ANNUAL MONITORING REPORT – 2001/2002

PAYNESVILLE MUNICIPAL WATER SUPPLY – MPCA
PAYNESVILLE, MINNESOTA
MPCA SITE ID # LEAK00000131

Terracon Project No. 41987018
May 2, 2002

Prepared for:

MINNESOTA POLLUTION CONTROL AGENCY
Majors and Remediation Division
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Prepared by:

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Terracon

Section 1. GROUND WATER MONITORING

Discuss the groundwater monitoring results, including water level measurements and analytical results, performed since the remedial investigation (RI) report or the last progress report submitted.

Fluid levels were collected from wells (map unit number in parentheses) DW-1(1), DW-2(2), DW-3(3), DW-4(4), DW-5(45), DW-6(46); Midtown wells MW-10(24), MW-10D(5), MW-14(25), MW-14D(6), MW-16(27), and MW-17(28); Johnson wells MW-4(44) and MW-5(7); and City of Paynesville monitoring wells identified as map units 42 and 43 on a monthly basis (Figures 1 and 2). The City of Paynesville test well CTW-18(18) was checked for ground water elevations through August 13, 2001. Well construction information is summarized in Table 1. The fluid level data is presented in Table 2. The fluid level data from wells screened between 75 and 95 feet below ground surface were used to prepare the ground water contour maps depicted in Figures 3A through 3D. The contour maps for the April 12, 2001 and October 9, 2001 site visits indicate that the horizontal ground water flow direction is to the southeast. A southeasterly flow direction is consistent with previously collected data. Ground water contour maps for the August 13, 2001 and January 29, 2002 site visits indicate a general southeasterly flow direction. However, the ground water elevation data suggests that during the two aforementioned site visits ground water flow may have been altered by pumping activities associated with City Well CW-4(10). Fluid level data from select monitoring wells screened within the drinking water aquifer and/or located near recovery well DW-5 are depicted on hydrographs in Figures 4A and 4B. The hydrographs illustrate season fluctuations in ground water elevations, and in the case of wells CMW-42 (42) and DW-5 (45) (Figure 4A) the results of ground water pumping activities.

Ground water samples were collected from City Well CW-4(10), Water Treatment Plant Influent, and Water Treatment Plant Effluent on a monthly basis for laboratory analysis. Two samples continued to be taken from the water treatment plant effluent as this is chlorinated water which occasionally reacts with the HCl. One water treatment plant effluent sample included HCl as a preservative; the other effluent sample did not contain the HCl preservative to allow the laboratory to analyze an unpreserved sampling if the holding time (7 days) permits . Ground water samples were collected from monitoring wells DW-3 (3), DW-6 (46), DW-7S(48), DW-7D(49), recovery well DW-5(45), and City Well CW-3 on a quarterly basis during the current reporting period for laboratory analysis. Ground water samples were collected from City Wells CW-5 through CW-8 on an annual basis for laboratory analysis. The laboratory results are summarized in Table 3. Laboratory reports and sampling information forms are included in Appendix D.

Ground water samples from City Wells CW-3, CW-5, CW-6, CW-7, and CW-8 exhibited non-detectable concentrations of target volatile organic compounds for the annual sampling event. Samples collected from the water treatment plant influent and effluent points showed periodic detectable concentrations of target volatile organic compounds. Volatile organic compounds detected in the water treatment plant influent and effluent samples did not reveal

a pattern and the origin for the detected compounds could not be identified through analytical results from the city wells.

Ground water samples from City Well CW-4 have shown consistent detection of benzene and 1,2 DCA during the last four monthly sampling events. The most notable trend in the City Well CW-4 analytical results is that the benzene concentrations have increased from a concentration between the Method Detection Limit (MDL) and Practical Quantification Limit (PQL) to a concentration above the laboratory PQL. The increase in benzene concentrations from between laboratory MDL and PQL to above the laboratory PQL coincides with increased pumping activity of City Well CW-4. Before December 20, 2001 the pumping rate of City Well CW-4 was approximately 75 gallons per minute (gpm) for twelve hours followed by twelve hours of not pumping. On December 20, 2001, pumping activities of City Well CW-4 were increased to 125 gpm continuously for 24 hours. The increased pumping activity of City Well CW-4 appears to be drawing the contamination plume further to the north than was occurring at the lower pumping rate.

Increased pumping of City Well CW-4 was initiated in response to rising benzene concentrations in ground water samples collected from monitoring well DW-3. Contaminant concentrations in ground water samples from monitoring well DW-3 have decreased since the increase in City Well CW-4 pumping activity. Monitoring wells DW-7S and DW-7D are located between monitoring well DW-3 and the city wells CW-5 through CW-7. Monitoring wells DW-7S and DW-7D were installed as sentinel wells between the Midtown Auto site and City Wells CW-5, CW-6 and CW-7. Ground water samples collected from monitoring wells DW-7S and DW-7D exhibited non-detectable concentrations of target volatile organic compounds.

Pumping activities of recovery well DW-5 have continued during this monitoring period. Contaminant concentrations in effluent samples collected from recovery well DW-5 continue to decrease. The last quarterly sample collected from recovery well DW-5 exhibited benzene concentration below MDH HRLs and a gasoline range organics (GRO) concentration below the laboratory PQL. The adjacent and shallower monitoring well DW-6 appears to be relatively unaffected by pumping activities in recovery well DW-5. Ground water samples from monitoring well DW-6 continue to exhibit elevated concentrations of petroleum products. However, the contaminant concentrations encountered in samples from monitoring well DW-6 appear to be stable with fluctuations due to seasonal variations in the ground water table.

