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Wilbur-Ellis Company
3145 NW Yeon Avenue
Portland, Oregon 97210

Attn: Mr. Ken Manning

Re: Annual Monitoring Report (November 1998 through October 1999)
Shedd, Oregon
J-5144-06

Dear Mr. Manning:

This letter presents the results of our annual groundwater monitoring activities for the period of November 1998 through October 1999 in Shedd, Oregon (Figure 1). Our work was performed in general accordance with the Groundwater Monitoring Plan (September 15, 1994) for the Wilbur-Ellis Company (formerly Willamette Seed Company) facility.

This letter discusses the following:

- Measurement of groundwater elevations in eight on-site monitoring wells;
- Groundwater sampling and field parameter measurements from eight groundwater monitoring wells and one domestic well located on the Wilbur-Ellis Company facility, and seven domestic wells located off of the Wilbur-Ellis site;
- Analysis of groundwater samples for nitrate concentrations;
- Quality assurance/quality control (QA/QC); and
- Evaluation of groundwater monitoring data collected during the past year.

ANNUAL GROUNDWATER MONITORING

Groundwater Flow Directions in Shallow and Deep Aquifers

On October 21, 1999, we measured groundwater levels in monitoring wells MW-1 through MW-8 on the Wilbur-Ellis Company site (Table 1). Monitoring wells MW-1 through MW-4

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are completed in a shallow aquifer, and monitoring wells MW-5 through MW-8 are completed in the underlying semi-confined aquifer. The groundwater table measured in the shallow aquifer ranged from about eight to twelve feet below the ground surface (bgs). The potentiometric surface of the deeper, semi-confined aquifer ranged from about 16 feet to 19 feet bgs.

Relative groundwater elevations indicated that the horizontal component of the groundwater gradient was to the north-northwest in the shallow aquifer (Figure 2), and to the west-southwest in the deep aquifer (Figure 3). Both the shallow and deep aquifer gradient directions were generally consistent with the October 1998 monitoring event.

Groundwater Sampling and Field Parameter Measurement

On October 21 and 22, 1999, we purged and sampled the eight monitoring wells (MW-1 through MW-8) and eight domestic wells (including one located on the Wilbur-Ellis site, and seven domestic wells located off of the site) following the field methods described in Attachment A. The locations of the monitoring and domestic wells are shown on Figure 2. Throughout the purging process, field parameters were measured in each well. The results of the field parameter measurements are summarized in Table 2.

The pH and temperature measurements collected during this annual event were generally consistent among the groundwater samples from the monitoring wells (MW-1 through MW-8) and the domestic wells (Wilbur-Ellis, OSW-1 through OSW-8, excluding OSW-5). However, in general, the specific conductance measurements from the on-site wells are higher than those from the off-site wells.

Groundwater temperatures measured in the on-site shallow monitoring wells were generally consistent with the October 1998 groundwater monitoring event.

Groundwater Chemical Analysis

Groundwater samples were submitted to North Creek Analytical of Beaverton, Oregon, for chemical analysis. Samples from all of the monitoring and domestic wells were analyzed for nitrate concentrations using EPA Method 300. The analytical results for nitrate are presented in Table 3 and shown on Figure 4. Copies of the laboratory reports are included in Attachment B. Nitrate concentrations ranged from 28.6 to 177 mg/L in the wells located on the Willamette Seed site. Nitrate concentrations in off-site domestic wells ranged from 0.46 to 9.59 mg/L. The Federal Drinking Water Maximum Contaminant Level (MCL) for nitrate is 10 mg/L.

In general, nitrate concentrations were consistent with those measured in previous monitoring events.

Quality Assurance/Quality Control (QA/QC)

To assess the quality of the analytical results, we collected and analyzed a duplicate sample. In addition, the laboratory performs a number of analyses to assess the quality of the data. The purposes and results of each of these analyses are discussed in Attachment A. All data were acceptable for their intended use.

ANNUAL DATA EVALUATION

Site Hydrogeology

In general, the water level data collected during this latest round of annual monitoring support the original hydrogeologic model conceptualized for this site. The conceptual model as described in previous reports and restated here represents a two-aquifer system consisting of a shallow water table aquifer overlying a deeper, semi-confined aquifer. The two aquifers are separated by a horizon of soil with lower hydraulic conductivity. The low permeability zone lies at a depth of about 20 feet and serves as a semi-confining unit for the deep aquifer and may also impede downward migration of groundwater from the shallow aquifer to the deep aquifer. The strong vertical gradient between the shallow and deep aquifer, and the occurrence of relatively high nitrate concentrations in the deep aquifer beneath the fertilizer facility suggest that groundwater with dissolved nitrate is migrating from source areas in the shallow aquifer downward to the deep aquifer. The results of a previous aquifer pump test conducted at the site indicate that hydraulic connection between the two aquifers is measurable, but not direct. The horizontal component of groundwater flow in the shallow aquifer is likely influenced largely by recharge from precipitation and nearby surface water bodies. The horizontal component of flow in the deep aquifer is likely to be influenced primarily by local groundwater withdrawals and distant surface water features (e.g., the Willamette River).

Shallow Aquifer. Water table contours for the shallow wells in October 1999 are shown on Figure 2. The horizontal component of groundwater flow in the shallow aquifer was primarily towards the north-northwest. The horizontal gradient in October 1999 was about 0.015 ft/ft.

Deep Aquifer. Potentiometric surface contours for the deep wells in October 1999 are shown on Figure 3. The horizontal component of groundwater flow in the deep aquifer

was towards the west-southwest. The hydraulic gradient in October 1999 was about 0.002 ft/ft.

A relatively high rate of groundwater pumping from a "Public Supply" well located about 350 feet south-southwest from the fertilizer facility may influence groundwater flow and cause the horizontal gradient across the site to vary from a westward to a more southwestward direction. This pumping influence may become more pronounced during the dry season when more groundwater is being withdrawn for lawn irrigation. The deep aquifer groundwater gradient may also be influenced by seasonal variations in use of the domestic well at the Wilbur-Ellis facility.

Groundwater Nitrate Concentrations

The groundwater nitrate concentrations measured in all on-site monitoring wells and off-site residential wells in October 1999 are shown in Table 3. The historical nitrate data are plotted versus time on Figures 5 through 13. Table 3 also includes statistical parameters for the data by well (mean, median, minimum, maximum, and standard deviation).

On-site Monitoring Wells. Referring to Figures 5 through 9, all on-site wells (MW-1 through MW-8 and Wilbur-Ellis) consistently had nitrate concentrations above the MCL of 10 mg/L. Nitrate concentrations in the on-site wells ranged from 28.6 to 177 mg/L for 1999.

An apparent overall decrease in nitrate concentrations has been observed in all the shallow on-site monitoring wells (Figures 5 and 6) as compared to the historical nitrate concentrations observed in 1991. Nitrate concentrations generally declined until sometime around June 1997, and have leveled off since then.

The nitrate concentrations in the deep on-site monitoring wells (MW-5 through MW-8 and Wilbur-Ellis) have generally remained constant with no significant changes since monitoring began in 1991 (Figures 7 and 8).

Off-site Residential Wells. Nitrate concentrations in all off-site residential wells were below the MCL. OSW-7 showed a consistent increase in nitrate concentration to levels above the MCL through June 1998, but appears to have decreased slightly and leveled off below 10 mg/L over the last year. Nitrate concentrations in the off-site wells ranged from 0.46 to 9.59 mg/L for 1999.

Historical nitrate concentrations which were measured in the off-site residential wells OSW-1, OSW-3, and OSW-6 in December 1991 and August 1993 are shown in Table 3.

Historically, nitrate concentrations in these three wells have exceeded the MCL. Comparison of data (Figures 9 through 13) suggests nitrate concentrations in these wells have decreased since 1991.

CONCLUSIONS AND RECOMMENDATIONS

Based on the water level measurements from the on-site monitoring wells, it appears that the horizontal component of groundwater flow in the shallow aquifer is to the north-northwest. The horizontal gradient in the deep aquifer was to the west-southwest in October 1999. However, based on historical observations from quarterly, semi-annual, and annual groundwater monitoring, the horizontal gradient in the deep aquifer appears to vary seasonally from a westerly direction in the winter and spring, and to the southwest in the summer and fall.

Nitrate concentrations in residential wells located down-gradient from the fertilizer facility have remained below the MCL for the last five years with the exception of two detections of 12 mg/L (November 1995 and October 1996) in OSW-6. Nitrate concentrations in OSW-6 have remained below the MCL for the past three years.

