



**Minnesota Pollution
Control Agency's**

**Closed
Landfill
Program**

Site Report 2005 - 2006

**Highway 77
Landfill**

SW-262



Minnesota Pollution Control Agency

Compiled By



**The Closed Landfill Program
Petroleum & Landfill Remediation Section
Remediation Division
Minnesota Pollution Control Agency
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Detroit Lakes, Minnesota 56501**

Report Dates

**Forum completed: February 13, 2007
Report completed: March 6, 2007**

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I. Site Background

The Highway 77 Sanitary Landfill (The Landfill) is located along County Highway 77 in St. Louis County, Greenwood Township at T62N, R16W, Sect. 21 (Figure 1). The Landfill is located about four miles north of the intersection of State Highway 169, State Highway 1, and Highway 77. The Landfill received its first permit to accept waste on November 29, 1983, and it continued to operate under permit until November 1, 1989. The Landfill was under public ownership when in operation, and St. Louis County still owns the property.



Figure 1. Highway 77 Landfill - Site Map

The permitted Landfill is 8.2 acres and it contains approximately 88,391 cubic yards of waste that is consolidated in a 4.67-acre fill area. The Environmental Monitoring System includes eight ground water monitoring wells that are located around the perimeter of the Landfill.

The Minnesota Pollution Control Agency (MPCA) periodically assesses and classifies sites in the Closed Landfill Program. According to the latest assessment and classification conducted during 1997, the Landfill retained its 1995 ranking of C and a score of 2. While this classification may be revised as needed, the rank of C indicates that this landfill requires a cover upgrade, minor construction (such as gas vents) and/or future corrective actions which may be needed because the cover does not meet MPCA standards.

II. Site Engineering Summary

A. Landfill Cover Maintenance and Construction

When the Landfill closed on November 1, 1989, two feet of final cover was in place. No improvements have been made since this time.

B. Leachate Management System

The Landfill does not have a leachate management system, and no leachate seeps were observed on or near the Landfill.

C. Landfill Gas Management System

1. Landfill Gas Management System Maintenance

The Highway 77 Sanitary Landfill has a passive gas venting system. The vents have been damaged or are not working, and may require replacement.

2. Landfill Gas Monitoring

There are no landfill gas monitoring points at the Highway 77 Sanitary Landfill. There is no evidence of stressed vegetation or other signs of off-site gas migration.

D. Additional Maintenance

The Landfill cover is mowed annually.

E. Engineering Recommendations

The landfill venting system should be enhanced or repaired to facilitate proper landfill gas ventilation.

F. Land Recovered for Beneficial Use

St. Louis County is operating a Solid Waste Transfer Station adjacent to the Landfill.

III. Site Environmental Monitoring Summary

A. Groundwater Monitoring System Summary

WELL	Unique Well Number	Date of Installation	Well Depth (ft)	Stick-up (ft)	Type of Casing	Casing Diam. (in)	Screen Type + Length (ft)	Gradient up / dn / side
MW-1	245724	Jul-82	22	2	PVC	2	PVC / ?	dn / side
MW-2	245725	Jul-82	39.3	2	PVC	2	PVC / ?	side / dn
MW-3	245726	Jul-82	31.4	2	PVC	2	PVC / ?	up
MW 92-1	480091	Nov-92	30	2	low C steel	2	SS / 10	side / dn
MW 92-2	480092	Nov-92	52.1	3	low C steel	2	SS / 10	down
MW 92-2A	480093	Nov-92	30	3	low C steel	2	SS / 10	down
MW-5	727210	May-05	51.9	2.36		2		Up
MW-6	727208	May-05	16.4	2.82		2		side

The ground water monitoring system is comprised of 8 wells that surround the Landfill, with locations identified on Figure 1.

1. Ground Water Monitoring System Maintenance

All monitoring wells are labeled, locked, and required no maintenance in the past few years. Monitoring wells 5 and 6 were installed by STS in conjunction with a Phase II study of the adjacent Vermillion Dump. Both were in advantageous locations so they were transferred to the Closed Landfill Program after the study was complete.