Section 2. VAPOR IMPACT MONITORING

If vapor impacts were detected during previous assessments, discuss the results of follow-up vapor monitoring. Include in your discussion the sampling instrument and sampling method.

No new vapor surveys were conducted during the 2001 / 2002 monitoring period. The results of the 1999 vapor survey are attached (Table 4).

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 651/649-5451 (metro and outside Minnesota) or 1-800/422-0798 (Greater Minnesota). TTY users call 651/297-5353 (V/TTY) or 1-800/627-3529 (V/TTY). **Vapor mitigation is required.**

Section 3. RECOMMENDATIONS

Discuss your recommendations. Your recommendation should be based on fact sheet #3.1, *Leaking Underground Storage Tank Program.*
N/A
If additional corrective action is recommended, please provide your justification.
N/A
If significant reduction of risk has been achieved at the site, recommendations and rationale for the reduction or termination of corrective actions may be presented.
N/A
If additional monitoring is recommended, indicate the proposed monitoring schedule and frequency.

Ground water quality data collected from City Well CW-4 and monitoring well DW-3 suggests that the contamination plume is responsive to city well pumping activities and that plume migration may be influence by city well pumping rates. The increased pumping activity of City Well CW-4 on December 20, 2001 from approximately 75 gpm for 12 hours per day, to 125 gpm continuously for 24 hours per day appears to have contributed to decreased concentrations of contaminants in ground water samples from monitoring well DW-3. In addition, the higher pumping rate of city well CW-4 resulted in increased contaminant concentrations in CW-4. At this same time City Well CW-8 was placed on-line on a full time basis and City Well CW-5, CW-6 and CW-7 were used on an alternating basis.

Pumping rates of CW-4 may be used to control contamination plume migration in the direction of City Wells CW-5 through CW-7. However, pumping rates of City Well CW-4 should be limited so that it does not promote excessive migration of the contaminant plume further to the north or into the drinking water aquifer. Continued analysis of samples from the water treatment plant, city wells, and select monitoring wells should continue in order to monitor the quality of the water supply and contaminant plume stability or migration.

Ground water quality data collected from wells DW-5, DW-6 and MW-17 suggest that although pumping activities at recovery well DW-5 have decreased petroleum concentrations at the location of the well, the impact from these activities is limited in extent. The pump in recovery well failed during April 2002. Terracon recommends that pumping activities remained suspended and the ground water quality data be collected to assess whether there is substantial rebound of petroleum concentrations. An attempt was made to find an alternative location for the recovery well system near to the source area

(the Midtown site). However, the owner of a vacant residential property located south of the Casey's General Store not interested in allowing access for assessment or the installation of a recovery system.

Specifically, Terracon recommends the following activities:

- *Evaluate performing a packer test on City Well CW-4 to the pumping rate and ground water quality. The packer test should isolate the intervals between 70 and 80 feet, 80 and 90 feet, 90 and 100 feet and 100 and 110 feet below ground surface. Ground water samples collected during the packer test should be analyzed for VOCs listed in MDH Method 456F and GRO. Location options for moving the recovery system closer to the Midtown site should also be continually assessed.*

- *Suspend continuous pumping activities for recovery well DW-5 and monitor the response of ground water quality wells DW-5, DW-6 and MW-17. The pump in well DW-5 should be repaired or replaced to facilitate sampling of the well. Pumping activities should resume if ground water quality data collected from wells DW-5, DW-6 and MW-17 indicates a significant rebound in petroleum concentrations. If ground water extraction activities resume, routine operation and maintenance of the system should be performed on a monthly basis.*

- *Continue ground water extraction activities utilizing City Well CW-4(10) to contain the petroleum plume. Adjust the pumping activity of city well CW-4(10) to 90 gpm for 24 hours per day, in order to establish an extraction rate that prevents the contaminant plume from migrating in the direction of either CW-4 or in the direction of wells DW-3, DW-7S, DW-7D, and CW-5 through CW-7. The flow rate may require additional adjustment to maximize the effectiveness of the well or if a portion of City Well CW-4 is closed off with packers.*

- *Collect monthly ground water samples from City Wells CW-4, water treatment plant influent, and water treatment effluent. The ground water samples should be analyzed for the presence of VOCs listed in Minnesota Department of Health Method 465. This sample schedule should be changed to quarterly once the petroleum plume has stabilized. This may require submitting a request to the MPCA that the NPDES Permit be changed to quarterly sampling.*

- *Collect annual ground water samples from City Wells CW-5, CW-6, CW-7 and CW-8. The ground water samples should be analyzed for the presence of VOCs listed in Minnesota Department of Health Method 465F and pH. Four samples from city well CW-4 will also be analyzed for total lead consistent with NPDES Permit requirements.*

- *Conduct quarterly site visits to collect fluid level data from wells DW-1(1), DW-2(2), DW-3(3), DW-4(4), DW-5(45), DW-6(46), DW-7S(48), and DW-7D(49); Midtown wells*

MW-10(24), MW-10D(5), MW-14(25), MW-14D(6), MW-16(27), and MW-17(28); Johnson Motors wells MW-4(44) and MW-5(7); City of Paynesville monitoring wells identified as CMW-42 and CMW-43.