Groundwater from residential well OSW-7, located up-gradient from the facility, experienced an increase in nitrate concentration to levels above the MCL until October 1998. In October 1998 and October 1999, the nitrate concentration in OSW-7 remained just below the MCL.

Based on historical and 1999 monitoring results, and the nitrate migration simulation study conducted in 1997, it does not appear that nitrate in groundwater beneath the fertilizer facility represents a current or immediate future threat to off-site groundwater supplies. The data continue to support the presumption that conditions in the shallow source aquifer should result in eventual improvement in groundwater quality in the deep aquifer beneath the site.

As shown with the migration simulation, and demonstrated during the past five years of quarterly, semi-annual, or annual monitoring, nitrate concentrations in groundwater have generally stabilized or are slowly decreasing. As discussed in the migration simulation report, the nitrate plume appears to be settling into a steady-state condition balanced with a smaller mass of nitrate source (relative to the pre-1990 source which was removed). If conditions at the site remain constant (i.e., no additional sources or changes in operation), then it is expected that this plume will remain balanced in its current condition, with no

significant off-site impact. We recommend continuing with the annual groundwater monitoring to be conducted in the month of October. Continued annual monitoring in October will allow for sampling to occur during the time of year when higher concentrations of nitrate have been detected historically.

If you have any questions concerning this project, please feel free to call.

Sincerely,

HART CROWSER, INC.

for **GREGORY E. KUPILLAS, R.G.**
Senior Project Hydrogeologist

HERBERT F. CLOUGH, P.E.
Principal

Attachments: Table 1 - Well Casing and Groundwater Elevations
Table 2 - Groundwater Field Parameter Measurements
Table 3 - Nitrate Concentrations
Figure 1 - Site Location Map
Figure 2 - Site Plan - October 1999 Shallow Aquifer Groundwater Elevations
Figure 3 - Site Plan - October 1999 Deep Aquifer Groundwater Elevations
Figure 4 - Site Plan - October 1999 Groundwater Nitrate Concentrations
Figures 5 through 13 - Nitrate Concentrations vs. Time
Attachment A - Groundwater Sampling and QA/QC Procedures
Attachment B - Laboratory Analyses Test Documentation

c: Ken Cowdry, Wilbur-Ellis
Jack Arendt, DEQ

Table 1 - Well Casing and Groundwater Elevations
Wilbur-Ellis Company
Shedd, Oregon

Well Designation	MW-1		MW-2		MW-3		MW-4	
Top of Casing	96.83		97.17		97.81		98.95	
Date	DTW	Elevation	DTW	Elevation	DTW	Elevation	DTW	Elevation
26-Jan-95	2.52	94.31	1.60	95.57	2.30	95.51	2.79	96.16
25-Apr-95	1.80	95.03	1.51	95.66	2.22	95.59	1.68	97.27
27-Jul-95	6.13	90.70	4.03	93.14	5.33	92.48	3.34	95.61
8-Nov-95	4.82	92.01	3.49	93.68	4.79	93.02	2.80	96.15
25-Jan-96	1.21	95.62	0.66	96.51	1.66	96.15	1.11	97.84
30-Apr-96	2.60	94.23	1.43	95.74	2.07	95.74	2.10	96.85
25-Jul-96	2.93	93.90	2.7	94.47	4.38	93.43	2.25	96.70
13-Aug-96	5.16	91.67	3.95	93.22	5.34	92.47	3.25	95.70
18-Oct-96	2.25	94.58	1.79	95.38	4.43	93.38	2.46	96.49
24-Apr-97	0.80	96.03	1.10	96.07	1.50	96.31	1.20	97.75
31-Oct-97	2.23	94.60	1.68	95.49	3.10	94.71	1.25	97.70
27-May-98	1.80	95.03	1.23	95.94	2.05	95.76	1.38	97.57
7-Oct-98	8.62	88.21	8.48	88.69	8.05	89.76	5.18	93.77
21-Oct-99	10.09	86.74	11.72	85.45	9.80	88.01	8.45	90.50

Well Designation	MW-5		MW-6		MW-7		MW-8	
Top of Casing	96.90		97.34		99.11		98.05	
Date	DTW	Elevation	DTW	Elevation	DTW	Elevation	DTW	Elevation
26-Jan-95	2.86	94.04	3.56	93.78	5.00	94.11	4.10	93.95
25-Apr-95	3.15	93.75	3.38	93.96	5.29	93.82	4.30	93.75
27-Jul-95	12.15	84.75	11.86	85.48	14.44	84.67	13.42	84.63
8-Nov-95	12.76	84.14	12.59	84.75	15.16	83.95	14.03	84.02
25-Jan-96	1.92	94.98	2.29	95.05	4.14	94.97	3.10	94.95
30-Apr-96	6.45	90.45	5.22	92.12	8.58	90.53	10.70	87.35
25-Jul-96	9.89	87.01	9.85	87.49	12.78	86.33	11.44	86.61
13-Aug-96	12.27	84.63	11.84	85.50	14.84	84.27	13.73	84.32
18-Oct-96	15.7	81.20	13.6	83.74	18.34	80.77	19.75	78.30
24-Apr-97	3.12	93.78	3.10	94.24	5.35	93.76	4.80	93.25
31-Oct-97	9.34	87.56	9.09	88.25	11.68	87.43	10.62	87.43
27-May-98	2.63	94.27	2.95	94.39	4.68	94.43	3.70	94.35
7-Oct-98	13.39	83.51	13.46	83.88	15.73	83.38	14.57	83.48
21-Oct-99	16.28	80.62	16.54	80.80	18.59	80.52	17.69	80.36

Notes:
1. Top of Casing = Top of Casing Elevation in Feet
2. DTW = Depth to Water in Feet
3. Elevation = Groundwater Elevation in Feet

Table 2 - Groundwater Field Parameter Measurements
Wilbur-Ellis Company
Shedd, Oregon

Well Designation	Date	Ranges of Parameters Measured		
		pH	Specific Conductance (µmhos)	Temperature (°C)
MW-1	26-Jan-95	6.5 - 6.7	700	12.4 - 13.5
	25-Apr-95	5.6 - 5.7	1300 - 1400	12.4 - 12.9
	27-Jul-95	8.5 - 8.8	840 - 920	17.8
	8-Nov-95	5.5 - 5.8	800	16.7 - 17.2
	25-Jan-96	6.8 - 7.4	1360 - 1410	11.4 - 12.3
	30-Apr-96	8.1 - 9.9	990 - 1060	13.0
	25-Jul-96	5.2 - 5.5	810 - 830	18.3 - 19.4
	18-Oct-96	5.0 - 5.2	1410 - 1550	17.5 - 17.9
	24-Apr-97	7.0 - 7.6	820 - 880	11.9 - 12.4
	31-Oct-97	5.5 - 5.8	1720 - 1740	15.8 - 15.9
	27-May-98	5.9 - 6.1	820 - 880	14.7 - 15.2
	7-Oct-98	6.2	630 - 640	18.0
	21-Oct-99	7.3 - 7.4	1050 - 1090	16.0 - 16.2
MW-2	26-Jan-95	5.8 - 6.0	940 - 970	11.1 - 11.5
	25-Apr-95	4.2 - 4.5	1300	12.0 - 12.5
	27-Jul-95	8.0 - 8.2	790 - 840	16.7 - 18.3
	8-Nov-95	4.2 - 5.5	960 - 1010	16.1
	25-Jan-96	6.6 - 7.8	1000 - 1300	10.2 - 10.7
	30-Apr-96	6.5 - 6.8	780 - 830	12.6 - 13.7
	25-Jul-96	5.6 - 5.7	550 - 610	18.6 - 19.4
	18-Oct-96	3.6 - 3.9	980 - 990	17.0 - 17.8
	24-Apr-97	6.1 - 6.6	470 - 510	12.1 - 12.3
	31-Oct-97	4.3 - 4.7	800 - 830	14.8 - 15.3
	27-May-98	6.1 - 7.2	690 - 800	14.6 - 16.4
	7-Oct-98	4.5 - 4.7	440 - 520	17.0
	21-Oct-99	6.9	1010	13.8
MW-3	26-Jan-95	6.0 - 6.5	4600 - 5200	13.0 - 13.2
	25-Apr-95	4.5	1100	12.9 - 13.1
	27-Jul-95	8.2 - 8.3	1700 - 2000	16.1 - 17.8
	8-Nov-95	5.2 - 5.8	1130 - 1980	17.2
	25-Jan-96	7.0 - 7.4	800 - 1200	12.8 - 13.6
	30-Apr-96	7.1 - 7.2	810 - 870	12.9 - 13.0
	25-Jul-96	6.3 - 6.9	980 - 1140	17.4 - 17.5
	18-Oct-96	5.0 - 5.4	1120 - 1590	17.1 - 17.6
	24-Apr-97	7.5 - 7.6	610 - 690	12.4 - 12.8
	31-Oct-97	6.1 - 6.3	1080 - 1130	16.8 - 17.0
	27-May-98	8.1 - 8.2	570 - 720	13.3 - 13.6
	7-Oct-98	7.0 - 7.1	1050 - 1080	17.0
	21-Oct-99	7.1 - 7.2	2100 - 2200	15.5 - 15.6

Notes: Refer to last page of table.

