✓				
3					✓			MW-3		21128	✓										✓		✓				
~~3~~					~~✓~~			~~RW-1~~			~~✓~~										~~✓~~		~~✓~~				
3					✓			Dup.		21129			✓										✓				
								TRIP BLANK		21130	X											~~✓~~					
~~1~~							~~✓~~	~~M-18~~														~~✓~~					

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	9/26/97 3:45	[signature]			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Contents Temperature:	Comments:
[signature]	9/26/97 4:40	[signature]	9/26/97 16	ICE	

CHECK HERE FOR DRINKING WATER DETECTION LIMITS ☐

TURNAROUND TIME REQUIRED: ☐ NORMAL ☐ RUSH

DATE REQUIRED:

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

June 26, 1997

Mike Watson
Dahl & Associates
4390 McMenemy Street
St. Paul, MN 55127

Project ID:	24930601	
Chain of Custody:	20808	
Date Sampled:	06-12-97	
Date Received:	06-17-97	
Date Analyzed:	06-24-97	
Matrix:	Water	
Sample Identification:		
Lab ID:	17034	MW-2
	17035	MW-3
	17036	RW-1

Samples were analyzed for GRO by the Wisconsin Modified GRO procedure. The results are reported on the following page.

Sincerely,

Chad Holznagel 6/30

Chad Holznagel
Chemist

Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Hydrocarbons as GRO
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
MDL:	10.0	1.0	1.0	1.0	3.0	0.1
17034 MW-2	16.4	23.3	45.1	21.3	115	0.58
17035 MW-3	144	1650	1980	2920	5660	29.0
17036 RW-1	BDL	15.5	17.6	22.9	60.1	0.37

BDL = Below Detection Limit, MDL = Method Detection Limit

MIDWEST ANALYTICAL SERVICES
330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

CHAIN OF CUSTODY RECORD AND REQUEST FOR ANALYSIS

(Instructions on Back of Form)

№ 20808

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

CLIENT: Dahl & Assoc.

PROJECT I.D.: 24930601

REPORTS TO BE SENT TO: Mike Watson

SAMPLER NAME: R. Joyce

SAMPLER SIGNATURE: Richard Joyce

REMARKS:

SHADED AREAS FOR LABORATORY USE ONLY

NO. OF CONTAINERS	COMP.	GRAB	DATE	TIME	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE	SAMPLE NO.	LABORATORY I.D. NO.	GRO (Includes BTEX)	DRO	BTEX	VOC (465-D)	pH	Pb (DISS. OR TOTAL)	RCRA 8 METALS	BOD OR CBOD	TSS	FCOL OR TCOL	MTBE						PRESERVATIVE: HCl	HNO3	H2SO4	ICE	OTHER
3			6/12	1220	X			MW-2		17034	X										X						3				
↓			↓	1300	↓			MW-3		17035	X										X						3				
↓			↓	1345	↓			RW-1		17036	X										X						3				

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Richard Joyce	6/12/97 1500	Clive McClaylor			

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Samples Temperature:	Comments:
[illegible]	6/17/97 2:45	[illegible]	6-17-97		

CHECK HERE FOR DRINKING WATER DETECTION LIMITS ☐

TURNAROUND TIME REQUIRED: ☐ NORMAL ☐ RUSH

DATE REQUIRED: ____

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

April 1, 1997

Mike Watson
Dahl & Associates
4390 McMenemy Street
St. Paul, MN 55127

Project ID:	24930601	
Chain of Custody:	19569	
Date Sampled:	03-12-97	
Date Received:	03-14-97	
Matrix:	Water	
Sample Identification:		
Lab ID:	14137	MW-2
	14138	MW-3
	14139	Effluent
	14140	Influent

This is a ***CORRECTED REPORT.*** Results for sample number 14138 (MW-3) were reported incorrectly.

Samples were analyzed for GRO by the Wisconsin Modified GRO procedure and for TPH as Gasoline by the California/USGS Method. The results are reported on the following page.

Sincerely,

Chad Holznagel 4/1

Chad Holznagel
Chemist

Deb Marlton

Deb Marlton 4/1
Biologist

Date Analyzed: 03-21-97

Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Hydrocarbons as GRO	Total Petroleum Hydrocarbons as Gasoline
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(mg/L)
MDL:	10.0	1.0	1.0	1.0	3.0	0.1	0.1
14137 MW-2	42.8	8.45	21.5	17.7	84.1	0.69	
14138 MW-3	306	931	101	2070	3350	24.6	
14139 Effluent	BDL	BDL	BDL	BDL	BDL		BDL
14140 Influent	163	303	299	309	1480		7.53

Parameter	14139 Effluent	Date Analyzed
COD (mg/L)	33	03-25-97
TSS (mg/L)	9.2	03-20-97

BDL = Below Detection Limit, MDL = Method Detection Limit

MIDWEST ANALYTICAL SERVICES

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

CHAIN OF CUSTODY RECORD AND REQUEST FOR ANALYSIS

(Instructions on Back of Form)

No. 19569

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

CLIENT: Dahl & Assoc

SAMPLER NAME: R. Joyce

PROJECT I.D.: 24930601

SAMPLER SIGNATURE: Richard Joyce

REPORTS TO BE SENT TO: Mike Watson

REMARKS:

SHADED AREAS FOR LABORATORY USE ONLY

NO. OF CONTAINERS	COMP.	GRAB	DATE	TIME	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE	SAMPLE NO.	LABORATORY I.D. NO.	GRO (Includes BTEX)	DRO	BTEX	VOC (465-D)	pH	Pb (Diss. or Total)	RCRA 8 METALS	BOD or CBOD	TSS	FCOL or TCOL	MTBE	THG	COD				PRESERVATIVE: HCl	PRESERVATIVE: HNO_3	PRESERVATIVE: H_2SO_4	PRESERVATIVE: ICE	PRESERVATIVE: OTHER
3			3/12/97	1350	X			mw-2		14137	X									X							3				
3				1420				mw-3		14138	X									X											
5				1430				effluent		14139			X						X	X	X	X							1		1
3				1440				influent		14140			X							X	X										

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Richard Joyce	3/12/97 1545	Mike Taylor			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Mike Taylor	3/14/97 10	Chad Hobyn			
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Temperature:	Comments:
			3/14/97 15:03		ICE

CHECK HERE FOR DRINKING WATER DETECTION LIMITS ☐

TURNAROUND TIME REQUIRED: ☐ NORMAL ☐ RUSH

DATE REQUIRED: _____

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

March 27, 1997

Jeff Ryan
Dahl & Associates
4390 McMenemy Street
St. Paul, MN 55127

Project ID:	24930601	
Chain of Custody:	19569	
Date Sampled:	03-12-97	
Date Received:	03-14-97	
Matrix:	Water	
Sample Identification:		
Lab ID:	14137	MW-2
	14138	MW-3
	14139	Effluent
	14140	Influent

Samples were analyzed for GRO by the Wisconsin Modified GRO procedure and for TPH as Gasoline by the California/USGS Method. The results are reported on the following page.

Sincerely,

Chad Holznagel 3/27

Chad Holznagel
Chemist

Deb Marlton 3/27

Deb Marlton
Biologist

Date Analyzed: 03-21-97

Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Hydrocarbons as GRO	Total Petroleum Hydrocarbons as Gasoline
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(mg/L)
MDL:	10.0	1.0	1.0	1.0	3.0	0.1	0.1
14137 MW-2	42.8	8.45	21.5	17.7	84.1	0.69	
14138 MW-3	2420	5050	5820	1190	3530	24.6	
14139 Effluent	BDL	BDL	BDL	BDL	BDL		BDL
14140 Influent	163	303	299	309	1480		7.53

Parameter	14139 Effluent	Date Analyzed
COD (mg/L)	33	03-25-97
TSS (mg/L)	9.2	03-20-97

BDL = Below Detection Limit, MDL = Method Detection Limit

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

February 12, 1997

Mike Watson
Dahl & Associates
4390 McMenemy Street
St. Paul, MN 55127

Project ID:	24930601	
Chain of Custody:	19560	
Date Sampled:	02-03-97	
Date Received:	02-04-97	
Matrix:	Water	
Sample Identification:		
Lab ID:	12929	Effluent

Samples were analyzed for TPH as Gasoline by the California/USGS Method. The results are reported on the following page.

Sincerely,

Chad Holznagel 2/12

Chad Holznagel
Chemist

Deb Marlton 2/12

Deb Marlton
Biologist

Date Analyzed: 02-06-97

Parameter:	**MTBE**	**Benzene**	**Toluene**	**Ethyl Benzene**	**Xylenes**	**Total Petroleum Hydrocarbons as Gasoline**
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
MDL:	10.0	1.0	1.0	1.0	3.0	0.1
12929 Effluent	6.2	25.7	BDL	BDL	61.9	0.44

Lab ID:	**12929 Effluent**	**Date Analyzed**
COD (mg/L)	36	02-05-97
TSS (mg/L)	25.0	02-06-97

BDL = Below Detection Limit, MDL = Method Detection Limit

MIDWEST ANALYTICAL SERVICES

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

CHAIN OF CUSTODY RECORD AND REQUEST FOR ANALYSIS

(Instructions on Back of Form)

№ 19560

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

CLIENT: Dahl & Assoc.
SAMPLER NAME: R. Joyce
PROJECT I.D.: 24930601
SAMPLER SIGNATURE: Richard Joyce
REPORTS TO BE SENT TO: Mike Watson
REMARKS:

SHADED AREAS FOR LABORATORY USE ONLY

NO. OF CONTAINERS	COMP.	GRAB	DATE	TIME	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE	SAMPLE NO.	LABORATORY I.D. NO.	GRO (Includes BTEX)	DRO	BTEX	VOC (465-D)	pH	Pb (Diss. or Total)	RCRA 8 METALS	BOD or CBOD	TSS	FCOL or TCOL	MTBE	THC	CWD				PRESERVATIVE: HCl	HNO3	H2SO4	ICE	OTHER
3			2/3/97	1030	X			MW-3			X									X							3				
3				1145	X			influent			X									X											
5			↓	1230	X			effluent		12929			X						X	X	X	X	X				↓		1		1

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Richard Joyce	2/3/97 1500	John Dahl Assoc			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
John Dahl Assoc	2/4/97 1:20	Kelly Manke		2/4/97	

Received for Laboratory by: (Signature) — Date / Time — Comments Temperature: — Comments:

CHECK HERE FOR DRINKING WATER DETECTION LIMITS ☐

TURNAROUND TIME REQUIRED: ☐ NORMAL ☐ RUSH

DATE REQUIRED: _____

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

January 16, 1997

Mike Watson
Dahl & Associates
4390 McMenemy Street
St. Paul, MN 55127

Project ID: 24930601
Chain of Custody:
Date Sampled: 01-06-97
Date Received: 01-07-97
Matrix: Water
Sample Identification:
Lab ID: 12340 Effluent

Samples were analyzed for TPH as Gasoline by the California/USGS Method. The results are reported on the following page.

Sincerely,

Chad Holznagel 1/16

Chad Holznagel
Chemist

Deb Marlton 1/16

Deb Marlton
Biologist

Date Analyzed: 01-15-97

Parameter:	**MTBE**	**Benzene**	**Toluene**	**Ethyl Benzene**	**Xylenes**	**Total Petroleum Hydrocarbons as Gasoline**
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
MDL:	10.0	1.0	1.0	1.0	3.0	0.1
12340 Effluent	BDL	BDL	BDL	BDL	BDL	BDL

Lab ID:	**12340 Effluent**	**Date Analyzed**
COD (mg/L)	33	01-08-97
TSS (mg/L)	24.0	01-07-97

BDL = Below Detection Limit, MDL = Method Detection Limit

MIDWEST ANALYTICAL SERVICES

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

CHAIN OF CUSTODY RECORD AND REQUEST FOR ANALYSIS

(Instructions on Back of Form)

№ 19551

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

CLIENT: ~~[illegible]~~ Dahl & Assoc

SAMPLER NAME: R. Joyce

PROJECT I.D.: 24930601

SAMPLER SIGNATURE: Richard Joyce

REPORTS TO BE SENT TO: Mike Watson

REMARKS:

SHADED AREAS FOR LABORATORY USE ONLY

NO. OF CONTAINERS	COMP.	GRAB	DATE	TIME	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE	SAMPLE NO.	LABORATORY I.D. NO.	GRO (Includes BTEX)	DRO	BTEX	VOC (465-D)	pH	Pb (Diss. or Total)	RCRA 8 METALS	BOD or CBOD	TSS	Fcol or Tcol	MTBE + TH6	CoD	PRESERVATIVE: HCl	PRESERVATIVE: HNO_3	PRESERVATIVE: H_2SO_4	PRESERVATIVE: ICE	PRESERVATIVE: OTHER
5			1/16/97	1200	X			effluent		12340			X						X		X	X	3		1		1

Relinquished by: (Signature) Richard Joyce — Date / Time 1/16/97 1400 — Received by: (Signature) Alan M Clayton

Relinquished by: (Signature) — Date / Time — Received by: (Signature)

Relinquished by: (Signature) Alan Clayton — Date / Time 1/16/97 12:45 — Received for Laboratory by: (Signature) D Marlow — Date / Time 1-17-97 12:15 — Temperature:

Relinquished by: (Signature) — Date / Time — Received by: (Signature)

Relinquished by: (Signature) — Date / Time — Received by: (Signature)

Comments:

CHECK HERE FOR DRINKING WATER DETECTION LIMITS ☐

TURNAROUND TIME REQUIRED:
☐ NORMAL ☐ RUSH
DATE REQUIRED: _____

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

December 30, 1996

Mike Watson
Dahl & Associates
4390 McMenemy Street
St. Paul, MN 55127

Project ID:	24930601	
Chain of Custody:	19541	
Date Sampled:	12-10-96	
Date Received:	12-12-96	
Matrix:	Water	
Sample Identification:		
Lab ID:	96-11649	MW-2
	96-11650	MW-3
	96-11651	MW-4
	96-11652	Field Blank
	96-11653	Duplicate
	96-11654	Influent
	96-11655	Effluent

Samples were analyzed for GRO by the Wisconsin Modified GRO procedure and for TPH as Gasoline by the California/USGS Method. The results are reported on the following page.

Sincerely,

Chad Holz 12/30

Chad Holznagel
Chemist

Deb Marlton 12/30

Deb Marlton
Biologist

Date Analyzed: 12-18-96

Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Hydrocarbons as GRO	Total Petroleum Hydrocarbons as Gasoline
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(mg/L)
MDL:	10.0	1.0	1.0	1.0	3.0	0.1	0.1
96-11649 MW-2	14.1	28.6	102	43.7	370	1.11	
96-11650 MW-3	95.9	825	68.9	1830	3370	21.9	
96-11651 MW-4	BDL	BDL	BDL	BDL	BDL	BDL	
96-11652 Field Blank	BDL	BDL	BDL	BDL	BDL	BDL	
96-11653 Duplicate		915	44.6	1870	3730		
96-11654 Influent	69.9	204	148	170	953		2.95
96-11655 Effluent	BDL	BDL	BDL	BDL	BDL		BDL

Lab ID:	96-11655 Effluent	Date Analyzed
COD (mg/L)	32	12-12-96
TSS (mg/L)	11.0	12-13-96

BDL = Below Detection Limit, MDL = Method Detection Limit

MIDWEST ANALYTICAL SERVICES

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

CHAIN OF CUSTODY RECORD AND REQUEST FOR ANALYSIS

(Instructions on Back of Form)

No. 19541

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

CLIENT: Dahl & Assoc
SAMPLER NAME: R. Joyce
PROJECT I.D.: 24930601
SAMPLER SIGNATURE: Richard Joyce
REPORTS TO BE SENT TO: Mike Watson
REMARKS:

SHADED AREAS FOR LABORATORY USE ONLY

NO. OF CONTAINERS	COMP.	GRAB	DATE	TIME	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE	SAMPLE NO.	LABORATORY I.D. NO.	GRO (Includes BTEX)	DRO	BTEX	VOC (465-D)	pH	Pb (Diss. or Total)	RCRA 8 Metals	BOD or CBOD	TSS	FCOL or TCOL	MTBE	THG	COD				PRESERVATIVE: HCl	PRESERVATIVE: HNO_3	PRESERVATIVE: H_2SO_4	PRESERVATIVE: ICE	PRESERVATIVE: OTHER
3			12/10	1144	X			MW-2			X										X						3				
				1220				MW-3			X										X										
				1250				MW-4			X										X										
				1200				Field blank					X																		
				—				duplicate					X																		
				1310				influent					X								X	X									
5				1300				effluent					X						X		X	X	X					1		1	

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Richard Joyce	12/10/96 1500	John DeLuhanty			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature) John DeLuhanty	Date / Time 12/11/96 4:20	Received for Laboratory by: (Signature)	Date / Time	Cr... Temperature:	Comments:

CHECK HERE FOR DRINKING WATER DETECTION LIMITS ☐

TURNAROUND TIME REQUIRED:
☐ NORMAL ☐ RUSH
DATE REQUIRED: ___

33. SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

November 21, 1996

Mike Watson
Dahl & Associates
4390 McMenemy Street
St. Paul, MN 55127

Project ID:	2493 0601	
Chain of Custody:	18481	
Date Sampled:	11-08-96	
Date Received:	11-11-96	
Matrix:	Water	
Sample Identification:		
Lab ID:	96-10647	Effluent

Samples were analyzed for TPH as Gasoline by the California/USGS Method. The results are reported on the following page.

Sincerely,

Chad Holznagel 11/21

Chad Holznagel
Chemist

Deb Marlton 11/21

Deb Marlton
Biologist

Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Petroleum Hydrocarbons as Gasoline
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
MDL:	10.0	1.0	1.0	1.0	3.0	0.1
96-10647 Effluent	BDL	BDL	BDL	BDL	BDL	BDL

Lab ID:	96-10647 Effluent	Date Analyzed
COD (mg/L)	19	11-19-96
TSS (mg/L)	9.8	11-14-96

BDL = Below Detection Limit, MDL = Method Detection Limit

MIDWEST ANALYTICAL SERVICES

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

CHAIN OF CUSTODY RECORD Nº 18481

AND

REQUEST FOR ANALYSIS

(Instructions on Back of Form)

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

CLIENT: Dahl & Assoc.
SAMPLER NAME: R. Joyce
PROJECT I.D.: 24930601
SAMPLER SIGNATURE: Richard Joyce
REPORTS TO BE SENT TO: Mike Watson
REMARKS:

SHADED AREAS FOR LABORATORY USE ONLY

NO. OF CONTAINERS	COMP.	GRAB	DATE	TIME	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE	SAMPLE NO.	LABORATORY I.D. NO.	GRO (Includes BTEX)	DRO	BTEX	VOC (465-D)	pH	Pb (Diss. or Total)	RCRA 8 METALS	BOD or CBOD	TSS	FCOL or TCOL	THC	MTBE	COD				PRESERVATIVE: HCl	PRESERVATIVE: HNO_3	PRESERVATIVE: H_2SO_4	PRESERVATIVE: ICE	PRESERVATIVE: OTHER
5			11/8/96	1420	X			effluent		96-10647			X						+	X	X	X	X				3		1		1

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Richard Joyce	11/8/96 1500	John DeLaHunty			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for laboratory by: (Signature)	Date / Time	nts Temperature:	Comments:
John DeLaHunty	11/11/96 1:30	Chad Hudson	11/11/96 14:3	ICE	

CHECK HERE FOR DRINKING WATER DETECTION LIMITS ☒

TURNAROUND TIME REQUIRED:
☒ NORMAL ☐ RUSH

DATE REQUIRED: _____

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

October 24, 1996

Mike Watson
Dahl & Associates
4390 McMenemy Street
St. Paul, MN 55127

Project ID:	2493 0601	
Chain of Custody:	18476	
Date Sampled:	10-11-96	
Date Received:	10-15-96	
Matrix:	Water	
Sample Identification:		
Lab ID:	96-09789	Effluent

Samples were analyzed for TPH as Gasoline by the California/USGS Method. The results are reported on the following page.

Sincerely,

Lon Jones 10/24
Lon Jones
Organic/Bio Group Leader

Deb Marlton 10/24
Deb Marlton
Biologist

Date Analyzed: 10-16-96

Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Petroleum Hydrocarbons as Gasoline
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
MDL:	10.0	1.0	1.0	1.0	3.0	0.1
96-09789 Effluent	BDL	BDL	BDL	BDL	BDL	0.18

BDL = Below Detection Limit, MDL = Method Detection Limit

Lab ID:	96-09789 Effluent	Date Analyzed
COD (mg/L)	33	10-22-96
TSS (mg/L)	46.0	10-15-96

MIDWEST ANALYTICAL SERVICES
330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

CHAIN OF CUSTODY RECORD AND REQUEST FOR ANALYSIS

(Instructions on Back of Form)

№ 18476

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

CLIENT: Dahl & Assoc.

SAMPLER NAME: R. Joyce

PROJECT I.D.: 24930601

SAMPLER SIGNATURE: Richard Joyce

REPORTS TO BE SENT TO: Mike Watson

REMARKS:

SHADED AREAS FOR LABORATORY USE ONLY

NO. OF CONTAINERS	COMP.	GRAB	DATE	TIME	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE	SAMPLE NO.	LABORATORY I.D. NO.	GRO (Includes BTEX)	DRO	BTEX	VOC (465-D)	pH	Pb (DISS. OR TOTAL)	RCRA 8 METALS	BOD OR CBOD	TSS	FCOL OR TCOL	MTBE	THG	COD				PRESERVATIVE: HCl	HNO$_3$	H$_2$SO$_4$	ICE	OTHER
5			10/11/96	1300	X			effluent		96-09789			X						X		X	X	X				3		1		1

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Richard Joyce	10/11/96 1400	Clair M. Cayle			

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Contents Temperature:	Comments:
Clair M. Cayle	10/14/96 4:05	D Marlton	10-15-96 8:_0		

CHECK HERE FOR DRINKING WATER DETECTION LIMITS ☐

TURNAROUND TIME REQUIRED: ☐ NORMAL ☐ RUSH

DATE REQUIRED: ________

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

September 26, 1996

Mike Watson
Dahl & Associates
4390 McMenemy Street
St. Paul, MN 55127

Project ID:	2493 0601	
Chain of Custody:	18443	
Date Sampled:	09-11-96	
Date Received:	09-12-96	
Date Analyzed:	See Below	
Matrix:	Water	
Sample Identification:		
Lab ID:	96-08770	MW-2
	96-08771	MW-3
	96-08772	Effluent
	96-08773	Influent

Samples were analyzed for GRO and DRO by the Wisconsin Modified GRO and DRO procedures. The results are reported on the following page.

Sincerely,

Chad Holznagel 9/26

Chad Holznagel
Chemist

Deb Marlton 9/26

Deb Marlton
Biologist

Date Analyzed: 09-20-96

Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Hydrocarbons as GRO	TPH as Gasoline
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(mg/L)
MDL:	10.0	1.0	1.0	1.0	3.0	0.1	0.1
96-08770 MW2	10.0	17.7	37.9	25.4	142	0.67	
96-08771 MW3	67.8	730	31.2	2030	3400	22.9	
96-08772 Effluent	BDL	BDL	BDL	BDL	BDL		BDL
96-08773 Influent	42.6	291	349	215	1930		8.72

BDL= Below Detection Limit, MDL = Method Detection Limit

Parameter	96-08772 Effluent	Date Analyzed
COD (mg/L)	26	09-26-96
TSS (mg/L)	16.4	09-17-96

MIDWEST ANALYTICAL SERVICES

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

CHAIN OF CUSTODY RECORD AND REQUEST FOR ANALYSIS

(Instructions on Back of Form)

№ 18443

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

CLIENT: Dahl & Assoc
SAMPLER NAME: R. Joyce
PROJECT I.D.: 24930601
SAMPLER SIGNATURE: Richard Joyce
REPORTS TO BE SENT TO: Mike Watson
REMARKS:

SHADED AREAS FOR LABORATORY USE ONLY

NO. OF CONTAINERS	COMP.	GRAB	DATE	TIME	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE IDENTIFICATION: SAMPLE	SAMPLE NO.	LABORATORY I.D. NO.	GRO (Includes BTEX)	DRO	BTEX	VOC (465-D)	pH	Pb (Diss. or Total)	RCRA 8 METALS	BOD or CBOD	TSS	FcoL or TcoL	MTBE	THG	COD				PRESERVATIVE: HCl	HNO_3	H_2SO_4	ICE	OTHER
3			9/11/96	1420	X			MW-2		96-08770	X										X						X				
3				1445				MW-3		96-08771	X																				
5				1345				effluent		96-08772			X						X			X	X						1		1
3				1355				influent		96-08773			X									X									

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Richard Joyce	9/11/96 1545	Alice M Clayton			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for laboratory by: (Signature)	Date / Time	Ambients Temperature:	Comments:
Alice M Clayton	9/12/96 2?		3 9.12		

CHECK HERE FOR DRINKING WATER DETECTION LIMITS ☐

TURNAROUND TIME REQUIRED:
☐ NORMAL ☐ RUSH
DATE REQUIRED

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

August 21, 1996

Mike Watson
Dahl & Associates
4390 McMenemy Road
St. Paul, MN 55127

Project ID:	24930601	
Chain of Custody:	18389	
Date Sampled:	08-08-96	
Date Received:	08-09-96	
Matrix:	Water	
Sample Identification:		
Lab ID:	96-07664	Effluent
	96-07664b	Trip Blank

Samples were analyzed for TPH as Gasoline by the California USGS Method. The results are reported on the following page.

Sincerely,

Chad Holznagel 8/23

Chad Holznagel
Chemist

Deb Marlton 8/22

Deb Marlton
Biologist

CB

Date Analyzed: 08-13-96

Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Petroleum Hydrocarbons as Gasoline
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
MDL:	10.0	1.0	1.0	1.0	3.0	0.1
96-07664 Effluent	BDL	BDL	BDL	BDL	BDL	BDL
96-07664b Trip Blank	BDL	BDL	BDL	BDL	BDL	BDL

Parameter:	96-07664 Effluent	Date Analyzed
COD (mg/L)	43	08-15-96
TSS (mg/L)	28.0	08-12-96

BDL = Below Detection Limit, MDL = Method Detection Limit

MIDWEST ANALYTICAL SERVICES
330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

CHAIN OF CUSTODY RECORD AND REQUEST FOR ANALYSIS

(Instructions on Back of Form)

№ 18389

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

CLIENT: Dahl & Assoc.

SAMPLER NAME: R. Joyce

PROJECT I.D.: 24930601

SAMPLER SIGNATURE: Richard Joyce

REPORTS TO BE SENT TO: Mike Watson

REMARKS:

SHADED AREAS FOR LABORATORY USE ONLY

NO. OF CONTAINERS	COMP.	GRAB	DATE	TIME	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE	SAMPLE NO.	LABORATORY I.D. NO.
5			8/8/96	1500	X			effluent		96-07264

GRO (Includes BTEX)	DRO	BTEX	VOC (465-D)	pH	Pb (Diss. or Total)	RCRA 8 METALS	BOD or CBOD	TSS	Fcol or Tcol	MTBE	TTG	COD				PRESERVATIVE: HCl	HNO₃	H_2SO_4	ICE	OTHER
		X						X		X	X	X				3		1		1

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Richard Joyce	8/8/96 1520	Olivia M Clayton			

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Ambient Temperature:	Comments:
Olivia M. Clayton	8/9/96 1 p	Chad Halgaard	8/9/96 13		Ice

CHECK HERE FOR DRINKING WATER DETECTION LIMITS ☐

TURNAROUND TIME REQUIRED: ☐ NORMAL ☐ RUSH

DATE REQUIRED:

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

July 23, 1996

Mike Watson
Dahl & Associates
4390 McMenemy Road
St. Paul, MN 55127

Project ID:	24930601	
Chain of Custody:	17271	
Date Sampled:	07-09-96	
Date Received:	07-10-96	
Matrix:	Water	
Sample Identification:		
Lab ID:	96-06496	Effluent

Samples were analyzed for TPH as Gasoline by the California USGS Method. The results are reported on the following page.

Sincerely,

Chad Holznagel 7/23

Chad Holznagel
Chemist

Deb Marlton 7/23
Biologist

Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Petroleum Hydrocarbons as Gasoline
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
MDL:	10.0	1.0	1.0	1.0	3.0	0.1
96-06496 Effluent	BDL	BDL	BDL	BDL	BDL	BDL

Parameter:	96-06496 Effluent	Date Analyzed
TSS (mg/L)	11.2	07-11-96
COD (mg/L)	52	07-19-96

BDL = Below Detection Limit, MDL = Method Detection Limit

NOTE: Samples will be retained 30 days from the date of report or until the holding time for analyzed parameters expires, whichever comes first. Samples will be returned if requested within that time.

MIDWES ALYTICAL SERVICES
330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

CHAIN OF CUSTODY RECORD AND REQUEST FOR ANALYSIS

(Instructions on Back of Form)

№ 17271

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

CLIENT: Dahl & Assoc.

SAMPLER NAME: R. Joyce

PROJECT I.D.: 24930601

SAMPLER SIGNATURE: Richard Joyce

REPORTS TO BE SENT TO: Mike Watson

REMARKS:

SHADED AREAS FOR LABORATORY USE ONLY

NO. OF CONTAINERS	COMP.	GRAB	DATE	TIME	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE	SAMPLE NO.	LABORATORY I.D. NO.	GRO (Includes BTEX)	DRO	BTEX	VOC (465-D)	pH	Pb (DISS. OR TOTAL)	RCRA 8 METALS	BOD OR CBOD	TSS	FCOL OR TCOL	MTBE	THG	COD				PRESERVATIVE: HCl	HNO₃	H₂SO₄	ICE	OTHER
5			7/9/96	13³⁰	X			effluent		96-6496			X						X		X	X	X				3		1		1

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Richard Joyce	7/10/96 0800	Olen McClaylor			

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Contents Temperature:	Comments:
Olen McClaylor	7/10/96 3⁰⁰ pm	[illegible] Smith	7-10-96 3:51		

CHECK HERE FOR DRINKING WATER DETECTION LIMITS ☐

TURNAROUND TIME REQUIRED: ☐ NORMAL ☐ RUSH

DATE REQUIRED: ______

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

June 24, 1996

Mike Watson
Dahl & Associates
4390 McMenemy Street
St. Paul, MN 55127

Project ID:	24930601	
Chain of Custody:	17247	
Date Sampled:	06-07-96	
Date Received:	06-10-96	
Matrix:	Water	
Sample Identification:		
Lab ID:	96-05234	MW-2
	96-05235	MW-3
	96-05236	Influent
	96-05237	Effluent

Samples were analyzed for GRO by the Wisconsin Modified GRO procedure and for TPH as Gasoline by the California USGS Method. The results are reported on the following page.

Sincerely,

Chad Holznagel 6/24

Chad Holznagel
Chemist

Deb Marlton 6/24

Deb Marlton
Biologist

Date Analyzed: 06-18-96

Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Hydrocarbons as GRO
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
MDL:	10.0	1.0	1.0	1.0	3.0	0.1
96-05234 MW-2	49.9	102	164	97.8	612	2.48
96-05235 MW-3	1190	1370	<25.0	2590	3790	24.2

Date Analyzed: 06-18-96

Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Petroleum Hydrocarbons as Gasoline
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
MDL:	10.0	1.0	1.0	1.0	3.0	0.1
96-05236 Influent	366	311	410	204	1000	6.84
96-05237 Effluent	BDL	BDL	BDL	BDL	BDL	BDL

Parameter:	96-05237 Effluent	Date Analyzed
TSS (mg/L)	21.6	06-20-96
COD (mg/L)	27	06-18-96

BDL = Below Detection Limit, MDL = Method Detection Limit

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

May 23, 1996

Mike Watson
Dahl & Associates
4390 McMenemy Road
St. Paul, MN 55127

Project ID:	24930601	
Chain of Custody:	16711	
Date Sampled:	05-09-96	
Date Received:	05-10-96	
Matrix:	Water	
Sample Identification:		
Lab ID:	96-03972	Effluent

Samples were analyzed for TPH as Gasoline by the California USGS Method and for lead by atomic absorption spectrophotometry. The results are reported on the following page.