- *Collect quarterly ground water quality samples for laboratory analysis from monitoring wells DW-3, DW-6, DW-7S, DW-7D, and recovery well DW-5. Recovery well DW-5 should be sampled after purging with the recovery well pump. The samples should be analyzed for BTEX, MTBE, and GRO. A duplicate sample or field blank should be analyzed during each sampling event.*

- *Perform reporting and project management duties associated with the continued sampling of the municipal water supply and plume containment which includes permitting requirements, utility costs, submission of data to MPCA Staff and the City of Paynesville, and the preparation of an annual monitoring report. The annual report will fulfill the requirements of MPCA Fact Sheets #3.26 and #3.31.*

General Comments

The analysis and opinions expressed in this report are based upon data obtained from the soil borings and laboratory chemical analysis at the indicated locations or from other information discussed in this report. This report does not reflect variations in subsurface stratigraphy, hydrogeology, and contaminant distribution which may occur across the site. Actual subsurface conditions may vary and may not become evident without further assessment.

This report is prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted environmental engineering practices. No warranties are intended or made. In the event any changes in the nature or location of suspected sources of contamination as outlined in this report are observed, the conclusions and recommendations contained in this report shall not be valid unless these changes are reviewed and the opinions of this report are modified or verified in writing by Terracon.

GROUND WATER PUMP-OUT SYSTEMS

Influent/Effluent concentrations

☒ Attach a table of cumulative ground water influent and effluent discharge concentrations (in ug/L).

Operating parameters

Pumping rate: *~10* gallons per minute
Amount of water table drawdown: *~30* feet

Contaminant mass removal

Estimated contaminant mass removal rate: *0.003* gallons/day
Estimated contaminant mass removal to date: *4.5* gallons
Cumulative mass removal vs time (plot) *Figure 6*

SOIL VENTING SYSTEMS *N/A*

Emission concentrations

☐ Attach a table containing field screening results for each vapor extraction point.
☐ Attach a table of soil vent system emissions concentrations. Include all analytical samples collected since system startup. Collect the samples from a sampling port located upstream of the blower. Analyze the samples for benzene, ethyl benzene, toluene and xylene using EPA Method 18. Include the Screening Emission Rates (SERs) for each compound on the table.

Operating parameters

Extraction airflow rate: standard cubic feet/minute (scfm)

☐ Attach a table of cumulative vacuum data from vent points and monitoring points.

Bioactivity measurements

☐ Attach a table of cumulative extraction system CO_2 and O_2 concentrations.

Contaminant mass removal:

Estimated contaminant mass removal rate: kg/day x gal/kg = gal/day
Estimated contaminant mass removal to date: gallons
Cumulative mass removal vs time (plot)

SOIL VENTING/AIR SPARGING SYSTEMS *N/A*

(Complete the soil venting systems section above for all air sparge/soil venting combination systems)

☐ Attach a table of air injection rates for each sparge point in the system.
Total air injection rate: scfm
Total air removal rate: scfm

TOTAL SITE CONTAMINANT MASS REMOVAL *N/A*

Fill out this section if ground water pump-out is used in combination with a soil venting system or a soil venting/air sparging system.

Total estimated contaminant mass removal rate for the site: gallons/day
Total estimated contaminant mass removal to date for the site: gallons
Cumulative mass removal vs time (plot).

SYSTEM CHANGES

Describe in detail any changes in system operation or configuration made during this reporting period (attach additional pages if needed). Also explain any periods during which the system was not operating.
The system remained operating (pumping) for the reporting period until the April 2002 site visit when the well pump was found to be produce only a few gallons of water before tripping off. Prior to the site meeting on April 29, 2001 the system was check and found to not be pumping water. The pump controller repeatedly trips off suggesting that the motor has failed.

Several minor operational problems also occurred during this monitoring period. The flow meter plugged during July / August 2001. The motor hour counter for the system hours failed between the September 2001 and November 2001 visits. The motor hour counter began operating again during December 2001. Although the system hours were not automatically recorded, the total gallons of water pumped were consistently recorded with the flow rate and percent availability in Table 5 has been adjusted to reflect the actual conditions.

RECOMMENDATIONS

List recommendations for modifying the monitoring schedule, system operation, system configuration or site closure (attach additional pages if needed):

See Fact Sheet 3.26

OBSERVATIONS

Please provide observations made at the site and describe unusual circumstance that may have influenced the sampling results:
See system changes and Fact Sheet 3.26.