Table 2 - Groundwater Field Parameter Measurements
Wilbur-Ellis Company
Shedd, Oregon

Well Designation	Date	Ranges of Parameters Measured		
		pH	Specific Conductance (µmhos)	Temperature (°C)
MW-4	26-Jan-95	6.2 - 6.5	920 - 1200	13.0 - 13.5
	25-Apr-95	6.1 - 6.3	2300 - 2500	13.3 - 13.7
	27-Jul-95	8.3 - 8.4	500 - 510	17.8 - 19.4
	8-Nov-95	5.5 - 5.8	1090 - 1200	17.2 - 17.8
	25-Jan-96	6.9 - 7.2	1880 - 2100	11.7 - 12.8
	30-Apr-96	6.6 - 6.9	1670 - 1950	13.5 - 14.1
	25-Jul-96	5.7 - 5.8	520 - 640	17.0 - 19.2
	18-Oct-96	4.8	1490 - 1620	18.3 - 18.8
	24-Apr-97	6.5 - 6.9	950 - 1600	12.7 - 12.9
	31-Oct-97	6.1 - 6.5	650 - 690	17.2 - 17.7
	27-May-98	5.7 - 6.4	1600 - 1880	14.5 - 15.3
	7-Oct-98	6.0 - 6.3	1060 - 1230	18 - 19
	21-Oct-99	7.1	1500 - 1700	16.1 - 16.7
MW-5	26-Jan-95	6.5 - 6.7	750 - 900	14.1 - 14.5
	25-Apr-95	6.4 - 6.5	1300-1800	14.2 - 14.3
	27-Jul-95	8.4	1100 - 1200	15.6 - 16.1
	8-Nov-95	5.6 - 5.9	2800 - 3800	15.0
	25-Jan-96	6.4 - 7.3	1690 - 1870	12.8 - 13.6
	30-Apr-96	7.1 - 7.8	1090 - 1310	14.7 - 15.2
	25-Jul-96	6.2 - 6.5	1020 - 1090	14.9 - 15.1
	18-Oct-96	6.2 - 6.3	1180 - 1300	14.9 - 15.0
	24-Apr-97	6.9 - 7.6	880 - 990	14.4 - 16.9
	31-Oct-97	6.3 - 6.8	1120 - 1320	14.4 - 15.3
	27-May-98	6.5 - 7.0	1000 - 1430	15.1 - 15.5
	7-Oct-98	6.1 - 6.4	540 - 560	15.0
	21-Oct-99	7.3 - 7.4	1200 - 1400	14.6 - 14.8
MW-6	26-Jan-95	6.4 - 6.8	980 - 1010	14.2 - 15.1
	25-Apr-95	5.9 - 6.7	190	14.2 - 14.5
	27-Jul-95	7.6 - 8.3	1300	15.0 - 15.6
	8-Nov-95	5.7 - 7.6	1400 - 1500	15.0
	25-Jan-96	8.8	1900	13.1
	30-Apr-96	6.5 - 6.7	1220 - 1460	14.6 - 14.8
	25-Jul-96	6.1 - 6.5	1030 - 1090	15.2
	18-Oct-96	5.9 - 6.2	1050 - 1158	14.5 - 14.7
	24-Apr-97	6.7 - 6.8	830 - 860	14.1 - 14.2
	31-Oct-97	6.7 - 6.8	1430 - 1510	13.7 - 14.0
	27-May-98	6.1 - 7.9	1320 - 1430	15.5 - 16.1
	7-Oct-98	7.3 - 7.4	960 - 1130	15.0
	21-Oct-99	7.1 - 7.4	1600 - 1700	13.4

Notes: Refer to last page of table.

Table 2 - Groundwater Field Parameter Measurements
Wilbur-Ellis Company
Shedd, Oregon

Well Designation	Date	Ranges of Parameters Measured		
		pH	Specific Conductance (µmhos)	Temperature (°C)
MW-7	26-Jan-95	6.4 - 6.9	620 - 660	14.0 - 14.4
	25-Apr-95	7.3 - 7.6	700 - 800	14.4 - 15.1
	27-Jul-95	8.4 - 8.5	640 - 720	15.5 - 16.1
	8-Nov-95	6.3 - 7.0	700 - 710	15.0 - 15.6
	25-Jan-96	6.6 - 7.4	960	13.3 - 14.0
	30-Apr-96	6.7 - 7.1	530 - 680	14.7 - 15.1
	25-Jul-96	6.7 - 6.9	650 - 660	15.5 - 15.7
	13-Aug-96	7.5 - 7.8	840 - 850	16.4 - 16.6
	18-Oct-96	6.9 - 7.1	890 - 920	14.9 - 15.0
	24-Apr-97	7.0	510 - 580	15.3
	31-Oct-97	6.7 - 7.2	1040 - 1050	15.0 - 15.2
	27-May-98	6.6 - 7.5	600 - 700	15.5 - 16.1
	7-Oct-98	7.0 - 7.5	430 - 460	15.0
	21-Oct-99	7.3	770 - 850	14.0 - 14.1
MW-8	26-Jan-95	6.4 - 6.7	1170 - 1240	14.1 - 15.2
	25-Apr-95	7.0 - 7.3	2200 - 2500	14.6 - 14.7
	27-Jul-95	8.4	1600 - 1900	15.6
	8-Nov-95	5.9 - 6.3	1730 - 1740	15.6
	25-Jan-96	6.4 - 7.1	2400 - 2600	13.7 - 14.2
	30-Apr-96	6.5 - 7.3	1950 - 2600	14.6
	25-Jul-96	6.5 - 7.3	1950 - 2600	14.6
	13-Aug-96	7.5 - 7.7	1670 - 2000	15.9 - 16.5
	18-Oct-96	6.5 - 6.7	1400	14.5 - 14.8
	24-Apr-97	7.5 - 7.6	1900 - 2000	14.5 - 14.7
	31-Oct-97	6.7 - 7.1	1600 - 1700	15.2 - 15.4
	27-May-98	8.0 - 8.2	1140 - 1230	14.4 - 14.8
	7-Oct-98	7.1 - 7.2	960 - 1030	15.0
	21-Oct-99	7.1 - 7.2	1900 - 2300	14.7 - 14.8
Wilbur-Ellis (Formerly Willamette Seed)	26-Jan-95	9.2	1240 - 1280	24.5 - 25.7
	25-Apr-95	7.5	1310 - 1320	14.9 - 15.6
	27-Jul-95	7.8	1050 - 1180	16.7 - 17.2
	8-Nov-95	7.8 - 7.9	1180 - 1190	15.0 - 15.6
	25-Jan-96	6.3 - 8.8	1580 - 1620	12.9 - 13.3
	30-Apr-96	7.9 - 8.1	710 - 820	NM
	25-Jul-96	6.7 - 7.4	960 - 1110	19.8 - 23.0
	18-Oct-96	7.3 - 7.4	1060 - 1070	13.8 - 13.9
	24-Apr-97	7.6 - 7.8	1400	14.6 - 14.7
	30-Oct-97	6.7 - 6.8	1400 - 1500	14.3 - 14.4
	27-May-98	8.1	860 - 940	15.5 - 15.5
	7-Oct-98	7.5 - 7.6	630 - 720	11 - 15
	21-Oct-99	7.8	1240 - 1290	14.7 - 14.9

Notes: Refer to last page of table.