Sincerely,

Chad Holznagel 5/23

Chad Holznagel
Chemist

Deb Marlton 5/23

Deb Marlton
Biologist

Date Analyzed: 05-21-96

Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Petroleum Hydrocarbons as Gasoline
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
MDL:	10.0	1.0	1.0	1.0	3.0	0.1
96-03972 Effluent	BDL	BDL	BDL	BDL	BDL	BDL

BDL = Below Detection Limit, MDL = Method Detection Limit

Parameter:	96-03972 Effluent	Date Analyzed
TSS (mg/L)	20.8	05-14-96
COD (mg/L)	39	05-17-96

NOTE: Samples will be retained 30 days from the date of report or until the holding time for analyzed parameters expires, whichever comes first. Samples will be returned if requested within that time.

MIDWEST ANALYTICAL SERVICES

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

CHAIN OF CUSTODY RECORD AND REQUEST FOR ANALYSIS

(Instructions on Back of Form)

№ 16711

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

CLIENT: Dahl & Assoc.
PROJECT I.D.: 24930601
REPORTS TO BE SENT TO: Mike Watson
SAMPLER NAME: R Joyce
SAMPLER SIGNATURE: Richard Joyce
REMARKS:

SHADED AREAS FOR LABORATORY USE ONLY

NO. OF CONTAINERS	COMP.	GRAB	DATE	TIME	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE	SAMPLE NO.	LABORATORY I.D. NO.	GRO (Includes BTEX)	DRO	BTEX	VOC (465-D)	pH	Pb (DISS. OR TOTAL)	RCRA 8 METALS	BOD OR CBOD	TSS	FCOL OR TCOL	THG	COD	MTBE				PRESERVATIVE: HCl	HNO_3	H_2SO_4	ICE	OTHER
5			5/9/96	12:20	X			effluent		96-03972			X						X		X	X	X				3		1		1

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Richard Joyce	5/10/96 8:15	Cleon Claytor			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	ents Temperature:	Comments:
Cleon Claytor	5/10/96 2:??	Chad Hahn	5/10/96 14:5?		

CHECK HERE FOR DRINKING WATER DETECTION LIMITS ☐

TURNAROUND TIME REQUIRED: ☑ NORMAL ☐ RUSH

DATE REQUIRED:

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

April 29, 1996

Mike Watson
Dahl & Associates
4390 McMenemy Road
St. Paul, MN 55127

Project ID: 24930601
Chain of Custody: 16699
Date Sampled: 04-15-96
Date Received: 04-16-96
Matrix: Water
Sample Identification:
Lab ID: 96-02913 Effluent

Samples were analyzed for TPH as Gasoline by the USGS/California. The results are reported on the following page.

Sincerely,

Chad Holznagel 4/29

Chad Holznagel
Chemist

Deb Marlton 4/29

Deb Marlton
Biologist

Date Analyzed: 04-24-96

Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Petroleum Hydrocarbons as Gasoline
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
MDL:	10.0	1.0	1.0	1.0	3.0	0.1
96-02913 Effluent	BDL	BDL	BDL	BDL	BDL	BDL

BDL = Below Detection Limit, MDL = Method Detection Limit

Lab ID:	96-02913 Effluent	Date Analyzed
COD (mg/L)	39	04-23-96
TSS (mg/L)	9.6	04-18-96

NOTE: Samples will be retained 30 days from the date of report or until the holding time for analyzed parameters expires, whichever comes first. Samples will be returned if requested within that time.

MIDWEST ANALYTICAL SERVICES
330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

CHAIN OF CUSTODY RECORD
AND
REQUEST FOR ANALYSIS
(Instructions on Back of Form)

№ 16699

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

CLIENT: Dahl + Associates
SAMPLER NAME: Jeff Howard
PROJECT I.D.: 24930601
SAMPLER SIGNATURE:
REPORTS TO BE SENT TO: Mike Watson
REMARKS:

SHADED AREAS FOR LABORATORY USE ONLY

NO. OF CONTAINERS	COMP.	GRAB	DATE	TIME	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE	SAMPLE NO.	LABORATORY I.D. NO.	GRO (Includes BTEX)	DRO	BTEX	VOC (465-D)	pH	Pb (Diss. or Total)	RCRA 8 METALS	BOD or CBOD	TSS	FCOL or TCOL	MTBE	THC	COD				PRESERVATIVE: HCl	PRESERVATIVE: HNO_3	PRESERVATIVE: H_2SO_4	PRESERVATIVE: ICE	PRESERVATIVE: OTHER
5			4/15/96	10³⁰	✓			EFFLUENT		9603913			✓						✓		✓	✓	✓				3		1		

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	4/16/96 10²⁵ AM				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	4/16/96 12²⁰ PM	Received for Laboratory by: (Signature)	Date / Time: 041696	Temperature:	Comments:
			1515		

CHECK HERE FOR DRINKING WATER DETECTION LIMITS ☐

TURNAROUND TIME REQUIRED:
☐ NORMAL ☐ RUSH

DATE REQUIRED:

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

March 28, 1996

Jeff Ryan
Dahl & Associates
4390 McMenemy Road
St. Paul, MN 55127

Project ID:	24930601	
Chain of Custody:	16453	
Date Sampled:	03-14-96	
Date Received:	03-18-96	
Matrix:	Water	
Sample Identification:		
Lab ID:	96-02072	MW-2
	96-02073	MW-3
	96-02074	Influent
	96-02075	Effluent

Samples were analyzed for GRO by the Wisconsin Modified GRO procedure and for TPH as Gasoline by the USGS/California Method. The results are reported on the following page.

Sincerely,

Chad Holznagel 3/29

Chad Holznagel
Chemist

Deb Marlton 3/29

Deb Marlton
Biologist

Date Analyzed: 03-25-96

Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Hydrocarbons as GRO
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
MDL:	10.0	1.0	1.0	1.0	3.0	0.1
96-02072 MW-2	BDL	117	167	86.4	422	1.98
96-02073 MW-3	<100	889	<25.0	2650	3790	21.0

Date Analyzed: 03-25-96

Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Petroleum Hydrocarbons as Gasoline
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
MDL:	10.0	1.0	1.0	1.0	3.0	0.1
96-02074 Influent	BDL	159	147	152	425	2.78
96-02075 Effluent	BDL	BDL	BDL	BDL	BDL	BDL

Lab ID:	96-02075 Effluent	Date Analyzed
COD (mg/L)	26	03-27-96
TSS (mg/L)	11.2	03-21-96

BDL = Below Detection Limit, MDL = Method Detection Limit

NOTE: Samples will be retained 30 days from the date of report or until the holding time for analyzed parameters expires, whichever comes first. Samples will be returned if requested within that time.

MIDWEST ANALYTICAL SERVICES

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

CHAIN OF CUSTODY RECORD
AND
REQUEST FOR ANALYSIS
(Instructions on Back of Form)

No. 16453

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

CLIENT: Dahl & Assoc.
SAMPLER NAME: Richard Joyce
PROJECT I.D.: 24930601
SAMPLER SIGNATURE: Richard Joyce
REPORTS TO BE SENT TO: Mike Watson
REMARKS:

SHADED AREAS FOR LABORATORY USE ONLY

NO. OF CONTAINERS	COMP.	GRAB	DATE	TIME	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE	SAMPLE NO.	LABORATORY I.D. NO.	GRO (Includes BTEX)	DRO	BTEX	VOC (465-D)	pH	Pb (Diss. or Total)	RCRA 8 METALS	BOD or CBOD	TSS	FCOL or TCOL	MTBE	THG	COD	TSS			PRESERVATIVE: HCl	PRESERVATIVE: HNO_3	PRESERVATIVE: H_2SO_4	PRESERVATIVE: ICE	PRESERVATIVE: OTHER
3			3/14/96	1375	X			mw-2		96-02072	X		X								X						3				
3			↓	1350	↓			mw-3		2073	X		X								↓						3				
2				1300				influent		2074			X									X						2				
5			↓	1255	↓			effluent		2075			↓								↓	X	X	X			3		1		1

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Richard Joyce	3/14/96 1500	[illegible]	[illegible]	3-18-96 2:50PM	[illegible]
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Contents Temperature:	Comments:
[illegible]	3/15, 1:56	[illegible]	3/18/96 16:04	ICE	

CHECK HERE FOR DRINKING WATER DETECTION LIMITS ☐

TURNAROUND TIME REQUIRED:
☒ NORMAL ☐ RUSH

DATE REQUIRED: _____

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

March 7, 1996

Dahl & Associates
4390 McMenemy Road
St. Paul, MN 55127

Project ID:	24930601	
Chain of Custody:	14749	
Date Sampled:	02-27-96	
Date Received:	02-28-96	
Date Analyzed:	See Below	
Matrix:	Water	
Sample Identification:		
Lab ID:	96-01433	(Effluent)

The results are reported on the following page.

Sincerely,

Chad Holznagel 3/8

Chad Holznagel
Chemist

Deb Marlton 3/4

Deb Marlton
Biologist

WR 3-20-96

Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Hydrocarbons as Gasoline
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
MDL:	10.0	1.0	1.0	1.0	3.0	0.1
96-01433 Effluent	BDL	BDL	BDL	BDL	BDL	BDL

BDL = Below Detection Limit, MDL = Method Detection Limit

Parameter	96-01433 Effluent	Date Analyzed
COD (mg/L)	32	02-29-96
TSS (mg/L)	9.2	03-06-96

MIDWEST ANALYTICAL SERVICES
330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

CHAIN OF CUSTODY RECORD
AND
REQUEST FOR ANALYSIS
(Instructions on Back of Form)

No 14749

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

CLIENT: Dahl & Associates
SAMPLER NAME: J. Howard
PROJECT I.D.: 24930601
SAMPLER SIGNATURE:
REPORTS TO BE SENT TO: Mike Watson
REMARKS:

SHADED AREAS FOR LABORATORY USE ONLY

NO. OF CONTAINERS	COMP.	GRAB	DATE	TIME	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE	SAMPLE NO.	LABORATORY I.D. NO.	GRO (Includes BTEX)	DRO	BTEX	VOC (465-D)	pH	Pb (Diss. or Total)	RCRA 8 METALS	BOD or CBOD	TSS	FCOL or TCOL	MTBE	THG	COD				PRESERVATIVE: HCl	PRESERVATIVE: HNO_3	PRESERVATIVE: H_2SO_4	PRESERVATIVE: ICE	PRESERVATIVE: OTHER
5			2/27/96	1400	✓			Effluent		96-01433			X						X		X	X	X				3				

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	2/28/96 11A				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Contents Temperature:	Comments:
	2/28/96 1		2/28 2:00	1.6°	

CHECK HERE FOR DRINKING WATER DETECTION LIMITS ☐

TURNAROUND TIME REQUIRED:
☐ NORMAL ☐ RUSH

DATE REQUIRED: _____

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

January 29, 1996

Mike Watson
Dahl & Associates
4390 McMenemy Road
St. Paul, MN 55127

Project ID:	24930601	
Chain of Custody:	14738	
Date Sampled:	01-12-96	
Date Received:	01-15-96	
Matrix:	Water	
Sample Identification:		
Lab ID:	96-00341	Effluent

Samples were analyzed for TPH as Gasoline by the USGC/California Method. The results are reported on the following page.

Sincerely,

Chad Holznagel 1/29

Chad Holznagel
Chemist

Deb Marlton 1/29

Deb Marlton
Biologist

TW MS

Date Analyzed: 01-17-96

Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Petroleum Hydrocarbons as Gasoline
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
MDL:	10.0	1.0	1.0	1.0	3.0	0.1
96-00341 Effluent	BDL	BDL	1.3	BDL	BDL	BDL*

BDL = Below Detection Limit, MDL = Method Detection Limit
* = Peaks present in range but below detection limit.

Lab ID:	96-00341 Effluent	Date Analyzed
COD (mg/L)	22	01-19-96
TSS (mg/L)	6.4	01-18-96

MIDWE[illegible]ALYTICAL SERVICES

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

CHAIN OF C[illegible]TODY RECORD
AND
REQUEST FOR ANALYSIS
(Instructions on Back of Form)

№ 14738

MS

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

CLIENT: Dahl Associates

SAMPLER NAME: Jeff Howard

PROJECT I.D.: 24930601

SAMPLER SIGNATURE: [signature]

REPORTS TO BE SENT TO: Mike Watson

REMARKS:

SHADED AREAS FOR LABORATORY USE ONLY

NO. OF CONTAINERS	COMP.	GRAB	DATE	TIME	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE	SAMPLE NO.	LABORATORY I.D. NO.	GRO (Includes BTEX)	DRO	BTEX	VOC (465-D)	pH	Pb (Diss. or Total)	RCRA 8 Metals	BOD or CBOD	TSS	Fcol or Tcol	MTBE	THG	COD				PRESERVATIVE: HCl	PRESERVATIVE: HNO_3	PRESERVATIVE: H_2SO_4	PRESERVATIVE: ICE	PRESERVATIVE: OTHER
5			1/12/96	0900	X			EFFLUENT		96-0341			X						✓		✓	✓	✓				3				

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]		[signature]	[signature]	1-15-96 1:39 PM	[signature]
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	[illegible]nts Temperature:	Comments:
[signature]	1/15, 1:40	[signature]	1/15 1:40	ICE	

CHECK HERE FOR DRINKING WATER DETECTION LIMITS ☐

TURNAROUND TIME REQUIRED:
☐ NORMAL ☐ RUSH

DATE REQUIRED: _____

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

January 9, 1996

Mike Watson
Dahl & Associates
4390 McMenemy Road
St. Paul, MN 55127

Project ID:	2493 0601	
Chain of Custody:	14726	
Date Sampled:	12-22-95	
Date Received:	12-28-95	
Matrix:	Water	
Sample Identification:		
Lab ID:	95-11707	MW1
	95-11708	MW2
	95-11709	MW3
	95-11710	MW4
	95-11711	MW5
	95-11712	Influent
	95-11713	Effluent

Samples were analyzed for GRO by the Wisconsin Modified GRO procedure and for lead by atomic absorption spectrophotometry. The results are reported on the following page.

Sincerely,

Chad Holznagel 1/9

Chad Holznagel
Chemist

Deb Marlton 1/9

Deb Marlton
Biologist

1/11/96

Date Analyzed: 01-04-96

Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Hydrocarbons as GRO
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)
MDL:	10.0	1.0	1.0	1.0	3.0	0.1
95-11707 MW1	BDL	BDL	BDL	BDL	BDL	BDL*
95-11708 MW2	BDL	43.5	39.0	19.8	74.1	0.54
95-11709 MW3	<250	1650	1730	3580	6340	77.5
95-11710 MW4	BDL	BDL	4.0	BDL	BDL	BDL*
95-11711 MW5	BDL	BDL	BDL	BDL	BDL	BDL
95-11712 Influent	<20.0	266	239	163	985	4.80
95-11713 Effluent	BDL	1.3	2.2	BDL	BDL	BDL*

BDL = Below Detection Limit, MDL = Method Detection Limit
* = Peaks present in range but below detection limit.

Lab ID:	95-11713 Effluent	Date Analyzed
COD (mg/L)	30	01-02-96
TSS (mg/L)	11.6	01-02-96

NOTE: Samples will be retained 30 days from the date of report or until the holding time for analyzed parameters expires, whichever comes first. Samples will be returned if requested within that time.

MIDWEST ANALYTICAL SERVICES

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

CHAIN OF CUSTODY RECORD
AND
REQUEST FOR ANALYSIS
(Instructions on Back of Form)

No 14726

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

CLIENT: Dahl & Associates
SAMPLER NAME: Dan Madsen
PROJECT I.D.: 2493 0601
SAMPLER SIGNATURE: Dan Madsen
REPORTS TO BE SENT TO: Mike Watson
REMARKS:

SHADED AREAS FOR LABORATORY USE ONLY

NO. OF CONTAINERS	COMP.	GRAB	DATE	TIME	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE	SAMPLE NO.	LABORATORY I.D. NO.	GRO (Includes BTEX)	DRO	BTEX	VOC (465-D)	pH	Pb (Diss. or Total)	RCRA 8 METALS	BOD or CBOD	TSS	FCOL or TCOL	GRO/DRO/BTEX/MTBE	TSS, COD	PRESERVATIVE: HCl	PRESERVATIVE: HNO_3	PRESERVATIVE: H_2SO_4	PRESERVATIVE: ICE	PRESERVATIVE: OTHER
3		X	12/22/95	1:45	X			MW 1		95-11707										3			3				
1		X		2:00	X			MW 2		11708													1				
		X		2:30	X			MW 3		11709																	
		X		2:45	X			MW 4		11710																	
V		X	V	2:15	X			MW 5		11711										X			V				
								INFLUENT		11712										X							
								EFFLUENT		11713										X	X						

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Dan Madsen	12-27 1530	[signature]			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Contents Temperature:	Comments:
		[signature] 12/29/95	11:01	ICE	

CHECK HERE FOR DRINKING WATER DETECTION LIMITS ☐

TURNAROUND TIME REQUIRED:
☐ NORMAL ☐ RUSH
DATE REQUIRED: _____

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

December 5, 1995

Mike Watson
Dahl & Associates
4390 McMenemy Road
St. Paul, MN 55127

Project ID: 24930601
Chain of Custody: 14705
Date Sampled: 11-21-95
Date Received: 11-22-95
Matrix: Water
Sample Identification:
Lab ID: 95-10469 Effluent

Samples were analyzed for TPH as Gasoline by the California Method. The results are reported on the following page.

Sincerely,

Chad Holznagel 12/5

Chad Holznagel
Chemist

Deb Marlton 12/5

Deb Marlton
Biologist

Entered MR, 12/15

Date Analyzed: 11-29-95 Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Petroleum Hydrocarbons as Gasoline
Units	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(mg/L)
Method Detection Limit	10.0	1.0	1.0	1.0	3.0	0.1
Sample Number						
95-10469 Effluent	BDL	BDL	BDL	BDL	BDL	BDL

BDL = Below Detection Limit

Parameter	95-10469 Effluent	Date Analyzed
COD (mg/L)	36	11-30-95
TSS (mg/L)	8.4	11-27-95

NOTE: Samples will be retained 30 days from the date of report or until the holding time for analyzed parameters expires, whichever comes first. Samples will be returned if requested within that time.

MIDWEST ANALYTICAL SERVICES

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

CHAIN OF CUSTODY RECORD
AND
REQUEST FOR ANALYSIS
(Instructions on Back of Form)

№ 14705

MS

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

CLIENT: Dahl & Associates

SAMPLER NAME: Jeff Howard

PROJECT I.D.: 24930601

SAMPLER SIGNATURE:

REPORTS TO BE SENT TO: Mike Watson

REMARKS:

SHADED AREAS FOR LABORATORY USE ONLY

NO. OF CONTAINERS	COMP.	GRAB	DATE	TIME	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE IDENTIFICATION: SAMPLE	SAMPLE NO.	LABORATORY I.D. NO.	GRO (Includes BTEX)	DRO	BTEX	VOC (465-D)	pH	Pb (Diss. or Total)	RCRA 8 METALS	BOD or CBOD	TSS	FCOL or TCOL	MTBE	TMG	CBD				PRESERVATIVE: HCl	PRESERVATIVE: HNO_3	PRESERVATIVE: H_2SO_4	PRESERVATIVE: ICE	PRESERVATIVE: OTHER
5			11/21					EFFLUENT		95-10469			X						X		X	X	X				3				

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	11/22 8:00				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	nts Temperature:	Comments:
	11/22 3:15		11/22 330		

CHECK HERE FOR DRINKING WATER DETECTION LIMITS ☐

TURNAROUND TIME REQUIRED:
☐ NORMAL ☐ RUSH

DATE REQUIRED: _____

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

October 16, 1995

Mike Watson
Dahl & Associates
4390 McMenemy Road
St. Paul, MN 55127

Project ID: 2493 0601
Chain of Custody: 14677
Date Sampled: 10-03-95
Date Received: 10-04-95
Date Analyzed: See below
Matrix: Water
Sample Identification:
Lab ID: 95-08379 Effluent

Samples were analyzed for TPH as Gasoline by the Wisconsin Modified GRO procedure. The results are reported on the following page.

Sincerely,

Chad Holznagel 10/16

Chad Holznagel
Chemist

Deb Marlton 10/16

Deb Marlton
Biologist

Date Analyzed: 10-09-95 Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Hydrocarbons as GRO
Units	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(mg/L)
Method Detection Limit	10.0	1.0	1.0	1.0	3.0	0.1
Sample Number						
95-08379 Effluent	BDL	BDL	1.1	BDL	BDL	BDL

BDL = Below Detection Limit

Lab ID:	95-08379 Effluent	Date Analyzed
COD (mg/L)	30	10-10-95
TSS (mg/L)	17.6	10-05-95

MIDWEST ANALYTICAL SERVICES
330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

CHAIN OF CUSTODY RECORD AND REQUEST FOR ANALYSIS

(Instructions on Back of Form)

№ 14677

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

CLIENT: Dahl9 Associates

SAMPLER NAME: Dan Madsen

PROJECT I.D.: 2493 0601

SAMPLER SIGNATURE: Dan Madsen

REPORTS TO BE SENT TO: Mike Watson

REMARKS:

SHADED AREAS FOR LABORATORY USE ONLY

NO. OF CONTAINERS	COMP.	GRAB	DATE	TIME	WATER	SOIL	OTHER	SAMPLE	SAMPLE NO.	LABORATORY I.D. NO.	GRO (Includes BTEX)	DRO	BTEX	VOC (465-D)	pH	Pb (DISS. OR TOTAL)	RCRA 8 METALS	BOD OR CBOD	TSS	FCOL OR TCOL	BTEX MTBE THC	C.O.D	HCl	HNO_3	H_2SO_4	ICE	OTHER
5	X	X	10/3/95	9:15	X			Effluent		95-08379									X		X	X	X		X		

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Dan Madsen	10/4/ 11:10	G. Henning	[illegible] Henning	10/4/95 11:45	D. Lunde
D. Lunde	10-4-95 1:31 PM	A. Philipczyk			

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Contents Temperature:	Comments:
A. Philipczyk	10/4, 1:35	M. Hayes	10-4-95 2:00		

CHECK HERE FOR DRINKING WATER DETECTION LIMITS ☐

TURNAROUND TIME REQUIRED: ☐ NORMAL ☐ RUSH

DATE REQUIRED: ____________

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

MIDWEST ANALYTICAL SERVICES

MINNESOTA CERTIFIED LABORATORY
NUMBER 027-059-156

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

October 3, 1995

Mike Watson
Dahl & Associates
4390 McMenemy Road
St. Paul, MN 55127

Project ID: 24930601
Chain of Custody: 14663
Date Sampled: 09-21-95
Date Received: 09-25-95
Date Analyzed: See below
Matrix: Water
Sample Identification:

Lab ID:		
	95-07900	MW-1
	95-07901	MW-2
	95-07902	MW-3
	95-07903	MW-4
	95-07904	MW-5
	95-07905	Influent
	95-07906	Effluent

Samples were analyzed for GRO and TPH as Gasoline by the Wisconsin Modified GRO procedure. The results are reported on the following pages.

Sincerely,

Chad Holznagel 10/3

Chad Holznagel
Chemist

Deb Marlton 10/4

Deb Marlton
Biologist

Date Analyzed: 10-01-95 Parameter:	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Hydrocarbons as GRO
Units	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(mg/L)
Method Detection Limit	1.0	1.0	1.0	3.0	0.1
Sample Number					
95-07900 MW-1	BDL	BDL	BDL	BDL	BDL*
95-07901 MW-2	7.0	7.3	5.7	23.0	0.12
95-07902 MW-3	3140	509	2810	6490	38.0
95-07903 MW-4	BDL	BDL	BDL	BDL	BDL*
95-07904 MW-5	BDL	BDL	BDL	BDL	BDL

Parameter:	MTBE	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Petroleum Hydrocarbons as Gasoline
Units	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(mg/L)
Method Detection Limit	10.0	1.0	1.0	1.0	3.0	0.1
Sample Number						
95-07905 Influent	<50.0	545	423	420	1910	7.84
95-07906 Effluent	BDL	BDL	BDL	BDL	6.7	BDL*

BDL = Below Detection Limit
* = Peaks present in range but below detection limit.

Lab ID:	95-07906 Effluent	Date Analyzed
COD (mg/L)	53	09-26-95
TSS (mg/L)	7.2	09-25-95

MIDWEST ANALYTICAL SERVICES

330 SO. CLEVELAND ST.
P.O. BOX 349
CAMBRIDGE, MN 55008

CHAIN OF CUSTODY RECORD
AND
REQUEST FOR ANALYSIS
(Instructions on Back of Form)

No 14663

MS

LAB (612) 689-2175
METRO (612) 444-9270
FAX (612) 689-3660

CLIENT: Dahl - Assoc.

SAMPLER NAME: Jeff Howard

PROJECT I.D.: 24930601

SAMPLER SIGNATURE:

REPORTS TO BE SENT TO: M. Kewatson

REMARKS:

SHADED AREAS FOR LABORATORY USE ONLY

NO. OF CONTAINERS	COMP.	GRAB	DATE	TIME	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE IDENTIFICATION: SAMPLE	SAMPLE NO.	LABORATORY I.D. NO.	GRO (Includes BTEX)	DRO	BTEX	VOC (465-D)	pH	Pb (Diss. or Total)	RCRA 8 METALS	BOD or CBOD	TSS	FCOL or TCOL	MTBE	THG	COD				PRESERVATIVE: HCl	HNO3	H2SO4	ICE	OTHER
3			9-21-95	1345	✓			MW-1		95-07900	X																3				
				1415	✓			MW-2		7901	X																3				
				1430	✓			MW-3		7902	X																3				
				1500	✓			MW-4		7903	X																3				
				1470	✓			MW 5		7904	X																3				
				1230	✓			Influent		7905			X								X	X					3				
5				1245	✓			Effluent		7906			X						X	✱	X	X	X				3		1		

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	9-22 800				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Contents Temperature:	Comments:
		M. Hayes 9-25-95	11:25		

CHECK HERE FOR DRINKING WATER DETECTION LIMITS ☐

TURNAROUND TIME REQUIRED:
☐ NORMAL ☐ RUSH

DATE REQUIRED: _____

APPENDIX B

Soil Ventilation/Air Sparge System Documentation

Form 2 - Offgas Screening Evaluation

DRAFT 4/26/91

Site Name: South Robert	Responsible Party Contact		Form Completed By:	MPS
Address: 1126 S. Robert St.	Name:	Keith Coffman	Dahl & Associates, Inc.	
W. St. Paul, MN	Affiliation:	Conoco Inc.	Date Form Completed:	09/26/97
MPCA Leak #:0000858	Phone#:	(281) 293-3568	Sampling Date:	06/20/95

	A	B	C	D	E	
CONTAMINANT (CAS #)	Test Method	Emission Concentration (ug/m3)	Gas flow rate through vent stack (m3/sec)	Emission Rate (ug/sec)	Significant Emission Rate (ug/sec)	Is ER > SER?
		(EC) X	(GF)	(ER)	(SER)	(yes/no)
Benzene (71-43-2)	EPA Method 18	1600	0.031	49.6	4,600	NO
Ethylbenzene (100-41-4)	EPA Method 18	1500	0.031	46.5	497,700	NO
Toluene (108-88-3)	EPA Method 18	1700	0.031	52.7	429,800	NO
Xylene (mixed) (1330-20-7)	EPA Method 18	14000	0.031	434	497,700	NO
Chloroform (67-66-3)	see footnote 1				1,600	
Dichlorodifluoromethane (75-71-8)	see footnote 1				767,200	
1,1-Dichloroethane (75-34-3)	see footnote 1				1,918,000	
1,2-Dichloroethane (107-06-2)	see footnote 1				1,500	
1,1-Dichloroethylene (75-35-4)	see footnote 1				800	
1,2-Dichloroethylene (540-59-0)	see footnote 1				2,083,900	
Dichlorofluoromethane (75-43-4)	see footnote 1				105,300	
Methylene Chloride (75-09-2)	see footnote 1				80,600	
1,1,2,2-Tetrachloroethane (79-34-5)	see footnote 1				700	
Tetrachloroethylene (127-18-4)	see footnote 1				65,200	
1,1,1-Trichloroethane (71-55-6)	see footnote 1				3,835,800	
1,1,2-Trichloroethane (79-00-5)	see footnote 1				2,400	
Trichloroethylene (79-01-6)	see footnote 1				22,600	
Trichlorofluoromethane (75-69-4)	see footnote 1				2,685,100	
1,1,2-Trichlorotrifluoroethane (76-13-1)	see footnote 1				20,048,000	
Vinyl chloride (75-01-4)	see footnote 1				9,200	
Other 1						

1 Contact MPCA Division of Air Quality Staff (296-7757) regarding contaminants not on this list, or for test methods other than for BETX.

Form 2 - Offgas Screening Evaluation

DRAFT 4/26/91

Site Name: South Robert	Responsible Party Contact		Form Completed By: MPS
Address: 1126 S. Robert St.	Name:	Keith Coffman	Dahl & Associates, Inc.
W. St. Paul, MN	Affiliation:	Conoco Inc.	Date Form Completed: 09/26/97
MPCA Leak #:0000858	Phone#:	(281) 293-3568	Sampling Date: 09/21/95

	A	B	C	D	E	
CONTAMINANT (CAS #)	Test Method	Emission Concentration (ug/m3)	Gas flow rate through vent stack (m3/sec)	Emission Rate (ug/sec)	Significant Emission Rate (ug/sec)	Is ER > SER?
		(EC) X	(GF)	(ER)	(SER)	(yes/no)
Benzene (71-43-2)	EPA Method 18	1800	0.023	41.4	4,600	NO
Ethylbenzene (100-41-4)	EPA Method 18	6100	0.031	189.1	497,700	NO
Toluene (108-88-3)	EPA Method 18	7700	0.031	238.7	429,800	NO
Xylene (mixed) (1330-20-7)	EPA Method 18	25000	0.031	775	497,700	NO
Chloroform (67-66-3)	see footnote 1				1,600	
Dichlorodifluoromethane (75-71-8)	see footnote 1				767,200	
1,1-Dichloroethane (75-34-3)	see footnote 1				1,918,000	
1,2-Dichloroethane (107-06-2)	see footnote 1				1,500	
1,1-Dichloroethylene (75-35-4)	see footnote 1				800	
1,2-Dichloroethylene (540-59-0)	see footnote 1				2,083,900	
Dichlorofluoromethane (75-43-4)	see footnote 1				105,300	
Methylene Chloride (75-09-2)	see footnote 1				80,600	
1,1,2,2-Tetrachloroethane (79-34-5)	see footnote 1				700	
Tetrachloroethylene (127-18-4)	see footnote 1				65,200	
1,1,1-Trichloroethane (71-55-6)	see footnote 1				3,835,800	
1,1,2-Trichloroethane (79-00-5)	see footnote 1				2,400	
Trichloroethylene (79-01-6)	see footnote 1				22,600	
Trichlorofluoromethane (75-69-4)	see footnote 1				2,685,100	
1,1,2-Trichlorotrifluoroethane (76-13-1)	see footnote 1				20,048,000	
Vinyl chloride (75-01-4)	see footnote 1				9,200	
Other 1						

1 Contact MPCA Division of Air Quality Staff (296-7757) regarding contaminants not on this list, or for test methods other than for BETX.

Form 2 - Offgas Screening Evaluation

DRAFT 4/26/91

Site Name: South Robert	Responsible Party Contact		Form Completed By: MPS
Address: 1126 S. Robert St.	Name:	Keith Coffman	Dahl & Associates, Inc.
W. St. Paul, MN	Affiliation:	Conoco Inc.	Date Form Completed: 09/26/97
MPCA Leak #:0000858	Phone#:	(281) 293-3568	Sampling Date: 12/22/95

	A	B	C	D	E	
CONTAMINANT (CAS #)	Test Method	Emission Concentration (ug/m3)	Gas flow rate through vent stack (m3/sec)	Emission Rate (ug/sec)	Significant Emission Rate (ug/sec)	Is ER > SER?
		(EC) X	(GF)	(ER)	(SER)	(yes/no)
Benzene (71-43-2)	EPA Method 18	5200	0.018	93.6	4,600	NO
Ethylbenzene (100-41-4)	EPA Method 18	3500	0.018	63	497,700	NO
Toluene (108-88-3)	EPA Method 18	4700	0.018	84.6	429,800	NO
Xylene (mixed) (1330-20-7)	EPA Method 18	13000	0.018	234	497,700	NO
Chloroform (67-66-3)	see footnote 1				1,600	
Dichlorodifluoromethane (75-71-8)	see footnote 1				767,200	
1,1-Dichloroethane (75-34-3)	see footnote 1				1,918,000	
1,2-Dichloroethane (107-06-2)	see footnote 1				1,500	
1,1-Dichloroethylene (75-35-4)	see footnote 1				800	
1,2-Dichloroethylene (540-59-0)	see footnote 1				2,083,900	
Dichlorofluoromethane (75-43-4)	see footnote 1				105,300	
Methylene Chloride (75-09-2)	see footnote 1				80,600	
1,1,2,2-Tetrachloroethane (79-34-5)	see footnote 1				700	
Tetrachloroethylene (127-18-4)	see footnote 1				65,200	
1,1,1-Trichloroethane (71-55-6)	see footnote 1				3,835,800	
1,1,2-Trichloroethane (79-00-5)	see footnote 1				2,400	
Trichloroethylene (79-01-6)	see footnote 1				22,600	
Trichlorofluoromethane (75-69-4)	see footnote 1				2,685,100	
1,1,2-Trichlorotrifluoroethane (76-13-1)	see footnote 1				20,048,000	
Vinyl chloride (75-01-4)	see footnote 1				9,200	
Other 1						

1 Contact MPCA Division of Air Quality Staff (296-7757) regarding contaminants not on this list, or for test methods other than for BETX.