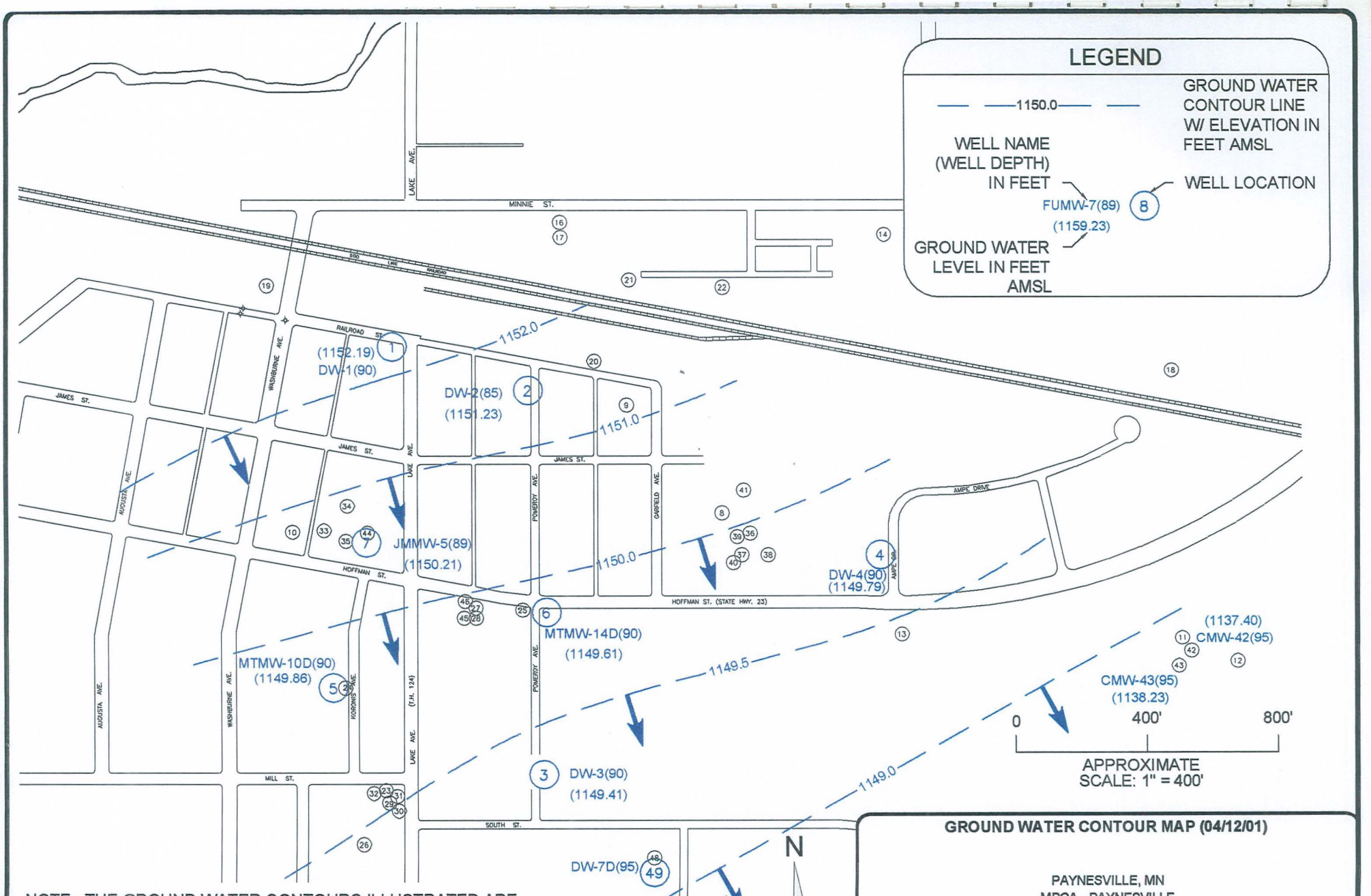
TABLES & GRAPHS

Tables and graphs as requested above.

Web pages and phone numbers	
MPCA staff	http://data.pca.state.mn.us/pca/emplsearch.html
MPCA toll free	1-800-657-3864
LUST web page	http://www.pca.state.mn.us/programs/lust_p.html
MPCA Infor. Request	http://www.pca.state.mn.us/about/inforequest.html
PetroFund Web Page	http://www.commerce.state.mn.us/mainpf.htm
PetroFund Phone	651-297-1119, or 1-800-638-0418
State Duty Officer	**651-649-5451 or 1-800-422-0798**

Upon request, this document can be made available in other formats, including Braille, large print and audio tape. TTY users call 651/282-5332 or Greater Minnesota 1-800/657-3864.

Printed on recycled paper containing at least 10 percent fibers from paper recycled by consumers.



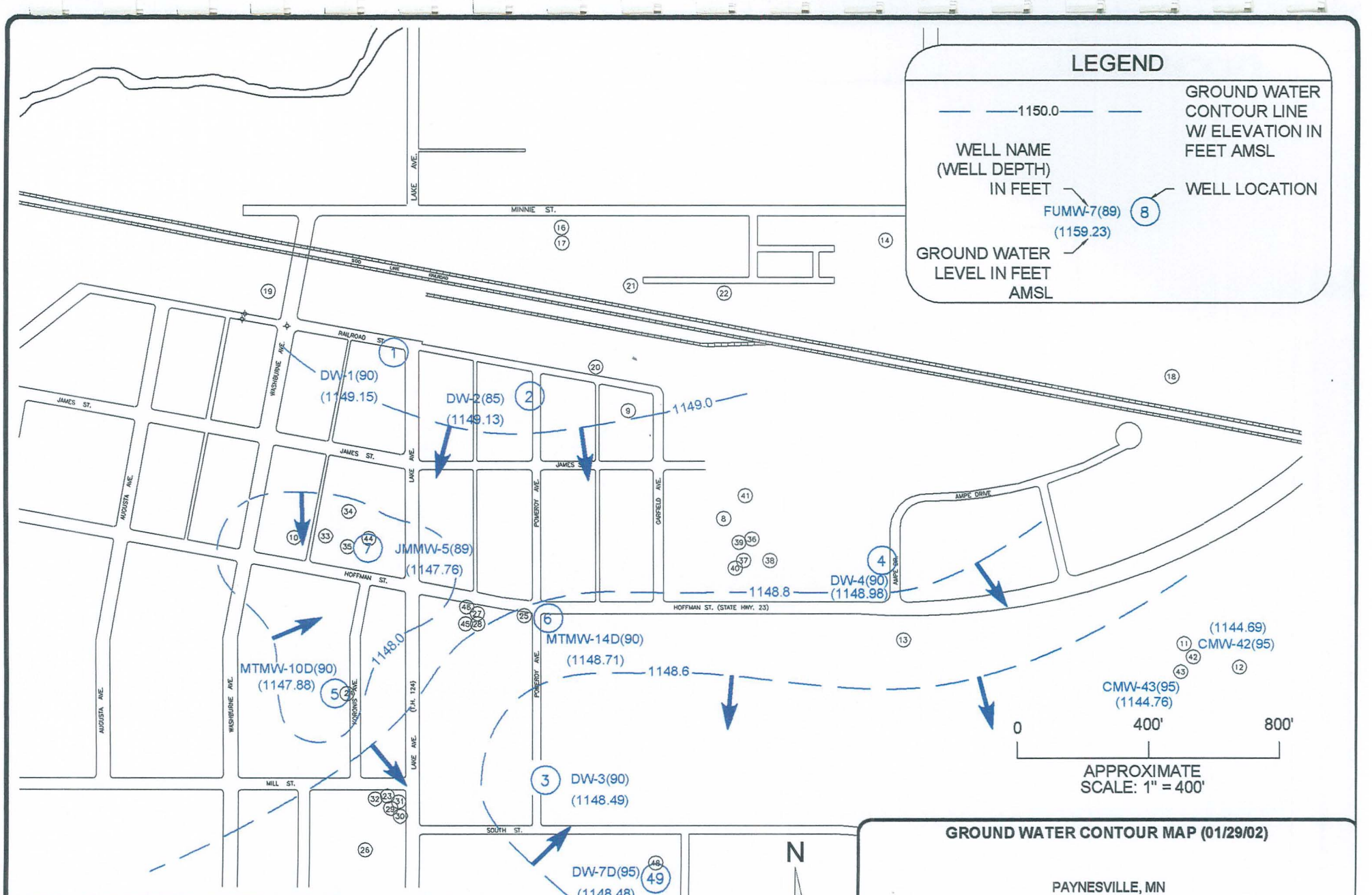
NOTE: THE GROUND WATER CONTOURS ILLUSTRATED ARE BASED UPON INTERPOLATIONS OF WATER LEVEL DATA OBTAINED FROM THE WELLS ON 04/12/01. GROUND WATER ELEVATION DATA COLLECTED FROM WELLS CMW-42 & CMW-43 WERE NOT USED IN THE PREPARATION OF THIS MAP. ACTUAL CONDITIONS MAY VARY.