Table 2 - Groundwater Field Parameter Measurements
Wilbur-Ellis Company
Shedd, Oregon

Well Designation	Date	Ranges of Parameters Measured		
		pH	Specific Conductance (µmhos)	Temperature (°C)
OSW-1	26-Jan-95	9.4 - 9.5	480 - 500	23.5 - 24.5
	25-Apr-95	8.1	470 - 490	13.2
	27-Jul-95	8.0 - 8.1	410 - 460	14.4
	8-Nov-95	8.6	470-480	13.8 - 14.4
	25-Jan-96	8.8 - 9.1	560 - 580	11.7 - 12.0
	30-Apr-96	8.5 - 8.6	370 - 430	NM
	25-Jul-96	8.0 - 8.1	370 - 390	14.5 - 15.4
	18-Oct-96	7.8	530	13.2
	24-Apr-97	8.0	470	12.6 - 12.7
	30-Oct-97	8.1 - 8.2	470 - 480	14.4 - 14.5
	27-May-98	6.9 - 7.3	350 - 370	15.0 - 15.4
	7-Oct-98	7.4 - 7.5	410 - 500	17.5 - 18.0
	21-Oct-99	7.8 - 7.9	490 - 520	13.6 - 13.8
OSW-2	26-Jan-95	9.1	570	18.9 - 25.8
	25-Apr-95	7.4 - 7.5	740 - 750	13.7 - 13.8
	27-Jul-95	7.8	550 - 560	15.0 - 15.6
	8-Nov-95	8.1 - 8.2	550	14.4
	25-Jan-96	6.9 - 8.8	750 - 790	12.5 - 12.8
	30-Apr-96	7.7 - 7.9	550 - 600	14.5 - 15.3
	25-Jul-96	7.4	450 - 470	15.4 - 16.8
	18-Oct-96	7.5 - 7.6	630 - 650	13.7
	24-Apr-97	7.8 - 7.9	680 - 690	13.2
	30-Oct-97	7.7	620 - 640	14.4
	27-May-98	7.0 - 7.3	540 - 560	14.6 - 15.6
	7-Oct-98	7.3 - 7.5	610 - 640	16.5 - 19.1
	21-Oct-99	7.7	580 - 610	13.9 - 14.3
OSW-3	26-Jan-95	8.1 - 8.5	610 - 620	13.4 - 13.8
	25-Apr-95	6.8 - 7.1	820 - 840	13.4 - 13.5
	27-Jul-95	7.9	660 - 680	14.4 - 15.0
	8-Nov-95	7.8	710	13.8
	25-Jan-96	5.5 - 6.3	860 - 900	12.1 - 12.4
	30-Apr-96	7.5 - 7.8	600 - 690	13.6 - 14.3
	25-Jul-96	7.4 - 7.7	550 - 590	14.1 - 14.4
	18-Oct-96	7.3 - 7.4	680 - 690	12.8 - 13.2
	24-Apr-97	8.0	690 - 710	12.4 - 12.6
	30-Oct-97	7.4	670 - 690	14.0 - 14.4
	27-May-98	7.2 - 7.4	560 - 570	13.3 - 13.5
	7-Oct-98	6.7 - 7.0	580 - 650	14.3 - 14.9
	21-Oct-99	7.4	790 - 810	12.6

Notes: Refer to last page of table.

Table 2 - Groundwater Field Parameter Measurements
Wilbur-Ellis Company
Shedd, Oregon

Well Designation	Date	Ranges of Parameters Measured		
		pH	Specific Conductance (µmhos)	Temperature (°C)
OSW-4	26-Jan-95	9.1 - 9.5	470 - 540	15.7 - 23.9
	25-Apr-95	7.6 - 7.7	570 - 640	13.6 - 14.4
	27-Jul-95	7.9 - 8.1	540 - 550	17.2 - 20.0
	8-Nov-95	7.6 - 7.8	540 - 560	13.8
	25-Jan-96	6.7 - 6.8	680 - 700	7.7 - 11.8
	30-Apr-96	8.1	440 - 480	NM
	25-Jul-96	7.3 - 7.6	390 - 440	16.5 - 20.0
	18-Oct-96	7.5 - 7.6	570 - 600	13.4 - 14.0
	24-Apr-97	7.9 - 8.1	550	13.4 - 14.3
	30-Oct-97	7.3 - 7.4	560 - 570	13.0 - 13.8
	27-May-98	6.1 - 6.7	450	14.4 - 16.2
	7-Oct-98	7.3 - 7.5	560 - 610	15.6 - 17.9
	21-Oct-99	7.8 - 7.9	570 - 610	14.0 - 19.4
OSW-5	26-Jan-95	9.1 - 9.5	500 - 510	23.4 - 24.1
	25-Apr-95	7.6 - 7.8	570 - 600	13.0 - 13.2
	27-Jul-95	7.9 - 8.0	430 - 470	14.4
	8-Nov-95	8.2 - 8.4	490	13.8
OSW-6	26-Jan-95	9.3	570 - 580	26.7 - 27.2
	25-Apr-95	7.7 - 7.8	640 - 660	15.5 - 15.6
	27-Jul-95	7.9	520	16.1 - 18.3
	8-Nov-95	7.7	610 - 660	15.6 - 16.1
	25-Jan-96	6.6 - 6.8	690 - 700	14.0 - 14.3
	30-Apr-96	7.8 - 8.0	460 - 470	NM
	25-Jul-96	7.3	450 - 480	15.6 - 16.1
	18-Oct-96	7.5	650 - 720	14.6 - 17.2
	24-Apr-97	7.9	540 - 550	15.0 - 16.1
	30-Oct-97	7.4	570 - 660	15.0 - 17.4
	27-May-98	8.0 - 8.1	400 - 450	15.1 - 17.2
	7-Oct-98	7.6	540 - 580	16 - 18
	21-Oct-99	7.9	570 - 600	14.9 - 18.2

Notes: Refer to last page of table.

Table 2 - Groundwater Field Parameter Measurements
Wilbur-Ellis Company
Shedd, Oregon

Well Designation	Date	Ranges of Parameters Measured		
		pH	Specific Conductance (µmhos)	Temperature (°C)
OSW-7	26-Jan-95	8.8 - 8.9	490 - 510	13.9 - 15.5
	25-Apr-95	6.2 - 6.7	580 - 620	13.9
	27-Jul-95	7.9 - 8.6	490 - 520	15.0
	8-Nov-95	7.3 - 7.6	480 - 530	13.8
	25-Jan-96	5.9 - 6.2	680 - 730	7.8 - 12.2
	30-Apr-96	7.8 - 8.0	490 - 540	13.0 - 14.1
	25-Jul-96	7.2 - 7.3	450 - 500	14.9 - 18.1
	18-Oct-96	6.9 - 7.1	590 - 610	12.1 - 13.2
	24-Apr-97	7.8 - 8.0	570 - 580	12.1 - 13.6
	30-Oct-97	7.2 - 7.5	550 - 590	13.2 - 13.7
	27-May-98	7.4 - 8.1	490 - 540	14.2 - 14.4
	7-Oct-98	6.9 - 7.1	560 - 630	14.5 - 15.9
	21-Oct-99	7.4 - 7.5	610 - 630	9.6 - 12.9
OSW-8	25-Jan-96	5.1 - 6.5	630 - 690	12.9 - 13.3
	30-Apr-96	7.8	450 - 460	15.1 - 16.7
	25-Jul-96	7.4 - 7.6	370 - 410	16.0 - 17.1
	18-Oct-96	7.5 - 7.6	550 - 570	14.1 - 14.3
	24-Apr-97	8.0	500 - 520	13.7 - 14.0
	30-Oct-97	7.6 - 7.7	520	14.9 - 15.1
	27-May-98	7.4 - 7.8	390	15.1 - 15.3
	7-Oct-98	7.1 - 7.3	440 - 580	15.6 - 15.8
	21-Oct-99	7.6	540 - 550	13.7 - 13.8

Note:
NM = Parameter not measured due to faulty equipment.

Table 3 - Nitrate Concentrations
Wilbur-Ellis Company
Shedd, Oregon

	Nitrate Concentrations in mg/L								
Date	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	Wilbur-Ellis
1991 (1)	120	200	370	200	130	180	30	130	71
26-Jan-95	99	130	71	180	120	130	32	180	74
25-Apr-95	94	84	94	210	92	120	24	160	62
27-Jul-95	88	76	250	55	110	140	38	190	67
8-Nov-95	65	110	230	130	110	120	33	180	72
25-Jan-96	97	76	140	210	120	130	27	230	74
30-Apr-96	75	92	100	220	110	130	28	240	65
25-Jul-96	73	53	150	70	110	140	180*	45*	130
13-Aug-96	NS	NS	NS	NS	NS	NS	40	170	NS
18-Oct-96	58	200	140	140	89	140	35	130	61
24-Apr-97	65	58	58	183	106	137	26	191	97
31-Oct-97	196 (3)	67	105	103	46 (3)	129	51	181	131
27-May-98	58	67.4	96.8	166	106	119	25.2	157	68
7-Oct-98	83	64.3	189	214	92.8	123	20.6	169	56.2
21-Oct-99	81.7	72.8	177	118	96.4	118	28.6	144	53.1
Statistics (2)									
Mean	87.1	88.5	138.5	153.8	100.6	128.9	31.4	178.6	77.7
Median	81.7	76	140	166	106	130	28.6	180	68
Maximum	196	200	250	220	120	140	51	240	131
Minimum	58	53	58	55	46	118	20.6	130	53.1
Std. Dev.	35.6	39.7	59.4	55.8	19.2	8.4	8.1	30.6	25.8

Notes:

(1) Monitoring wells MW-1 through MW-4 sampled on 7/1/91. Monitoring wells MW-5 through MW-8 sampled on 8/22/91. Wilbur-Ellis well sampled 6/18/91. Residential wells OSW-1, OSW-3, and OSW-6 sampled on 12/10/91.