Form 2 - Offgas Screening Evaluation

DRAFT 4/26/91

Site Name: South Robert	Responsible Party Contact		Form Completed By: MPS
Address: 1126 S. Robert St.	Name:	Keith Coffman	Dahl & Associates, Inc.
W. St. Paul, MN	Affiliation:	Conoco Inc.	Date Form Completed: 09/26/97
MPCA Leak #:0000858	Phone#:	(281) 293-3568	Sampling Date: 03/14/96

	A	B	C	D	E	
CONTAMINANT (CAS #)	Test Method	Emission Concentration (ug/m3)	Gas flow rate through vent stack (m3/sec)	Emission Rate (ug/sec)	Significant Emission Rate (ug/sec)	Is ER > SER?
		(EC) X	(GF)	(ER)	(SER)	(yes/no)
Benzene (71-43-2)	EPA Method 18	10000	0.027	270	4,600	NO
Ethylbenzene (100-41-4)	EPA Method 18	4000	0.027	108	497,700	NO
Toluene (108-88-3)	EPA Method 18	7700	0.027	207.9	429,800	NO
Xylene (mixed) (1330-20-7)	EPA Method 18	8300	0.027	224.1	497,700	NO
Chloroform (67-66-3)	see footnote 1				1,600	
Dichlorodifluoromethane (75-71-8)	see footnote 1				767,200	
1,1-Dichloroethane (75-34-3)	see footnote 1				1,918,000	
1,2-Dichloroethane (107-06-2)	see footnote 1				1,500	
1,1-Dichloroethylene (75-35-4)	see footnote 1				800	
1,2-Dichloroethylene (540-59-0)	see footnote 1				2,083,900	
Dichlorofluoromethane (75-43-4)	see footnote 1				105,300	
Methylene Chloride (75-09-2)	see footnote 1				80,600	
1,1,2,2-Tetrachloroethane (79-34-5)	see footnote 1				700	
Tetrachloroethylene (127-18-4)	see footnote 1				65,200	
1,1,1-Trichloroethane (71-55-6)	see footnote 1				3,835,800	
1,1,2-Trichloroethane (79-00-5)	see footnote 1				2,400	
Trichloroethylene (79-01-6)	see footnote 1				22,600	
Trichlorofluoromethane (75-69-4)	see footnote 1				2,685,100	
1,1,2-Trichlorotrifluoroethane (76-13-1)	see footnote 1				20,048,000	
Vinyl chloride (75-01-4)	see footnote 1				9,200	
Other 1						

1 Contact MPCA Division of Air Quality Staff (296-7757) regarding contaminants not on this list, or for test methods other than for BETX.

Form 2 - Offgas Screening Evaluation

DRAFT 4/26/91

Site Name: South Robert	Responsible Party Contact		Form Completed By:	MPS
Address: 1126 S. Robert St.	Name:	Keith Coffman	Dahl & Associates, Inc.	
W. St. Paul, MN	Affiliation:	Conoco Inc.	Date Form Completed:	09/26/97
MPCA Leak #:0000858	Phone#:	(281) 293-3568	Sampling Date:	06/07/96

	A	B	C	D	E	
CONTAMINANT (CAS #)	Test Method	Emission Concentration (ug/m3)	Gas flow rate through vent stack (m3/sec)	Emission Rate (ug/sec)	Significant Emission Rate (ug/sec)	Is ER > SER?
		(EC) X	(GF)	(ER)	(SER)	(yes/no)
Benzene (71-43-2)	EPA Method 18	1000	0.032	32	4,600	NO
Ethylbenzene (100-41-4)	EPA Method 18	3500	0.032	112	497,700	NO
Toluene (108-88-3)	EPA Method 18	3800	0.032	121.6	429,800	NO
Xylene (mixed) (1330-20-7)	EPA Method 18	15000	0.032	480	497,700	NO
Chloroform (67-66-3)	see footnote 1				1,600	
Dichlorodifluoromethane (75-71-8)	see footnote 1				767,200	
1,1-Dichloroethane (75-34-3)	see footnote 1				1,918,000	
1,2-Dichloroethane (107-06-2)	see footnote 1				1,500	
1,1-Dichloroethylene (75-35-4)	see footnote 1				800	
1,2-Dichloroethylene (540-59-0)	see footnote 1				2,083,900	
Dichlorofluoromethane (75-43-4)	see footnote 1				105,300	
Methylene Chloride (75-09-2)	see footnote 1				80,600	
1,1,2,2-Tetrachloroethane (79-34-5)	see footnote 1				700	
Tetrachloroethylene (127-18-4)	see footnote 1				65,200	
1,1,1-Trichloroethane (71-55-6)	see footnote 1				3,835,800	
1,1,2-Trichloroethane (79-00-5)	see footnote 1				2,400	
Trichloroethylene (79-01-6)	see footnote 1				22,600	
Trichlorofluoromethane (75-69-4)	see footnote 1				2,685,100	
1,1,2-Trichlorotrifluoroethane (76-13-1)	see footnote 1				20,048,000	
Vinyl chloride (75-01-4)	see footnote 1				9,200	
Other 1						

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Form 2 - Offgas Screening Evaluation

DRAFT 4/26/91

Site Name: South Robert	Responsible Party Contact		Form Completed By:	MPS
Address: 1126 S. Robert St.	Name:	Keith Coffman	Dahl & Associates, Inc.	
W. St. Paul, MN	Affiliation:	Conoco Inc.	Date Form Completed:	09/26/97
MPCA Leak #:0000858	Phone#:	(281) 293-3568	Sampling Date:	09/11/96

	A	B	C	D	E	
CONTAMINANT (CAS #)	Test Method	Emission Concentration (ug/m3)	Gas flow rate through vent stack (m3/sec)	Emission Rate (ug/sec)	Significant Emission Rate (ug/sec)	Is ER > SER?
		(EC) X	(GF)	(ER)	(SER)	(yes/no)
Benzene (71-43-2)	EPA Method 18	4000	0.038	152	4,600	NO
Ethylbenzene (100-41-4)	EPA Method 18	1200	0.038	45.6	497,700	NO
Toluene (108-88-3)	EPA Method 18	1400	0.038	53.2	429,800	NO
Xylene (mixed) (1330-20-7)	EPA Method 18	5800	0.038	220.4	497,700	NO
Chloroform (67-66-3)	see footnote 1				1,600	
Dichlorodifluoromethane (75-71-8)	see footnote 1				767,200	
1,1-Dichloroethane (75-34-3)	see footnote 1				1,918,000	
1,2-Dichloroethane (107-06-2)	see footnote 1				1,500	
1,1-Dichloroethylene (75-35-4)	see footnote 1				800	
1,2-Dichloroethylene (540-59-0)	see footnote 1				2,083,900	
Dichlorofluoromethane (75-43-4)	see footnote 1				105,300	
Methylene Chloride (75-09-2)	see footnote 1				80,600	
1,1,2,2-Tetrachloroethane (79-34-5)	see footnote 1				700	
Tetrachloroethylene (127-18-4)	see footnote 1				65,200	
1,1,1-Trichloroethane (71-55-6)	see footnote 1				3,835,800	
1,1,2-Trichloroethane (79-00-5)	see footnote 1				2,400	
Trichloroethylene (79-01-6)	see footnote 1				22,600	
Trichlorofluoromethane (75-69-4)	see footnote 1				2,685,100	
1,1,2-Trichlorotrifluoroethane (76-13-1)	see footnote 1				20,048,000	
Vinyl chloride (75-01-4)	see footnote 1				9,200	
Other 1						

1 Contact MPCA Division of Air Quality Staff (296-7757) regarding contaminants not on this list, or for test methods other than for BETX.

Form 2 - Offgas Screening Evaluation

DRAFT 4/26/91

Site Name: South Robert	Responsible Party Contact		Form Completed By: MPS
Address: 1126 S. Robert St.	Name:	Keith Coffman	Dahl & Associates, Inc.
W. St. Paul, MN	Affiliation:	Conoco Inc.	Date Form Completed: 09/26/97
MPCA Leak #:0000858	Phone#:	(281) 293-3568	Sampling Date: 12/10/96

	A	B	C	D	E	
CONTAMINANT (CAS #)	Test Method	Emission Concentration (ug/m3)	Gas flow rate through vent stack (m3/sec)	Emission Rate (ug/sec)	Significant Emission Rate (ug/sec)	Is ER > SER?
		(EC) X	(GF)	(ER)	(SER)	(yes/no)
Benzene (71-43-2)	EPA Method 18	400	0.03	12	4,600	NO
Ethylbenzene (100-41-4)	EPA Method 18	1100	0.03	33	497,700	NO
Toluene (108-88-3)	EPA Method 18	1500	0.03	45	429,800	NO
Xylene (mixed) (1330-20-7)	EPA Method 18	6700	0.03	201	497,700	NO
Chloroform (67-66-3)	see footnote 1				1,600	
Dichlorodifluoromethane (75-71-8)	see footnote 1				767,200	
1,1-Dichloroethane (75-34-3)	see footnote 1				1,918,000	
1,2-Dichloroethane (107-06-2)	see footnote 1				1,500	
1,1-Dichloroethylene (75-35-4)	see footnote 1				800	
1,2-Dichloroethylene (540-59-0)	see footnote 1				2,083,900	
Dichlorofluoromethane (75-43-4)	see footnote 1				105,300	
Methylene Chloride (75-09-2)	see footnote 1				80,600	
1,1,2,2-Tetrachloroethane (79-34-5)	see footnote 1				700	
Tetrachloroethylene (127-18-4)	see footnote 1				65,200	
1,1,1-Trichloroethane (71-55-6)	see footnote 1				3,835,800	
1,1,2-Trichloroethane (79-00-5)	see footnote 1				2,400	
Trichloroethylene (79-01-6)	see footnote 1				22,600	
Trichlorofluoromethane (75-69-4)	see footnote 1				2,685,100	
1,1,2-Trichlorotrifluoroethane (76-13-1)	see footnote 1				20,048,000	
Vinyl chloride (75-01-4)	see footnote 1				9,200	
Other 1						

1 Contact MPCA Division of Air Quality Staff (296-7757) regarding contaminants not on this list, or for test methods other than for BETX.

Form 2 - Offgas Screening Evaluation

DRAFT 4/26/91

Site Name: South Robert	Responsible Party Contact		Form Completed By:	MPS
Address: 1126 S. Robert St.	Name:	Keith Coffman	Dahl & Associates, Inc.	
W. St. Paul, MN	Affiliation:	Conoco Inc.	Date Form Completed:	09/26/97
MPCA Leak #:0000858	Phone#:	(281) 293-3568	Sampling Date:	03/12/97

	A	B	C	D	E	
CONTAMINANT (CAS #)	Test Method	Emission Concentration (ug/m3)	Gas flow rate through vent stack (m3/sec)	Emission Rate (ug/sec)	Significant Emission Rate (ug/sec)	Is ER > SER?
		(EC) X	(GF)	(ER)	(SER)	(yes/no)
Benzene (71-43-2)	EPA Method 18	480	0.03	14.4	4,600	NO
Ethylbenzene (100-41-4)	EPA Method 18	2400	0.03	72	497,700	NO
Toluene (108-88-3)	EPA Method 18	1700	0.03	51	429,800	NO
Xylene (mixed) (1330-20-7)	EPA Method 18	13000	0.03	390	497,700	NO
Chloroform (67-66-3)	see footnote 1				1,600	
Dichlorodifluoromethane (75-71-8)	see footnote 1				767,200	
1,1-Dichloroethane (75-34-3)	see footnote 1				1,918,000	
1,2-Dichloroethane (107-06-2)	see footnote 1				1,500	
1,1-Dichloroethylene (75-35-4)	see footnote 1				800	
1,2-Dichloroethylene (540-59-0)	see footnote 1				2,083,900	
Dichlorofluoromethane (75-43-4)	see footnote 1				105,300	
Methylene Chloride (75-09-2)	see footnote 1				80,600	
1,1,2,2-Tetrachloroethane (79-34-5)	see footnote 1				700	
Tetrachloroethylene (127-18-4)	see footnote 1				65,200	
1,1,1-Trichloroethane (71-55-6)	see footnote 1				3,835,800	
1,1,2-Trichloroethane (79-00-5)	see footnote 1				2,400	
Trichloroethylene (79-01-6)	see footnote 1				22,600	
Trichlorofluoromethane (75-69-4)	see footnote 1				2,685,100	
1,1,2-Trichlorotrifluoroethane (76-13-1)	see footnote 1				20,048,000	
Vinyl chloride (75-01-4)	see footnote 1				9,200	
Other 1						

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Form 2 - Offgas Screening Evaluation

DRAFT 4/26/91

Site Name: South Robert	Responsible Party Contact		Form Completed By:	MPS
Address: 1126 S. Robert St.	Name:	Keith Coffman	Dahl & Associates, Inc.	
W. St. Paul, MN	Affiliation:	Conoco Inc.	Date Form Completed:	09/26/97
MPCA Leak #:0000858	Phone#:	(281) 293-3568	Sampling Date:	06/12/97

	A	B	C	D	E	
CONTAMINANT (CAS #)	Test Method	Emission Concentration (ug/m3)	Gas flow rate through vent stack (m3/sec)	Emission Rate (ug/sec)	Significant Emission Rate (ug/sec)	Is ER > SER?
		(EC) X	(GF)	(ER)	(SER)	(yes/no)
Benzene (71-43-2)	EPA Method 18	2100	0.038	79.8	4,600	NO
Ethylbenzene (100-41-4)	EPA Method 18	2100	0.038	79.8	497,700	NO
Toluene (108-88-3)	EPA Method 18	840	0.038	31.92	429,800	NO
Xylene (mixed) (1330-20-7)	EPA Method 18	13000	0.038	494	497,700	NO
Chloroform (67-66-3)	see footnote 1				1,600	
Dichlorodifluoromethane (75-71-8)	see footnote 1				767,200	
1,1-Dichloroethane (75-34-3)	see footnote 1				1,918,000	
1,2-Dichloroethane (107-06-2)	see footnote 1				1,500	
1,1-Dichloroethylene (75-35-4)	see footnote 1				800	
1,2-Dichloroethylene (540-59-0)	see footnote 1				2,083,900	
Dichlorofluoromethane (75-43-4)	see footnote 1				105,300	
Methylene Chloride (75-09-2)	see footnote 1				80,600	
1,1,2,2-Tetrachloroethane (79-34-5)	see footnote 1				700	
Tetrachloroethylene (127-18-4)	see footnote 1				65,200	
1,1,1-Trichloroethane (71-55-6)	see footnote 1				3,835,800	
1,1,2-Trichloroethane (79-00-5)	see footnote 1				2,400	
Trichloroethylene (79-01-6)	see footnote 1				22,600	
Trichlorofluoromethane (75-69-4)	see footnote 1				2,685,100	
1,1,2-Trichlorotrifluoroethane (76-13-1)	see footnote 1				20,048,000	
Vinyl chloride (75-01-4)	see footnote 1				9,200	
Other 1						

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DAHL
& ASSOCIATES, INC

TECHNICIAN: DR DATE: 22-Sep-97 TIME: 01:00:00 PM

FIELD DATA SHEET - SOIL VENTILATION - OPERATIONAL

PROJECT NAME:	PROJECT #	PROJECT MGR.
CONOCO SOUTH ROBERT	**24930601**	**MW**

TEMPERATURES	deg F	deg C
BUILDING, AMBIENT	NA	20.0
EXHAUST, WET BULB	32	26
EXHAUST, DRY BULB	32	37
MANIFOLD	32	

ALTITUDE	937	FMSL

STACK GAS COMPOSITION		
FID EXHAUST		ppm (vol/vol)
LEL EXHAUST	NT	% of LEL
STACK 02	NT	% (vol/vol)
STACK CO2	NT	% (vol/vol)
W = HUMIDITY RATIO		lb H2O/lb air

PRESSURES			
LOCATION	DISTANCE	READING	UNITS
STACK VP(1)	1 IN	0.02	in WCG
STACK VP(2)	3 IN	0.02	in WCG
STACK VP(3)	1 IN	0.02	in WCG
STACK VP(4)	3 IN	0.02	in WCG
VP(CENTER)	2 IN	0.02	in WCG
# OF TRAVERSE POINTS		4	unitless
EXHAUST STATIC		0.02	in WCG
BAROMETRIC		26.10	in Hg
MANIFOLD		11.5	in Hg
MANIFOLD		NO PORT 0.00	in WCG

EPA METHOD 18: LABORATORY DATA		
BENZENE	uG	NA
ETHYL BENZENE	uG	NA
TOLUENE	uG	NA
XYLENES	uG	NA
TOTAL HYDROCARBONS AS GASOLINE	uG	NA

NOTES: A) GMW GASOLINE ASUMED AS 95
B) CONVERSION FACTOR, GASOLINE (gallons/kg) 0.37

EPA METHOD 18: SAMPLE COLLECTION	
PUMP CALIBRATION (INITIAL):	14.97
PUMP CALIBRATION (FINAL):	NA
PUMP CALIBRATION (AVE):	NA
SAMPLE START TIME	13:42
SAMPLE STOP TIME	NA
SAMPLE TIME (minutes)	NA
SAMPLE VOLUME (liters)	NA

	DATA UPON ARRIVAL					REBALANCED	FLOW RATE	
	FID	PRESSURES (in WCG)				@ VENT SIDE	INITIAL	REBALANCED
LOCATION	READING	@ MANHOLE	@ VENT SIDE	@ BLOWER SIDE	DIFFERENTIAL	in WCG	scfm	scfm
RW-1	1		40		0.3	0	0.00	4.39
SVV-1	3		36				0.00	0.00
SVV-2	2		42				0.00	0.00
SVV-3	2		38				0.00	0.00
SVV-4	2		22				0.00	0.00
SVV-5	2		43				0.00	0.00
SVV-6	2		32		0.5		5.61	0.00
SVV-7	2		30		1		7.92	0.00
SVV-8	2		8		4.0	4	15.40	15.40
SVV-9	2		20				0.00	0.00
SVV-10	1.8		30		0.1	0	2.51	2.51
SVV-11	2		18				0.00	0.00
TOTAL							31.44	17.91

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(W)	NT	NT	NT
SVP-2(W)	NT	NT	NT
SVP-3(W)	NT	NT	NT
SVP-4(W)	NT	NT	NT
SVP-5(W)	NT	NT	NT
SVP-6(W)	NT	NT	NT

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(E)	NT	NT	NT
SVP-2(E)	NT	NT	NT
SVP-3(E)	NT	NT	NT
SVP-4(E)	NT	NT	NT
SVP-5(E)	NT	NT	NT
SVP-6(E)	NT	NT	NT

COMMENTS:

SVV 7 definatrly pulling water, emptied water colletor turned it off.

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SOIL VENTILATION PERFORMANCE PAGE 1

PROJECT NUMBER: 24930601.00

ANALYSIS PERFORMED BY: MPS

DATE PRINTED: 26-Sep-97 07:32:02 AM

DESCRIPTION	UNITS	
SYSTEM DATA		
STACK DATA		
OUTSIDE DIAMETER	INCHES	4.5
INSIDE DIAMETER	INCHES	4.026
FLOW AREA	SQFT	0.0884
ALTITUDE	FMSL	937
NUMBER OF BLOWERS	DIMENSIONLESS	4
FIELD DATA		
DATE	DD/MM/YY	22-Sep-97
TECHNICIAN	INITIALS	DR
TEMPERATURES		
BUILDING, AMBIENT	DEGREES F.	NA
EXHAUST, DRY BULB	DEGREES F.	32
EXHAUST, WET BULB	DEGREES F.	32
MANIFOLD	DEGREES F.	32
PRESSURES		
BAROMETRIC	IN. Hg	26.1
FLOWING GAS	IN. W.C. GAUGE	0.02
MANIFOLD	IN. W.C. GAUGE	NO PORT 0.00
EPA METHOD 2		
NUMBER OF TRAVERSE POINTS	DIMENSIONLESS	4
VP (POINT 1)	IN. W.C. GAUGE	0.02
VP (POINT 2)	IN. W.C. GAUGE	0.02
VP (POINT 3)	IN. W.C. GAUGE	0.02
VP (POINT 4)	IN. W.C. GAUGE	0.02
VP (CENTERLINE)	IN. W.C. GAUGE	0.02
CHEMICAL ANALYSIS		
FID	PPM (v/v)	0
FID (converted to uG/L)	uG/L	0
LABORATORY DATA (EPA METHOD 18)		
BENZENE	uG/L	ERR
ETHYL BENZENE	uG/L	ERR
TOLUENE	uG/L	ERR
XYLENES	uG/L	ERR
TOTAL HYDROCARBONS AS GASOLINE	uG/L	ERR

DATA REDUCTION						
GAS FLOW VELOCITY						
FIELD DATA, EPA METHOD 2						
AF = ALTITUDE FACTOR	DIMENSIONLESS	0.97				
W = HUMIDITY RATIO	LB H2O/LB AIR	0				
Vw = VOLUME WATER VAPOR (std)	CUFT/LB AIR	0				
Vgas = VOLUME OF GAS (dry, std)	CUFT/LB AIR	13.333333333				
Bws = WATER VAPOR IN GAS	VOL/VOL	0				
HV = HUMID VOLUME	CUFT/LB	13.333333333				
Ms = MOLECULAR WEIGHT OF STACK GAS	GAS DESITY	29				
p(SL) = DENSITY @ SEA LEVEL	LB/CUFT	0.0750				
p(ACTUAL) = DENSITY ACTUAL	LB/CUFT	0.0635				
Kp = PITOT TUBE CONSTANT		85.49				
PTF = PITOT TUBE FACTOR	DIMENSIONLESS	0.99				
T = TEMPERATURE OF STACK GAS	DEGREE R	492				
Ps = PRESSURE OF STACK GAS	IN Hg (abs)	26.101470588				
{(VP)^.5}ave	(IN H2O)^0.5	0.1414				
VS = VELOCITY OF STACK GAS	FT/SEC	9.6497613663				
GAS FLOW RATE						
EPA METHOD 2	SCFM	48	0.0226181438	M^3/SEC		
BLOWER PERFORMANCE CURVE	SCFM	440	0.20768	M^3/SEC		
TOTAL OF VENTS						
ORIFICE						
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	ERR	M^3/SEC		
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	ERR	M^3/SEC		
PRODUCT REMOVAL RATE						
EPA METHODS 2 & 18 (USEPA REPORTING)			SER	% OF SER	LBS/YEAR	
BENZENE	uG/SEC	ERR	4600	ERR	319.362912	4321.1028837
ETHYLBENZENE	uG/SEC	ERR	497700	ERR	34553.678544	
TOLUENE	uG/SEC	ERR	429800	ERR	29839.604256	
XYLENES	uG/SEC	ERR	497700	ERR	34553.678544	
TOTAL HYDROCARBON AS GASOLINE	uG/SEC	ERR	718065	ERR	49852.897959	5.6870748299

STATE OF MINNESOTA REPORTING		OBSERVED	LIMIT	% OF LIMIT
BENZENE	gallons/day	ERR	0.87	ERR
TOTAL HYDROCARBON AS GASOLINE	gallons/day	ERR	136.49	ERR
EPA METHODS 2 & FID	gallons/day	0.00	136.49	0.00%
BLOWER PERFORMANCE CURVE & FID	gallons/day	0.00	136.49	0.00%
SUM OF VENTS (ORIFICE), INITIAL	gallons/day	ERR	136.49	ERR
SUM OF VENTS (ORIFICE), ADJUSTED	gallons/day	ERR	136.49	ERR

NOTES:

TO CONVERT uG/L TO uG/M^3 MULTIPLY BY 0.001

TO CALCULATE uG/L DIVIDE ANALYSIS BY SAMPLED VOLUME IN LITERS

TO CALCULATE SAMPLE VOLUME MULTIPLY AVERAGE OF PUMP CALIBRATION BY SAMPLE TIME

SOIL VENTILATION PERFORMANCE PAGE 1 PAGE 2
PROJECT NUMBER: 24930601.00
ANALYSIS PERFORMED BY: MPS
DATE PRINTED: 26-Sep-97 07:32:02 AM

DESCRIPTION	UNITS																	
SYSTEM DATA																		
IDENTIFICATION	DIMENSIONLESS	SYSTEM	RW-1	SVV-1	SVV-2	SVV-3	SVV-4	ERR	SVV-5	SVV-6	ERR	ERR	SVV-7	SVV-8	SVV-9	SVV-10	SVV-11	
D = DIAMETER, PIPE INSIDE	INCHES	4.026	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
d = DIAMETER, ORIFICE	INCHES	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
B = BETA RATIO	DIMENSIONLESS	0.186	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375
NUMBER OF BLOWERS	DIMENSIONLESS	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DESIGN SOIL THICKNESS	FEET	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
DESIGN GAS EXCHANGE RATE	MIN/EXCHANGE	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
DESIGN GAS FLOW RATE	SCFM	150	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
FIELD DATA																		
DATE	DD/MM/YY	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97
TECHNICIAN	INITIALS	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
PRESSURE																		
@ MANHOLE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0	0
VENT SIDE (FLOWING GAS PRESSURE)	IN. W.C. GAUGE	NA	40	36	42	38	22	ERR	43	32	ERR	ERR	30	6.4	20	30	18	
BLOWER SIDE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0	
MANIFOLD	IN. W.C. GAUGE	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	
EXHAUST	IN. W.C. GAUGE	0.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
ORIFICE PLATE																		
DIFFERENTIAL, UPON ARRIVAL	IN. W.C. GAUGE	NA	0.3	0	0	0	0	ERR	0	0.5	ERR	ERR	1	4	0	0.1	0	
DIFFERENTIAL, RE-ADJUSTED	IN. W.C. GAUGE	NA	0.3	0	0	0	0	ERR	0	0	ERR	ERR	0	4	0	0.1	0	
TEMPERATURE, FLOWING GAS	DEGREE F	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
COMMENTS	EXPLANATION																	
FID	PPM (v/v)	0	0.6	3.4	1.8	2	1.6	ERR	1.8	1.8	ERR	ERR	1.8	1.8	1.8	1.8	1.6	
FID (converted to ug/L)	ug/L	0	2	13	7	8	6	ERR	7	7	ERR	ERR	7	7	7	7	6	
DATA REDUCTION																		
G = SPECIFIC GRAVITY, GAS	DIMENSIONLESS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Rd = REYNOLD'S #, DESIGN	DIMENSIONLESS	63011	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	
K = ORIFICE COEFFICIENT	DIMENSIONLESS	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	
Fa = ORIFICE EXPANSION FACTOR	DIMENSIONLESS	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	
Ti = TEMPERATURE OF FLOWING GAS	DEG R	492	492	492	492	492	492	492	492	492	492	492	492	492	492	492	492	
Pi = PRESSURE OF FLOWING GAS	PSIA	14.7	16.1452	16.00068	16.21746	16.07294	15.49486	ERR	16.25359	15.85616	ERR	ERR	15.7839	15.003492	15.4226	15.7839	15.36034	
Fpv = GAS COMPRESSIBILITY FACTOR	DIMENSIONLESS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Y = GAS EXPANSION FACTOR	DIMENSIONLESS	1	0.9997770235	1	1	1	1	ERR	1	0.9996215982	ERR	ERR	0.9992397316	0.9968007448	1	0.9999239732	1	
ORIFICE																		
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	4.39	0.00	0.00	0.00	0.00	ERR	0.00	5.61	ERR	ERR	7.92	15.40	0.00	2.51	0.00	
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	4.39	0.00	0.00	0.00	0.00	ERR	0.00	0.00	ERR	ERR	0.00	15.40	0.00	2.51	0.00	
PRODUCT REMOVAL RATE																		
ORIFICE, INITIAL	POUNDS/HR	ERR	0.0002	0.0000	0.0000	0.0000	0.0000	ERR	0.0000	0.0006	ERR	ERR	0.0008	0.0016	0.0000	0.0003	0.0000	
ORIFICE ADJUSTED	POUNDS/HR	ERR	0.0002	0.0000	0.0000	0.0000	0.0000	ERR	0.0000	0.0000	ERR	ERR	0.0000	0.0016	0.0000	0.0003	0.0000	
EFFECTIVENESS																		
RADIUS, ORIFICE, INITIAL	FEET	NA	7.48	0.50	0.50	0.50	0.50	ERR	0.50	9.43	ERR	ERR	13.10	25.01	0.50	4.49	0.50	
RADIUS, ORIFICE, ADJUSTED	FEET	NA	7.48	0.50	0.50	0.50	0.50	ERR	0.50	0.50	ERR	ERR	0.50	25.01	0.50	4.49	0.50	

DAHL
& ASSOCIATES, INC

TECHNICIAN: DM DATE: 20-Jun-95 TIME: 11:00 09:45:00 AM

FIELD DATA SHEET - SOIL VENTILATION - OPERATIONAL

PROJECT NAME:	PROJECT #	PROJECT MGR.
CONOCO SOUTH ROBERT	**24930601**	**MW**

TEMPERATURES	deg F	deg C
BUILDING, AMBIENT	85	29.4
EXHAUST, WET BULB	77	25
EXHAUST, DRY BULB	118.4	48
MANIFOLD	50	10

ALTITUDE	937	FMSL

STACK GAS COMPOSITION		
FID EXHAUST	180	ppm (vol/vol)
LEL EXHAUST	0	% of LEL
STACK 02	18.64	% (vol/vol)
STACK CO2	0	% (vol/vol)
W = HUMIDITY RATIO	0.012	lb H2O/lb air

PRESSURES			
LOCATION	DISTANCE	READING	UNITS
STACK VP(1)	1 IN	0.04	in WCG
STACK VP(2)	3 IN	0.04	in WCG
STACK VP(3)	1 IN	0.04	in WCG
STACK VP(4)	3 IN	0.04	in WCG
VP(CENTER)	2 IN	0.04	in WCG
# OF TRAVERSE POINTS		4	unitless
EXHAUST STATIC		0.01	in WCG
BAROMETRIC		28.97	in Hg
MANIFOLD		NA	in Hg
MANIFOLD		0.00	in WCG

EPA METHOD 18: LABORATORY DATA		
BENZENE	uG	16
ETHYL BENZENE	uG	15
TOLUENE	uG	17
XYLENES	uG	140
TOTAL HYDROCARBONS AS GASOLINE	uG	2900

NOTES: A) GMW GASOLINE ASUMED AS 95
B) CONVERSION FACTOR, GASOLINE (gallons/kg) 0.37

EPA METHOD 18: SAMPLE COLLECTION	
PUMP CALIBRATION (INITIAL):	15.09
PUMP CALIBRATION (FINAL):	14.68
PUMP CALIBRATION (AVE):	14.885
SAMPLE START TIME	11:00:00 AM
SAMPLE STOP TIME	11:50:00 AM
SAMPLE TIME (minutes)	50
SAMPLE VOLUME (liters)	10.08

	DATA UPON ARRIVAL					REBALANCED	FLOW RATE	
	FID	PRESSURES (in WCG)				DIFFERENTIAL	INITIAL	REBALANCED
LOCATION	READING	@ MANHOLE	@ VENT SIDE	@ BLOWER SIDE	DIFFERENTIAL	in WCG	scfm	scfm
RW-1	40		-25		1.4		8.60	0.00
SVV-1	125		-24		0.4		4.61	0.00
SVV-2	600		-25		0.1		2.30	0.00
SVV-3	170		-16		0.3		4.03	0.00
SVV-4	90		-15		0.3		0.00	0.00
SVV-5	310		-15		0		4.66	0.00
SVV-6	70		-29		0.4		9.70	0.00
SVV-7	45		-24		1.8		21.93	0.00
SVV-8	40		-16		9.2		5.20	0.00
SVV-9	30		-18		0.5		3.28	0.00
SVV-10	72		-14		0.2		ERR	ERR
SVV-11	87		-20		0.3		4.01	0.00
TOTAL							ERR	ERR

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(W)	20	NA	-0.08
SVP-2(W)	450	2.2	-1.6
SVP-3(W)	50	1.3	0.02
SVP-4(W)	17	6.4	-0.16
SVP-5(W)			
SVP-6(W)			

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(E)	20	2.3	0.02
SVP-2(E)	650	10.5	1
SVP-3(E)	65	3.2	-0.12
SVP-4(E)	20	7.2	-0.16
SVP-5(E)			
SVP-6(E)			

COMMENTS:

Rebalanced vent side vac.