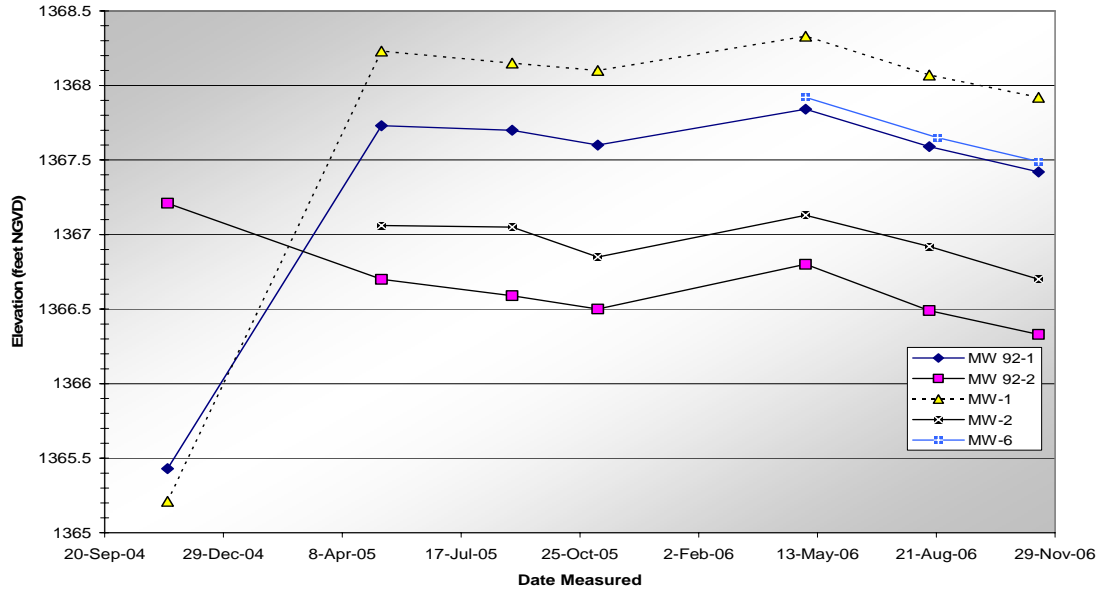
2. Ground Water Monitoring

The Landfill is located along the southwest slope of a ridge that separates Lake Vermilion to the north and a large peat-bog marsh to the southwest. Lake Vermilion is located about 900 feet to the north while the peat bog borders the toe of the Landfill on the southwest (Figure 1). Naturally occurring soil beneath the Landfill generally consist of sand and silty sand glacial outwash deposits. The water table beneath the Landfill is unconfined and ranges in elevation from about 1365 to 1371 feet above mean sea

level. The water table is about 50 to 60 feet below grade beneath the highest points of the Landfill, and it is less than 5 feet below grade beneath the southwest edge of the Landfill bordering the peat bog. Surface water run off from the Landfill flows toward the southwest and west into the adjacent peat-bog marsh.

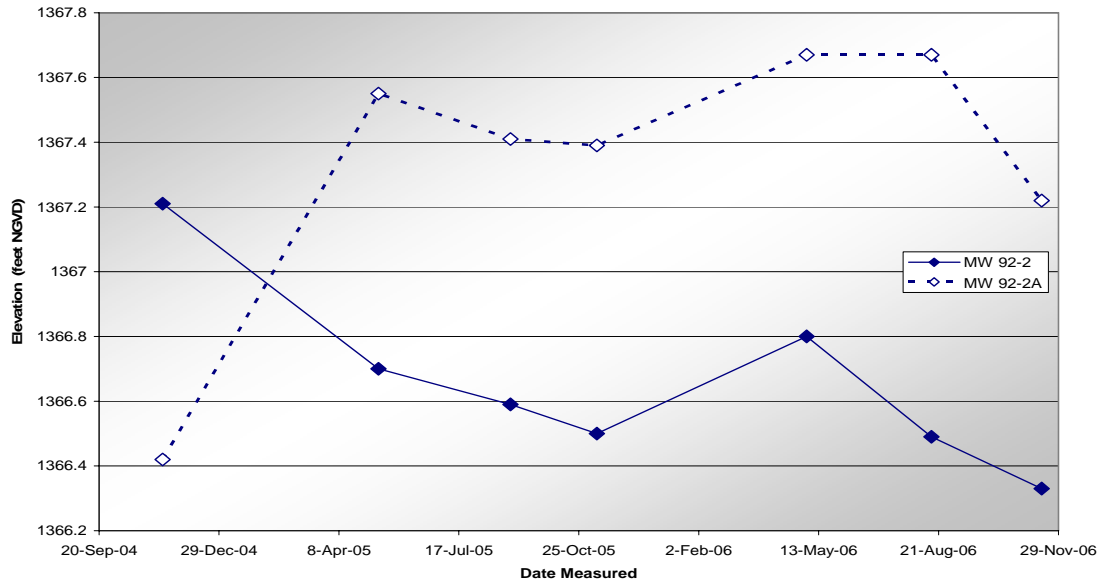
Northeast Technical Services (NTS) conducted three rounds of environmental monitoring at the Landfill during each year during the reporting period, with water samples collected in summer only, for analysis (Table I). The water table, in general, decreased slightly during 2005 (Figure 2), increased, as expected by spring 2006, and then decreased about 1 foot during 2006.