(2) Statistical parameters calculated for 1995 through 1999.

(3) Based on historical concentrations, samples from monitoring wells MW-1 and MW-5 may have been mislabeled in the field during the October 31, 1997, sampling period.

NS = Not Sampled

* Based on results of August 13, 1996 sampling, it appears that samples MW-7 and MW-8 were mislabeled in the field.

Table 3 - Nitrate Concentrations
Wilbur-Ellis Company
Shedd, Oregon

	Nitrate Concentrations in mg/L							
Date	OSW-1	OSW-2	OSW-3	OSW-4	OSW-5	OSW-6	OSW-7	OSW-8
1991 (1)	25.1	NS	22.4	NS	NS	6.5	NS	NS
29-Aug-93	26.5	NS	12.3	NS	NS	29.4	NS	NS
26-Jan-95	2.0	<0.13	4.2	2.0	3.9	8.7	7.0	NS
25-Apr-95	<0.10	0.19	8.0	1.8	3.2	5.4	6.9	NS
27-Jul-95	0.59	2.0	8.2	1.8	2.7	7.8	7.2	NS
8-Nov-95	<0.10	<0.10	6.5	2.1	3.7	12	8.6	NS
25-Jan-96	0.95	0.10	4.2	2.0	NS	6.8	9.8	1.3
30-Apr-96	0.21	0.20	7.3	2.1	NS	3.3	8.6	1.7
25-Jul-96	0.18	1.6	4.9	2.0	NS	7.9	9.2	1.5
18-Oct-96	<0.10	0.24	3.3	1.7	NS	12	9.9	1.4
24-Apr-97	<0.10	2	4.6	2	NS	4.7	13	1.7
30-Oct-97	<0.10	0.17	3.4	1.7	NS	7.7	11.7	1.2
27-May-98	<0.10	1.66	3.93	2.16	NS	3.02	11.8	1.4
7-Oct-98	<0.10	0.49	2.84	1.41	NS	4.3	9.7	0.8
21-Oct-99	0.46	0.96	3.44	1.62	NS	5.60	9.59	1.54
Statistics (2)								
Mean	0.4	0.8	5.4	2.0	3.4	7.4	10.2	1.6
Median	0.525	0.49	4.2	2	3.45	6.8	9.59	1.4
Maximum	2.0	2.0	8.2	2.16	3.9	12	13	1.7
Minimum	0.18	0.1	2.84	1.41	2.7	3.02	6.9	0.8
Std. Dev.	0.7	0.8	1.9	0.2	0.5	2.9	1.9	0.3

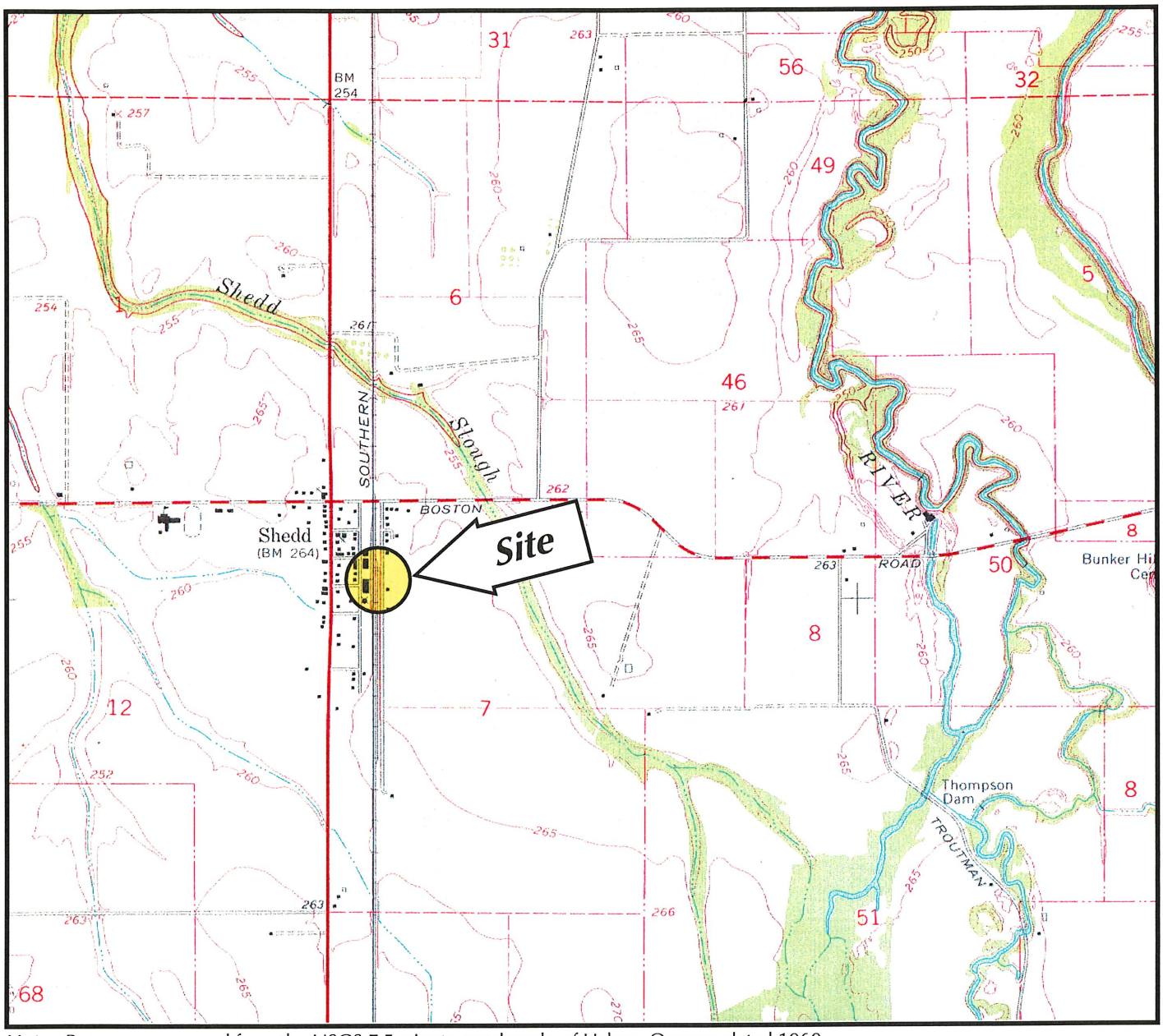
Notes:

(1) Monitoring wells MW-1 through MW-4 sampled on 7/1/91. Monitoring wells MW-5 through MW-8 sampled on 8/22/91. Wilbur-Ellis well sampled 6/18/91. Residential wells OSW-1, OSW-3, and OSW-6 sampled on 12/10/91.

(2) Statistical parameters calculated for 1995 through 1999. One half the Method Reporting Level (MRL) was used to calculate the statistical parameters for samples with concentrations less than the MRL.

NS = Not Sampled

Site Location Map
Wilbur-Ellis Company, Shedd, Oregon



Note: Base map prepared from the USGS 7.5-minute quadrangle of Halsey, Oregon, dated 1969.