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SOIL VENTILATION PERFORMANCE PAGE 1
PROJECT NUMBER: 24930601.00
ANALYSIS PERFORMED BY: MPS
DATE PRINTED: 26-Sep-97 10:05:23 AM

DESCRIPTION	UNITS	
SYSTEM DATA		
STACK DATA		
OUTSIDE DIAMETER	INCHES	4.5
INSIDE DIAMETER	INCHES	4.026
FLOW AREA	SQFT	0.0884
ALTITUDE	FMSL	937
NUMBER OF BLOWERS	DIMENSIONLESS	4
FIELD DATA		
DATE	DD/MM/YY	20-Jun-95
TECHNICIAN	INITIALS	DM
TEMPERATURES		
BUILDING, AMBIENT	DEGREES F.	85
EXHAUST, DRY BULB	DEGREES F.	118.4
EXHAUST, WET BULB	DEGREES F.	77
MANIFOLD	DEGREES F.	50
PRESSURES		
BAROMETRIC	IN. Hg	28.97
FLOWING GAS	IN. W.C. GAUGE	0.01
MANIFOLD	IN. W.C. GAUGE	0
EPA METHOD 2		
NUMBER OF TRAVERSE POINTS	DIMENSIONLESS	4
VP (POINT 1)	IN. W.C. GAUGE	0.04
VP (POINT 2)	IN. W.C. GAUGE	0.04
VP (POINT 3)	IN. W.C. GAUGE	0.04
VP (POINT 4)	IN. W.C. GAUGE	0.04
VP (CENTERLINE)	IN. W.C. GAUGE	0.04
CHEMICAL ANALYSIS		
FID	PPM (v/v)	180
FID (converted to uG/L)	uG/L	698
LABORATORY DATA (EPA METHOD 18)		
BENZENE	uG/L	1.5877333333
ETHYL BENZENE	uG/L	1.4885
TOLUENE	uG/L	1.6869666667
XYLENES	uG/L	13.892666667
TOTAL HYDROCARBONS AS GASOLINE	uG/L	287.77666667

DATA REDUCTION		
GAS FLOW VELOCITY		
FIELD DATA, EPA METHOD 2		
AF = ALTITUDE FACTOR	DIMENSIONLESS	0.97
W = HUMIDITY RATIO	LB H2O/LB AIR	0.012
Vw = VOLUME WATER VAPOR (std)	CUFT/LB AIR	0.2562071523
Vgas = VOLUME OF GAS (dry, std)	CUFT/LB AIR	13.333333333
Bws = WATER VAPOR IN GAS	VOL/VOL	0.0188532609
HV = HUMID VOLUME	CUFT/LB	13.589540486
Ms = MOLECULAR WEIGHT OF STACK GAS	GAS DESITY	28.79261413
p(SL) = DENSITY @ SEA LEVEL	LB/CUFT	0.0745
p(ACTUAL) = DENSITY ACTUAL	LB/CUFT	0.0700
Kp = PITOT TUBE CONSTANT		85.49
PTF = PITOT TUBE FACTOR	DIMENSIONLESS	0.99
T = TEMPERATURE OF STACK GAS	DEGREE R	578.4
Ps = PRESSURE OF STACK GAS	IN Hg (abs)	28.970735294
{(VP)^.5}ave	(IN H2O)^0.5	0.2000
VS = VELOCITY OF STACK GAS	FT/SEC	14.095300594

GAS FLOW RATE				
EPA METHOD 2	SCFM	66	0.0311922059	M^3/SEC
BLOWER PERFORMANCE CURVE	SCFM	440	0.20768	M^3/SEC
TOTAL OF VENTS				
ORIFICE				
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	ERR	M^3/SEC
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	ERR	M^3/SEC
PRODUCT REMOVAL RATE				
EPA METHODS 2 & 18 (USEPA REPORTING)			SER	% OF SER
BENZENE	uG/SEC	50	4600	1.08
ETHYLBENZENE	uG/SEC	46	497700	0.01
TOLUENE	uG/SEC	53	429800	0.01
XYLENES	uG/SEC	433	497700	0.09
TOTAL HYDROCARBON AS GASOLINE	uG/SEC	8977	718065	1.25

LBS/YEAR						
319.362912	4321.1028837					
34553.678544						
29839.604256						
34553.678544						
49852.897959	5.6870748299					

STATE OF MINNESOTA REPORTING		OBSERVED	LIMIT	% OF LIMIT
BENZENE	gallons/day	0.00	0.87	0.18%
TOTAL HYDROCARBON AS GASOLINE	gallons/day	0.29	136.49	0.21%
EPA METHODS 2 & FID	gallons/day	0.70	136.49	0.51%
BLOWER PERFORMANCE CURVE & FID	gallons/day	4.63	136.49	3.40%
SUM OF VENTS (ORIFICE), INITIAL	gallons/day	ERR	136.49	ERR
SUM OF VENTS (ORIFICE), ADJUSTED	gallons/day	ERR	136.49	ERR

NOTES:
TO CONVERT uG/L TO uG/M^3 MULTIPLY BY 0.001
TO CALCULATE uG/L DIVIDE ANALYSIS BY SAMPLED VOLUME IN LITERS
TO CALCULATE SAMPLE VOLUME MULTIPLY AVERAGE OF PUMP CALIBRATION BY SAMPLE TIME

SOIL VENTILATION PERFORMANCE PAGE 1 PAGE 2
PROJECT NUMBER: 24930601.00
ANALYSIS PERFORMED BY: MPS
DATE PRINTED: 26-Sep-97 10:05:23 AM

DESCRIPTION	UNITS																
SYSTEM DATA																	
IDENTIFICATION	DIMENSIONLESS	SYSTEM	RW-1	SVV-1	SVV-2	SVV-3	SVV-4	ERR	SVV-5	SVV-6	ERR	ERR	SVV-7	SVV-8	SVV-9	SVV-10	SVV-11
D = DIAMETER, PIPE INSIDE	INCHES	4.026	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
d = DIAMETER, ORIFICE	INCHES	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
B = BETA RATIO	DIMENSIONLESS	0.186	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375
NUMBER OF BLOWERS	DIMENSIONLESS	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DESIGN SOIL THICKNESS	FEET	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
DESIGN GAS EXCHANGE RATE	MIN/EXCHANGE	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
DESIGN GAS FLOW RATE	SCFM	150	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
FIELD DATA																	
DATE	DD/MM/YY	20-Jun-95	20-Jun-95	20-Jun-95	20-Jun-95	20-Jun-95	20-Jun-95	20-Jun-95	20-Jun-95	20-Jun-95	20-Jun-95	20-Jun-95	20-Jun-95	20-Jun-95	20-Jun-95	20-Jun-95	20-Jun-95
TECHNICIAN	INITIALS	DM	DM	DM	DM	DM	DM	DM	DM	DM	DM	DM	DM	DM	DM	DM	DM
PRESSURE																	
@ MANHOLE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0
VENT SIDE (FLOWING GAS PRESSURE)	IN. W.C. GAUGE	NA	-25	-24	-25	-16	-15	ERR	-15	-29	ERR	ERR	-24	-16	-18	-14	-20
BLOWER SIDE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0
MANIFOLD	IN. W.C. GAUGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EXHAUST	IN. W.C. GAUGE	0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ORIFICE PLATE																	
DIFFERENTIAL, UPON ARRIVAL	IN. W.C. GAUGE	NA	1.4	0.4	0.1	0.3	0	ERR	0.4	1.8	ERR	ERR	9.2	0.5	0.2	ERR	0.3
DIFFERENTIAL, RE-ADJUSTED	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0
TEMPERATURE, FLOWING GAS	DEGREE F	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
COMMENTS	EXPLANATION																
FID	PPM (V/V)	180	40	125	600	170	90	ERR	310	70	ERR	ERR	45	40	30	72	87
FID (converted to ug/L)	uG/L	698	155	485	2327	659	349	ERR	1202	271	ERR	ERR	174	155	116	279	337
DATA REDUCTION																	
G = SPECIFIC GRAVITY, GAS	DIMENSIONLESS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Rd = REYNOLD'S #, DESIGN	DIMENSIONLESS	63011	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456
K = ORIFICE COEFFICIENT	DIMENSIONLESS	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110
Fa = ORIFICE EXPANSION FACTOR	DIMENSIONLESS	0.99976775	0.99976775	0.99976775	0.99976775	0.99976775	0.99976775	0.99976775	0.99976775	0.99976775	0.99976775	0.99976775	0.99976775	0.99976775	0.99976775	0.99976775	0.99976775
Ti = TEMPERATURE OF FLOWING GAS	DEG R	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510
Pf = PRESSURE OF FLOWING GAS	PSIA	14.7	13.79675	13.83288	13.79675	14.12192	14.15805	ERR	14.15805	13.65223	ERR	ERR	13.83288	14.12192	14.04966	14.19418	13.9774
Fpv = GAS COMPRESSIBILITY FACTOR	DIMENSIONLESS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Y = GAS EXPANSION FACTOR	DIMENSIONLESS	1	0.9987823219	0.9996530007	0.999913023	0.9997450772	1	ERR	0.9996609703	0.9984178409	ERR	ERR	0.9920190156	0.9995751286	0.9998291774	ERR	0.9997424414
ORIFICE																	
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	8.60	4.61	2.30	4.03	0.00	ERR	4.66	9.70	ERR	ERR	21.93	5.20	3.28	ERR	4.01
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	0.00	0.00	0.00	0.00	0.00	ERR	0.00	0.00	ERR	ERR	0.00	0.00	0.00	ERR	0.00
PRODUCT REMOVAL RATE																	
ORIFICE, INITIAL	POUNDS/HR	ERR	0.0201	0.0337	0.0808	0.0401	0.0000	ERR	0.0845	0.0397	ERR	ERR	0.0577	0.0122	0.0058	ERR	0.0204
ORIFICE ADJUSTED	POUNDS/HR	ERR	0.0000	0.0000	0.0000	0.0000	0.0000	ERR	0.0000	0.0000	ERR	ERR	0.0000	0.0000	0.0000	ERR	0.0000
EFFECTIVENESS																	
RADIUS, ORIFICE, INITIAL	FEET	NA	14.19	7.63	4.16	6.92	0.50	ERR	7.92	15.94	ERR	ERR	35.40	8.78	5.73	ERR	6.88
RADIUS, ORIFICE, ADJUSTED	FEET	NA	0.50	0.50	0.50	0.50	0.50	ERR	0.50	0.50	ERR	ERR	0.50	0.50	0.50	ERR	0.50

DAHL

& ASSOCIATES, INC

TECHNICIAN: JLH DATE: 21-Sep-95 TIME: 11:00 11:30:00 AM

FIELD DATA SHEET - SOIL VENTILATION - OPERATIONAL

PROJECT NAME:	PROJECT #	PROJECT MGR.
CONOCO SOUTH ROBERT	**24930601**	**MW**

TEMPERATURES	deg F	deg C
BUILDING, AMBIENT	64.4	18.0
EXHAUST, WET BULB	86	30
EXHAUST, DRY BULB	59	15
MANIFOLD	53.6	12

ALTITUDE	937	FMSL

STACK GAS COMPOSITION		
FID EXHAUST	40	ppm (vol/vol)
LEL EXHAUST	0	% of LEL
STACK 02	19.5	% (vol/vol)
STACK CO2	0	% (vol/vol)
W = HUMIDITY RATIO	0.012	lb H2O/lb air

PRESSURES			
LOCATION	DISTANCE	READING	UNITS
STACK VP(1)	1 IN	0.03	in WCG
STACK VP(2)	3 IN	0.03	in WCG
STACK VP(3)	1 IN	0.03	in WCG
STACK VP(4)	3 IN	0.03	in WCG
VP(CENTER)	2 IN	0.03	in WCG
# OF TRAVERSE POINTS		5	unitless
EXHAUST STATIC		0	in WCG
BAROMETRIC		29.3	in Hg
MANIFOLD		NA	in Hg
MANIFOLD		0.00	in WCG

EPA METHOD 18: LABORATORY DATA		
BENZENE	uG	18
ETHYL BENZENE	uG	61
TOLUENE	uG	77
XYLENES	uG	250
TOTAL HYDROCARBONS AS GASOLINE	uG	5700

NOTES: A) GMW GASOLINE ASUMED AS 95

B) CONVERSION FACTOR, GASOLINE (gallons/kg) 0.37

EPA METHOD 18: SAMPLE COLLECTION	
PUMP CALIBRATION (INITIAL):	15.89
PUMP CALIBRATION (FINAL):	15.86
PUMP CALIBRATION (AVE):	15.875
SAMPLE START TIME	01:00:00 PM
SAMPLE STOP TIME	01:50:00 PM
SAMPLE TIME (minutes)	50
SAMPLE VOLUME (liters)	10

		DATA UPON ARRIVAL				REBALANCED	FLOW RATE	
	FID	PRESSURES (in WCG)				@ VENT SIDE	INITIAL	REBALANCED
LOCATION	READING	@ MANHOLE	@ VENT SIDE	@ BLOWER SIDE	DIFFERENTIAL	in WCG	scfm	scfm
RW-1	25		-20		0.8	-20	6.53	ERR
SVV-1	200		-18		0.1	-20	2.31	ERR
SVV-2	275		0		0.1	-15	2.37	ERR
SVV-3	110		-10		0	-15	0.00	ERR
SVV-4	40		-11		0.1	-15	2.34	ERR
SVV-5	160		0		0	-15	0.00	ERR
SVV-6	7		-13		0	-15	0.00	ERR
SVV-7	16		-16		0.8	-20	6.56	ERR
SVV-8	8		-15		4.5	-20	15.53	ERR
SVV-9	8		-9		0	-15	0.00	ERR
SVV-10	20		-2		0.2	-15	3.34	ERR
SVV-11	32		-8		0	-15	0.00	ERR
TOTAL							32.44	ERR

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(W)	40	NT	-0.8
SVP-2(W)	600	NT	-0.1
SVP-3(W)	10000	NT	0
SVP-4(W)	20	NT	0
SVP-5(W)			
SVP-6(W)			

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(E)	100	NT	0
SVP-2(E)	550	NT	0.18
SVP-3(E)	180	NT	0
SVP-4(E)	22	NT	-0.4
SVP-5(E)			
SVP-6(E)			

COMMENTS:

Rebalanced vent side vac.

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SOIL VENTILATION PERFORMANCE

PROJECT NUMBER: 24930601.00
ANALYSIS PERFORMED BY: MPS
DATE PRINTED: 26-Sep-97 10:24:11 AM

DESCRIPTION	UNITS	
SYSTEM DATA		
STACK DATA		
OUTSIDE DIAMETER	INCHES	4.5
INSIDE DIAMETER	INCHES	4.026
FLOW AREA	SQFT	0.0884
ALTITUDE	FMSL	937
NUMBER OF BLOWERS	DIMENSIONLESS	4
FIELD DATA		
DATE	DD/MM/YY	21-Sep-95
TECHNICIAN	INITIALS	JLH
TEMPERATURES		
BUILDING, AMBIENT	DEGREES F.	64.4
EXHAUST, DRY BULB	DEGREES F.	59
EXHAUST, WET BULB	DEGREES F.	86
MANIFOLD	DEGREES F.	53.6
PRESSURES		
BAROMETRIC	IN. Hg	29.3
FLOWING GAS	IN. W.C. GAUGE	0
MANIFOLD	IN. W.C. GAUGE	0
EPA METHOD 2		
NUMBER OF TRAVERSE POINTS	DIMENSIONLESS	5
VP (POINT 1)	IN. W.C. GAUGE	0.03
VP (POINT 2)	IN. W.C. GAUGE	0.03
VP (POINT 3)	IN. W.C. GAUGE	0.03
VP (POINT 4)	IN. W.C. GAUGE	0.03
VP (CENTERLINE)	IN. W.C. GAUGE	0.03
CHEMICAL ANALYSIS		
FID	PPM (v/v)	40
FID (converted to uG/L)	uG/L	155
LABORATORY DATA (EPA METHOD 18)		
BENZENE	uG/L	1.8
ETHYL BENZENE	uG/L	6.1
TOLUENE	uG/L	7.7
XYLENES	uG/L	25
TOTAL HYDROCARBONS AS GASOLINE	uG/L	570

DATA REDUCTION		
GAS FLOW VELOCITY		
FIELD DATA, EPA METHOD 2		
AF = ALTITUDE FACTOR	DIMENSIONLESS	0.97
W = HUMIDITY RATIO	LB H2O/LB AIR	0.012
Vw = VOLUME WATER VAPOR (std)	CUFT/LB AIR	0.2562071523
Vgas = VOLUME OF GAS (dry, std)	CUFT/LB AIR	13.333333333
Bws = WATER VAPOR IN GAS	VOL/VOL	0.0188532609
HV = HUMID VOLUME	CUFT/LB	13.589540486
Ms = MOLECULAR WEIGHT OF STACK GAS	GAS DESITY	28.79261413
p(SL) = DENSITY @ SEA LEVEL	LB/CUFT	0.0745
p(ACTUAL) = DENSITY ACTUAL	LB/CUFT	0.0708
Kp = PITOT TUBE CONSTANT		85.49
PTF = PITOT TUBE FACTOR	DIMENSIONLESS	0.99
T = TEMPERATURE OF STACK GAS	DEGREE R	519
Ps = PRESSURE OF STACK GAS	IN Hg (abs)	29.3
{(VP)^.5}ave	(IN H2O)^0.5	0.1386
VS = VELOCITY OF STACK GAS	FT/SEC	9.1983609223

GAS FLOW RATE				
EPA METHOD 2	SCFM	49	0.0229430537	M^3/SEC
BLOWER PERFORMANCE CURVE	SCFM	440	0.20768	M^3/SEC
TOTAL OF VENTS				
ORIFICE				
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	ERR	M^3/SEC
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	ERR	M^3/SEC

PRODUCT REMOVAL RATE						
EPA METHODS 2 & 18 (USEPA REPORTING)			SER	% OF SER	LBS/YEAR	
BENZENE	uG/SEC	41	4600	0.90	319.362912	4321.1028837
ETHYLBENZENE	uG/SEC	140	497700	0.03	34553.678544	
TOLUENE	uG/SEC	177	429800	0.04	29839.604256	
XYLENES	uG/SEC	574	497700	0.12	34553.678544	
TOTAL HYDROCARBON AS GASOLINE	uG/SEC	13078	718065	1.82	49852.897959	5.6870748299

STATE OF MINNESOTA REPORTING		OBSERVED	LIMIT	% OF LIMIT
BENZENE	gallons/day	0.00	0.87	0.15%
TOTAL HYDROCARBON AS GASOLINE	gallons/day	0.42	136.49	0.31%
EPA METHODS 2 & FID	gallons/day	0.11	136.49	0.08%
BLOWER PERFORMANCE CURVE & FID	gallons/day	1.03	136.49	0.75%
SUM OF VENTS (ORIFICE), INITIAL	gallons/day	ERR	136.49	ERR
SUM OF VENTS (ORIFICE), ADJUSTED	gallons/day	ERR	136.49	ERR

NOTES:
TO CONVERT uG/L TO uG/M^3 MULTIPLY BY 0.001
TO CALCULATE uG/L DIVIDE ANALYSIS BY SAMPLED VOLUME IN LITERS
TO CALCULATE SAMPLE VOLUME MULTIPLY AVERAGE OF PUMP CALIBRATION BY SAMPLE TIME

SOIL VENTILATION PERFORMANCE
PROJECT NUMBER: 24930601.00
ANALYSIS PERFORMED BY: MPS
DATE PRINTED: 26-Sep-97 10:01:14 AM

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PAGE 2

DESCRIPTION	UNITS																	
SYSTEM DATA																		
IDENTIFICATION	DIMENSIONLESS	SYSTEM	RW-1	SVV-1	SVV-2	SVV-3	SVV-4	ERR	SVV-5	SVV-6	ERR	ERR	SVV-7	SVV-8	SVV-9	SVV-10	SVV-11	
D = DIAMETER, PIPE INSIDE	INCHES	4.026	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
d = DIAMETER, ORIFICE	INCHES	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
B = BETA RATIO	DIMENSIONLESS	0.186	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375
NUMBER OF BLOWERS	DIMENSIONLESS	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DESIGN SOIL THICKNESS	FEET	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
DESIGN GAS EXCHANGE RATE	MIN/EXCHANGE	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
DESIGN GAS FLOW RATE	SCFM	150	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
FIELD DATA																		
DATE	DD/MM/YY	21-Sep-95	21-Sep-95	21-Sep-95	21-Sep-95	21-Sep-95	21-Sep-95	21-Sep-95	21-Sep-95	21-Sep-95	21-Sep-95	21-Sep-95	21-Sep-95	21-Sep-95	21-Sep-95	21-Sep-95	21-Sep-95	21-Sep-95
TECHNICIAN	INITIALS	JLH	JLH	JLH	JLH	JLH	JLH	JLH	JLH	JLH	JLH	JLH	JLH	JLH	JLH	JLH	JLH	JLH
PRESSURE																		
@ MANHOLE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0	
VENT SIDE (FLOWING GAS PRESSURE)	IN. W.C. GAUGE	NA	-20	-18	0	-10	-11	ERR	0	-13	ERR	ERR	-16	-15	-9	-2	-8	
BLOWER SIDE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0	
MANIFOLD	IN. W.C. GAUGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
EXHAUST	IN. W.C. GAUGE	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
ORIFICE PLATE																		
DIFFERENTIAL, UPON ARRIVAL	IN. W.C. GAUGE	NA	0.8	0.1	0.1	0	0.1	ERR	0	0	ERR	ERR	0.8	4.5	0	0.2	0	
DIFFERENTIAL, RE-ADJUSTED	IN. W.C. GAUGE	NA	-20	-20	-15	-15	-15	ERR	-15	-15	ERR	ERR	-20	-20	-15	-15	-15	
TEMPERATURE, FLOWING GAS	DEGREE F	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	
COMMENTS	EXPLANATION																	
FID	PPM (v/v)	40	25	200	275	110	40	ERR	160	7	ERR	ERR	16	8	8	20	32	
FID (converted to ug/L)	uG/L	155	97	776	1066	427	155	ERR	620	27	ERR	ERR	62	31	31	78	124	
DATA REDUCTION																		
G = SPECIFIC GRAVITY, GAS	DIMENSIONLESS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Rd = REYNOLD'S #, DESIGN	DIMENSIONLESS	63011	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	
K = ORIFICE COEFFICIENT	DIMENSIONLESS	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	
Fa = ORIFICE EXPANSION FACTOR	DIMENSIONLESS	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	
Tf = TEMPERATURE OF FLOWING GAS	DEG R	513.6	513.6	513.6	513.6	513.6	513.6	513.6	513.6	513.6	513.6	513.6	513.6	513.6	513.6	513.6	513.6	
Pf = PRESSURE OF FLOWING GAS	PSIA	14.7	13.9774	14.04966	14.7	14.3387	14.30257	ERR	14.7	14.23031	ERR	ERR	14.12192	14.15805	14.37483	14.62774	14.41096	
Fpv = GAS COMPRESSIBILITY FACTOR	DIMENSIONLESS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Y = GAS EXPANSION FACTOR	DIMENSIONLESS	1	0.999313177	0.9999145867	0.9999183673	1	0.999916099	ERR	1	1	ERR	ERR	0.9993202058	0.9961859154	1	0.9998359282	1	
ORIFICE																		
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	6.53	2.31	2.37	0.00	2.34	ERR	0.00	0.00	ERR	ERR	6.56	15.53	0.00	3.34	0.00	
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	
PRODUCT REMOVAL RATE																		
ORIFICE, INITIAL	POUNDS/HR	ERR	0.0095	0.0271	0.0381	0.0000	0.0055	ERR	0.0000	0.0000	ERR	ERR	0.0061	0.0073	0.0000	0.0039	0.0000	
ORIFICE ADJUSTED	POUNDS/HR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	
EFFECTIVENESS																		
RADIUS, ORIFICE, INITIAL	FEET	NA	10.89	4.18	4.27	0.50	4.22	ERR	0.50	0.50	ERR	ERR	10.94	25.21	0.50	5.81	0.50	
RADIUS, ORIFICE, ADJUSTED	FEET	NA	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	

DAHL

& ASSOCIATES, INC

TECHNICIAN: DM DATE: 22-Dec-95 TIME: 10:00:00 AM

FIELD DATA SHEET - SOIL VENTILATION - OPERATIONAL

PROJECT NAME:	PROJECT #	PROJECT MGR.
CONOCO SOUTH ROBERT	**24930601**	**MW**

TEMPERATURES	deg F	deg C
BUILDING, AMBIENT	45.5	7.5
EXHAUST, WET BULB	51.8	11
EXHAUST, DRY BULB	75.2	24
MANIFOLD	158	70

ALTITUDE	937	FMSL

STACK GAS COMPOSITION		
FID EXHAUST		ppm (vol/vol)
LEL EXHAUST	0	% of LEL
STACK 02	18.5	% (vol/vol)
STACK CO2	0	% (vol/vol)
W = HUMIDITY RATIO		lb H2O/lb air

PRESSURES			
LOCATION	DISTANCE	READING	UNITS
STACK VP(1)	1 IN	0.02	in WCG
STACK VP(2)	3 IN	0.02	in WCG
STACK VP(3)	1 IN	0.02	in WCG
STACK VP(4)	3 IN	0.02	in WCG
VP(CENTER)	2 IN	0.02	in WCG
# OF TRAVERSE POINTS		5	unitless
EXHAUST STATIC		0	in WCG
BAROMETRIC		29.21	in Hg
MANIFOLD		NA	in Hg
MANIFOLD		0.00	in WCG

EPA METHOD 18: LABORATORY DATA		
BENZENE	uG	5.2
ETHYL BENZENE	uG	3.5
TOLUENE	uG	4.7
XYLENES	uG	13
TOTAL HYDROCARBONS AS GASOLINE	uG	220

NOTES: A) GMW GASOLINE ASUMED AS 95

B) CONVERSION FACTOR, GASOLINE (gallons/kg) 0.37

EPA METHOD 18: SAMPLE COLLECTION	
PUMP CALIBRATION (INITIAL):	15.13
PUMP CALIBRATION (FINAL):	14.79
PUMP CALIBRATION (AVE):	14.95
SAMPLE START TIME	10:28:00 AM
SAMPLE STOP TIME	11:18:00 AM
SAMPLE TIME (minutes)	50
SAMPLE VOLUME (liters)	10.00

	DATA UPON ARRIVAL					REBALANCED	FLOW RATE	
	FID	PRESSURES (in WCG)				@ VENT SIDE	INITIAL	REBALANCED
LOCATION	READING	@ MANHOLE	@ VENT SIDE	@ BLOWER SIDE	DIFFERENTIAL	in WCG	scfm	scfm
RW-1	3		-11		1.8		9.04	0.00
SVV-1	5		-46		0		0.00	0.00
SVV-2	25		-14		0.3		3.68	0.00
SVV-3	15		-12		0.1		2.13	0.00
SVV-4	3		-13		0.3		3.68	0.00
SVV-5	15		-12		0		0.00	0.00
SVV-6	3		-15		0.1		2.12	0.00
SVV-7	3		-4		0		0.00	0.00
SVV-8	3		-25		4.8		14.46	0.00
SVV-9	3		-9		0.2		3.02	0.00
SVV-10	3		-12		0.1		2.13	0.00
SVV-11	5		-20		0.5		4.71	0.00
TOTAL							35.94	0.00

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(W)	5		-1.5
SVP-2(W)	1		-0.8
SVP-3(W)	3		-1.7
SVP-4(W)	1.5		-1
SVP-5(W)			
SVP-6(W)			

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(E)	3		-0.9
SVP-2(E)	25		-0.50
SVP-3(E)	7		-1.7
SVP-4(E)	1.5		-1.2
SVP-5(E)			
SVP-6(E)			

COMMENTS: Ambient FID 1 ppm.