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

GROUND WATER CONTOUR MAP (04/12/01)

PAYNESVILLE, MN
MPCA - PAYNESVILLE

Project Mngr:	PJW	Terracon	Project No.	41987018
Designed By:	JMS		Scale:	AS SHOWN
Checked By:	JMS	3535 Hoffman Road East White Bear Lake, MN 55110	Date:	04/10/02
Approved By:	PJW		Drawn By:	BMS (41)
File Name:	41987018gw.dwg	Layout1	Figure No.	3A



NOTE: THE GROUND WATER CONTOURS ILLUSTRATED ARE BASED UPON INTERPOLATIONS OF WATER LEVEL DATA OBTAINED FROM THE WELLS ON 01/29/02. GROUND WATER ELEVATION DATA COLLECTED FROM WELLS CMW-42 & CMW-43 WERE NOT USED IN THE PREPARATION OF THIS MAP. ACTUAL CONDITIONS MAY VARY.

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

GROUND WATER CONTOUR MAP (01/29/02)

PAYNESVILLE, MN
MPCA - PAYNESVILLE

Project Mngr:	PJW	Terracon	Project No.	41987018
Designed By:	JMS	3535 Hoffman Road East White Bear Lake, MN 55110	Scale:	AS SHOWN
Checked By:	JMS		Date:	04/10/02
Approved By:	PJW		Drawn By:	BMS (41)
File Name:	41987018gw.dwg	Layout4	Figure No.	3D