SCALE 1 : 24 000

1 1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

CONTOUR INTERVAL 5 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

N

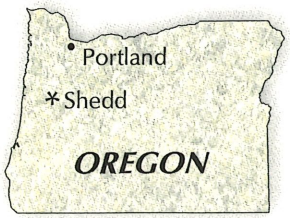


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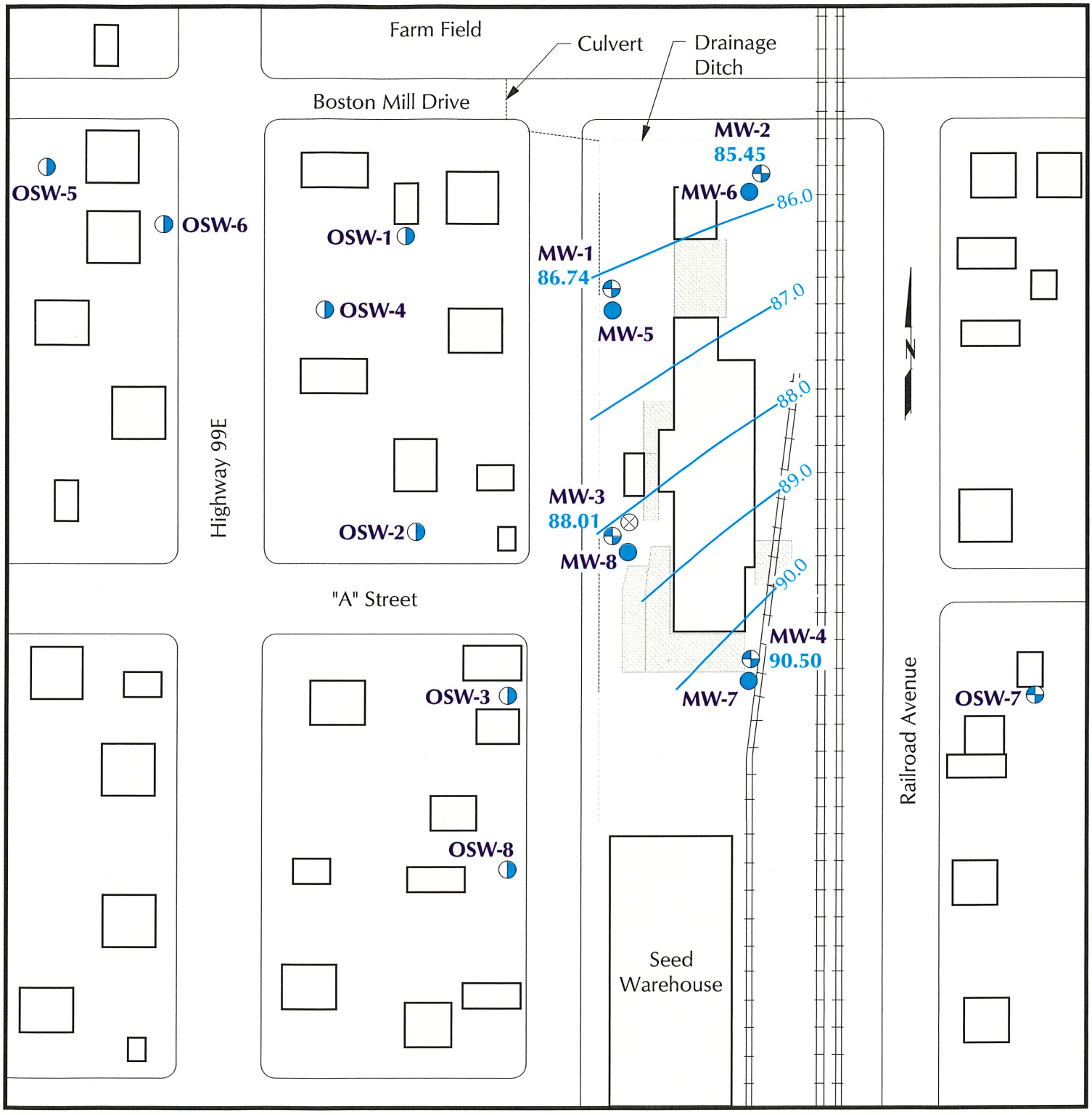
Figure 1

Site Plan - Oct. 1999 Shallow Aquifer Groundwater Elevations
Wilbur-Ellis Company, Shedd, Oregon



Legend:

- ⊗ Site Water Supply Well
- **MW-4** / **90.50** — Shallow Groundwater Monitoring Well Location and Designation; Relative Groundwater Elevation in Feet
- **MW-5** — Deep Groundwater Monitoring Well Location and Designation
- **OSW-2** — Offsite Residential Monitoring Well Location and Designation
- 90.0 —— Shallow Groundwater Elevation Contour in Feet

0 50 100 200
Approximate Scale in Feet

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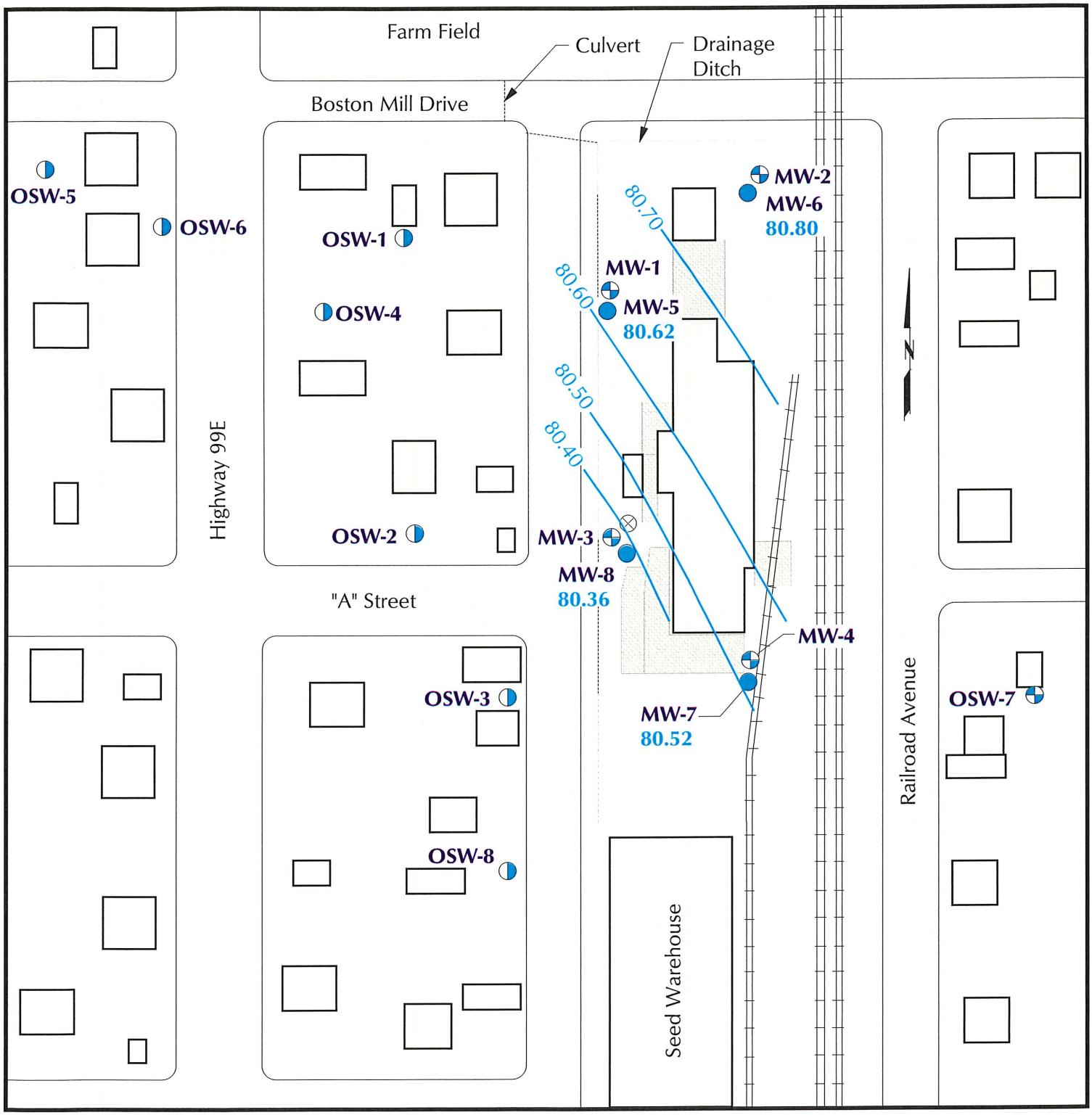
Figure 2

Site Plan - Oct. 1999 Deep Aquifer Groundwater Elevations
Wilbur-Ellis Company, Shedd, Oregon



Legend:

- ⊗ Site Water Supply Well
- MW-4 Shallow Groundwater Monitoring Well Location and Designation
- MW-5 / 80.62 Deep Groundwater Monitoring Well Location and Designation; Relative Groundwater Elevation in Feet
- OSW-2 Offsite Residential Monitoring Well Location and Designation
- 80.60 Relative Groundwater Level Contour in Feet