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SOIL VENTILATION PERFORMANCE PAGE 1

PROJECT NUMBER: 24930601.00

ANALYSIS PERFORMED BY: MPS

DATE PRINTED: 26-Sep-97 09:56:58 AM

DESCRIPTION	UNITS	
SYSTEM DATA		
STACK DATA		
OUTSIDE DIAMETER	INCHES	4.5
INSIDE DIAMETER	INCHES	4.026
FLOW AREA	SQFT	0.0884
ALTITUDE	FMSL	937
NUMBER OF BLOWERS	DIMENSIONLESS	4
FIELD DATA		
DATE	DD/MM/YY	22-Dec-95
TECHNICIAN	INITIALS	DM
TEMPERATURES		
BUILDING, AMBIENT	DEGREES F.	45.5
EXHAUST, DRY BULB	DEGREES F.	75.2
EXHAUST, WET BULB	DEGREES F.	51.8
MANIFOLD	DEGREES F.	158
PRESSURES		
BAROMETRIC	IN. Hg	29.21
FLOWING GAS	IN. W.C. GAUGE	0
MANIFOLD	IN. W.C. GAUGE	0
EPA METHOD 2		
NUMBER OF TRAVERSE POINTS	DIMENSIONLESS	5
VP (POINT 1)	IN. W.C. GAUGE	0.02
VP (POINT 2)	IN. W.C. GAUGE	0.02
VP (POINT 3)	IN. W.C. GAUGE	0.02
VP (POINT 4)	IN. W.C. GAUGE	0.02
VP (CENTERLINE)	IN. W.C. GAUGE	0.02
CHEMICAL ANALYSIS		
FID	PPM (v/v)	0
FID (converted to uG/L)	uG/L	0
LABORATORY DATA (EPA METHOD 18)		
BENZENE	uG/L	0.52
ETHYL BENZENE	uG/L	0.35
TOLUENE	uG/L	0.47
XYLENES	uG/L	1.3
TOTAL HYDROCARBONS AS GASOLINE	uG/L	22

DATA REDUCTION						
GAS FLOW VELOCITY						
FIELD DATA, EPA METHOD 2						
AF = ALTITUDE FACTOR	DIMENSIONLESS	0.97				
W = HUMIDITY RATIO	LB H2O/LB AIR	0				
Vw = VOLUME WATER VAPOR (std)	CUFT/LB AIR	0				
Vgas = VOLUME OF GAS (dry, std)	CUFT/LB AIR	13.333333333				
Bws = WATER VAPOR IN GAS	VOL/VOL	0				
HV = HUMID VOLUME	CUFT/LB	13.333333333				
Ms = MOLECULAR WEIGHT OF STACK GAS	GAS DESITY	29				
p(SL) = DENSITY @ SEA LEVEL	LB/CUFT	0.0750				
p(ACTUAL) = DENSITY ACTUAL	LB/CUFT	0.0711				
Kp = PITOT TUBE CONSTANT		85.49				
PTF = PITOT TUBE FACTOR	DIMENSIONLESS	0.99				
T = TEMPERATURE OF STACK GAS	DEGREE R	535.2				
Ps = PRESSURE OF STACK GAS	IN Hg (abs)	29.21				
{(VP)^.5}ave	(IN H2O)^0.5	0.1131				
VS = VELOCITY OF STACK GAS	FT/SEC	7.6111235434				
GAS FLOW RATE						
EPA METHOD 2	SCFM	39	0.0183529016	M^3/SEC		
BLOWER PERFORMANCE CURVE	SCFM	440	0.20768	M^3/SEC		
TOTAL OF VENTS						
ORIFICE						
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	ERR	M^3/SEC		
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	ERR	M^3/SEC		
PRODUCT REMOVAL RATE						
EPA METHODS 2 & 18 (USEPA REPORTING)			SER	% OF SER	LBS/YEAR	
BENZENE	uG/SEC	10	4600	0.21	319.362912	4321.1028837
ETHYLBENZENE	uG/SEC	6	497700	0.00	34553.678544	
TOLUENE	uG/SEC	9	429800	0.00	29839.604256	
XYLENES	uG/SEC	24	497700	0.00	34553.678544	
TOTAL HYDROCARBON AS GASOLINE	uG/SEC	404	718065	0.06	49852.897959	5.6870748299
STATE OF MINNESOTA REPORTING		OBSERVED	LIMIT	% OF LIMIT		
BENZENE	gallons/day	0.00	0.87	0.03%		
TOTAL HYDROCARBON AS GASOLINE	gallons/day	0.01	136.49	0.01%		
EPA METHODS 2 & FID	gallons/day	0.00	136.49	0.00%		
BLOWER PERFORMANCE CURVE & FID	gallons/day	0.00	136.49	0.00%		
SUM OF VENTS (ORIFICE), INITIAL	gallons/day	ERR	136.49	ERR		
SUM OF VENTS (ORIFICE), ADJUSTED	gallons/day	ERR	136.49	ERR		

NOTES:

TO CONVERT uG/L TO uG/M^3 MULTIPLY BY 0.001

TO CALCULATE uG/L DIVIDE ANALYSIS BY SAMPLED VOLUME IN LITERS

TO CALCULATE SAMPLE VOLUME MULTIPLY AVERAGE OF PUMP CALIBRATION BY SAMPLE TIME

SOIL VENTILATION PERFORMANCE PAGE 1 PAGE 2
PROJECT NUMBER: 24930601.00
ANALYSIS PERFORMED BY: MPS
DATE PRINTED: 26-Sep-97 09:56:58 AM

DESCRIPTION	UNITS																
SYSTEM DATA																	
IDENTIFICATION	DIMENSIONLESS	SYSTEM	RW-1	SVV-1	SVV-2	SVV-3	SVV-4	ERR	SVV-5	SVV-6	ERR	ERR	SVV-7	SVV-8	SVV-9	SVV-10	SVV-11
D = DIAMETER, PIPE INSIDE	INCHES	4.026	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
d = DIAMETER, ORIFICE	INCHES	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
B = BETA RATIO	DIMENSIONLESS	0.186	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375
NUMBER OF BLOWERS	DIMENSIONLESS	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DESIGN SOIL THICKNESS	FEET	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
DESIGN GAS EXCHANGE RATE	MIN/EXCHANGE	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
DESIGN GAS FLOW RATE	SCFM	150	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
FIELD DATA																	
DATE	DD/MM/YY	22-Dec-95	22-Dec-95	22-Dec-95	22-Dec-95	22-Dec-95	22-Dec-95	22-Dec-95	22-Dec-95	22-Dec-95	22-Dec-95	22-Dec-95	22-Dec-95	22-Dec-95	22-Dec-95	22-Dec-95	22-Dec-95
TECHNICIAN	INITIALS	DM	DM	DM	DM	DM	DM	DM	DM	DM	DM	DM	DM	DM	DM	DM	DM
PRESSURE																	
@ MANHOLE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0
VENT SIDE (FLOWING GAS PRESSURE)	IN. W.C. GAUGE	NA	-11	-46	-14	-12	-13	ERR	-12	-15	ERR	ERR	-4	-25	-9	-12	-20
BLOWER SIDE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0
MANIFOLD	IN. W.C. GAUGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EXHAUST	IN. W.C. GAUGE	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ORIFICE PLATE																	
DIFFERENTIAL, UPON ARRIVAL	IN. W.C. GAUGE	NA	1.8	0	0.3	0.1	0.3	ERR	0	0.1	ERR	ERR	0	4.8	0.2	0.1	0.5
DIFFERENTIAL, RE-ADJUSTED	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0
TEMPERATURE, FLOWING GAS	DEGREE F	158	158	158	158	158	158	158	158	158	158	158	158	158	158	158	158
COMMENTS	EXPLANATION																
FID	PPM (v/v)	0	3	5	25	15	3	ERR	15	3	ERR	ERR	3	3	3	3	5
FID (converted to ug/L)	uG/L	0	12	19	97	58	12	ERR	58	12	ERR	ERR	12	12	12	12	19
DATA REDUCTION																	
G = SPECIFIC GRAVITY, GAS	DIMENSIONLESS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Rd = REYNOLD'S #, DESIGN	DIMENSIONLESS	63011	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456
K = ORIFICE COEFFICIENT	DIMENSIONLESS	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110
Fa = ORIFICE EXPANSION FACTOR	DIMENSIONLESS	1.00185809	1.00185809	1.00185809	1.00185809	1.00185809	1.00185809	1.00185809	1.00185809	1.00185809	1.00185809	1.00185809	1.00185809	1.00185809	1.00185809	1.00185809	1.00185809
Tf = TEMPERATURE OF FLOWING GAS	DEG R	618	618	618	618	618	618	618	618	618	618	618	618	618	618	618	618
Pf = PRESSURE OF FLOWING GAS	PSIA	14.7	14.30257	13.03802	14.19418	14.26644	14.23031	ERR	14.26644	14.15805	ERR	ERR	14.55548	13.79675	14.37483	14.26644	13.9774
Fpv = GAS COMPRESSIBILITY FACTOR	DIMENSIONLESS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Y = GAS EXPANSION FACTOR	DIMENSIONLESS	1	0.9984897819	1	0.9997463749	0.9999158865	0.9997470189	ERR	1	0.9999152426	ERR	ERR	1	0.9958251037	0.9998330415	0.9999158865	0.9995707356
ORIFICE																	
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	9.04	0.00	3.68	2.13	3.68	ERR	0.00	2.12	ERR	ERR	0.00	14.46	3.02	2.13	4.71
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	0.00	0.00	0.00	0.00	0.00	ERR	0.00	0.00	ERR	ERR	0.00	0.00	0.00	0.00	0.00
PRODUCT REMOVAL RATE																	
ORIFICE, INITIAL	POUNDS/HR	ERR	0.0016	0.0000	0.0054	0.0019	0.0006	ERR	0.0000	0.0004	ERR	ERR	0.0000	0.0025	0.0005	0.0004	0.0014
ORIFICE ADJUSTED	POUNDS/HR	ERR	0.0000	0.0000	0.0000	0.0000	0.0000	ERR	0.0000	0.0000	ERR	ERR	0.0000	0.0000	0.0000	0.0000	0.0000
EFFECTIVENESS																	
RADIUS, ORIFICE, INITIAL	FEET	NA	14.88	0.50	6.36	3.89	6.36	ERR	0.50	3.88	ERR	ERR	0.50	23.51	5.31	3.89	8.00
RADIUS, ORIFICE, ADJUSTED	FEET	NA	0.50	0.50	0.50	0.50	0.50	ERR	0.50	0.50	ERR	ERR	0.50	0.50	0.50	0.50	0.50

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TECHNICIAN: RJ DATE: 14-Mar-96 TIME: 09:15:00 AM

FIELD DATA SHEET - SOIL VENTILATION - OPERATIONAL

PROJECT NAME:	PROJECT #	PROJECT MGR.
CONOCO SOUTH ROBERT	**24930601**	**MW**

TEMPERATURES	deg F	deg C
BUILDING, AMBIENT	60.8	16.0
EXHAUST, WET BULB	51.8	11
EXHAUST, DRY BULB	80.6	27
MANIFOLD	44.6	7

ALTITUDE	937	FMSL

STACK GAS COMPOSITION		
FID EXHAUST	160	ppm (vol/vol)
LEL EXHAUST	NT	% of LEL
STACK 02	NT	% (vol/vol)
STACK CO2	NT	% (vol/vol)
W = HUMIDITY RATIO		lb H2O/lb air

PRESSURES			
LOCATION	DISTANCE	READING	UNITS
STACK VP(1)	1 IN	0.03	in WCG
STACK VP(2)	3 IN	0.03	in WCG
STACK VP(3)	1 IN	0.03	in WCG
STACK VP(4)	3 IN	0.04	in WCG
VP(CENTER)	2 IN	0.04	in WCG
# OF TRAVERSE POINTS		4	unitless
EXHAUST STATIC		0.00	in WCG
BAROMETRIC		28.97	in Hg
MANIFOLD		NA	in Hg
MANIFOLD		0.00	in WCG

EPA METHOD 18: LABORATORY DATA		
BENZENE	uG	100
ETHYL BENZENE	uG	40
TOLUENE	uG	77
XYLENES	uG	83
TOTAL HYDROCARBONS AS GASOLINE	uG	6190

NOTES: A) GMW GASOLINE ASUMED AS 95

B) CONVERSION FACTOR, GASOLINE (gallons/kg) 0.37

EPA METHOD 18: SAMPLE COLLECTION	
PUMP CALIBRATION (INITIAL):	9.86
PUMP CALIBRATION (FINAL):	14.5
PUMP CALIBRATION (AVE):	12.18
SAMPLE START TIME	11:39
SAMPLE STOP TIME	12:29
SAMPLE TIME (minutes)	00:50
SAMPLE VOLUME (liters)	10

	DATA UPON ARRIVAL					REBALANCED	FLOW RATE	
	FID	PRESSURES (in WCG)				@ VENT SIDE	INITIAL	REBALANCED
LOCATION	READING	@ MANHOLE	@ VENT SIDE	@ BLOWER SIDE	DIFFERENTIAL	in WCG	scfm	scfm
RW-1	36		-19		2.2	-20	10.92	ERR
SVV-1	35		-26		0	-20	0.00	ERR
SVV-2	510		-52		0	-15	0.00	ERR
SVV-3	630		-28		0	-15	0.00	ERR
SVV-4	38		-49		0.1	-15	2.24	ERR
SVV-5	54		-4		0	-15	0.00	ERR
SVV-6	36		-2		0		0.00	0.00
SVV-7	25		-50		0	-20	0.00	ERR
SVV-8	14		-49		0.7	-20	5.92	ERR
SVV-9	15		-1		0	-15	0.00	ERR
SVV-10	350		-9		0.2	-15	3.34	ERR
SVV-11	125		-8		0	-15	0.00	ERR
TOTAL							11.50	ERR

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(W)	NT	NT	NT
SVP-2(W)	NT	NT	NT
SVP-3(W)	NT	NT	NT
SVP-4(W)	NT	NT	NT
SVP-5(W)	NT	NT	NT
SVP-6(W)	NT	NT	NT

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(E)	NT	NT	NT
SVP-2(E)	NT	NT	NT
SVP-3(E)	NT	NT	NT
SVP-4(E)	NT	NT	NT
SVP-5(E)	NT	NT	NT
SVP-6(E)	NT	NT	NT

COMMENTS:

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SOIL VENTILATION PERFORMANCE

PROJECT NUMBER: 24930601.00
ANALYSIS PERFORMED BY: MPS
DATE PRINTED: 26-Sep-97 09:21:33 AM

DESCRIPTION	UNITS	
SYSTEM DATA		
STACK DATA		
OUTSIDE DIAMETER	INCHES	4.5
INSIDE DIAMETER	INCHES	4.026
FLOW AREA	SQFT	0.0884
ALTITUDE	FMSL	937
NUMBER OF BLOWERS	DIMENSIONLESS	4
FIELD DATA		
DATE	DD/MM/YY	14-Mar-96
TECHNICIAN	INITIALS	RJ
TEMPERATURES		
BUILDING, AMBIENT	DEGREES F.	60.8
EXHAUST, DRY BULB	DEGREES F.	80.6
EXHAUST, WET BULB	DEGREES F.	51.8
MANIFOLD	DEGREES F.	44.6
PRESSURES		
BAROMETRIC	IN. Hg	28.97
FLOWING GAS	IN. W.C. GAUGE	0
MANIFOLD	IN. W.C. GAUGE	0
EPA METHOD 2		
NUMBER OF TRAVERSE POINTS	DIMENSIONLESS	4
VP (POINT 1)	IN. W.C. GAUGE	0.03
VP (POINT 2)	IN. W.C. GAUGE	0.03
VP (POINT 3)	IN. W.C. GAUGE	0.03
VP (POINT 4)	IN. W.C. GAUGE	0.04
VP (CENTERLINE)	IN. W.C. GAUGE	0.04
CHEMICAL ANALYSIS		
FID	PPM (v/v)	160
FID (converted to uG/L)	uG/L	620
LABORATORY DATA (EPA METHOD 18)		
BENZENE	uG/L	10
ETHYL BENZENE	uG/L	4
TOLUENE	uG/L	7.7
XYLENES	uG/L	8.3
TOTAL HYDROCARBONS AS GASOLINE	uG/L	619

DATA REDUCTION						
GAS FLOW VELOCITY						
FIELD DATA, EPA METHOD 2						
AF = ALTITUDE FACTOR	DIMENSIONLESS	0.97				
W = HUMIDITY RATIO	LB H2O/LB AIR	0				
Vw = VOLUME WATER VAPOR (std)	CUFT/LB AIR	0				
Vgas = VOLUME OF GAS (dry, std)	CUFT/LB AIR	13.333333333				
Bws = WATER VAPOR IN GAS	VOL/VOL	0				
HV = HUMID VOLUME	CUFT/LB	13.333333333				
Ms = MOLECULAR WEIGHT OF STACK GAS	GAS DESITY	29				
p(SL) = DENSITY @ SEA LEVEL	LB/CUFT	0.0750				
p(ACTUAL) = DENSITY ACTUAL	LB/CUFT	0.0705				
Kp = PITOT TUBE CONSTANT		85.49				
PTF = PITOT TUBE FACTOR	DIMENSIONLESS	0.99				
T = TEMPERATURE OF STACK GAS	DEGREE R	540.6				
Ps = PRESSURE OF STACK GAS	IN Hg (abs)	28.97				
((VP)^.5)ave	(IN H2O)^0.5	0.1799				
VS = VELOCITY OF STACK GAS	FT/SEC	12.213936228				
GAS FLOW RATE						
EPA METHOD 2	SCFM	61	0.0289180241	M^3/SEC		
BLOWER PERFORMANCE CURVE	SCFM	440	0.20768	M^3/SEC		
TOTAL OF VENTS						
ORIFICE						
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	ERR	M^3/SEC		
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	ERR	M^3/SEC		
PRODUCT REMOVAL RATE						
EPA METHODS 2 & 18 (USEPA REPORTING)			SER	% OF SER	LBS/YEAR	
BENZENE	uG/SEC	289	4600	6.29	319.362912	4321.1028837
ETHYLBENZENE	uG/SEC	116	497700	0.02	34553.678544	
TOLUENE	uG/SEC	223	429800	0.05	29839.604256	
XYLENES	uG/SEC	240	497700	0.05	34553.678544	
TOTAL HYDROCARBON AS GASOLINE	uG/SEC	17901	718065	2.49	49852.897959	5.6870748299
STATE OF MINNESOTA REPORTING		OBSERVED	LIMIT	% OF LIMIT		
BENZENE	gallons/day	0.01	0.87	1.06%		
TOTAL HYDROCARBON AS GASOLINE	gallons/day	0.57	136.49	0.42%		
EPA METHODS 2 & FID	gallons/day	0.57	136.49	0.42%		
BLOWER PERFORMANCE CURVE & FID	gallons/day	4.12	136.49	3.02%		
SUM OF VENTS (ORIFICE), INITIAL	gallons/day	ERR	136.49	ERR		
SUM OF VENTS (ORIFICE), ADJUSTED	gallons/day	ERR	136.49	ERR		

NOTES:
TO CONVERT uG/L TO uG/M^3 MULTIPLY BY 0.001
TO CALCULATE uG/L DIVIDE ANALYSIS BY SAMPLED VOLUME IN LITERS
TO CALCULATE SAMPLE VOLUME MULTIPLY AVERAGE OF PUMP CALIBRATION BY SAMPLE TIME

SOIL VENTILATION PERFORMANCE

PAGE 1

PAGE 2

PROJECT NUMBER: 24930601.00

ANALYSIS PERFORMED BY: MPS

DATE PRINTED: 26-Sep-97 09:21:33 AM

DESCRIPTION	UNITS																	
SYSTEM DATA																		
IDENTIFICATION	DIMENSIONLESS	SYSTEM	RW-1	SVV-1	SVV-2	SVV-3	SVV-4	ERR	SVV-5	SVV-6	ERR	ERR	SVV-7	SVV-8	SVV-9	SVV-10	SVV-11	
D = DIAMETER, PIPE INSIDE	INCHES	4.026	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
d = DIAMETER, ORIFICE	INCHES	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
B = BETA RATIO	DIMENSIONLESS	0.186	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375
NUMBER OF BLOWERS	DIMENSIONLESS	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DESIGN SOIL THICKNESS	FEET	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
DESIGN GAS EXCHANGE RATE	MIN/EXCHANGE	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
DESIGN GAS FLOW RATE	SCFM	150	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
FIELD DATA																		
DATE	DD/MM/YY	14-Mar-96	14-Mar-96	14-Mar-96	14-Mar-96	14-Mar-96	14-Mar-96	14-Mar-96	14-Mar-96	14-Mar-96	14-Mar-96	14-Mar-96	14-Mar-96	14-Mar-96	14-Mar-96	14-Mar-96	14-Mar-96	14-Mar-96
TECHNICIAN	INITIALS	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ
PRESSURE																		
@ MANHOLE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0	0
VENT SIDE (FLOWING GAS PRESSURE)	IN. W.C. GAUGE	NA	-19	-26	-52	-28	-49	ERR	-4.1	-1.5	ERR	ERR	-50	-49	-1	-9	-8	
BLOWER SIDE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0	
MANIFOLD	IN. W.C. GAUGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
EXHAUST	IN. W.C. GAUGE	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ORIFICE PLATE																		
DIFFERENTIAL, UPON ARRIVAL	IN. W.C. GAUGE	NA	2.2	0	0	0	0.1	ERR	0	0	ERR	ERR	0	0.7	0	0.2	0	
DIFFERENTIAL, RE-ADJUSTED	IN. W.C. GAUGE	NA	-20	-20	-15	-15	-15	ERR	-15	0	ERR	ERR	-20	-20	-15	-15	-15	
TEMPERATURE, FLOWING GAS	DEGREE F	44.6	44.6	44.6	44.6	44.6	44.6	44.6	44.6	44.6	44.6	44.6	44.6	44.6	44.6	44.6	44.6	44.6
COMMENTS	EXPLANATION																	
FID	PPM (v/v)	160	36	35	510	630	38	ERR	54	36	ERR	ERR	25	14	15	350	125	
FID (converted to ug/L)	uG/L	620	140	136	1978	2443	147	ERR	209	140	ERR	ERR	97	54	58	1357	485	
DATA REDUCTION																		
G = SPECIFIC GRAVITY, GAS	DIMENSIONLESS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Rd = REYNOLD'S #, DESIGN	DIMENSIONLESS	63011	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456
K = ORIFICE COEFFICIENT	DIMENSIONLESS	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110
Fa = ORIFICE EXPANSION FACTOR	DIMENSIONLESS	0.999663233	0.999663233	0.999663233	0.999663233	0.999663233	0.999663233	0.999663233	0.999663233	0.999663233	0.999663233	0.999663233	0.999663233	0.999663233	0.999663233	0.999663233	0.999663233	0.999663233
Tf = TEMPERATURE OF FLOWING GAS	DEG R	504.6	504.6	504.6	504.6	504.6	504.6	504.6	504.6	504.6	504.6	504.6	504.6	504.6	504.6	504.6	504.6	504.6
Pf = PRESSURE OF FLOWING GAS	PSIA	14.7	14.01353	13.76062	12.82124	13.68836	12.92963	ERR	14.551867	14.645805	ERR	ERR	12.8935	12.92963	14.66367	14.37483	14.41096	
Fpv = GAS COMPRESSIBILITY FACTOR	DIMENSIONLESS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Y = GAS EXPANSION FACTOR	DIMENSIONLESS	1	0.9981161064	1	1	1	0.9999071899	ERR	1	1	ERR	ERR	1	0.9993503294	1	0.9998330415	1	
ORIFICE																		
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	10.92	0.00	0.00	0.00	2.24	ERR	0.00	0.00	ERR	ERR	0.00	5.92	0.00	3.34	0.00	
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	0.00	ERR	ERR	ERR	ERR	ERR	ERR	ERR	
PRODUCT REMOVAL RATE																		
ORIFICE, INITIAL	POUNDS/HR	ERR	0.0230	0.0000	0.0000	0.0000	0.0050	ERR	0.0000	0.0000	ERR	ERR	0.0000	0.0049	0.0000	0.0684	0.0000	
ORIFICE ADJUSTED	POUNDS/HR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	0.0000	ERR	ERR	ERR	ERR	ERR	ERR	ERR	
EFFECTIVENESS																		
RADIUS, ORIFICE, INITIAL	FEET	NA	17.87	0.50	0.50	0.50	4.06	ERR	0.50	0.50	ERR	ERR	0.50	9.93	0.50	5.81	0.50	
RADIUS, ORIFICE, ADJUSTED	FEET	NA	ERR	ERR	ERR	ERR	ERR	ERR	ERR	0.50	ERR	ERR	ERR	ERR	ERR	ERR	ERR	

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TECHNICIAN: RJ DATE: 07-Jun-96 TIME: 09:15:00 AM

FIELD DATA SHEET - SOIL VENTILATION - OPERATIONAL

PROJECT NAME:	PROJECT #	PROJECT MGR.
CONOCO SOUTH ROBERT	**24930601**	**MW**

TEMPERATURES	deg F	deg C
BUILDING, AMBIENT	64.4	18.0
EXHAUST, WET BULB	62.6	17
EXHAUST, DRY BULB	77	25
MANIFOLD	53.6	12

ALTITUDE	937	FMSL

STACK GAS COMPOSITION		
FID EXHAUST	64	ppm (vol/vol)
LEL EXHAUST	NT	% of LEL
STACK 02	NT	% (vol/vol)
STACK CO2	NT	% (vol/vol)
W = HUMIDITY RATIO		lb H2O/lb air

PRESSURES			
LOCATION	DISTANCE	READING	UNITS
STACK VP(1)	1 IN	0.04	in WCG
STACK VP(2)	3 IN	0.04	in WCG
STACK VP(3)	1 IN	0.04	in WCG
STACK VP(4)	3 IN	0.04	in WCG
VP(CENTER)	2 IN	0.05	in WCG
# OF TRAVERSE POINTS		4	unitless
EXHAUST STATIC		0.02	in WCG
BAROMETRIC		29.07	in Hg
MANIFOLD		NA	in Hg
MANIFOLD		0.00	in WCG

EPA METHOD 18: LABORATORY DATA		
BENZENE	uG	6.2
ETHYL BENZENE	uG	35
TOLUENE	uG	38
XYLENES	uG	150
TOTAL HYDROCARBONS AS GASOLINE	uG	1800

NOTES: A) GMW GASOLINE ASUMED AS 95

B) CONVERSION FACTOR, GASOLINE (gallons/kg) 0.37

EPA METHOD 18: SAMPLE COLLECTION	
PUMP CALIBRATION (INITIAL):	14.3
PUMP CALIBRATION (FINAL):	14.5
PUMP CALIBRATION (AVE):	14.4
SAMPLE START TIME	10:59
SAMPLE STOP TIME	11:49
SAMPLE TIME (minutes)	00:50
SAMPLE VOLUME (liters)	10

	DATA UPON ARRIVAL					REBALANCED	FLOW RATE	
	FID	PRESSURES (in WCG)				@ VENT SIDE	INITIAL	REBALANCED
LOCATION	READING	@ MANHOLE	@ VENT SIDE	@ BLOWER SIDE	DIFFERENTIAL	in WCG	scfm	scfm
RW-1	0		-30		1.2	-30	7.88	ERR
SVV-1	89		-22		0.4	-22	4.60	ERR
SVV-2	325		-18		0.2	-18	3.27	ERR
SVV-3	39		-20		0	-20	0.00	ERR
SVV-4	13		-27		0	-27	0.00	ERR
SVV-5	220		-40		0	-40	0.00	ERR
SVV-6	11		-25		0.3	-25	3.97	ERR
SVV-7	7		-19		1.3	-19	8.33	ERR
SVV-8	9		-12		4.7	-12	15.93	ERR
SVV-9	7		-12		0.2	-12	3.30	ERR
SVV-10	13		-24		0.2	-24	3.25	ERR
SVV-11	15		-6		0	-6	0.00	ERR
TOTAL							42.65	ERR

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(W)	NT	NT	NT
SVP-2(W)	NT	NT	NT
SVP-3(W)	NT	NT	NT
SVP-4(W)	NT	NT	NT
SVP-5(W)	NT	NT	NT
SVP-6(W)	NT	NT	NT

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(E)	NT	NT	NT
SVP-2(E)	NT	NT	NT
SVP-3(E)	NT	NT	NT
SVP-4(E)	NT	NT	NT
SVP-5(E)	NT	NT	NT
SVP-6(E)	NT	NT	NT

COMMENTS:

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SOIL VENTILATION PERFORMANCE

PROJECT NUMBER: 24930601.00
ANALYSIS PERFORMED BY: MPS
DATE PRINTED: 26-Sep-97 09:27:53 AM

DESCRIPTION	UNITS	
SYSTEM DATA		
STACK DATA		
OUTSIDE DIAMETER	INCHES	4.5
INSIDE DIAMETER	INCHES	4.026
FLOW AREA	SQFT	0.0884
ALTITUDE	FMSL	937
NUMBER OF BLOWERS	DIMENSIONLESS	4
FIELD DATA		
DATE	DD/MM/YY	07-Jun-96
TECHNICIAN	INITIALS	RJ
TEMPERATURES		
BUILDING, AMBIENT	DEGREES F.	64.4
EXHAUST, DRY BULB	DEGREES F.	77
EXHAUST, WET BULB	DEGREES F.	62.6
MANIFOLD	DEGREES F.	53.6
PRESSURES		
BAROMETRIC	IN. Hg	29.07
FLOWING GAS	IN. W.C. GAUGE	0.02
MANIFOLD	IN. W.C. GAUGE	0
EPA METHOD 2		
NUMBER OF TRAVERSE POINTS	DIMENSIONLESS	4
VP (POINT 1)	IN. W.C. GAUGE	0.04
VP (POINT 2)	IN. W.C. GAUGE	0.04
VP (POINT 3)	IN. W.C. GAUGE	0.04
VP (POINT 4)	IN. W.C. GAUGE	0.04
VP (CENTERLINE)	IN. W.C. GAUGE	0.05
CHEMICAL ANALYSIS		
FID	PPM (v/v)	64
FID (converted to uG/L)	uG/L	248
LABORATORY DATA (EPA METHOD 18)		
BENZENE	uG/L	0.62
ETHYL BENZENE	uG/L	3.5
TOLUENE	uG/L	3.8
XYLENES	uG/L	15
TOTAL HYDROCARBONS AS GASOLINE	uG/L	180

DATA REDUCTION		
GAS FLOW VELOCITY		
FIELD DATA, EPA METHOD 2		
AF = ALTITUDE FACTOR	DIMENSIONLESS	0.97
W = HUMIDITY RATIO	LB H2O/LB AIR	0
Vw = VOLUME WATER VAPOR (std)	CUFT/LB AIR	0
Vgas = VOLUME OF GAS (dry, std)	CUFT/LB AIR	13.333333333
Bws = WATER VAPOR IN GAS	VOL/VOL	0
HV = HUMID VOLUME	CUFT/LB	13.333333333
Ms = MOLECULAR WEIGHT OF STACK GAS	GAS DESITY	29
p(SL) = DENSITY @ SEA LEVEL	LB/CUFT	0.0750
p(ACTUAL) = DENSITY ACTUAL	LB/CUFT	0.0707
Kp = PITOT TUBE CONSTANT		85.49
PTF = PITOT TUBE FACTOR	DIMENSIONLESS	0.99
T = TEMPERATURE OF STACK GAS	DEGREE R	537
Ps = PRESSURE OF STACK GAS	IN Hg (abs)	29.071470588
{(VP)^.5}ave	(IN H2O)^0.5	0.2000
VS = VELOCITY OF STACK GAS	FT/SEC	13.509371684

GAS FLOW RATE				
EPA METHOD 2	SCFM	68	0.0323123377	M^3/SEC
BLOWER PERFORMANCE CURVE	SCFM	440	0.20768	M^3/SEC
TOTAL OF VENTS				
ORIFICE				
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	ERR	M^3/SEC
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	ERR	M^3/SEC

PRODUCT REMOVAL RATE						
EPA METHODS 2 & 18 (USEPA REPORTING)			SER	% OF SER	LBS/YEAR	
BENZENE	uG/SEC	20	4600	0.44	319.362912	4321.1028837
ETHYLBENZENE	uG/SEC	113	497700	0.02	34553.678544	
TOLUENE	uG/SEC	123	429800	0.03	29839.604256	
XYLENES	uG/SEC	485	497700	0.10	34553.678544	
TOTAL HYDROCARBON AS GASOLINE	uG/SEC	5816	718065	0.81	49852.897959	5.6870748299

STATE OF MINNESOTA REPORTING		OBSERVED	LIMIT	% OF LIMIT
BENZENE	gallons/day	0.00	0.87	0.07%
TOTAL HYDROCARBON AS GASOLINE	gallons/day	0.19	136.49	0.14%
EPA METHODS 2 & FID	gallons/day	0.26	136.49	0.19%
BLOWER PERFORMANCE CURVE & FID	gallons/day	1.65	136.49	1.21%
SUM OF VENTS (ORIFICE), INITIAL	gallons/day	ERR	136.49	ERR
SUM OF VENTS (ORIFICE), ADJUSTED	gallons/day	ERR	136.49	ERR

NOTES:
TO CONVERT uG/L TO uG/M^3 MULTIPLY BY 0.001
TO CALCULATE uG/L DIVIDE ANALYSIS BY SAMPLED VOLUME IN LITERS
TO CALCULATE SAMPLE VOLUME MULTIPLY AVERAGE OF PUMP CALIBRATION BY SAMPLE TIME

SOIL VENTILATION PERFORMANCE PAGE 1 PAGE 2
PROJECT NUMBER: 24930601.00
ANALYSIS PERFORMED BY: MPS
DATE PRINTED: 26-Sep-97 09:27:53 AM