Figure 2. Hwy 77 Sanitary Landfill - Elevation of Shallow Ground Water



One of the site monitoring wells (MW92-2A) is a deeper nested well that is completed at about 20 feet beneath the water table surface. This well is nested with MW92-2. A comparison of the water level in the nested wells (Figure 3) indicates water has been flowing from deeper to shallower areas within the aquifer, except during November 2004, when the flow was reversed.

Figure 3. Comparison of Deep and Shallow Ground Water Elevations



Generally, it appears that ground water beneath the Landfill is flowing toward and discharging at peat-bog marsh that borders on the southwest and west. This model fits well with the area topography, which consists of high glacial outwash ridge to the north and low peat-bog marsh bordering on the south and west. By plotting the monitoring wells and contouring the static water levels measured during each event, the direction of groundwater flow can be established for each of those time periods. During August 2005, the groundwater flow remained west-southwesterly beneath the fill area (Figure 4). During August 2006, the ground water flow becomes more westerly as it flows away from the western edge of the fill area (Figure 5).



Figure 4. Highway 77 Sanitary Landfill Ground Water Flow Direction August 2005



Figure 5. Highway 77 Sanitary Landfill Ground Water Flow Direction August 2006

The only monitoring well indicating the ground water has been impacted by leachate from the Landfill is MW 92-2, which has had low-level detections of several VOCs and metals (Table II), however, none of which exceed the Health Risk Limits (HRLs) as established by the MN Department of Health.

B. Additional Monitoring Summary

1. Surface Water Sampling

No surface water is located in close proximity to the landfill to allow for sampling.

2. Private Well Sampling

No potable water supplies are located in close proximity to the landfill.

C. Monitoring Recommendations

Continue with groundwater monitoring, which has been decreased to once per year. Assure all monitoring wells are fitted with pumps if conditions support their use. Have the site and all positive structures resurveyed.

IV. Inspections

Four routine site inspections were completed during this reporting period, two in 2005 and two in 2006. During the inspections, the following observations were noted:

- The cover was in very good condition; there were no areas of settling noted, and erosion was not an issue during this reporting period.
- The vegetation was in excellent condition, and is mowed annually.
- Four fallen trees were removed from the eastern side of the site in 2005.
- The entrance road and gate are maintained by the staff at the canister station and are in good condition. The site is not fenced, and there are no signs at the closed landfill.
- An ATV trail was observed along the western side of the landfill.

V. Off-Site Impacts and Concerns

No contamination has moved off-site or is a risk for surrounding residents. Ground water flow direction is away from Hwy 77, so the installation of any additional water supply wells will not be a problem. There is no evidence of off-site gas migration.

VI. Conclusions

Ground water monitoring will continue annually and a survey will be made of land to the south for any additional monitoring wells left from the Vermillion dump Phase II investigation. Mowing will occur once during 2007. A site visit will be needed by the team in 2007 to evaluate site needs and the gas venting system.