0 50 100 200
Approximate Scale in Feet

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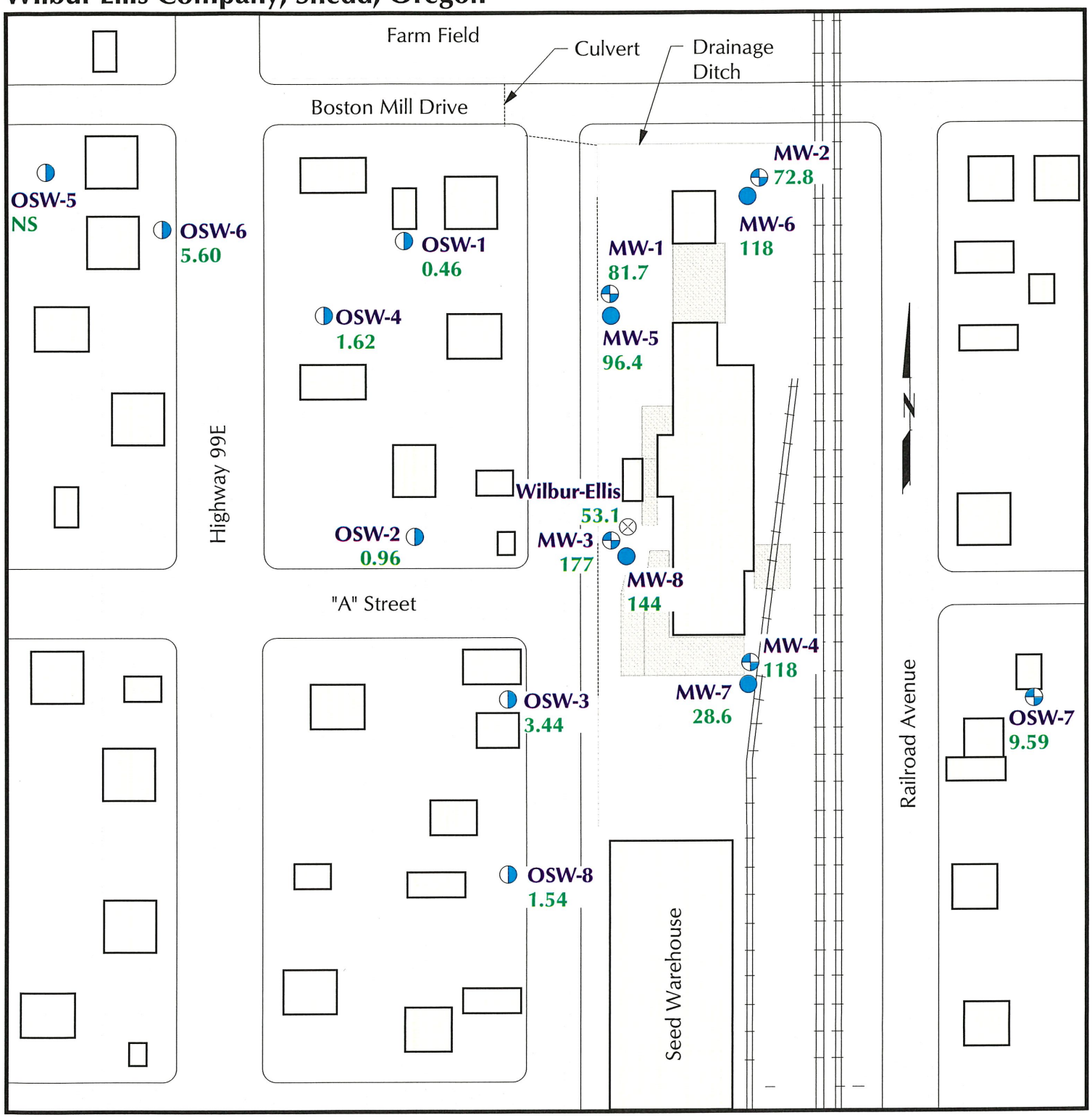
Figure 3

Site Plan - Oct. 1999 Groundwater Nitrate Concentrations
Wilbur-Ellis Company, Shedd, Oregon



Legend:

- ⊗ Site Water Supply Well
- **MW-4** Shallow Groundwater Monitoring Well Location and Designation (Oct. 1997)
- **GP-2** Shallow Groundwater Geoprobe Exploration Location and Designation (July 1997)
- **MW-5** Deep Groundwater Monitoring Well Location and Designation
- **OSW-2** Offsite Residential Monitoring Well Location and Designation (Oct. 1997)
- **0.96** Nitrate/Nitrite Concentration in mg/L (ppm)
- **NS** Not Sampled

0 50 100 200
Approximate Scale in Feet

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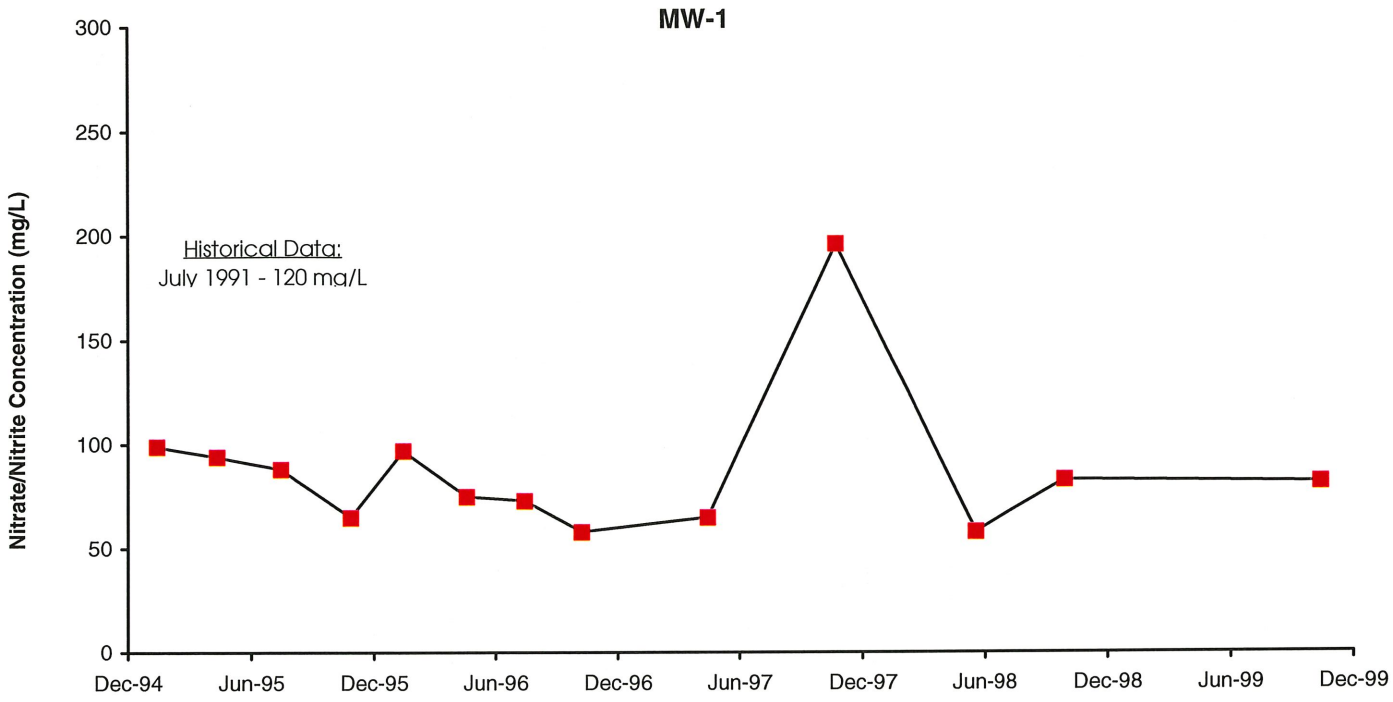
Figure 4