DESCRIPTION	UNITS																	
SYSTEM DATA																		
IDENTIFICATION	DIMENSIONLESS	SYSTEM	RW-1	SVV-1	SVV-2	SVV-3	SVV-4	ERR	SVV-5	SVV-6	ERR	ERR	SVV-7	SVV-8	SVV-9	SVV-10	SVV-11	
D = DIAMETER, PIPE INSIDE	INCHES	4.026	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
d = DIAMETER, ORIFICE	INCHES	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
B = BETA RATIO	DIMENSIONLESS	0.186	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375
NUMBER OF BLOWERS	DIMENSIONLESS	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DESIGN SOIL THICKNESS	FEET	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
DESIGN GAS EXCHANGE RATE	MIN/EXCHANGE	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
DESIGN GAS FLOW RATE	SCFM	150	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
FIELD DATA																		
DATE	DD/MM/YY	07-Jun-96	07-Jun-96	07-Jun-96	07-Jun-96	07-Jun-96	07-Jun-96	07-Jun-96	07-Jun-96	07-Jun-96	07-Jun-96	07-Jun-96	07-Jun-96	07-Jun-96	07-Jun-96	07-Jun-96	07-Jun-96	07-Jun-96
TECHNICIAN	INITIALS	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ
PRESSURE																		
@ MANHOLE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0	0
VENT SIDE (FLOWING GAS PRESSURE)	IN. W.C. GAUGE	NA	-30	-22	-18	-20	-27	ERR	-40	-25	ERR	ERR	-19	-12	-12	-24	-6	
BLOWER SIDE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0	
MANIFOLD	IN. W.C. GAUGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
EXHAUST	IN. W.C. GAUGE	0.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ORIFICE PLATE																		
DIFFERENTIAL, UPON ARRIVAL	IN. W.C. GAUGE	NA	1.2	0.4	0.2	0	0	ERR	0	0.3	ERR	ERR	1.3	4.7	0.2	0.2	0	
DIFFERENTIAL, RE-ADJUSTED	IN. W.C. GAUGE	NA	-30	-22	-18	-20	-27	ERR	-40	-25	ERR	ERR	-19	-12	-12	-24	-6	
TEMPERATURE, FLOWING GAS	DEGREE F	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6
COMMENTS	EXPLANATION																	
FID	PPM (v/v)	64	0	89	325	39	13	ERR	220	11	ERR	ERR	7	8.6	7.4	13	15	
FID (converted to ug/L)	ug/L	248	0	345	1260	151	50	ERR	853	43	ERR	ERR	27	33	29	50	58	
DATA REDUCTION																		
G = SPECIFIC GRAVITY, GAS	DIMENSIONLESS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Rd = REYNOLD'S #, DESIGN	DIMENSIONLESS	63011	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	
K = ORIFICE COEFFICIENT	DIMENSIONLESS	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	
Fa = ORIFICE EXPANSION FACTOR	DIMENSIONLESS	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	0.999837428	
Tf = TEMPERATURE OF FLOWING GAS	DEG R	513.6	513.6	513.6	513.6	513.6	513.6	513.6	513.6	513.6	513.6	513.6	513.6	513.6	513.6	513.6	513.6	
Pf = PRESSURE OF FLOWING GAS	PSIA	14.7	13.6161	13.90514	14.04966	13.9774	13.72449	ERR	13.2548	13.79675	ERR	ERR	14.01353	14.26644	14.26644	13.83288	14.48322	
Fpv = GAS COMPRESSIBILITY FACTOR	DIMENSIONLESS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Y = GAS EXPANSION FACTOR	DIMENSIONLESS	1	0.9989424284	0.9996548039	0.9998291774	1	1	ERR	1	0.999739069	ERR	ERR	0.9988867901	0.9960466662	0.999831773	0.9998265003	1	
ORIFICE																		
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	7.88	4.60	3.27	0.00	0.00	ERR	0.00	3.97	ERR	ERR	8.33	15.93	3.30	3.25	0.00	
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	
PRODUCT REMOVAL RATE																		
ORIFICE, INITIAL	POUNDS/HR	ERR	0.0000	0.0240	0.0622	0.0000	0.0000	ERR	0.0000	0.0026	ERR	ERR	0.0034	0.0080	0.0014	0.0025	0.0000	
ORIFICE ADJUSTED	POUNDS/HR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	
EFFECTIVENESS																		
RADIUS, ORIFICE, INITIAL	FEET	NA	13.05	7.83	5.71	0.50	0.50	ERR	0.50	6.82	ERR	ERR	13.75	25.85	5.75	5.67	0.50	
RADIUS, ORIFICE, ADJUSTED	FEET	NA	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	

DAHL

& ASSOCIATES, INC

TECHNICIAN: RJ DATE: Sep-11-96 TIME: 09:10:00 AM

FIELD DATA SHEET - SOIL VENTILATION - OPERATIONAL

PROJECT NAME:	PROJECT #	PROJECT MGR.
CONOCO SOUTH ROBERT	**24930601**	**MW**

TEMPERATURES	deg F	deg C
BUILDING, AMBIENT	NA	24.0
EXHAUST, WET BULB	32	
EXHAUST, DRY BULB	32	38
MANIFOLD	32	26

ALTITUDE	937	FMSL

STACK GAS COMPOSITION		
FID EXHAUST	48	ppm (vol/vol)
LEL EXHAUST	NT	% of LEL
STACK 02	NT	% (vol/vol)
STACK CO2	NT	% (vol/vol)
W = HUMIDITY RATIO		lb H2O/lb air

PRESSURES			
LOCATION	DISTANCE	READING	UNITS
STACK VP(1)	1 IN	0.05	in WCG
STACK VP(2)	3 IN	0.05	in WCG
STACK VP(3)	1 IN	0.05	in WCG
STACK VP(4)	3 IN	0.05	in WCG
VP(CENTER)	2 IN	0.05	in WCG
# OF TRAVERSE POINTS		4	unitless
EXHAUST STATIC		0.02	in WCG
BAROMETRIC		29.12	in Hg
MANIFOLD		NA	in Hg
MANIFOLD		NO PORT 0.00	in WCG

EPA METHOD 18: LABORATORY DATA		
BENZENE	uG	40
ETHYL BENZENE	uG	12
TOLUENE	uG	14
XYLENES	uG	58
TOTAL HYDROCARBONS AS GASOLINE	uG	630

NOTES: A) GMW GASOLINE ASUMED AS 95

B) CONVERSION FACTOR, GASOLINE (gallons/kg) 0.37

EPA METHOD 18: SAMPLE COLLECTION	
PUMP CALIBRATION (INITIAL):	14.74
PUMP CALIBRATION (FINAL):	NA
PUMP CALIBRATION (AVE):	15
SAMPLE START TIME	11:16
SAMPLE STOP TIME	12:06
SAMPLE TIME (minutes)	00:50
SAMPLE VOLUME (liters)	NA

	DATA UPON ARRIVAL					REBALANCED	FLOW RATE	
	FID	PRESSURES (in WCG)				@ VENT SIDE	INITIAL	REBALANCED
LOCATION	READING	@ MANHOLE	@ VENT SIDE	@ BLOWER SIDE	DIFFERENTIAL	in WCG	scfm	scfm
RW-1	5		-28		1.1		0.00	0.00
SVV-1	60		-20		0.4		4.71	0.00
SVV-2	200		-16		0.1		2.37	0.00
SVV-3	26		-18		0		0.00	0.00
SVV-4	21		-29		0		0.00	0.00
SVV-5	120		-39		0		0.00	0.00
SVV-6	3		-22		0.3		4.07	0.00
SVV-7	3		-17		1.3		8.52	0.00
SVV-8	3		-10		4.9		16.65	0.00
SVV-9	3		-11		0.1		2.38	0.00
SVV-10	4.5		-22		0.2		3.33	0.00
SVV-11	17		-5		0		0.00	0.00
TOTAL							42.04	0.00

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(W)	NT	NT	NT
SVP-2(W)	NT	NT	NT
SVP-3(W)	NT	NT	NT
SVP-4(W)	NT	NT	NT
SVP-5(W)	NT	NT	NT
SVP-6(W)	NT	NT	NT

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(E)	NT	NT	NT
SVP-2(E)	NT	NT	NT
SVP-3(E)	NT	NT	NT
SVP-4(E)	NT	NT	NT
SVP-5(E)	NT	NT	NT
SVP-6(E)	NT	NT	NT

COMMENTS:

MOSTLY CLOUDY 63 DEGREES, WIND 0-5 NW

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SOIL VENTILATION PERFORMANCE
PROJECT NUMBER: 24930601.00
ANALYSIS PERFORMED BY: MPS
DATE PRINTED: 26-Sep-97 09:15:47 AM

DESCRIPTION	UNITS	
SYSTEM DATA		
STACK DATA		
OUTSIDE DIAMETER	INCHES	4.5
INSIDE DIAMETER	INCHES	4.026
FLOW AREA	SQFT	0.0884
ALTITUDE	FMSL	937
NUMBER OF BLOWERS	DIMENSIONLESS	4
FIELD DATA		
DATE	DD/MM/YY	Sep-11-96
TECHNICIAN	INITIALS	RJ
TEMPERATURES		
BUILDING, AMBIENT	DEGREES F.	NA
EXHAUST, DRY BULB	DEGREES F.	32
EXHAUST, WET BULB	DEGREES F.	32
MANIFOLD	DEGREES F.	32
PRESSURES		
BAROMETRIC	IN. Hg	29.12
FLOWING GAS	IN. W.C. GAUGE	0.02
MANIFOLD	IN. W.C. GAUGE	NO PORT 0.00
EPA METHOD 2		
NUMBER OF TRAVERSE POINTS	DIMENSIONLESS	4
VP (POINT 1)	IN. W.C. GAUGE	0.05
VP (POINT 2)	IN. W.C. GAUGE	0.05
VP (POINT 3)	IN. W.C. GAUGE	0.05
VP (POINT 4)	IN. W.C. GAUGE	0.05
VP (CENTERLINE)	IN. W.C. GAUGE	0.05
CHEMICAL ANALYSIS		
FID	PPM (v/v)	48
FID (converted to uG/L)	uG/L	186
LABORATORY DATA (EPA METHOD 18)		
BENZENE	uG/L	ERR
ETHYL BENZENE	uG/L	ERR
TOLUENE	uG/L	ERR
XYLENES	uG/L	ERR
TOTAL HYDROCARBONS AS GASOLINE	uG/L	ERR

DATA REDUCTION		
GAS FLOW VELOCITY		
FIELD DATA, EPA METHOD 2		
AF = ALTITUDE FACTOR	DIMENSIONLESS	0.97
W = HUMIDITY RATIO	LB H2O/LB AIR	0
Vw = VOLUME WATER VAPOR (std)	CUFT/LB AIR	0
Vgas = VOLUME OF GAS (dry, std)	CUFT/LB AIR	13.333333333
Bws = WATER VAPOR IN GAS	VOL/VOL	0
HV = HUMID VOLUME	CUFT/LB	13.333333333
Ms = MOLECULAR WEIGHT OF STACK GAS	GAS DESITY	29
p(SL) = DENSITY @ SEA LEVEL	LB/CUFT	0.0750
p(ACTUAL) = DENSITY ACTUAL	LB/CUFT	0.0708
Kp = PITOT TUBE CONSTANT		85.49
PTF = PITOT TUBE FACTOR	DIMENSIONLESS	0.99
T = TEMPERATURE OF STACK GAS	DEGREE R	492
Ps = PRESSURE OF STACK GAS	IN Hg (abs)	29.121470588
((VP)^.5)ave	(IN H2O)^0.5	0.2236
VS = VELOCITY OF STACK GAS	FT/SEC	14.444829337

GAS FLOW RATE				
EPA METHOD 2	SCFM	80	0.037774709	M^3/SEC
BLOWER PERFORMANCE CURVE	SCFM	440	0.20768	M^3/SEC
TOTAL OF VENTS				
ORIFICE				
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	ERR	M^3/SEC
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	ERR	M^3/SEC

PRODUCT REMOVAL RATE						
EPA METHODS 2 & 18 (USEPA REPORTING)			SER	% OF SER	LBS/YEAR	
BENZENE	uG/SEC	ERR	4600	ERR	319.362912	4321.1028837
ETHYLBENZENE	uG/SEC	ERR	497700	ERR	34553.678544	
TOLUENE	uG/SEC	ERR	429800	ERR	29839.604256	
XYLENES	uG/SEC	ERR	497700	ERR	34553.678544	
TOTAL HYDROCARBON AS GASOLINE	uG/SEC	ERR	718065	ERR	49852.897959	5.6870748299

STATE OF MINNESOTA REPORTING		OBSERVED	LIMIT	% OF LIMIT
BENZENE	gallons/day	ERR	0.87	ERR
TOTAL HYDROCARBON AS GASOLINE	gallons/day	ERR	136.49	ERR
EPA METHODS 2 & FID	gallons/day	0.22	136.49	0.16%
BLOWER PERFORMANCE CURVE & FID	gallons/day	1.24	136.49	0.91%
SUM OF VENTS (ORIFICE), INITIAL	gallons/day	ERR	136.49	ERR
SUM OF VENTS (ORIFICE), ADJUSTED	gallons/day	ERR	136.49	ERR

NOTES:
TO CONVERT uG/L TO uG/M^3 MULTIPLY BY 0.001
TO CALCULATE uG/L DIVIDE ANALYSIS BY SAMPLED VOLUME IN LITERS
TO CALCULATE SAMPLE VOLUME MULTIPLY AVERAGE OF PUMP CALIBRATION BY SAMPLE TIME

SOIL VENTILATION PERFORMANCE PAGE 1 PAGE 2
PROJECT NUMBER: 24930601.00
ANALYSIS PERFORMED BY: MPS
DATE PRINTED: 26-Sep-97 09:15:47 AM

DESCRIPTION	UNITS																
SYSTEM DATA																	
IDENTIFICATION	DIMENSIONLESS	SYSTEM	RW-1	SVV-1	SVV-2	SVV-3	SVV-4	ERR	SVV-5	SVV-6	ERR	ERR	SVV-7	SVV-8	SVV-9	SVV-10	SVV-11
D = DIAMETER, PIPE INSIDE	INCHES	4.026	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
d = DIAMETER, ORIFICE	INCHES	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
B = BETA RATIO	DIMENSIONLESS	0.186	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375
NUMBER OF BLOWERS	DIMENSIONLESS	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DESIGN SOIL THICKNESS	FEET	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
DESIGN GAS EXCHANGE RATE	MIN/EXCHANGE	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
DESIGN GAS FLOW RATE	SCFM	150	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
FIELD DATA																	
DATE	DD/MM/YY	Sep-11-96	Sep-11-96	Sep-11-96	Sep-11-96	Sep-11-96	Sep-11-96	Sep-11-96	Sep-11-96	Sep-11-96	Sep-11-96	Sep-11-96	Sep-11-96	Sep-11-96	Sep-11-96	Sep-11-96	Sep-11-96
TECHNICIAN	INITIALS	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ
PRESSURE																	
@ MANHOLE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0
VENT SIDE (FLOWING GAS PRESSURE)	IN. W.C. GAUGE	NA	-28	-20	-16	-18	-29	ERR	-39	-22	ERR	ERR	-17	-10	-11	-22	-5
BLOWER SIDE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0
MANIFOLD	IN. W.C. GAUGE	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00
EXHAUST	IN. W.C. GAUGE	0.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ORIFICE PLATE																	
DIFFERENTIAL, UPON ARRIVAL	IN. W.C. GAUGE	NA	1.1	0.4	0.1	0	0	ERR	0	0.3	ERR	ERR	1.3	4.9	0.1	0.2	0
DIFFERENTIAL, RE-ADJUSTED	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0
TEMPERATURE, FLOWING GAS	DEGREE F	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
COMMENTS	EXPLANATION																
FID	PPM (v/v)	48	5	60	200	26	21	ERR	120	2.5	ERR	ERR	2.5	3	2.5	4.5	17
FID (converted to ug/L)	uG/L	186	19	233	776	101	81	ERR	465	10	ERR	ERR	10	12	10	17	66
DATA REDUCTION																	
G = SPECIFIC GRAVITY, GAS	DIMENSIONLESS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Rd = REYNOLD'S #, DESIGN	DIMENSIONLESS	63011	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456
K = ORIFICE COEFFICIENT	DIMENSIONLESS	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110
Fa = ORIFICE EXPANSION FACTOR	DIMENSIONLESS	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936
Tf = TEMPERATURE OF FLOWING GAS	DEG R	492	492	492	492	492	492	492	492	492	492	492	492	492	492	492	492
Pf = PRESSURE OF FLOWING GAS	PSIA	14.7	13.68836	13.9774	14.12192	14.04966	13.65223	ERR	13.29093	13.90514	ERR	ERR	14.08579	14.3387	14.30257	13.90514	14.51935
Fpv = GAS COMPRESSIBILITY FACTOR	DIMENSIONLESS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Y = GAS EXPANSION FACTOR	DIMENSIONLESS	1	0.999035677	0.9996565885	0.9999150257	1	1	ERR	1	0.9997411029	ERR	ERR	0.9988925009	0.9958992098	0.999916099	0.999827402	1
ORIFICE																	
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	7.73	4.71	2.37	0.00	0.00	ERR	0.00	4.07	ERR	ERR	8.52	16.65	2.38	3.33	0.00
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	0.00	0.00	0.00	0.00	0.00	ERR	0.00	0.00	ERR	ERR	0.00	0.00	0.00	0.00	0.00
PRODUCT REMOVAL RATE																	
ORIFICE, INITIAL	POUNDS/HR	ERR	0.0023	0.0165	0.0277	0.0000	0.0000	ERR	0.0000	0.0006	ERR	ERR	0.0012	0.0029	0.0003	0.0009	0.0000
ORIFICE ADJUSTED	POUNDS/HR	ERR	0.0000	0.0000	0.0000	0.0000	0.0000	ERR	0.0000	0.0000	ERR	ERR	0.0000	0.0000	0.0000	0.0000	0.0000
EFFECTIVENESS																	
RADIUS, ORIFICE, INITIAL	FEET	NA	12.80	8.00	4.27	0.50	0.50	ERR	0.50	6.98	ERR	ERR	14.07	27.00	4.30	5.79	0.50
RADIUS, ORIFICE, ADJUSTED	FEET	NA	0.50	0.50	0.50	0.50	0.50	ERR	0.50	0.50	ERR	ERR	0.50	0.50	0.50	0.50	0.50

DAHL
& ASSOCIATES, INC

TECHNICIAN: RJ DATE: 10-Dec-96 TIME: 09:00:00 AM

FIELD DATA SHEET - SOIL VENTILATION - OPERATIONAL

PROJECT NAME:	PROJECT #	PROJECT MGR.
CONOCO SOUTH ROBERT	**24930601**	**MW**

TEMPERATURES	deg F	deg C
BUILDING, AMBIENT	NA	14.0
EXHAUST, WET BULB	32	13
EXHAUST, DRY BULB	32	23
MANIFOLD	32	12

ALTITUDE	937	FMSL

STACK GAS COMPOSITION		
FID EXHAUST	25	ppm (vol/vol)
LEL EXHAUST	NT	% of LEL
STACK 02	NT	% (vol/vol)
STACK CO2	NT	% (vol/vol)
W = HUMIDITY RATIO		lb H2O/lb air

PRESSURES			
LOCATION	DISTANCE	READING	UNITS
STACK VP(1)	1 IN	0.03	in WCG
STACK VP(2)	3 IN	0.03	in WCG
STACK VP(3)	1 IN	0.03	in WCG
STACK VP(4)	3 IN	0.03	in WCG
VP(CENTER)	2 IN	0.04	in WCG
# OF TRAVERSE POINTS		4	unitless
EXHAUST STATIC		0.01	in WCG
BAROMETRIC		28.75	in Hg
MANIFOLD		NA	in Hg
MANIFOLD		NO PORT 0.00	in WCG

EPA METHOD 18: LABORATORY DATA		
BENZENE	uG	4
ETHYL BENZENE	uG	11
TOLUENE	uG	15
XYLENES	uG	67
TOTAL HYDROCARBONS AS GASOLINE	uG	590

NOTES: A) GMW GASOLINE ASUMED AS 95

B) CONVERSION FACTOR, GASOLINE (gallons/kg) 0.37

EPA METHOD 18: SAMPLE COLLECTION	
PUMP CALIBRATION (INITIAL):	14.99
PUMP CALIBRATION (FINAL):	NA
PUMP CALIBRATION (AVE):	15
SAMPLE START TIME	10:38
SAMPLE STOP TIME	11:18
SAMPLE TIME (minutes)	00:50
SAMPLE VOLUME (liters)	10

	DATA UPON ARRIVAL					REBALANCED	FLOW RATE	
	FID	PRESSURES (in WCG)				@ VENT SIDE	INITIAL	REBALANCED
LOCATION	READING	@ MANHOLE	@ VENT SIDE	@ BLOWER SIDE	DIFFERENTIAL	in WCG	scfm	scfm
RW-1	1		-33		1.3		0.00	0.00
SVV-1	3		-17		1		7.48	0.00
SVV-2	100		-20		0.2		3.33	0.00
SVV-3	9		-25		0.2		3.31	0.00
SVV-4	3		-25		0		0.00	0.00
SVV-5	77		-43		0		0.00	0.00
SVV-6	11		-26		0.4		4.68	0.00
SVV-7	7		-38		1.1		7.63	0.00
SVV-8	6		-31		3.0		12.70	0.00
SVV-9	8		-31		0		0.00	0.00
SVV-10	7		-23		0.2		3.32	0.00
SVV-11	1		-20		0		0.00	0.00
TOTAL							42.45	0.00

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(W)	NT	NT	NT
SVP-2(W)	NT	NT	NT
SVP-3(W)	NT	NT	NT
SVP-4(W)	NT	NT	NT
SVP-5(W)	NT	NT	NT
SVP-6(W)	NT	NT	NT

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(E)	NT	NT	NT
SVP-2(E)	NT	NT	NT
SVP-3(E)	NT	NT	NT
SVP-4(E)	NT	NT	NT
SVP-5(E)	NT	NT	NT
SVP-6(E)	NT	NT	NT

COMMENTS:

DRAINED MOISTURE TRAPS

U:\USERS\PROJECTS\LOTFILES\VEMN0600\0601SV27

SOIL VENTILATION PERFORMANCE

PROJECT NUMBER: 24930601.00
ANALYSIS PERFORMED BY: MPS
DATE PRINTED: 26-Sep-97 08:40:59 AM

DESCRIPTION	UNITS	
SYSTEM DATA		
STACK DATA		
OUTSIDE DIAMETER	INCHES	4.5
INSIDE DIAMETER	INCHES	4.026
FLOW AREA	SQFT	0.0884
ALTITUDE	FMSL	937
NUMBER OF BLOWERS	DIMENSIONLESS	4
FIELD DATA		
DATE	DD/MM/YY	10-Dec-96
TECHNICIAN	INITIALS	RJ
TEMPERATURES		
BUILDING, AMBIENT	DEGREES F.	NA
EXHAUST, DRY BULB	DEGREES F.	32
EXHAUST, WET BULB	DEGREES F.	32
MANIFOLD	DEGREES F.	32
PRESSURES		
BAROMETRIC	IN. Hg	28.75
FLOWING GAS	IN. W.C. GAUGE	0.01
MANIFOLD	IN. W.C. GAUGE	NO PORT 0.00
EPA METHOD 2		
NUMBER OF TRAVERSE POINTS	DIMENSIONLESS	4
VP (POINT 1)	IN. W.C. GAUGE	0.03
VP (POINT 2)	IN. W.C. GAUGE	0.03
VP (POINT 3)	IN. W.C. GAUGE	0.03
VP (POINT 4)	IN. W.C. GAUGE	0.03
VP (CENTERLINE)	IN. W.C. GAUGE	0.04
CHEMICAL ANALYSIS		
FID	PPM (v/v)	25
FID (converted to uG/L)	uG/L	97
LABORATORY DATA (EPA METHOD 18)		
BENZENE	uG/L	0.4
ETHYL BENZENE	uG/L	1.1
TOLUENE	uG/L	1.5
XYLENES	uG/L	6.7
TOTAL HYDROCARBONS AS GASOLINE	uG/L	59

DATA REDUCTION						
GAS FLOW VELOCITY						
FIELD DATA, EPA METHOD 2						
AF = ALTITUDE FACTOR	DIMENSIONLESS	0.97				
W = HUMIDITY RATIO	LB H2O/LB AIR	0				
Vw = VOLUME WATER VAPOR (std)	CUFT/LB AIR	0				
Vgas = VOLUME OF GAS (dry, std)	CUFT/LB AIR	13.333333333				
Bws = WATER VAPOR IN GAS	VOL/VOL	0				
HV = HUMID VOLUME	CUFT/LB	13.333333333				
Ms = MOLECULAR WEIGHT OF STACK GAS	GAS DESITY	29				
p(SL) = DENSITY @ SEA LEVEL	LB/CUFT	0.0750				
p(ACTUAL) = DENSITY ACTUAL	LB/CUFT	0.0699				
Kp = PITOT TUBE CONSTANT		85.49				
PTF = PITOT TUBE FACTOR	DIMENSIONLESS	0.99				
T = TEMPERATURE OF STACK GAS	DEGREE R	492				
Ps = PRESSURE OF STACK GAS	IN Hg (abs)	28.750735294				
{(VP)^.5}ave	(IN H2O)^0.5	0.1732				
VS = VELOCITY OF STACK GAS	FT/SEC	11.260825105				
GAS FLOW RATE						
EPA METHOD 2	SCFM	62	0.0290733167	M^3/SEC		
BLOWER PERFORMANCE CURVE	SCFM	440	0.20768	M^3/SEC		
TOTAL OF VENTS						
ORIFICE						
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	ERR	M^3/SEC		
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	ERR	M^3/SEC		
PRODUCT REMOVAL RATE						
EPA METHODS 2 & 18 (USEPA REPORTING)			SER	% OF SER	LBS/YEAR	
BENZENE	uG/SEC	12	4600	0.25	319.362912	4321.1028837
ETHYLBENZENE	uG/SEC	32	497700	0.01	34553.678544	
TOLUENE	uG/SEC	44	429800	0.01	29839.604256	
XYLENES	uG/SEC	195	497700	0.04	34553.678544	
TOTAL HYDROCARBON AS GASOLINE	uG/SEC	1715	718065	0.24	49852.897959	5.6870748299

STATE OF MINNESOTA REPORTING		OBSERVED	LIMIT	% OF LIMIT
BENZENE	gallons/day	0.00	0.87	0.04%
TOTAL HYDROCARBON AS GASOLINE	gallons/day	0.05	136.49	0.04%
EPA METHODS 2 & FID	gallons/day	0.09	136.49	0.07%
BLOWER PERFORMANCE CURVE & FID	gallons/day	0.64	136.49	0.47%
SUM OF VENTS (ORIFICE), INITIAL	gallons/day	ERR	136.49	ERR
SUM OF VENTS (ORIFICE), ADJUSTED	gallons/day	ERR	136.49	ERR

NOTES:
TO CONVERT uG/L TO uG/M^3 MULTIPLY BY 0.001
TO CALCULATE uG/L DIVIDE ANALYSIS BY SAMPLED VOLUME IN LITERS
TO CALCULATE SAMPLE VOLUME MULTIPLY AVERAGE OF PUMP CALIBRATION BY SAMPLE TIME

SOIL VENTILATION PERFORMANCE PAGE 1 PAGE 2

PROJECT NUMBER: 24930601.00

ANALYSIS PERFORMED BY: MPS

DATE PRINTED: 26-Sep-97 08:40:59 AM

DESCRIPTION	UNITS																	
SYSTEM DATA																		
IDENTIFICATION	DIMENSIONLESS	SYSTEM	RW-1	SVV-1	SVV-2	SVV-3	SVV-4	ERR	SVV-5	SVV-6	ERR	ERR	SVV-7	SVV-8	SVV-9	SVV-10	SVV-11	
D = DIAMETER, PIPE INSIDE	INCHES	4.026	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
d = DIAMETER, ORIFICE	INCHES	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
B = BETA RATIO	DIMENSIONLESS	0.186	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375
NUMBER OF BLOWERS	DIMENSIONLESS	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DESIGN SOIL THICKNESS	FEET	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
DESIGN GAS EXCHANGE RATE	MIN/EXCHANGE	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
DESIGN GAS FLOW RATE	SCFM	150	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
FIELD DATA																		
DATE	DD/MM/YY	10-Dec-96	10-Dec-96	10-Dec-96	10-Dec-96	10-Dec-96	10-Dec-96	10-Dec-96	10-Dec-96	10-Dec-96	10-Dec-96	10-Dec-96	10-Dec-96	10-Dec-96	10-Dec-96	10-Dec-96	10-Dec-96	10-Dec-96
TECHNICIAN	INITIALS	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ
PRESSURE																		
@ MANHOLE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0	0
VENT SIDE (FLOWING GAS PRESSURE)	IN. W.C. GAUGE	NA	-33	-17	-20	-25	-25	ERR	-43	-26	ERR	ERR	-38	-31	-31	-23	-20	
BLOWER SIDE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0	
MANIFOLD	IN. W.C. GAUGE	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	
EXHAUST	IN. W.C. GAUGE	0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ORIFICE PLATE																		
DIFFERENTIAL, UPON ARRIVAL	IN. W.C. GAUGE	NA	1.3	1	0.2	0.2	0	ERR	0	0.4	ERR	ERR	1.1	3	0	0.2	0	
DIFFERENTIAL, RE-ADJUSTED	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0	
TEMPERATURE, FLOWING GAS	DEGREE F	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
COMMENTS	EXPLANATION																	
FID	PPM (v/v)	25	1	3	100	9	3	ERR	77	11	ERR	ERR	7	6	8	7	1	
FID (converted to ug/L)	uG/L	97	4	12	388	35	12	ERR	299	43	ERR	ERR	27	23	31	27	4	
DATA REDUCTION																		
G = SPECIFIC GRAVITY, GAS	DIMENSIONLESS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Rd = REYNOLD'S #, DESIGN	DIMENSIONLESS	63011	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	
K = ORIFICE COEFFICIENT	DIMENSIONLESS	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	
Fa = ORIFICE EXPANSION FACTOR	DIMENSIONLESS	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936
Ti = TEMPERATURE OF FLOWING GAS	DEG R	492	492	492	492	492	492	492	492	492	492	492	492	492	492	492	492	492
Pi = PRESSURE OF FLOWING GAS	PSIA	14.7	13.50771	14.08579	13.9774	13.79675	13.79675	ERR	13.14641	13.76062	ERR	ERR	13.32706	13.57997	13.57997	13.86901	13.9774	
Fpv = GAS COMPRESSIBILITY FACTOR	DIMENSIONLESS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Y = GAS EXPANSION FACTOR	DIMENSIONLESS	1	0.998845104	0.9991480776	0.9998282942	0.999826046	1	ERR	1	0.9996511785	ERR	ERR	0.999009534	0.9973490369	1	0.9998269523	1	
ORIFICE																		
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	8.35	7.48	3.33	3.31	0.00	ERR	0.00	4.68	ERR	ERR	7.63	12.70	0.00	3.32	0.00	
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	0.00	0.00	0.00	0.00	0.00	ERR	0.00	0.00	ERR	ERR	0.00	0.00	0.00	0.00	0.00	
PRODUCT REMOVAL RATE																		
ORIFICE, INITIAL	POUNDS/HR	ERR	0.0005	0.0013	0.0195	0.0017	0.0000	ERR	0.0000	0.0030	ERR	ERR	0.0031	0.0045	0.0000	0.0014	0.0000	
ORIFICE ADJUSTED	POUNDS/HR	ERR	0.0000	0.0000	0.0000	0.0000	0.0000	ERR	0.0000	0.0000	ERR	ERR	0.0000	0.0000	0.0000	0.0000	0.0000	
EFFECTIVENESS																		
RADIUS, ORIFICE, INITIAL	FEET	NA	13.79	12.40	5.81	5.77	0.50	ERR	0.50	7.94	ERR	ERR	12.64	20.71	0.50	5.79	0.50	
RADIUS, ORIFICE, ADJUSTED	FEET	NA	0.50	0.50	0.50	0.50	0.50	ERR	0.50	0.50	ERR	ERR	0.50	0.50	0.50	0.50	0.50	

DAHL
& ASSOCIATES, INC

TECHNICIAN: RJ DATE: 12-Mar-97 TIME: 09:00:00 AM

FIELD DATA SHEET - SOIL VENTILATION - OPERATIONAL

PROJECT NAME:	PROJECT #	PROJECT MGR.
CONOCO SOUTH ROBERT	**24930601**	**MW**

TEMPERATURES	deg F	deg C
BUILDING, AMBIENT	NA	20.0
EXHAUST, WET BULB	32	17
EXHAUST, DRY BULB	32	33
MANIFOLD	32	10

ALTITUDE	937	FMSL

STACK GAS COMPOSITION		
FID EXHAUST	34	ppm (vol/vol)
LEL EXHAUST	NT	% of LEL
STACK 02	NT	% (vol/vol)
STACK CO2	NT	% (vol/vol)
W = HUMIDITY RATIO		lb H2O/lb air

PRESSURES			
LOCATION	DISTANCE	READING	UNITS
STACK VP(1)	1 IN	0.03	in WCG
STACK VP(2)	3 IN	0.03	in WCG
STACK VP(3)	1 IN	0.03	in WCG
STACK VP(4)	3 IN	0.03	in WCG
VP(CENTER)	2 IN	0.03	in WCG
# OF TRAVERSE POINTS		4	unitless
EXHAUST STATIC		0.01	in WCG
BAROMETRIC		29.42	in Hg
MANIFOLD		NA	in Hg
MANIFOLD		NO PORT 0.00	in WCG

EPA METHOD 18: LABORATORY DATA		
BENZENE	uG	4.8
ETHYL BENZENE	uG	24
TOLUENE	uG	17
XYLENES	uG	130
TOTAL HYDROCARBONS AS GASOLINE	uG	2500

NOTES: A) GMW GASOLINE ASUMED AS 95

B) CONVERSION FACTOR, GASOLINE (gallons/kg) 0.37

EPA METHOD 18: SAMPLE COLLECTION	
PUMP CALIBRATION (INITIAL):	14.64
PUMP CALIBRATION (FINAL):	NA
PUMP CALIBRATION (AVE):	15
SAMPLE START TIME	11:59
SAMPLE STOP TIME	12:39
SAMPLE TIME (minutes)	00:50
SAMPLE VOLUME (liters)	10

	DATA UPON ARRIVAL					REBALANCED	FLOW RATE	
	FID	PRESSURES (in WCG)				@ VENT SIDE	INITIAL	REBALANCED
LOCATION	READING	@ MANHOLE	@ VENT SIDE	@ BLOWER SIDE	DIFFERENTIAL	in WCG	scfm	scfm
RW-1	12		-19		1.2		0.00	0.00
SVV-1	25		-25		0.2		3.31	0.00
SVV-2	78		-17		0		0.00	0.00
SVV-3	11		-22		0		0.00	0.00
SVV-4	7		-14		0		0.00	0.00
SVV-5	37		-44		0		0.00	0.00
SVV-6	2		-44		0		0.00	0.00
SVV-7	9		-50		0.3		3.92	0.00
SVV-8	2		-22		3.2		13.27	0.00
SVV-9	4		-13		0		0.00	0.00
SVV-10	24		-24		0.2		3.32	0.00
SVV-11	8		-26		0		0.00	0.00
TOTAL							23.82	0.00

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(W)	NT	NT	NT
SVP-2(W)	NT	NT	NT
SVP-3(W)	NT	NT	NT
SVP-4(W)	NT	NT	NT
SVP-5(W)	NT	NT	NT
SVP-6(W)	NT	NT	NT

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(E)	NT	NT	NT
SVP-2(E)	NT	NT	NT
SVP-3(E)	NT	NT	NT
SVP-4(E)	NT	NT	NT
SVP-5(E)	NT	NT	NT
SVP-6(E)	NT	NT	NT

COMMENTS:

Mag gauge for vent side readings may have been defective or broken. Drained moisture traps.