TABLE 5

PAYNESVILLE MUNICIPAL WATER SUPPLY - MPCA
PAYNESVILLE, MINNESOTA
TERRACON PROJECT NO. 41987018

GROUND WATER EXTRACTION SYSTEM
DISSOLVED PHASE CONTAMINANT REMOVAL DATA

COMPOUND	Date	Conc. (ug/l)	Flow Rate (gal/min)	Flow Rate (l/sec)	Emission (ug/sec)	Removal (gal/day)	Removal (kg/day)	Interval (days)	Availability (%)	Total Removal (gal)	Cummulative Removal (gal)
Benzene	12/24/98	1,600	9.6	0.61	970	0.0310	0.0838	0	100%	0.00	0.0
Benzene	12/30/98	1300	9.6	0.61	788	0.0252	0.0681	6	100%	0.15	0.2
Benzene	01/25/99	600	9.5	0.60	360	0.0115	0.0311	26	100%	0.30	0.5
Benzene	02/18/99	400	9.4	0.59	237	0.0076	0.0205	24	96%	0.18	0.6
Benzene	03/17/99	380	9.3	0.59	223	0.0071	0.0193	27	97%	0.19	0.8
Benzene	04/22/99	240	16.0	1.01	242	0.0078	0.0209	36	84%	0.23	1.0
Benzene	05/21/99	160	15.8	1.00	160	0.0051	0.0138	29	66%	0.10	1.1
Benzene	06/24/99	170	11.8	0.74	127	0.0040	0.0109	34	100%	0.14	1.3
Benzene	07/19/99	170	11.4	0.72	122	0.0039	0.0106	25	100%	0.10	1.4
Benzene	08/23/99	160	10.0	0.63	101	0.0032	0.0087	35	100%	0.11	1.5
Benzene	09/22/99	170	10.1	0.64	108	0.0035	0.0094	30	100%	0.10	1.6
Benzene	10/25/99	160	9.9	0.63	100	0.0032	0.0086	33	101%	0.11	1.7
Benzene	11/24/99	150	9.9	0.63	94	0.0030	0.0081	30	99%	0.09	1.8
Benzene	12/09/99	140	9.8	0.62	87	0.0028	0.0075	15	100%	0.04	1.8
Benzene	01/13/00	140	9.8	0.62	87	0.0028	0.0075	35	66%	0.06	1.9
Benzene	02/17/00	150	9.6	0.61	91	0.0029	0.0078	35	54%	0.05	2.0
Benzene	03/13/00	140	10.0	0.63	88	0.0028	0.0076	25	32%	0.02	2.0
Benzene	04/20/00	140	8.5	0.54	75	0.0024	0.0065	38	75%	0.07	2.0
Benzene	05/23/00	96	9.0	0.57	55	0.0017	0.0047	33	45%	0.03	2.1
Benzene	06/17/00	150	9.9	0.62	94	0.0030	0.0081	25	76%	0.06	2.1
Benzene	07/27/00	130	9.9	0.63	81	0.0026	0.0070	40	77%	0.08	2.2
Benzene	10/20/00	57	17.5	1.11	63	0.0020	0.0054	85	58%	0.10	2.3
Benzene	01/16/01	79	2.0	0.13	10	0.0003	0.0009	88	0%	0.00	2.3
Benzene	04/12/01	44	10.0	0.63	28	0.0009	0.0024	86	12%	0.01	2.3
Benzene	08/16/01	68	1.7	0.11	7	0.0002	0.0006	126	100%	0.03	2.3
Benzene	10/09/01	68	2.3	0.15	10	0.0003	0.0009	54	100%	0.02	2.4
Benzene	01/29/02	7	6.7	0.42	3	0.0001	0.0003	112	15%	0.00	2.4
Toluene	12/24/98	81	9.6	0.61	49	0.0016	0.0042	0	100%	0.00	0.0
Toluene	12/30/98	47	9.6	0.61	28	0.0009	0.0025	6	100%	0.01	0.0
Toluene	01/25/99	28	9.5	0.60	17	0.0005	0.0015	26	100%	0.01	0.0
Toluene	02/18/99	13	9.4	0.59	8	0.0002	0.0007	24	96%	0.01	0.0
Toluene	03/17/99	13	9.3	0.59	8	0.0002	0.0007	27	97%	0.01	0.0
Toluene	04/22/99	1	16.0	1.01	1	0.0000	0.0001	36	84%	0.00	0.0
Toluene	05/21/99	8.7	15.8	1.00	9	0.0003	0.0007	29	66%	0.01	0.0
Toluene	06/24/99	6.2	11.8	0.74	5	0.0001	0.0004	34	100%	0.01	0.0
Toluene	07/19/99	5.7	11.4	0.72	4	0.0001	0.0004	25	100%	0.00	0.0

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PAYNESVILLE MUNICIPAL WATER SUPPLY - MPCA
PAYNESVILLE, MINNESOTA
TERRACON PROJECT NO. 41987018

GROUND WATER EXTRACTION SYSTEM
DISSOLVED PHASE CONTAMINANT REMOVAL DATA

COMPOUND	Date	Conc. (ug/l)	Flow Rate (gal/min)	Flow Rate (l/sec)	Emission (ug/sec)	Removal (gal/day)	Removal (kg/day)	Interval (days)	Availability (%)	Total Removal (gal)	Cummulative Removal (gal)
Toluene	08/23/99	6.2	10.0	0.63	4	0.0001	0.0003	35	100%	0.00	0.1
Toluene	09/22/99	5.7	10.1	0.64	4	0.0001	0.0003	30	100%	0.00	0.1
Toluene	10/25/99	5.6	9.9	0.63	4	0.0001	0.0003	33	101%	0.00	0.1
Toluene	11/24/99	5.8	9.9	0.63	4	0.0001	0.0003	30	99%	0.00	0.1
Toluene	12/09/99	5.7	9.8	0.62	4	0.0001	0.0003	15	100%	0.00	0.1
Toluene	01/13/00	10.0	9.8	0.62	6	0.0002	0.0005	35	66%	0.00	0.1
Toluene	02/17/00	5.5	9.6	0.61	3	0.0001	0.0003	35	54%	0.00	0.1
Toluene	03/13/00	4.3	10.0	0.63	3	0.0001	0.0002	25	32%	0.00	0.1
Toluene	04/20/00	8.0	8.5	0.54	4	0.0001	0.0004	38	75%	0.00	0.1
Toluene	05/23/00	3.6	9.0	0.57	2	0.0001	0.0002	33	45%	0.00	0.1
Toluene	06/17/00	4.9	9.9	0.62	3	0.0001	0.0003	25	76%	0.00	0.1
Toluene	07/27/00	4.0	9.9	0.63	3	0.0001	0.0002	40	77%	0.00	0.1
Toluene	10/20/00	2.1	17.5	1.10	2	0.0001	0.0002	85	58%	0.00	0.1
Toluene	01/16/01	3.3	2.0	0.13	0	0.0000	0.0000	88	0%	0.00	0.1
Toluene	04/12/01	1.0	10.0	0.63	1	0.0000	0.0001	86	12%	0.00	0.1
Toluene	08/16/01	1.3	10.0	0.63	1	0.0000	0.0001	126	100%	0.00	0.1
Toluene	10/09/01	1.9	9.5	0.60	1	0.0000	0.0001	180	100%	0.01	0.1
Toluene	01/29/02	1.0	6.7	0.42	0	0.0000	0.0000	166	15%	0.00	0.1
E.Benzene	12/24/98	64	9.6	0.61	39	0.0012	0.0034	0	100%	0.00	0.0
E.Benzene	12/30/98	51	9.6	0.61	31	0.0010	0.0027	6	100%	0.01	0.0
E.Benzene	01/25/99	41	9.5	0.60	25	0.0008	0.0021	26	100%	0.02	0.0
E.Benzene	02/18/99	25	9.4	0.59	15	0.0005	0.0013	24	96%	0.01	0.0
E.Benzene	03/17/99	22	9.3	0.59	13	0.0004	0.0011	27	97%	0.01	0.0
E.Benzene	04/22/99	13	16.0	1.01	13	0.0004	0.0011	36	84%	0.01	0.1
E.Benzene	05/21/99	14	15.8	1.00	14	0.0004	0.0012	29	66%	0.01	0.1
E.Benzene	06/24/99	9.9	11.8	0.74	7	0.0002	0.0006	34	100%	0.01	0.1
E.Benzene	07/19/99	11	11.4	0.72	8	0.0003	0.0007	25	100%	0.01	0.1
E.Benzene	08/23/99	12	10.0	0.63	8	0.0002	0.0007	35	100%	0.01	0.1
E.Benzene	09/22/99	11	10.1	0.64	7	0.0002	0.0006	30	100%	0.01	0.1
E.Benzene	10/25/99	12	9.9	0.63	8	0.0002	0.0006	33	101%	0.01	0.1
E.Benzene	11/24/99	11	9.9	0.63	7	0.0002	0.0006	30	99%	0.01	0.1
E.Benzene	12/09/99	12	9.8	0.62	7	0.0002	0.0006	15	100%	0.00	0.1
E.Benzene	01/13/00	12	9.8	0.62	7	0.0002	0.0006	35	66%	0.01	0.1
E.Benzene	02/17/00	12	9.6	0.61	7	0.0002	0.0006	35	54%	0.00	0.1
E.Benzene	03/13/00	11	10.0	0.63	7	0.0002	0.0006	25	32%	0.00	0.1
E.Benzene	04/20/00	11	8.5	0.54	6	0.0002	0.0005	38	75%	0.01	0.1
E.Benzene	05/23/00	8.2	9.0	0.57	5	0.0001	0.0004	33	45%	0.00	0.1