VII. Certifications

A. Hydrogeologic Certification

I certify, that the hydrogeologic portions of this document and all attachments were prepared under my direction or supervision under a system designed to assure that qualified personnel gathered and evaluated the information submitted. The information submitted is, to the best of my knowledge and belief, true, accurate, and complete. Furthermore, I certify that I am a duly Licensed Professional Geologist under the laws of the State of Minnesota.

Name: Kate Rolf	Title: Hydrogeologist	Date: March 6, 2007
Mailing Address: 714 Lake Ave., Detroit Lakes, MN 56501		Phone: 218 / 296-7388
LICENSE NO. P.G. 30267		

B. Engineering Certification

I certify, that the engineering portions of this document and all attachments were prepared under my direction or supervision under a system designed to assure that qualified personnel gathered and evaluated the information submitted. The information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Name: Peter Tiffany	Title: Engineer	Date: March 6, 2007
Mailing Address: 520 Lafayette Rd., St. Paul, MN 55155		Phone: 651 / 296-7274

C. Field Certification

I certify, that the maintenance and construction portions of this document and all attachments were prepared under my direction or supervision under a system designed to assure that qualified personnel gathered and evaluated the information submitted. Based upon my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

Name: Roger Tix	Title: Field Representative	Date: March 6, 2007
Mailing Address: 7678 College Road, Suite 105, Baxter, MN 56425		Phone: 218 / 828-6066

D. Annual Report Certification

I certify, that this document and all attachments were prepared under my direction or supervision under a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based upon my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

Name: Ron Schwartz	Title: Project Leader	Date: March 6, 2007
Mailing Address: 520 Lafayette Rd., St. Paul, MN 55155		Phone: 651 / 297-2915

APPENDIX

Table I Ground Water Elevation Data

Table II Analytical Detections in Ground Water

Table I	Highway 77 Sanitary Landfill						
	Ground Water Elevation Data						
COMMON STATION ID	UNIQUE STATION ID	DATE COLLECTED	DTW (feet)	ELEV (feet)	MEASURING POINT ELEV	WELL DEPTH MP	OPENING MID ELEV
MW 92-1	480091	12-Nov-04	17.56	1365.43	1382.99	24	1365.99
MW 92-1	480091	11-May-05	15.26	1367.73	1382.99	24	1365.99
MW 92-1	480091	29-Aug-05	15.29	1367.7	1382.99	24	1365.99
MW 92-1	480091	9-Nov-05	15.39	1367.6	1382.99	24	1365.99
MW 92-1	480091	3-May-06	15.15	1367.84	1382.99	24	1365.99
MW 92-1	480091	15-Aug-06	15.4	1367.59	1382.99	24	1365.99
MW 92-1	480091	15-Nov-06	15.57	1367.42	1382.99	24	1365.99
MW 92-2	480092	12-Nov-04	4.6	1367.21	1371.81	18	1359.31
MW 92-2	480092	11-May-05	5.11	1366.7	1371.81	18	1359.31
MW 92-2	480092	29-Aug-05	5.22	1366.59	1371.81	18	1359.31
MW 92-2	480092	9-Nov-05	5.31	1366.5	1371.81	18	1359.31
MW 92-2	480092	3-May-06	5.01	1366.8	1371.81	18	1359.31
MW 92-2	480092	15-Aug-06	5.32	1366.49	1371.81	18	1359.31
MW 92-2	480092	15-Nov-06	5.48	1366.33	1371.81	18	1359.31
MW 92-2A	480093	12-Nov-04	4.6	1366.42	1371.02	38	1338.52
MW 92-2A	480093	11-May-05	3.47	1367.55	1371.02	38	1338.52
MW 92-2A	480093	29-Aug-05	3.61	1367.41	1371.02	38	1338.52
MW 92-2A	480093	9-Nov-05	3.63	1367.39	1371.02	38	1338.52
MW 92-2A	480093	3-May-06	3.35	1367.67	1371.02	38	1338.52
MW 92-2A	480093	15-Aug-06	3.35	1367.67	1371.02	38	1338.52
MW 92-2A	480093	15-Nov-06	3.8	1367.22	1371.02	38	1338.52
MW-1	245724	12-Nov-04	6.48	1365.21	1371.69	25	1353.69
MW-1	245724	11-May-05	3.46	1368.23	1371.69	25	1353.69
MW-1	245724	29-Aug-05	3.54	1368.15	1371.69	25	1353.69
MW-1	245724	9-Nov-05	3.59	1368.1	1371.69	25	1353.69
MW-1	245724	3-May-06	3.36	1368.33	1371.69	25	1353.69
MW-1	245724	15-Aug-06	3.62	1368.07	1371.69	25	1353.69
MW-1	245724	15-Nov-06	3.77	1367.92	1371.69	25	1353.69
MW-2	245725	11-May-05	16.74	1367.06	1383.8	26	1364.8
MW-2	245725	29-Aug-05	16.75	1367.05	1383.8	26	1364.8
MW-2	245725	9-Nov-05	16.95	1366.85	1383.8	26	1364.8
MW-2	245725	3-May-06	16.67	1367.13	1383.8	26	1364.8
MW-2	245725	15-Aug-06	16.88	1366.92	1383.8	26	1364.8
MW-2	245725	15-Nov-06	17.1	1366.7	1383.8	26	1364.8
MW-3	245726	12-Nov-04	65.68	1368.42	1434.1	76	1365.1
MW-3	245726	11-May-05	62.14	1371.96	1434.1	76	1365.1
MW-3	245726	29-Aug-05	61.82	1372.28	1434.1	76	1365.1
MW-3	245726	9-Nov-05	62.17	1371.93	1434.1	76	1365.1
MW-3	245726	3-May-06	62.02	1372.08	1434.1	76	1365.1
MW-3	245726	15-Aug-06	62.15	1371.95	1434.1	76	1365.1
MW-3	245726	15-Nov-06	62.45	1371.65	1434.1	76	1365.1
MW-5	727210	3-May-06	54.68	1368.18	1422.86	60.5	1367.36
MW-5	727210	22-Aug-06	54.98	1367.88	1422.86	60.5	1367.36
MW-5	727210	15-Nov-06	55.21	1367.65	1422.86	60.5	1367.36
MW-6	727208	3-May-06	12.8	1367.92	1380.72	19.2	1366.52
MW-6	727208	22-Aug-06	13.07	1367.65	1380.72	19.2	1366.52
MW-6	727208	15-Nov-06	13.23	1367.49	1380.72	19.2	1366.52