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SOIL VENTILATION PERFORMANCE
PROJECT NUMBER: 24930601.00
ANALYSIS PERFORMED BY: MPS
DATE PRINTED: 26-Sep-97 08:19:40 AM

DESCRIPTION	UNITS	
SYSTEM DATA		
STACK DATA		
OUTSIDE DIAMETER	INCHES	4.5
INSIDE DIAMETER	INCHES	4.026
FLOW AREA	SQFT	0.0884
ALTITUDE	FMSL	937
NUMBER OF BLOWERS	DIMENSIONLESS	4
FIELD DATA		
DATE	DD/MM/YY	12-Mar-97
TECHNICIAN	INITIALS	RJ
TEMPERATURES		
BUILDING, AMBIENT	DEGREES F.	NA
EXHAUST, DRY BULB	DEGREES F.	32
EXHAUST, WET BULB	DEGREES F.	32
MANIFOLD	DEGREES F.	32
PRESSURES		
BAROMETRIC	IN. Hg	29.42
FLOWING GAS	IN. W.C. GAUGE	0.01
MANIFOLD	IN. W.C. GAUGE	NO PORT 0.00
EPA METHOD 2		
NUMBER OF TRAVERSE POINTS	DIMENSIONLESS	4
VP (POINT 1)	IN. W.C. GAUGE	0.03
VP (POINT 2)	IN. W.C. GAUGE	0.03
VP (POINT 3)	IN. W.C. GAUGE	0.03
VP (POINT 4)	IN. W.C. GAUGE	0.03
VP (CENTERLINE)	IN. W.C. GAUGE	0.03
CHEMICAL ANALYSIS		
FID	PPM (v/v)	34
FID (converted to uG/L)	uG/L	132
LABORATORY DATA (EPA METHOD 18)		
BENZENE	uG/L	0.48
ETHYL BENZENE	uG/L	2.4
TOLUENE	uG/L	1.7
XYLENES	uG/L	13
TOTAL HYDROCARBONS AS GASOLINE	uG/L	250

DATA REDUCTION						
GAS FLOW VELOCITY						
FIELD DATA, EPA METHOD 2						
AF = ALTITUDE FACTOR	DIMENSIONLESS	0.97				
W = HUMIDITY RATIO	LB H2O/LB AIR	0				
Vw = VOLUME WATER VAPOR (std)	CUFT/LB AIR	0				
Vgas = VOLUME OF GAS (dry, std)	CUFT/LB AIR	13.333333333				
Bws = WATER VAPOR IN GAS	VOL/VOL	0				
HV = HUMID VOLUME	CUFT/LB	13.333333333				
Ms = MOLECULAR WEIGHT OF STACK GAS	GAS DESITY	29				
p(SL) = DENSITY @ SEA LEVEL	LB/CUFT	0.0750				
p(ACTUAL) = DENSITY ACTUAL	LB/CUFT	0.0716				
Kp = PITOT TUBE CONSTANT		85.49				
PTF = PITOT TUBE FACTOR	DIMENSIONLESS	0.99				
T = TEMPERATURE OF STACK GAS	DEGREE R	492				
Ps = PRESSURE OF STACK GAS	IN Hg (abs)	29.420735294				
{(VP)^.5}ave	(IN H2O)^0.5	0.1732				
VS = VELOCITY OF STACK GAS	FT/SEC	11.131864983				
GAS FLOW RATE						
EPA METHOD 2	SCFM	62	0.0294101245	M^3/SEC		
BLOWER PERFORMANCE CURVE	SCFM	440	0.20768	M^3/SEC		
TOTAL OF VENTS						
ORIFICE						
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	ERR	M^3/SEC		
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	ERR	M^3/SEC		
PRODUCT REMOVAL RATE						
EPA METHODS 2 & 18 (USEPA REPORTING)			SER	% OF SER	LBS/YEAR	
BENZENE	uG/SEC	14	4600	0.31	319.362912	4321.1028837
ETHYLBENZENE	uG/SEC	71	497700	0.01	34553.678544	
TOLUENE	uG/SEC	50	429800	0.01	29839.604256	
XYLENES	uG/SEC	382	497700	0.08	34553.678544	
TOTAL HYDROCARBON AS GASOLINE	uG/SEC	7353	718065	1.02	49852.897959	5.6870748299
STATE OF MINNESOTA REPORTING		OBSERVED	LIMIT	% OF LIMIT		
BENZENE	gallons/day	0.00	0.87	0.05%		
TOTAL HYDROCARBON AS GASOLINE	gallons/day	0.24	136.49	0.17%		
EPA METHODS 2 & FID	gallons/day	0.12	136.49	0.09%		
BLOWER PERFORMANCE CURVE & FID	gallons/day	0.88	136.49	0.64%		
SUM OF VENTS (ORIFICE), INITIAL	gallons/day	ERR	136.49	ERR		
SUM OF VENTS (ORIFICE), ADJUSTED	gallons/day	ERR	136.49	ERR		

NOTES:
TO CONVERT uG/L TO uG/M^3 MULTIPLY BY 0.001
TO CALCULATE uG/L DIVIDE ANALYSIS BY SAMPLED VOLUME IN LITERS
TO CALCULATE SAMPLE VOLUME MULTIPLY AVERAGE OF PUMP CALIBRATION BY SAMPLE TIME

SOIL VENTILATION PERFORMANCE PAGE 1 PAGE 2
PROJECT NUMBER: 24930601.00
ANALYSIS PERFORMED BY: MPS
DATE PRINTED: 26-Sep-97 08:19:40 AM

DESCRIPTION	UNITS																
SYSTEM DATA																	
IDENTIFICATION	DIMENSIONLESS	SYSTEM	RW-1	SVV-1	SVV-2	SVV-3	SVV-4	ERR	SVV-5	SVV-6	ERR	ERR	SVV-7	SVV-8	SVV-9	SVV-10	SVV-11
D = DIAMETER, PIPE INSIDE	INCHES	4.026	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
d = DIAMETER, ORIFICE	INCHES	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
B = BETA RATIO	DIMENSIONLESS	0.186	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375
NUMBER OF BLOWERS	DIMENSIONLESS	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DESIGN SOIL THICKNESS	FEET	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
DESIGN GAS EXCHANGE RATE	MIN/EXCHANGE	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
DESIGN GAS FLOW RATE	SCFM	150	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
FIELD DATA																	
DATE	DD/MM/YY	12-Mar-97	12-Mar-97	12-Mar-97	12-Mar-97	12-Mar-97	12-Mar-97	12-Mar-97	12-Mar-97	12-Mar-97	12-Mar-97	12-Mar-97	12-Mar-97	12-Mar-97	12-Mar-97	12-Mar-97	12-Mar-97
TECHNICIAN	INITIALS	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ	RJ
PRESSURE																	
@ MANHOLE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0
VENT SIDE (FLOWING GAS PRESSURE)	IN. W.C. GAUGE	NA	-19	-25	-17	-22	-14	ERR	-44	-44	ERR	ERR	-50	-22	-13	-24	-26
BLOWER SIDE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0
MANIFOLD	IN. W.C. GAUGE	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00
EXHAUST	IN. W.C. GAUGE	0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ORIFICE PLATE																	
DIFFERENTIAL, UPON ARRIVAL	IN. W.C. GAUGE	NA	1.2	0.2	0	0	0	ERR	0	0	ERR	ERR	0.3	3.2	0	0.2	0
DIFFERENTIAL, RE-ADJUSTED	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0
TEMPERATURE, FLOWING GAS	DEGREE F	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
COMMENTS	EXPLANATION																
FID	PPM (v/v)	34	12	25	78	11	7	ERR	37	2	ERR	ERR	9	2	4	24	8
FID (converted to ug/L)	uG/L	132	47	97	302	43	27	ERR	143	8	ERR	ERR	35	8	16	93	31
DATA REDUCTION																	
G = SPECIFIC GRAVITY, GAS	DIMENSIONLESS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Rd = REYNOLD'S #, DESIGN	DIMENSIONLESS	63011	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456
K = ORIFICE COEFFICIENT	DIMENSIONLESS	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110
Fa = ORIFICE EXPANSION FACTOR	DIMENSIONLESS	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936
TI = TEMPERATURE OF FLOWING GAS	DEG R	492	492	492	492	492	492	492	492	492	492	492	492	492	492	492	492
PI = PRESSURE OF FLOWING GAS	PSIA	14.7	14.01353	13.79675	14.08579	13.90514	14.19418	ERR	13.11028	13.11028	ERR	ERR	12.8935	13.90514	14.23031	13.83288	13.76062
Fpv = GAS COMPRESSIBILITY FACTOR	DIMENSIONLESS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Y = GAS EXPANSION FACTOR	DIMENSIONLESS	1	0.9989724217	0.999826046	1	1	1	ERR	1	1	ERR	ERR	0.9997207895	0.9972384313	1	0.9998265003	1
ORIFICE																	
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	8.17	3.31	0.00	0.00	0.00	ERR	0.00	0.00	ERR	ERR	3.92	13.27	0.00	3.32	0.00
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	0.00	0.00	0.00	0.00	0.00	ERR	0.00	0.00	ERR	ERR	0.00	0.00	0.00	0.00	0.00
PRODUCT REMOVAL RATE																	
ORIFICE, INITIAL	POUNDS/HR	ERR	0.0057	0.0048	0.0000	0.0000	0.0000	ERR	0.0000	0.0000	ERR	ERR	0.0021	0.0016	0.0000	0.0047	0.0000
ORIFICE ADJUSTED	POUNDS/HR	ERR	0.0000	0.0000	0.0000	0.0000	0.0000	ERR	0.0000	0.0000	ERR	ERR	0.0000	0.0000	0.0000	0.0000	0.0000
EFFECTIVENESS																	
RADIUS, ORIFICE, INITIAL	FEET	NA	13.50	5.77	0.50	0.50	0.50	ERR	0.50	0.50	ERR	ERR	6.74	21.61	0.50	5.78	0.50
RADIUS, ORIFICE, ADJUSTED	FEET	NA	0.50	0.50	0.50	0.50	0.50	ERR	0.50	0.50	ERR	ERR	0.50	0.50	0.50	0.50	0.50

DAHL

& ASSOCIATES, INC

TECHNICIAN: RPJ DATE: 12-Jun-97 TIME: 09:45:00 AM

FIELD DATA SHEET - SOIL VENTILATION - OPERATIONAL

PROJECT NAME:	PROJECT #	PROJECT MGR.
CONOCO SOUTH ROBERT	**24930601**	**MW**

TEMPERATURES	deg F	deg C
BUILDING, AMBIENT	NA	33.0
EXHAUST, WET BULB	32	33
EXHAUST, DRY BULB	32	51
MANIFOLD	32	24

ALTITUDE	937	FMSL

STACK GAS COMPOSITION		
FID EXHAUST	25	ppm (vol/vol)
LEL EXHAUST	NT	% of LEL
STACK 02	NT	% (vol/vol)
STACK CO2	NT	% (vol/vol)
W = HUMIDITY RATIO		lb H2O/lb air

PRESSURES			
LOCATION	DISTANCE	READING	UNITS
STACK VP(1)	1 IN	0.05	in WCG
STACK VP(2)	3 IN	0.05	in WCG
STACK VP(3)	1 IN	0.05	in WCG
STACK VP(4)	3 IN	0.05	in WCG
VP(CENTER)	2 IN	0.05	in WCG
# OF TRAVERSE POINTS		4	unitless
EXHAUST STATIC		0.03	in WCG
BAROMETRIC		28.80	in Hg
MANIFOLD		NA	in Hg
MANIFOLD		NO PORT 0.00	in WCG

EPA METHOD 18: LABORATORY DATA		
BENZENE	uG	21
ETHYL BENZENE	uG	21
TOLUENE	uG	8.4
XYLENES	uG	130
TOTAL HYDROCARBONS AS GASOLINE	uG	1200

NOTES: A) GMW GASOLINE ASUMED AS 95

B) CONVERSION FACTOR, GASOLINE (gallons/kg) 0.37

EPA METHOD 18: SAMPLE COLLECTION	
PUMP CALIBRATION (INITIAL):	15.66
PUMP CALIBRATION (FINAL):	NA
PUMP CALIBRATION (AVE):	15
SAMPLE START TIME	11:01
SAMPLE STOP TIME	11:51
SAMPLE TIME (minutes)	00:50
SAMPLE VOLUME (liters)	10

	DATA UPON ARRIVAL					REBALANCED	FLOW RATE	
	FID	PRESSURES (in WCG)				@ VENT SIDE	INITIAL	REBALANCED
LOCATION	READING	@ MANHOLE	@ VENT SIDE	@ BLOWER SIDE	DIFFERENTIAL	in WCG	scfm	scfm
RW-1	1		-35		0.6		0.00	0.00
SVV-1	24		-18		0.1		2.36	0.00
SVV-2	121		-18		0.1		2.36	0.00
SVV-3	5		-19		0		0.00	0.00
SVV-4	3		-15		0		0.00	0.00
SVV-5	84		-37		0		0.00	0.00
SVV-6	6		-22		0.4		4.70	0.00
SVV-7	5		-17		1.6		9.45	0.00
SVV-8	5		-8		8.7		22.17	0.00
SVV-9	6		-15		0.2		3.36	0.00
SVV-10	4.9		-26		0.2		3.31	0.00
SVV-11	1		-16		0		0.00	0.00
TOTAL							47.72	0.00

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(W)	NT	NT	NT
SVP-2(W)	NT	NT	NT
SVP-3(W)	NT	NT	NT
SVP-4(W)	NT	NT	NT
SVP-5(W)	NT	NT	NT
SVP-6(W)	NT	NT	NT

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(E)	NT	NT	NT
SVP-2(E)	NT	NT	NT
SVP-3(E)	NT	NT	NT
SVP-4(E)	NT	NT	NT
SVP-5(E)	NT	NT	NT
SVP-6(E)	NT	NT	NT

COMMENTS:

AMBIENT 3.5 ppm

MOISTURE TRAPS WERE EMPTY

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SOIL VENTILATION PERFORMANCE

PROJECT NUMBER: 24930601.00
ANALYSIS PERFORMED BY: MPS
DATE PRINTED: 26-Sep-97 07:45:38 AM

DESCRIPTION	UNITS	
SYSTEM DATA		
STACK DATA		
OUTSIDE DIAMETER	INCHES	4.5
INSIDE DIAMETER	INCHES	4.026
FLOW AREA	SQFT	0.0884
ALTITUDE	FMSL	937
NUMBER OF BLOWERS	DIMENSIONLESS	4
FIELD DATA		
DATE	DD/MM/YY	12-Jun-97
TECHNICIAN	INITIALS	RPJ
TEMPERATURES		
BUILDING, AMBIENT	DEGREES F.	NA
EXHAUST, DRY BULB	DEGREES F.	32
EXHAUST, WET BULB	DEGREES F.	32
MANIFOLD	DEGREES F.	32
PRESSURES		
BAROMETRIC	IN. Hg	28.8
FLOWING GAS	IN. W.C. GAUGE	0.03
MANIFOLD	IN. W.C. GAUGE	NO PORT 0.00
EPA METHOD 2		
NUMBER OF TRAVERSE POINTS	DIMENSIONLESS	4
VP (POINT 1)	IN. W.C. GAUGE	0.05
VP (POINT 2)	IN. W.C. GAUGE	0.05
VP (POINT 3)	IN. W.C. GAUGE	0.05
VP (POINT 4)	IN. W.C. GAUGE	0.05
VP (CENTERLINE)	IN. W.C. GAUGE	0.05
CHEMICAL ANALYSIS		
FID	PPM (v/v)	25
FID (converted to uG/L)	uG/L	97
LABORATORY DATA (EPA METHOD 18)		
BENZENE	uG/L	2.1
ETHYL BENZENE	uG/L	2.1
TOLUENE	uG/L	0.84
XYLENES	uG/L	13
TOTAL HYDROCARBONS AS GASOLINE	uG/L	120

DATA REDUCTION		
GAS FLOW VELOCITY		
FIELD DATA, EPA METHOD 2		
AF = ALTITUDE FACTOR	DIMENSIONLESS	0.97
W = HUMIDITY RATIO	LB H2O/LB AIR	0
Vw = VOLUME WATER VAPOR (std)	CUFT/LB AIR	0
Vgas = VOLUME OF GAS (dry, std)	CUFT/LB AIR	13.333333333
Bws = WATER VAPOR IN GAS	VOL/VOL	0
HV = HUMID VOLUME	CUFT/LB	13.333333333
Ms = MOLECULAR WEIGHT OF STACK GAS	GAS DESITY	29
p(SL) = DENSITY @ SEA LEVEL	LB/CUFT	0.0750
p(ACTUAL) = DENSITY ACTUAL	LB/CUFT	0.0701
Kp = PITOT TUBE CONSTANT		85.49
PTF = PITOT TUBE FACTOR	DIMENSIONLESS	0.99
T = TEMPERATURE OF STACK GAS	DEGREE R	492
Ps = PRESSURE OF STACK GAS	IN Hg (abs)	28.802205882
{(VP)^.5}ave	(IN H2O)^0.5	0.2236
VS = VELOCITY OF STACK GAS	FT/SEC	14.524667225

GAS FLOW RATE				
EPA METHOD 2	SCFM	80	0.0375670724	M^3/SEC
BLOWER PERFORMANCE CURVE	SCFM	440	0.20768	M^3/SEC
TOTAL OF VENTS				
ORIFICE				
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	ERR	M^3/SEC
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	ERR	M^3/SEC

PRODUCT REMOVAL RATE						
EPA METHODS 2 & 18 (USEPA REPORTING)			SER	% OF SER	LBS/YEAR	
BENZENE	uG/SEC	79	4600	1.72	319.362912	4321.1028837
ETHYLBENZENE	uG/SEC	79	497700	0.02	34553.678544	
TOLUENE	uG/SEC	32	429800	0.01	29839.604256	
XYLENES	uG/SEC	488	497700	0.10	34553.678544	
TOTAL HYDROCARBON AS GASOLINE	uG/SEC	4508	718065	0.63	49852.897959	5.6870748299

STATE OF MINNESOTA REPORTING		OBSERVED	LIMIT	% OF LIMIT
BENZENE	gallons/day	0.00	0.87	0.29%
TOTAL HYDROCARBON AS GASOLINE	gallons/day	0.14	136.49	0.11%
EPA METHODS 2 & FID	gallons/day	0.12	136.49	0.09%
BLOWER PERFORMANCE CURVE & FID	gallons/day	0.64	136.49	0.47%
SUM OF VENTS (ORIFICE), INITIAL	gallons/day	ERR	136.49	ERR
SUM OF VENTS (ORIFICE), ADJUSTED	gallons/day	ERR	136.49	ERR

NOTES:
TO CONVERT uG/L TO uG/M^3 MULTIPLY BY 0.001
TO CALCULATE uG/L DIVIDE ANALYSIS BY SAMPLED VOLUME IN LITERS
TO CALCULATE SAMPLE VOLUME MULTIPLY AVERAGE OF PUMP CALIBRATION BY SAMPLE TIME

SOIL VENTILATION PERFORMANCE PAGE 1 PAGE 2
PROJECT NUMBER: 24930601.00
ANALYSIS PERFORMED BY: MPS
DATE PRINTED: 26-Sep-97 07:45:38 AM

DESCRIPTION	UNITS																	
SYSTEM DATA																		
IDENTIFICATION	DIMENSIONLESS	SYSTEM	RW-1	SVV-1	SVV-2	SVV-3	SVV-4	ERR	SVV-5	SVV-6	ERR	ERR	SVV-7	SVV-8	SVV-9	SVV-10	SVV-11	
D = DIAMETER, PIPE INSIDE	INCHES	4.026	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
d = DIAMETER, ORIFICE	INCHES	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
B = BETA RATIO	DIMENSIONLESS	0.186	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375
NUMBER OF BLOWERS	DIMENSIONLESS	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DESIGN SOIL THICKNESS	FEET	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
DESIGN GAS EXCHANGE RATE	MIN/EXCHANGE	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
DESIGN GAS FLOW RATE	SCFM	150	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
FIELD DATA																		
DATE	DD/MM/YY	12-Jun-97	12-Jun-97	12-Jun-97	12-Jun-97	12-Jun-97	12-Jun-97	12-Jun-97	12-Jun-97	12-Jun-97	12-Jun-97	12-Jun-97	12-Jun-97	12-Jun-97	12-Jun-97	12-Jun-97	12-Jun-97	12-Jun-97
TECHNICIAN	INITIALS	RPJ	RPJ	RPJ	RPJ	RPJ	RPJ	RPJ	RPJ	RPJ	RPJ	RPJ	RPJ	RPJ	RPJ	RPJ	RPJ	RPJ
PRESSURE																		
@ MANHOLE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0	0
VENT SIDE (FLOWING GAS PRESSURE)	IN. W.C. GAUGE	NA	-35	-18	-18	-19	-15	ERR	-37	-22	ERR	ERR	-17	-8	-15	-26	-16	0
BLOWER SIDE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0	0
MANIFOLD	IN. W.C. GAUGE	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00
EXHAUST	IN. W.C. GAUGE	0.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ORIFICE PLATE																		
DIFFERENTIAL, UPON ARRIVAL	IN. W.C. GAUGE	NA	0.6	0.1	0.1	0	0	ERR	0	0.4	ERR	ERR	1.6	8.7	0.2	0.2	0	0
DIFFERENTIAL, RE-ADJUSTED	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0	0
TEMPERATURE, FLOWING GAS	DEGREE F	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
COMMENTS	EXPLANATION																	
FID	PPM (v/v)	25	1	24	121	5.2	3.3	ERR	84	5.5	ERR	ERR	4.9	4.6	5.6	4.9	1.2	
FID (converted to ug/L)	uG/L	97	4	93	469	20	13	ERR	326	21	ERR	ERR	19	18	22	19	5	
DATA REDUCTION																		
G = SPECIFIC GRAVITY, GAS	DIMENSIONLESS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Rd = REYNOLD'S #, DESIGN	DIMENSIONLESS	63011	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	
K = ORIFICE COEFFICIENT	DIMENSIONLESS	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	
Fa = ORIFICE EXPANSION FACTOR	DIMENSIONLESS	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	
TI = TEMPERATURE OF FLOWING GAS	DEG R	492	492	492	492	492	492	492	492	492	492	492	492	492	492	492	492	
PI = PRESSURE OF FLOWING GAS	PSIA	14.7	13.43545	14.04966	14.04966	14.01353	14.15805	ERR	13.36319	13.90514	ERR	ERR	14.08579	14.41096	14.15805	13.76062	14.12192	
Fpv = GAS COMPRESSIBILITY FACTOR	DIMENSIONLESS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Y = GAS EXPANSION FACTOR	DIMENSIONLESS	1	0.9994641043	0.9999145887	0.9999145887	1	1	ERR	1	0.9996548039	ERR	ERR	0.9986369242	0.9927555139	0.9998304851	0.9998255893	1	
ORIFICE																		
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	5.66	2.36	2.36	0.00	0.00	ERR	0.00	4.70	ERR	ERR	9.45	22.17	3.36	3.31	0.00	
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	0.00	0.00	0.00	0.00	0.00	ERR	0.00	0.00	ERR	ERR	0.00	0.00	0.00	0.00	0.00	
PRODUCT REMOVAL RATE																		
ORIFICE, INITIAL	POUNDS/HR	ERR	0.0003	0.0033	0.0167	0.0000	0.0000	ERR	0.0000	0.0015	ERR	ERR	0.0027	0.0060	0.0011	0.0009	0.0000	
ORIFICE ADJUSTED	POUNDS/HR	ERR	0.0000	0.0000	0.0000	0.0000	0.0000	ERR	0.0000	0.0000	ERR	ERR	0.0000	0.0000	0.0000	0.0000	0.0000	
EFFECTIVENESS																		
RADIUS, ORIFICE, INITIAL	FEET	NA	9.51	4.26	4.26	0.50	0.50	ERR	0.50	7.98	ERR	ERR	15.55	35.78	5.84	5.76	0.50	
RADIUS, ORIFICE, ADJUSTED	FEET	NA	0.50	0.50	0.50	0.50	0.50	ERR	0.50	0.50	ERR	ERR	0.50	0.50	0.50	0.50	0.50	

DAHL

& ASSOCIATES, INC

TECHNICIAN: DR DATE: 22-Sep-97 TIME: 01:00:00 PM

FIELD DATA SHEET - SOIL VENTILATION - OPERATIONAL

PROJECT NAME:	PROJECT #	PROJECT MGR.
CONOCO SOUTH ROBERT	**24930601**	**MW**

TEMPERATURES	deg F	deg C
BUILDING, AMBIENT	NA	20.0
EXHAUST, WET BULB	32	26
EXHAUST, DRY BULB	32	37
MANIFOLD	32	

ALTITUDE	937	FMSL

STACK GAS COMPOSITION		
FID EXHAUST		ppm (vol/vol)
LEL EXHAUST	NT	% of LEL
STACK 02	NT	% (vol/vol)
STACK CO2	NT	% (vol/vol)
W = HUMIDITY RATIO		lb H2O/lb air

PRESSURES			
LOCATION	DISTANCE	READING	UNITS
STACK VP(1)	1 IN	0.02	in WCG
STACK VP(2)	3 IN	0.02	in WCG
STACK VP(3)	1 IN	0.02	in WCG
STACK VP(4)	3 IN	0.02	in WCG
VP(CENTER)	2 IN	0.02	in WCG
# OF TRAVERSE POINTS		4	unitless
EXHAUST STATIC		0.02	in WCG
BAROMETRIC		26.10	in Hg
MANIFOLD		11.5	in Hg
MANIFOLD		NO PORT 0.00	in WCG

EPA METHOD 18: LABORATORY DATA		
BENZENE	uG	<15
ETHYL BENZENE	uG	4.8
TOLUENE	uG	<15
XYLENES	uG	54
TOTAL HYDROCARBONS AS GASOLINE	uG	240

NOTES: A) GMW GASOLINE ASUMED AS 95

B) CONVERSION FACTOR, GASOLINE (gallons/kg) 0.37

EPA METHOD 18: SAMPLE COLLECTION	
PUMP CALIBRATION (INITIAL):	14.97
PUMP CALIBRATION (FINAL):	NA
PUMP CALIBRATION (AVE):	NA
SAMPLE START TIME	13:42
SAMPLE STOP TIME	NA
SAMPLE TIME (minutes)	NA
SAMPLE VOLUME (liters)	NA

	DATA UPON ARRIVAL					REBALANCED	FLOW RATE	
	FID	PRESSURES (in WCG)				@ VENT SIDE	INITIAL	REBALANCED
LOCATION	READING	@ MANHOLE	@ VENT SIDE	@ BLOWER SIDE	DIFFERENTIAL	in WCG	scfm	scfm
RW-1	1		40		0.3	0	0.00	4.39
SVV-1	3		36				0.00	0.00
SVV-2	2		42				0.00	0.00
SVV-3	2		38				0.00	0.00
SVV-4	2		22				0.00	0.00
SVV-5	2		43				0.00	0.00
SVV-6	2		32		0.5		5.61	0.00
SVV-7	2		30		1		7.92	0.00
SVV-8	2		8		4.0	4	15.40	15.40
SVV-9	2		20				0.00	0.00
SVV-10	1.8		30		0.1	0	2.51	2.51
SVV-11	2		18				0.00	0.00
TOTAL							31.44	17.91

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(W)	NT	NT	NT
SVP-2(W)	NT	NT	NT
SVP-3(W)	NT	NT	NT
SVP-4(W)	NT	NT	NT
SVP-5(W)	NT	NT	NT
SVP-6(W)	NT	NT	NT

PROBES:

LOCATION	FID	Dissolved O2	PRESSURE
SVP-1(E)	NT	NT	NT
SVP-2(E)	NT	NT	NT
SVP-3(E)	NT	NT	NT
SVP-4(E)	NT	NT	NT
SVP-5(E)	NT	NT	NT
SVP-6(E)	NT	NT	NT

COMMENTS:

SVV 7 definatrly pulling water, emptied water colletor turned it off.