TABLE 5

PAYNESVILLE MUNICIPAL WATER SUPPLY - MPCA
PAYNESVILLE, MINNESOTA
TERRACON PROJECT NO. 41987018

GROUND WATER EXTRACTION SYSTEM
DISSOLVED PHASE CONTAMINANT REMOVAL DATA

COMPOUND	Date	Conc. (ug/l)	Flow Rate (gal/min)	Flow Rate (l/sec)	Emission (ug/sec)	Removal (gal/day)	Removal (kg/day)	Interval (days)	Availability (%)	Total Removal (gal)	Cummulative Removal (gal)
E.Benzene	06/17/00	11	9.9	0.62	7	0.0002	0.0006	25	76%	0.00	0.1
E.Benzene	07/27/00	9.2	9.9	0.63	6	0.0002	0.0005	40	77%	0.01	0.1
E.Benzene	10/20/00	5.5	17.5	1.10	6	0.0002	0.0005	85	58%	0.01	0.2
E.Benzene	01/16/01	7.7	2.0	0.13	1	0.0000	0.0001	88	0%	0.00	0.2
E.Benzene	04/12/01	6	10.0	0.63	4	0.0001	0.0003	86	12%	0.00	0.2
E.Benzene	08/16/01	8	10.0	0.63	5	0.0002	0.0004	126	100%	0.02	0.2
E.Benzene	10/09/01	9.7	9.5	0.60	6	0.0002	0.0005	54	100%	0.01	0.2
E.Benzene	01/29/02	1.3	6.7	0.42	1	0.0000	0.0000	112	15%	0.00	0.2
Xylenes	12/24/98	41	9.6	0.61	25	0.0008	0.0021	0	100%	0.00	0.0
Xylenes	12/30/98	41	9.6	0.61	25	0.0008	0.0021	6	100%	0.00	0.0
Xylenes	01/25/99	41	9.5	0.60	25	0.0008	0.0021	26	100%	0.02	0.0
Xylenes	02/18/99	5	9.4	0.59	3	0.0001	0.0003	24	96%	0.00	0.0
Xylenes	03/17/99	17	9.3	0.59	10	0.0003	0.0009	27	97%	0.01	0.0
Xylenes	04/22/99	18	16.0	1.01	18	0.0006	0.0016	36	84%	0.02	0.1
Xylenes	05/21/99	13	15.8	1.00	13	0.0004	0.0011	29	66%	0.01	0.1
Xylenes	06/24/99	8.9	11.8	0.74	7	0.0002	0.0006	34	100%	0.01	0.1
Xylenes	07/19/99	11	11.4	0.72	8	0.0003	0.0007	25	100%	0.01	0.1
Xylenes	08/23/99	8.9	10.0	0.63	6	0.0002	0.0005	35	100%	0.01	0.1
Xylenes	09/22/99	8.6	10.1	0.64	5	0.0002	0.0005	30	100%	0.01	0.1
Xylenes	10/25/99	10	9.9	0.63	6	0.0002	0.0005	33	101%	0.01	0.1
Xylenes	11/24/99	10	9.9	0.63	6	0.0002	0.0005	30	99%	0.01	0.1
Xylenes	12/09/99	9.7	9.8	0.62	6	0.0002	0.0005	15	100%	0.00	0.1
Xylenes	01/13/00	15.0	9.8	0.62	9	0.0003	0.0008	35	66%	0.01	0.1
Xylenes	02/17/00	11.0	9.6	0.61	7	0.0002	0.0006	35	54%	0.00	0.1
Xylenes	03/13/00	9.0	10.0	0.63	6	0.0002	0.0005	25	32%	0.00	0.1
Xylenes	04/20/00	13.0	8.5	0.54	7	0.0002	0.0006	38	75%	0.01	0.1
Xylenes	05/23/00	7.8	9.0	0.57	4	0.0001	0.0004	33	45%	0.00	0.1
Xylenes	06/17/00	10.0	9.9	0.62	6	0.0002	0.0005	25	76%	0.00	0.1
Xylenes	07/27/00	9.8	9.9	0.63	6	0.0002	0.0005	40	77%	0.01	0.1
Xylenes	10/20/00	6.0	17.5	1.10	7	0.0002	0.0006	85	58%	0.01	0.1
Xylenes	01/16/01	9.9	2.0	0.13	1	0.0000	0.0001	88	0%	0.00	0.1
Xylenes	04/12/01	9.2	10.0	0.63	6	0.0002	0.0005	86	12%	0.00	0.1
Xylenes	08/16/01	9.0	10.0	0.63	6	0.0002	0.0005	126	100%	0.02	0.2
Xylenes	10/09/01	7.9	9.5	0.60	5	0.0002	0.0004	54	100%	0.01	0.2
Xylenes	01/29/02	3.0	6.7	0.42	1	0.0000	0.0001	112	15%	0.00	0.2
GRO	12/24/98	2,800	9.6	0.61	1697	0.0543	0.1466	0	100%	0.00	0.1