TABLE II	Highway 77 Sanitary Landfill							
	Analytical Detections in Ground Water							
UNIQUE STATION ID	COMMON STATION ID	DATE COLLECTED	PARAMETER NAME	RESULT	UNITS	HRL	HBV	MCL
Volatile Organic Compounds (VOCs)								
TB1SW262	TRIP BLANK	3-May-06	Chloromethane	1.9	ug/L			
480092	MW 92-2	29-Aug-05	1,2-Dichloroethene, cis	1.8	ug/L	70		
480092	MW 92-2	29-Aug-05	Ethyl ether	9.5	ug/L	1000		
480092	MW 92-2	29-Aug-05	Tetrahydrofuran	31	ug/L		100	
480092	MW 92-2	15-Aug-06	1,2-Dichloroethene, cis	2.1	ug/L	70		
480092	MW 92-2	15-Aug-06	Benzene	1.14	ug/L	10		5
480092	MW 92-2	15-Aug-06	Chloroethane	1.87	ug/L		280	
480092	MW 92-2	15-Aug-06	Ethyl ether	10.5	ug/L	1000		
480092	MW 92-2	15-Aug-06	Tetrahydrofuran	35.3	ug/L		100	
Inorganics								
245724	MW-1	29-Aug-05	Solids, Suspended	8.8	mg/L			
245724	MW-1	15-Aug-06	Chloride	1.5	mg/L			
245724	MW-1	15-Aug-06	Nitrate+Nitrite Nitrogen	0.64	mg/L as N	10		
245724	MW-1	15-Aug-06	Solids, Suspended	6	mg/L			
245724	MW-1	15-Aug-06	Solids, Total Dissolved	276	mg/L			
245724	MW-1	15-Aug-06	Sulfate	50.8	mg/L			
245725	MW-2	15-Aug-06	Chloride	1.2	mg/L			
245725	MW-2	15-Aug-06	Nickel	11.1	ug/L	100		
245725	MW-2	15-Aug-06	Nitrate+Nitrite Nitrogen	0.3	mg/L as N	10		
245725	MW-2	15-Aug-06	Solids, Suspended	9	mg/L			
245725	MW-2	15-Aug-06	Solids, Total Dissolved	70	mg/L			
245725	MW-2	15-Aug-06	Sulfate	7.1	mg/L			
245726	MW-3	15-Aug-06	Chloride	17.9	mg/L			
245726	MW-3	15-Aug-06	Nitrate+Nitrite Nitrogen	0.85	mg/L as N	10		
245726	MW-3	15-Aug-06	Solids, Suspended	3	mg/L			
245726	MW-3	15-Aug-06	Solids, Total Dissolved	455	mg/L			
245726	MW-3	15-Aug-06	Sulfate	42.8	mg/L			
727210	MW-5	22-Aug-06	Chloride	1.74	mg/L			
727210	MW-5	22-Aug-06	Nitrate+Nitrite Nitrogen	0.77	mg/L as N	10		
727210	MW-5	22-Aug-06	Solids, Suspended	1080	mg/L			
727210	MW-5	22-Aug-06	Solids, Total Dissolved	434	mg/L			
727210	MW-5	22-Aug-06	Sulfate	15.8	mg/L			
727208	MW-6	22-Aug-06	Boron	268	ug/L	600		
727208	MW-6	22-Aug-06	Chloride	2.19	mg/L			
727208	MW-6	22-Aug-06	Nitrate+Nitrite Nitrogen	0.74	mg/L as N	10		
727208	MW-6	22-Aug-06	Solids, Suspended	12	mg/L			