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SOIL VENTILATION PERFORMANCE PAGE 1

PROJECT NUMBER: 24930601.00

ANALYSIS PERFORMED BY: MPS

DATE PRINTED: 20-Oct-97 03:14:18 PM

DESCRIPTION	UNITS	
SYSTEM DATA		
STACK DATA		
OUTSIDE DIAMETER	INCHES	4.5
INSIDE DIAMETER	INCHES	4.026
FLOW AREA	SQFT	0.0884
ALTITUDE	FMSL	937
NUMBER OF BLOWERS	DIMENSIONLESS	4
FIELD DATA		
DATE	DD/MM/YY	22-Sep-97
TECHNICIAN	INITIALS	DR
TEMPERATURES		
BUILDING, AMBIENT	DEGREES F.	NA
EXHAUST, DRY BULB	DEGREES F.	32
EXHAUST, WET BULB	DEGREES F.	32
MANIFOLD	DEGREES F.	32
PRESSURES		
BAROMETRIC	IN. Hg	26.1
FLOWING GAS	IN. W.C. GAUGE	0.02
MANIFOLD	IN. W.C. GAUGE	NO PORT 0.00
EPA METHOD 2		
NUMBER OF TRAVERSE POINTS	DIMENSIONLESS	4
VP (POINT 1)	IN. W.C. GAUGE	0.02
VP (POINT 2)	IN. W.C. GAUGE	0.02
VP (POINT 3)	IN. W.C. GAUGE	0.02
VP (POINT 4)	IN. W.C. GAUGE	0.02
VP (CENTERLINE)	IN. W.C. GAUGE	0.02
CHEMICAL ANALYSIS		
FID	PPM (v/v)	0
FID (converted to uG/L)	uG/L	0
LABORATORY DATA (EPA METHOD 18)		
BENZENE	uG/L	0
ETHYL BENZENE	uG/L	0.48
TOLUENE	uG/L	0
XYLENES	uG/L	5.4
TOTAL HYDROCARBONS AS GASOLINE	uG/L	24

DATA REDUCTION						
GAS FLOW VELOCITY						
FIELD DATA, EPA METHOD 2						
AF = ALTITUDE FACTOR	DIMENSIONLESS	0.97				
W = HUMIDITY RATIO	LB H2O/LB AIR	0				
Vw = VOLUME WATER VAPOR (std)	CUFT/LB AIR	0				
Vgas = VOLUME OF GAS (dry, std)	CUFT/LB AIR	13.333333333				
Bws = WATER VAPOR IN GAS	VOL/VOL	0				
HV = HUMID VOLUME	CUFT/LB	13.333333333				
Ms = MOLECULAR WEIGHT OF STACK GAS	GAS DESITY	29				
p(SL) = DENSITY @ SEA LEVEL	LB/CUFT	0.0750				
p(ACTUAL) = DENSITY ACTUAL	LB/CUFT	0.0635				
Kp = PITOT TUBE CONSTANT		85.49				
PTF = PITOT TUBE FACTOR	DIMENSIONLESS	0.99				
T = TEMPERATURE OF STACK GAS	DEGREE R	492				
Ps = PRESSURE OF STACK GAS	IN Hg (abs)	26.101470588				
{(VP)^.5}ave	(IN H2O)^0.5	0.1414				
VS = VELOCITY OF STACK GAS	FT/SEC	9.6497613663				
GAS FLOW RATE						
EPA METHOD 2	SCFM	48	0.0226181438	M^3/SEC		
BLOWER PERFORMANCE CURVE	SCFM	440	0.20768	M^3/SEC		
TOTAL OF VENTS						
ORIFICE						
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	ERR	M^3/SEC		
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	ERR	M^3/SEC		
PRODUCT REMOVAL RATE						
EPA METHODS 2 & 18 (USEPA REPORTING)			SER	% OF SER	LBS/YEAR	
BENZENE	uG/SEC	0	4600	0.00	319.362912	4321.1028837
ETHYLBENZENE	uG/SEC	11	497700	0.00	34553.678544	
TOLUENE	uG/SEC	0	429800	0.00	29839.604256	
XYLENES	uG/SEC	122	497700	0.02	34553.678544	
TOTAL HYDROCARBON AS GASOLINE	uG/SEC	543	718065	0.08	49852.897959	5.6870748299
STATE OF MINNESOTA REPORTING		OBSERVED	LIMIT	% OF LIMIT		
BENZENE	gallons/day	0.00	0.87	0.00%		
TOTAL HYDROCARBON AS GASOLINE	gallons/day	0.02	136.49	0.01%		
EPA METHODS 2 & FID	gallons/day	0.00	136.49	0.00%		
BLOWER PERFORMANCE CURVE & FID	gallons/day	0.00	136.49	0.00%		
SUM OF VENTS (ORIFICE), INITIAL	gallons/day	ERR	136.49	ERR		
SUM OF VENTS (ORIFICE), ADJUSTED	gallons/day	ERR	136.49	ERR		

NOTES:

TO CONVERT uG/L TO uG/M^3 MULTIPLY BY 0.001

TO CALCULATE uG/L DIVIDE ANALYSIS BY SAMPLED VOLUME IN LITERS

TO CALCULATE SAMPLE VOLUME MULTIPLY AVERAGE OF PUMP CALIBRATION BY SAMPLE TIME

SOIL VENTILATION PERFORMANCE — PAGE 1 — PAGE 2
PROJECT NUMBER: 24930601.00
ANALYSIS PERFORMED BY: MPS
DATE PRINTED: 20-Oct-97 03:10:59 PM

DESCRIPTION	UNITS																	
SYSTEM DATA																		
IDENTIFICATION	DIMENSIONLESS	SYSTEM	RW-1	SVV-1	SVV-2	SVV-3	SVV-4	ERR	SVV-5	SVV-6	ERR	ERR	SVV-7	SVV-8	SVV-9	SVV-10	SVV-11	
D = DIAMETER, PIPE INSIDE	INCHES	4.026	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
d = DIAMETER, ORIFICE	INCHES	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	
B = BETA RATIO	DIMENSIONLESS	0.186	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	
NUMBER OF BLOWERS	DIMENSIONLESS	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
DESIGN SOIL THICKNESS	FEET	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	
DESIGN GAS EXCHANGE RATE	MIN/EXCHANGE	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	
DESIGN GAS FLOW RATE	SCFM	150	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
FIELD DATA																		
DATE	DD/MM/YY	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	22-Sep-97	
TECHNICIAN	INITIALS	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	
PRESSURE																		
@ MANHOLE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0	
VENT SIDE (FLOWING GAS PRESSURE)	IN. W.C. GAUGE	NA	40	36	42	38	22	ERR	43	32	ERR	ERR	30	8.4	20	30	18	
BLOWER SIDE	IN. W.C. GAUGE	NA	0	0	0	0	0	ERR	0	0	ERR	ERR	0	0	0	0	0	
MANIFOLD	IN. W.C. GAUGE	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	NO PORT 0.00	
EXHAUST	IN. W.C. GAUGE	0.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
ORIFICE PLATE																		
DIFFERENTIAL, UPON ARRIVAL	IN. W.C. GAUGE	NA	0.3	0	0	0	0	ERR	0	0.5	ERR	ERR	1	4	0	0.1	0	
DIFFERENTIAL, RE-ADJUSTED	IN. W.C. GAUGE	NA	0.3	0	0	0	0	ERR	0	0	ERR	ERR	0	4	0	0.1	0	
TEMPERATURE, FLOWING GAS	DEGREE F	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
COMMENTS	EXPLANATION																	
FID	PPM (V/V)	0	0.6	3.4	1.8	2	1.6	ERR	1.8	1.8	ERR	ERR	1.8	1.8	1.8	1.8	1.6	
FID (converted to ug/L)	uG/L	0	2	13	7	8	6	ERR	7	7	ERR	ERR	7	7	7	7	6	
DATA REDUCTION																		
G = SPECIFIC GRAVITY, GAS	DIMENSIONLESS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Rd = REYNOLD'S #, DESIGN	DIMENSIONLESS	63011	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	8456	
K = ORIFICE COEFFICIENT	DIMENSIONLESS	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	0.6110	
Fa = ORIFICE EXPANSION FACTOR	DIMENSIONLESS	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	0.99941936	
Tf = TEMPERATURE OF FLOWING GAS	DEG R	492	492	492	492	492	492	492	492	492	492	492	492	492	492	492	492	
Pf = PRESSURE OF FLOWING GAS	PSIA	14.7	16.1452	16.00068	16.21746	16.07294	15.49486	ERR	16.25359	15.85616	ERR	ERR	15.7839	15.003492	15.4226	15.7839	15.35034	
Fpv = GAS COMPRESSIBILITY FACTOR	DIMENSIONLESS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Y = GAS EXPANSION FACTOR	DIMENSIONLESS	1	0.9997770235	1	1	1	1	ERR	1	0.9996215982	ERR	ERR	0.9992397316	0.9968007448	1	0.9999239732	1	
ORIFICE																		
Qinit = GAS FLOW RATE, UPON ARRIVAL	SCFM	ERR	4.39	0.00	0.00	0.00	0.00	ERR	0.00	5.61	ERR	ERR	7.92	15.40	0.00	2.51	0.00	
Qadj = GAS FLOW RATE, READJUSTED	SCFM	ERR	4.39	0.00	0.00	0.00	0.00	ERR	0.00	0.00	ERR	ERR	0.00	15.40	0.00	2.51	0.00	
PRODUCT REMOVAL RATE																		
ORIFICE, INITIAL	POUNDS/HR	ERR	0.0002	0.0000	0.0000	0.0000	0.0000	ERR	0.0000	0.0006	ERR	ERR	0.0008	0.0016	0.0000	0.0003	0.0000	
ORIFICE ADJUSTED	POUNDS/HR	ERR	0.0002	0.0000	0.0000	0.0000	0.0000	ERR	0.0000	0.0000	ERR	ERR	0.0000	0.0016	0.0000	0.0003	0.0000	
EFFECTIVENESS																		
RADIUS, ORIFICE, INITIAL	FEET	NA	7.48	0.50	0.50	0.50	0.50	ERR	0.50	9.43	ERR	ERR	13.10	25.01	0.50	4.49	0.50	
RADIUS, ORIFICE, ADJUSTED	FEET	NA	7.48	0.50	0.50	0.50	0.50	ERR	0.50	0.50	ERR	ERR	0.50	25.01	0.50	4.49	0.50	

October 10, 1997

LEGEND
TECHNICAL SERVICES, INC.

Mr. Mike Watson
Dahl and Associates
4390 McMenemy Road
St. Paul, MN 55127

SUBJECT: 24930601
LEGEND No. 97-3485

1.0 INTRODUCTION

LEGEND TECHNICAL SERVICES, INC. (LEGEND) received one charcoal tube sample from a representative of Dahl and Associates on September 26 , 1997. The parameters and analytical results are listed on the attached table.

2.0 SAMPLE IDENTIFICATION

LABORATORY NO.	CLIENT IDENTIFICATION
SN97-90570	Air Sample

3.0 METHODOLOGY

Charcoal Tube

The charcoal tube contents were desorbed using carbon disulfide. The solution was analyzed using an HP 5890 gas chromatograph equipped with a flame ionization detector. Compounds were identified by retention times and quantified by comparison to known compounds using an HP Chemserver laboratory data system.

4.0 CASE NARRATIVE

The sample was taken on September 22, 1997, and was received in acceptable condition.

5.0 REMARKS

The sample was consumed in the analysis.

Prepared by,

LEGEND TECHNICAL SERVICES, INC.

Yoko Johnson
Project Manager

Chris Chapman
Chemist

10/06/97

YJ/CC/mmc

LEGEND TECHNICAL SERVICES, INC.

TABLE #1
LEGEND No. 97-3485

DAHL AND ASSOCIATES, INC.

PETROLEUM VOLATILE ORGANIC COMPOUNDS

Compound	Front (μg/tube)	Back (μg/tube)	Solvent Blank (μg/tube)	PQL (μg/tube)
Total hydrocarbons as gasoline	240	<75	<75	75
Benzene	<1.5	<1.5	<1.5	1.5
Toluene	<1.5	<1.5	<1.5	1.5
Ethyl benzene	4.8	<1.5	<1.5	1.5
Total xylenes	54	<3.0	<3.0	3.0
DATE ANALYZED:	10/01/97	10/01/97	10/01/97	----

< = Less than number shown

PQL = Practical quantitation limit

LEGEND TECHNICAL SERVICES, INC.
775 Vandalia Street, St. Paul, MN 55114 - Telephone: 612/642-1150 Fax: 612/642-1239

CHAIN-OF-CUSTODY RECORD

Client Name: Dahl & Assoc.

Report To: Dahl & Assoc
4390 McMenemy St.
St. Paul, MN 55127

Attn: Mike Watson

Sampled By: D. Roggy

Project No.: 24930601

Laboratory Project No.: 97-3485

Turnaround Time:

☑ Normal Date Needed: _____

☐ Rush Date Needed: _____

Condition Received:

☐ Received on Ice

Analysis/# of Containers:

PID FIELD READINGS | Method 18 | BTEX | Gas

Item No.	Field ID No.	Sample Description	Collection Date	Collection Time	Sample Matrix	Lab ID No.									
1	M18	Air Sample	9/22/97			90570		V							
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															

Transfer No.	Item No.	Relinquished By	Accepted By	Date	Time	Comments
1		Dale Roggy		9/26/97	9:45 am	on ice
2						
3						
4						

FORM FLD 007 (1/96)

LEGEND
TECHNICAL SERVICES, INC.

July 1, 1997

Mr. Mike Watson
Dahl and Associates
4390 McMenemy Road
St. Paul, MN 55127

SUBJECT: 24930601
LEGEND No. 97-1991

1.0 INTRODUCTION

LEGEND TECHNICAL SERVICES, INC. (LEGEND) received one charcoal tube sample from a representative of Dahl and Associates on June 18 , 1997. The parameters and analytical results are listed on the attached table.

2.0 SAMPLE IDENTIFICATION

LABORATORY NO.	CLIENT IDENTIFICATION
SN97-18951	SVS Stack

3.0 METHODOLOGY

Charcoal Tube

The charcoal tube contents were desorbed using carbon disulfide. The solution was analyzed using an HP 5890 gas chromatograph equipped with a flame ionization detector. Compounds were identified by retention times and quantified by comparison to known compounds using an HP Chemserver laboratory data system.

4.0 CASE NARRATIVE

The sample was taken on June 12, 1997, and was received in acceptable condition.

5.0 REMARKS

The sample was consumed in the analysis.

Submitted by,

LEGEND TECHNICAL SERVICES, INC.

Lisa M. Reuder

Lisa Reuder
Project Manager

Yoko Johnson

Yoko Johnson
Chemist

LR/YJ/mmc

LEGEND TECHNICAL SERVICES, INC.

TABLE #1
LEGEND No. 97-1991

DAHL AND ASSOCIATES, INC.

PETROLEUM VOLATILE ORGANIC COMPOUNDS

Compound	SVS - Stack Front (μg/tube)	SVS - Stack Back (μg/tube)	Solvent Blank (μg/tube)	PQL (μg/tube)
Total hydrocarbons as gasoline	1,200	<50	<50	50
Benzene	21	<4.0	<4.0	4.0
Toluene	8.4	<4.0	<4.0	4.0
Ethyl benzene	21	<4.0	<4.0	4.0
Total xylenes	130	<8.0	<8.0	8.0
DATE ANALYZED:	6/20/97	6/19/97	6/19/97	----

< = Less than number shown

PQL = Practical quantitation limit

LEGEND TECHNICAL SERVICES, INC.

775 Vandalia Street, St. Paul, MN 55114 - Telephone: 612/642-1150 Fax: 612/642-1239

CHAIN-OF-CUSTODY RECORD

Client Name: Dahl & Assoc.	Laboratory Project No.: 97-1991	Analysis/# of Containers:
Report To: 4390 McMenemy St St Paul MN 55127	Turnaround Time:	PID FIELD READINGS: BETX, THC
Attn: Mike Watson	[X] Normal Date Needed: _____	
Sampled By: R. Joyce	[ ] Rush Date Needed: _____	
Project No.: 24930601	Condition Received: [X] Received on Ice	

Item No.	Field ID No.	Sample Description	Collection Date	Collection Time	Sample Matrix	Lab ID No.								
1	SVS-stack		6/17/97	1151	Air	97-81957		+						
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														

Transfer No.	Item No.	Relinquished By	Accepted By	Date	Time	Comments
1	1	Richard Joyce	Leilani Wellbe	6/18/97	4:30	
2						
3						
4						

FORM FLD-007 (1/96)

LEGEND
TECHNICAL SERVICES, INC.

March 27, 1997

Mr. Mike Watson
Dahl and Associates
4390 McMenemy Road
St. Paul, MN 55127

SUBJECT: 24930601
LEGEND No. 97-0752

1.0 INTRODUCTION

LEGEND TECHNICAL SERVICES, INC. (LEGEND) received one charcoal tube sample from a representative of Dahl and Associates on March 20, 1997. The parameters and analytical results are listed on the attached table.

2.0 SAMPLE IDENTIFICATION

LABORATORY NO.	CLIENT IDENTIFICATION
SN97-74527	SVS - Stack

3.0 METHODOLOGY

Charcoal Tube

The charcoal tube contents were desorbed using carbon disulfide. The solution was analyzed using an HP 5890 gas chromatograph equipped with a flame ionization detector. Compounds were identified by retention times and quantified by comparison to known compounds using an HP Chemserver laboratory data system.

4.0 CASE NARRATIVE

The sample was taken on March 12, 1997, and was received in acceptable condition.

5.0 REMARKS

The sample was consumed in the analysis.

Submitted by,

LEGEND TECHNICAL SERVICES, INC.

Lisa M. Reuder

Lisa Reuder
Project Manager

Joan Zou
Chemist

LR/JZ/sec

LEGEND TECHNICAL SERVICES, INC.

TABLE #1
LEGEND No. 97-0752

DAHL AND ASSOCIATES, INC.

PETROLEUM VOLATILE ORGANIC COMPOUNDS

Compound	SVS - Stack Front [A] (μg/tube)	Solvent Blank (μg/tube)	PQL (μg/tube)
Total hydrocarbons as gasoline	2,500	<50	50
Benzene	4.8	<4.0	4.0
Toluene	17	<4.0	4.0
Ethyl benzene	24	<4.0	4.0
Total xylenes	130	<8.0	8.0
DATE ANALYZED:	3/23/97	3/21/97	----

< = Less than number shown

PQL = Practical quantitation limit

A = The sample was received without a back section.

490-2905

LEGEND TECHNICAL SERVICES, INC.

775 Vandalia Street, St. Paul, MN 55114 - Telephone: 612/642-1150 Fax: 612/642-1239

CHAIN-OF-CUSTODY RECORD

Client Name: Dahl & Assoc	Laboratory Project No.: 97-0752	Analysis/# of Containers:
Report To: 4390 McMenemy St St Paul MN 55127	Turnaround Time:	PID FIELD READINGS
Attn: Mike Watson	☒ Normal Date Needed: _____	
Sampled By: R. Joyce	☐ Rush Date Needed: _____	
Project No.: 24930601	Condition Received:	
	☒ Received on Ice	

Item No.	Field ID No.	Sample Description	Collection Date	Collection Time	Sample Matrix	Lab ID No.								
1	SVS-Stack		3/12/97	1239	Air	97-14527			X					
2														
3														
4														
5														
6					NO	back section of Charcoal Tube.								
7					Just	Report grant			for Mike Watson					
8									3-24-97					
9									MW					
10														
11														
12														
13														

Transfer No.	Item No.	Relinquished By	Accepted By	Date	Time	Comments
1	1	Richard Joyce	Theresa Sass	3/20/97	9:15 am	Rad on ice
2						
3						
4						

FORM FLD-007 (1/96)

December 19, 1996

LEGEND
TECHNICAL SERVICES, INC.

Mr. Mike Watson
Dahl and Associates
4390 McMenemy Road
St. Paul, MN 55127

SUBJECT: 24930601
LEGEND No. 96-3320

1.0 INTRODUCTION

LEGEND TECHNICAL SERVICES, INC. (LEGEND) received one charcoal tube sample from a representative of Dahl and Associates on December 10 , 1996. The parameters and analytical results are listed on the attached table.

2.0 SAMPLE IDENTIFICATION

LABORATORY NO.	CLIENT IDENTIFICATION
SN96-68865	SVE Stack

3.0 METHODOLOGY

Charcoal Tube

The charcoal tube contents were desorbed using carbon disulfide. The solution was analyzed using an HP 5890 gas chromatograph equipped with a flame ionization detector. Compounds were identified by retention times and quantified by comparison to known compounds using an HP Chemserver laboratory data system.

4.0 CASE NARRATIVE

The sample was taken on December 10, 1996, and was received in acceptable condition.

5.0 REMARKS

The sample was consumed in the analysis.

Submitted by,

LEGEND TECHNICAL SERVICES, INC.

Lisa M. Reuder

Lisa Reuder
Project Manager

Chris Bremer
Laboratory Manager

LR/CB/tls

LEGEND TECHNICAL SERVICES, INC.

TABLE #1
LEGEND No. 96-3320

DAHL AND ASSOCIATES, INC.

PETROLEUM VOLATILE ORGANIC COMPOUNDS

Compound	SVE Stack Front (μg/tube)	SVE Stack Back (μg/tube)	Method Blank (μg/tube)	PQL (μg/tube)
Total hydrocarbons as gasoline	590	<50	<50	50
Benzene	<4.0	<4.0	<4.0	4.0
Toluene	15	<4.0	<4.0	4.0
Ethyl benzene	11	<4.0	<4.0	4.0
Total xylenes	67	<8.0	<8.0	8.0
DATE ANALYZED:	12/13/96 12/16/96	12/13/96 12/16/96	12/13/96 12/16/96	----

< = Less than number shown

PQL = Practical quantitation limit

LEGEND TECHNICAL SERVICES, INC.

775 Vandalia Street, St. Paul, MN 55114 - Telephone: 612/642-1150 Fax: 612/642-1239

CHAIN-OF-CUSTODY RECORD

Client Name: Dahl & Assoc.

Report To: Mike Watson
4390 McMenemy St
St Paul MN 55127

Attn:

Sampled By: R. Joyce

Project No.: 24930601

Laboratory Project No.: 96-3320

Turnaround Time:

[X] Normal Date Needed: _____

[ ] Rush Date Needed: _____

Condition Received:

Analysis/# of Containers:

PID FIELD READINGS

BETX, THG

Item No	Field ID No.	Sample Description	Collection Date	Collection Time	Sample Matrix	Lab ID No.								
1		SVE-Stack	12/10/96	1118	Air	96-6886S		X						
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														

Transfer No.	Item No.	Relinquished By	Accepted By	Date	Time	Comments
1	1	Richard Joyce	Theresa Sass	12/10/96	4:55pm	
2						
3						
4						

FORM FLD 007 (3/95)

LEGEND
TECHNICAL SERVICES, INC.

September 24, 1996

Mr. Mike Watson
Dahl and Associates
4390 McMenemy Road
St. Paul, MN 55127

SUBJECT: 24930601
LEGEND No. 96-2478

1.0 INTRODUCTION

LEGEND TECHNICAL SERVICES, INC. (LEGEND) received one charcoal tube sample from a representative of Dahl and Associates on September 16 , 1996. The parameters and analytical results are listed on the attached table.

2.0 SAMPLE IDENTIFICATION

LABORATORY NO.	CLIENT IDENTIFICATION
SN96-63511	SVS-Stack

3.0 METHODOLOGY

Charcoal Tube

The charcoal tube contents were desorbed using carbon disulfide. The solution was analyzed using an HP 5890 gas chromatograph equipped with a flame ionization detector. Compounds were identified by retention times and quantified by comparison to known compounds using an HP Chemserver laboratory data system.

4.0 CASE NARRATIVE

The sample was taken on September 11, 1996, and was received in acceptable condition.

5.0 REMARKS

The sample was consumed in the analysis.

Submitted by,

LEGEND TECHNICAL SERVICES, INC.

Lisa Reuder
Project Manager

Chris Bremer
Laboratory Manager

LR/CB/tls

LEGEND TECHNICAL SERVICES, INC.

TABLE #1

LEGEND No. 96-2478

DAHL AND ASSOCIATES, INC.

PETROLEUM VOLATILE ORGANIC COMPOUNDS

Compound	SVS-Stack Front (µg/tube)	SVS-Stack Back (µg/tube)	Method Blank (µg/tube)	PQL (µg/tube)
Total hydrocarbons as gasoline	630	<50	<50	50
Benzene	<4.0	<4.0	<4.0	4.0
Toluene	14	<4.0	<4.0	4.0
Ethyl benzene	12	<4.0	<4.0	4.0
Total xylenes	58	<8.0	<8.0	8.0
DATE ANALYZED:	9/18/96	9/18/96	9/18/96	

< = Less than number shown

PQL = Practical quantitation limit

LEGEND TECHNICAL SERVICES, INC.
775 Vandalia Street, St. Paul, MN 55114 - Telephone: 612/642-1150 Fax: 612/642-1239

CHAIN-OF-CUSTODY RECORD

Client Name: Dahl & Assoc.
Report To: 4390 McMenemy St Stlake MN 55127
Attn: Mike Watson
Sampled By: R. Joyce
Project No.: 24930601

Laboratory Project No.: 96-2478
Turnaround Time:
☑ Normal Date Needed: _____
☐ Rush Date Needed: _____
Condition Received:

Analysis/# of Containers:
PID FIELD READINGS
BTEX, THC

Item No.	Field ID No.	Sample Description	Collection Date	Collection Time	Sample Matrix	Lab ID No.								
1		SVE - Stack	9/11/96	1206	Air	96-63511		4						
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														

Transfer No.	Item No.	Relinquished By	Accepted By	Date	Time	Comments
1	1	Richard Joyce	Theresa Sass	9/16/96	9:30 am	
2						
3						
4						

FORM FLD-007 (3/95)

LEGEND
TECHNICAL SERVICES, INC.

June 14, 1996

Mr. Mike Watson
Dahl and Associates
4390 McMenemy Road
St. Paul, MN 55127

SUBJECT: 24930601
LEGEND No. 96-1490

1.0 INTRODUCTION

LEGEND TECHNICAL SERVICES, INC. (LEGEND) received one charcoal tube sample from a representative of Dahl and Associates on June 11 , 1996. The parameters and analytical results are listed on the attached table.

2.0 SAMPLE IDENTIFICATION

LABORATORY NO.	CLIENT IDENTIFICATION
SN96-57435	SVS Stack

3.0 METHODOLOGY

Charcoal Tube

The charcoal tube contents were desorbed using carbon disulfide. The solution was analyzed using an HP 5890 gas chromatograph equipped with a flame ionization detector. Compounds were identified by retention times and quantified by comparison to known compounds using an HP Chemserver laboratory data system.

4.0 CASE NARRATIVE

The sample was taken on June 7, 1996, and was received in acceptable condition.

5.0 REMARKS

The sample was consumed in the analysis.

Submitted by,

LEGEND TECHNICAL SERVICES, INC.

Lisa M. Reuder

Lisa Reuder
Project Manager

Chris Bremer
Laboratory Manager

LR/CB/tls

LEGEND TECHNICAL SERVICES, INC.

TABLE #1
LEGEND No. 96-1490

DAHL AND ASSOCIATES, INC.

PETROLEUM VOLATILE ORGANIC COMPOUNDS

Compound	SVS Stack Front (μg/tube)	SVS Stack Back (μg/tube)	Method Blank (μg/tube)	PQL (μg/tube)
Total hydrocarbons as gasoline	1,800	<50	<50	50
Benzene	6.2	<4.0	<4.0	4.0
Toluene	38	<4.0	<4.0	4.0
Ethyl benzene	35	<4.0	<4.0	4.0
Total xylenes	150	<8.0	<8.0	8.0
DATE ANALYZED:	06/13/96	06/13/96	06/13/96	

< = Less than number shown

PQL = Practical quantitation limit

LEGEND TECHNICAL SERVICES, INC.
775 Vandalia Street, St. Paul, MN 55114 - Telephone: 612/642-1150 Fax. 612/642-1239

CHAIN-OF-CUSTODY RECORD

Client Name: Dahl Assoc.	Laboratory Project No.: 96-1490	Analysis/# of Containers:
Report To: 4390 McMenemy st St Paul MN 55127	Turnaround Time:	PID FIELD READINGS
Attn: Mike Watson	☒ Normal Date Needed:	BETX, THC
Sampled By: R Joyce	☐ Rush Date Needed:	
Project No.: 24930601	Condition Received:	

Item No.	Field ID No.	Sample Description	Collection Date	Collection Time	Sample Matrix	Lab ID No.								
1		SVE-Stack	6/7/96	1149	Air	57435		X						
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														

Transfer No.	Item No.	Relinquished By	Accepted By	Date	Time	Comments
1	1	Richard Joyce	Leilani Welles	6/11/96	8:4:28	
2						
3						
4						

LEGEND
TECHNICAL SERVICES, INC.

April 1, 1996

Mr. Mike Watson
Dahl and Associates
4390 McMenemy Road
St. Paul, MN 55127

SUBJECT: 24930601
LEGEND No. 96-0639

1.0 INTRODUCTION

LEGEND TECHNICAL SERVICES, INC. (LEGEND) received one charcoal tube sample from a representative of Dahl and Associates on March 21, 1996. The parameters and analytical results are listed on the attached table.

2.0 SAMPLE IDENTIFICATION

LABORATORY NO.	CLIENT IDENTIFICATION
SN96-53095	SVS-Stack

3.0 METHODOLOGY

Charcoal Tube

The charcoal tube contents were desorbed using carbon disulfide. The solution was analyzed using an HP 5890 gas chromatograph equipped with a flame ionization detector. Compounds were identified by retention times and quantified by comparison to known compounds using an HP Chemserver laboratory data system.

4.0 CASE NARRATIVE

The sample was taken on March 14, 1996, and was received in acceptable condition.

5.0 REMARKS

The sample was consumed in the analysis.

Submitted by,

LEGEND TECHNICAL SERVICES, INC.

Lisa Reuder (LR)
Lisa Reuder
Project Manager

Chris Bremer
Chris Bremer
Laboratory Manager

LR/CB/edt

LEGEND TECHNICAL SERVICES, INC.

TABLE #1

LEGEND No. 96-0639

DAHL AND ASSOCIATES, INC.

PETROLEUM VOLATILE ORGANIC COMPOUNDS

Compound	SVS Stack Front (μg/tube)	SVS Stack Back (μg/tube)	Method Blank (μg/tube)	PQL (μg/tube)
Total hydrocarbons as gasoline	6,100	<50	<50	50
Benzene	100	<4.0	<4.0	4.0
Toluene	77	<4.0	<4.0	4.0
Ethyl benzene	<4.0	<4.0	<4.0	4.0
Total xylenes	83	<8.0	<8.0	8.0
DATE ANALYZED:	3/23/96	3/23/96	3/22/96	----

< = Less than number shown

PQL = Practical quantitation limit

μg/tube is equal to micrograms per tube

LEGEND TECHNICAL SERVICES, INC.

775 Vandalia Street, St. Paul, MN 55114 - Telephone: 612/642-1150 Fax: 612/642-1239

CHAIN-OF-CUSTODY RECORD

96-0639

Client Name:	Laboratory Project No.:	Analysis/# of Containers:
Report To: Dahl & Assoc. 4390 McMenemy Rd St. Paul MN 55127 Attn: Mike Watson	Turnaround Time: ☑ Normal Date Needed: _____ ☐ Rush Date Needed: _____	PID FIELD READINGS
Sampled By: Richard Joyce	Condition Received:	
Project No.: 24930601		

Item No.	Field ID No.	Sample Description	Collection Date	Collection Time	Sample Matrix	Lab ID No.	PID FIELD READINGS	BETX THG						
1		SVS - Stack	3/14/96	1229	Air	96-53095		X						
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														

Transfer No.	Item No.	Relinquished By	Accepted By	Date	Time	Comments
1	1	Richard Joyce				
2	1	Richard Joyce	Erica Thomas	3/21/96	830	
3						
4						

FORM FLD-007 (3/95)

LEGEND
TECHNICAL SERVICES, INC.

January 15, 1996

Mr. Mike Watson
Dahl and Associates
4390 McMenemy Road
St. Paul, MN 55127

SUBJECT: 2493 0601
LEGEND No. 95-2943

1.0 INTRODUCTION

LEGEND TECHNICAL SERVICES, INC. (LEGEND) received one charcoal tube sample from a representative of Dahl and Associates on December 29, 1995. The parameters and analytical results are listed on the attached table.

2.0 SAMPLE IDENTIFICATION

LABORATORY NO.	CLIENT IDENTIFICATION
SN95-49415	Stack Effluent

3.0 METHODOLOGY

Charcoal Tube

The charcoal tube contents were desorbed using carbon disulfide. The solution was analyzed using an HP 5890 gas chromatograph equipped with a flame ionization detector. Compounds were identified by retention times and quantified by comparison to known compounds using an HP Chemserver laboratory data system.

4.0 CASE NARRATIVE

The sample was taken on December 22, 1995, and was received in acceptable condition.

5.0 REMARKS

The sample was consumed in the analysis.

Submitted by,

LEGEND TECHNICAL SERVICES, INC.

Lisa M. Reuder

Lisa Reuder
Project Manager

Chris Bremer
Laboratory Manager

LR/CB/tls

LEGEND TECHNICAL SERVICES, INC.

TABLE #1

LEGEND No. 95-2943

DAHL AND ASSOCIATES, INC.

PETROLEUM VOLATILE ORGANIC COMPOUNDS

Compound	Stack Effluent Front (μg/tube)	Stack Effluent Back (μg/tube)	Method Blank (μg/tube)	PQL (μg/tube)
Total hydrocarbons as gasoline	2,200	<50	<50	50
Benzene	52	<4.0	<4.0	4.0
Toluene	47	<4.0	<4.0	4.0
Ethyl benzene	35	<4.0	<4.0	4.0
Total xylenes	130	<8.0	<8.0	8.0
DATE ANALYZED:	01/05/96	01/05/96	01/05/96	

< = Less than number shown

PQL = Practical quantitation limit

LEGEND TECHNICAL SERVICES, INC.
775 Vandalia Street, St. Paul, MN 55114 - Telephone: 612/642-1150 Fax: 612/642-1239

CHAIN-OF-CUSTODY RECORD

Client Name: Dahl & Associates	Laboratory Project No.: 95-2943	Analysis/# of Containers:
Report To: Mike Watson 4390 McMenemy Rd Attn: St. Paul MN 55127	Turnaround Time: ☐ Normal Date Needed: _____ ☐ Rush Date Needed: _____	PID FIELD READINGS
Sampled By: Dan Madsen	Condition Received:	
Project No.: 2493 0601		

Item No.	Field ID No.	Sample Description	Collection Date	Collection Time	Sample Matrix	Lab ID No.
1		stack effluent	12/22/95	11:18	AIR	95-4941S
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						

Transfer No.	Item No.	Relinquished By	Accepted By	Date	Time	Comments
1		Dan Madsen	J. Samuel	12/29/95		
2						
3						
4						