TABLE 5

PAYNESVILLE MUNICIPAL WATER SUPPLY - MPCA
PAYNESVILLE, MINNESOTA
TERRACON PROJECT NO. 41987018

GROUND WATER EXTRACTION SYSTEM
DISSOLVED PHASE CONTAMINANT REMOVAL DATA

COMPOUND	Date	Conc. (ug/l)	Flow Rate (gal/min)	Flow Rate (l/sec)	Emission (ug/sec)	Removal (gal/day)	Removal (kg/day)	Interval (days)	Availability (%)	Total Removal (gal)	Cummulative Removal (gal)
GRO	12/30/98	1,700	9.6	0.61	1030	0.0329	0.0890	6	100%	0.20	0.3
GRO	01/25/99	1,100	9.5	0.60	660	0.0211	0.0570	26	100%	0.55	0.9
GRO	02/18/99	550	9.4	0.59	326	0.0104	0.0282	24	96%	0.24	1.1
GRO	03/17/99	610	9.3	0.59	358	0.0114	0.0309	27	97%	0.30	1.4
GRO	04/22/99	590	16.0	1.01	596	0.0191	0.0515	36	84%	0.57	2.0
GRO	05/21/99	500	15.8	1.00	499	0.0159	0.0431	29	66%	0.30	2.3
GRO	06/24/99	280	11.8	0.74	209	0.0067	0.0180	34	100%	0.23	2.5
GRO	07/19/99	300	11.4	0.72	216	0.0069	0.0187	25	100%	0.17	2.7
GRO	08/23/99	280	10.0	0.63	177	0.0057	0.0153	35	100%	0.20	2.9
GRO	09/22/99	280	10.1	0.64	179	0.0057	0.0154	30	100%	0.17	3.0
GRO	10/25/99	260	9.9	0.63	163	0.0052	0.0140	33	101%	0.17	3.2
GRO	11/24/99	250	9.9	0.63	156	0.0050	0.0135	30	99%	0.15	3.4
GRO	12/09/99	230	9.8	0.62	142	0.0045	0.0123	15	100%	0.07	3.4
GRO	01/13/00	290	9.8	0.62	179	0.0057	0.0155	35	66%	0.13	3.6
GRO	02/17/00	270	9.6	0.61	163	0.0052	0.0141	35	54%	0.10	3.7
GRO	03/13/00	220	10.0	0.63	139	0.0044	0.0120	25	32%	0.03	3.7
GRO	04/20/00	320	8.5	0.54	172	0.0055	0.0148	38	75%	0.16	3.9
GRO	05/23/00	180	9.0	0.57	102	0.0033	0.0088	33	45%	0.05	3.9
GRO	06/17/00	270	9.9	0.62	168	0.0054	0.0146	25	76%	0.10	4.0
GRO	07/27/00	210	9.9	0.63	132	0.0042	0.0114	40	77%	0.13	4.1
GRO	10/20/00	120	17.5	1.10	133	0.0042	0.0115	85	58%	0.21	4.3
GRO	01/16/01	170	2.0	0.13	21	0.0007	0.0019	88	0%	0.04	4.4
GRO	04/12/01	130	10.0	0.63	82	0.0026	0.0071	86	12%	0.04	4.4
GRO	08/16/01	170	10.0	0.63	107	0.0034	0.0093	126	100%	0.04	4.5
GRO	10/09/01	180	9.5	0.60	108	0.0035	0.0093	54	100%	0.04	4.5
GRO	01/29/02	100	6.7	0.42	42	0.0013	0.0036	112	15%	0.04	4.5

Note: PreT (ug/l) & flow rate (l/sec) were used to calculate the removal rate in gal/day using 1x10-9 kg/ug, 0.37 gal/kg & 86,400 sec/day. The total removal (gal) was calculated using the following: (days since last samples) x (removal rate in gal/day) x (% availability). Availability is the calculated by the following: (days since last sample)/(operational days according the control panel) thereby compensating for the amount of time the system was not functioning as part of its normal operation and down time.

< = Less than the method detection limit
- was not analyzed for this parameter

SER - Significant emission rate
GRO = Gasoline Range Organics