TABLE II	Highway 77 Sanitary Landfill							
	Analytical Detections in Ground Water							
UNIQUE STATION ID	COMMON STATION ID	DATE COLLECTED	PARAMETER NAME	RESULT	UNITS	HRL	HBV	MCL
Inorganics (con't)								
727208	MW-6	22-Aug-06	Solids, Total Dissolved	823	mg/L			
727208	MW-6	22-Aug-06	Sulfate	184	mg/L			
480091	MW 92-1	29-Aug-05	Solids, Suspended	1.6	mg/L			
480091	MW 92-1	15-Aug-06	Nitrate+Nitrite Nitrogen	1.01	mg/L as N	10		
480091	MW 92-1	15-Aug-06	Solids, Suspended	332	mg/L			
480091	MW 92-1	15-Aug-06	Solids, Total Dissolved	146	mg/L			
480091	MW 92-1	15-Aug-06	Sulfate	25.5	mg/L			
480092	MW 92-2	29-Aug-05	Arsenic	7.9	ug/L			10
480092	MW 92-2	29-Aug-05	Boron	167	ug/L	600		
480092	MW 92-2	29-Aug-05	Solids, Suspended	2370	mg/L			
480092	MW 92-2	15-Aug-06	Arsenic	8.9	ug/L			10
480092	MW 92-2	15-Aug-06	Boron	168	ug/L	600		
480092	MW 92-2	15-Aug-06	Chloride	47.9	mg/L			
480092	MW 92-2	15-Aug-06	Nickel	12.4	ug/L	100		
480092	MW 92-2	15-Aug-06	Nitrogen, ammonia	0.24	mg/L as N			
480092	MW 92-2	15-Aug-06	Solids, Suspended	1070	mg/L			
480092	MW 92-2	15-Aug-06	Solids, Total Dissolved	620	mg/L			
480092	MW 92-2	15-Aug-06	Sulfate	62.2	mg/L			
480092	MW 92-2	15-Aug-06	Zinc	56.1	ug/L	2000		
480093	MW 92-2A	29-Aug-05	Boron	40.5	ug/L	600		
480093	MW 92-2A	29-Aug-05	Solids, Suspended	33	mg/L			
480093	MW 92-2A	15-Aug-06	Chloride	17.3	mg/L			
480093	MW 92-2A	15-Aug-06	Solids, Suspended	35	mg/L			
480093	MW 92-2A	15-Aug-06	Solids, Total Dissolved	513	mg/L			
480093	MW 92-2A	15-Aug-06	Sulfate	69.7	mg/L			