Nitrate/Nitrite Concentrations vs. Time
Wilbur-Ellis Company
Shedd, Oregon



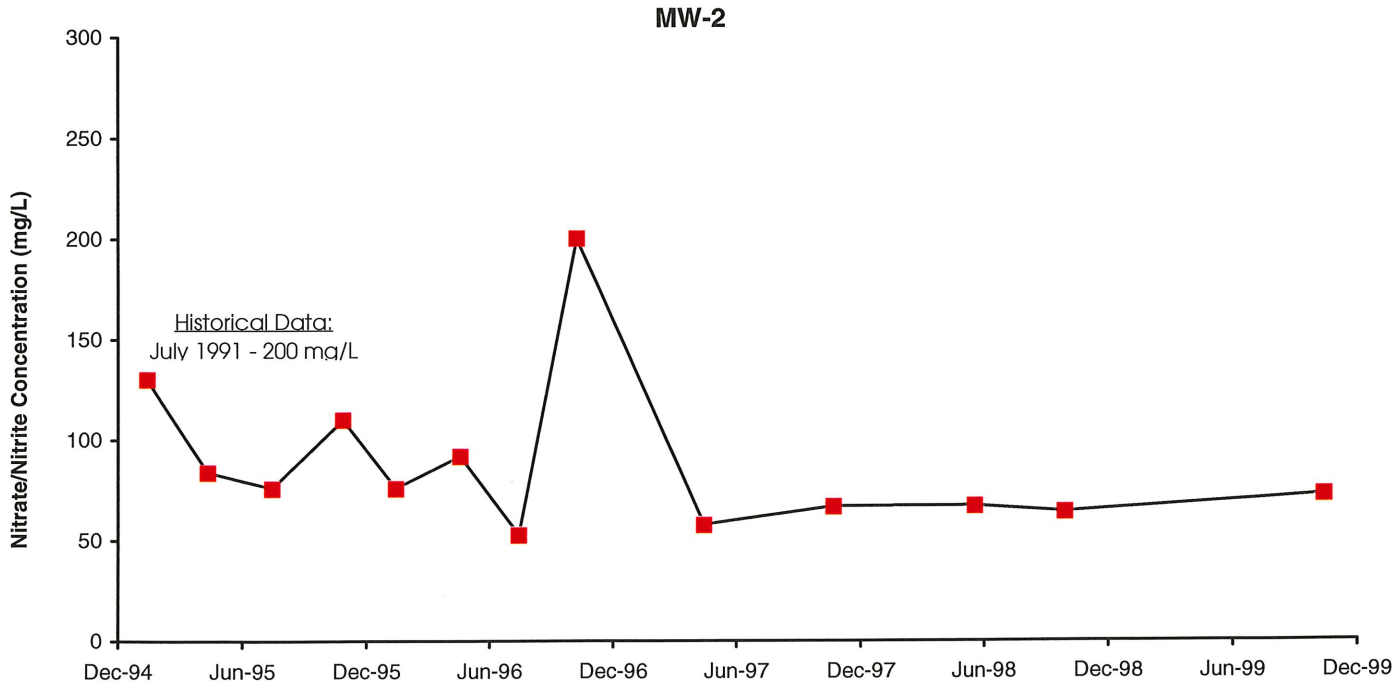


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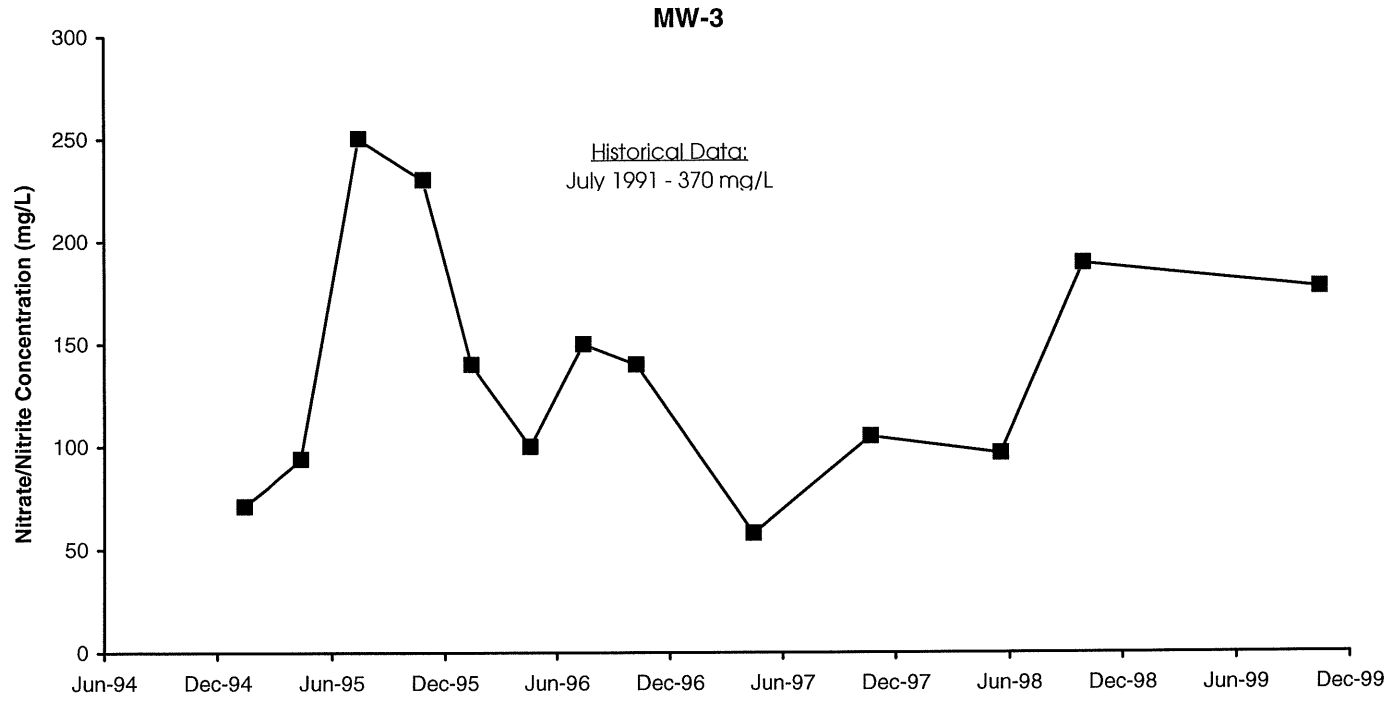
Figure 5

Nitrate/Nitrite Concentrations vs. Time
Wilbur-Ellis Company
Shedd, Oregon



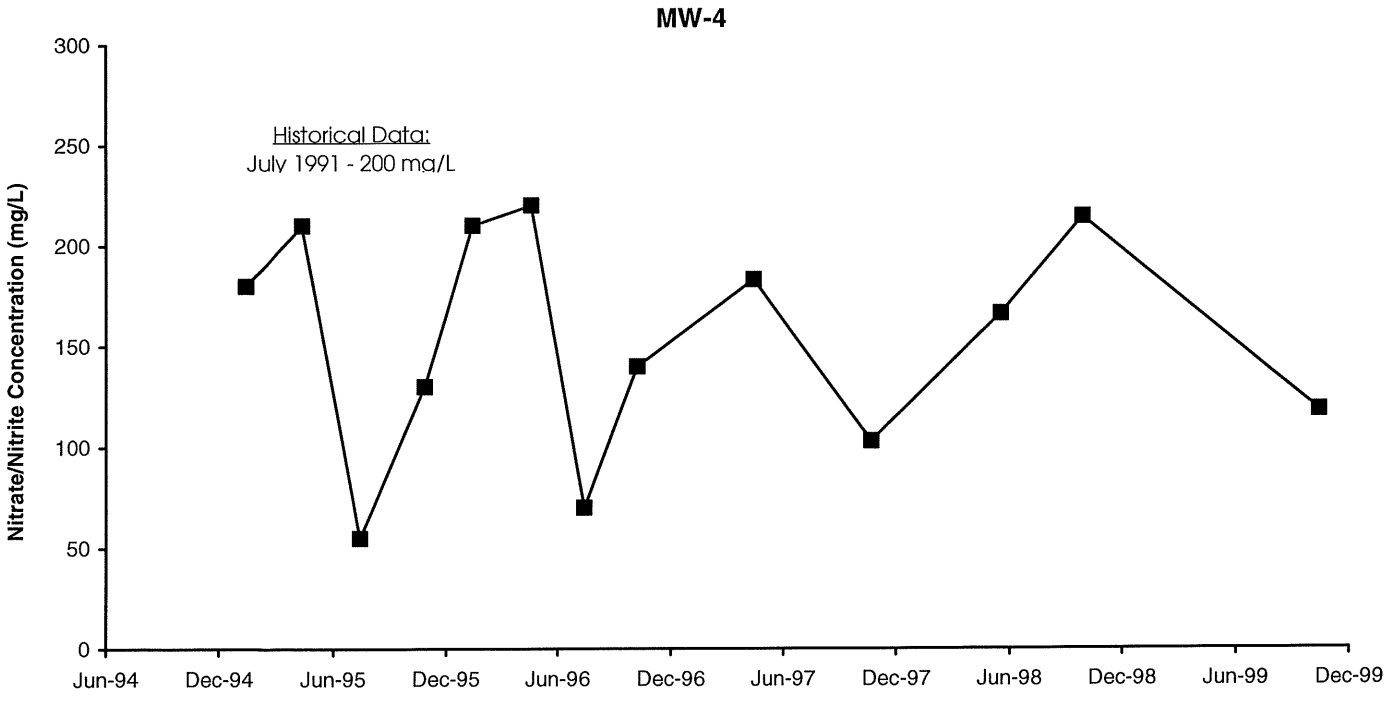


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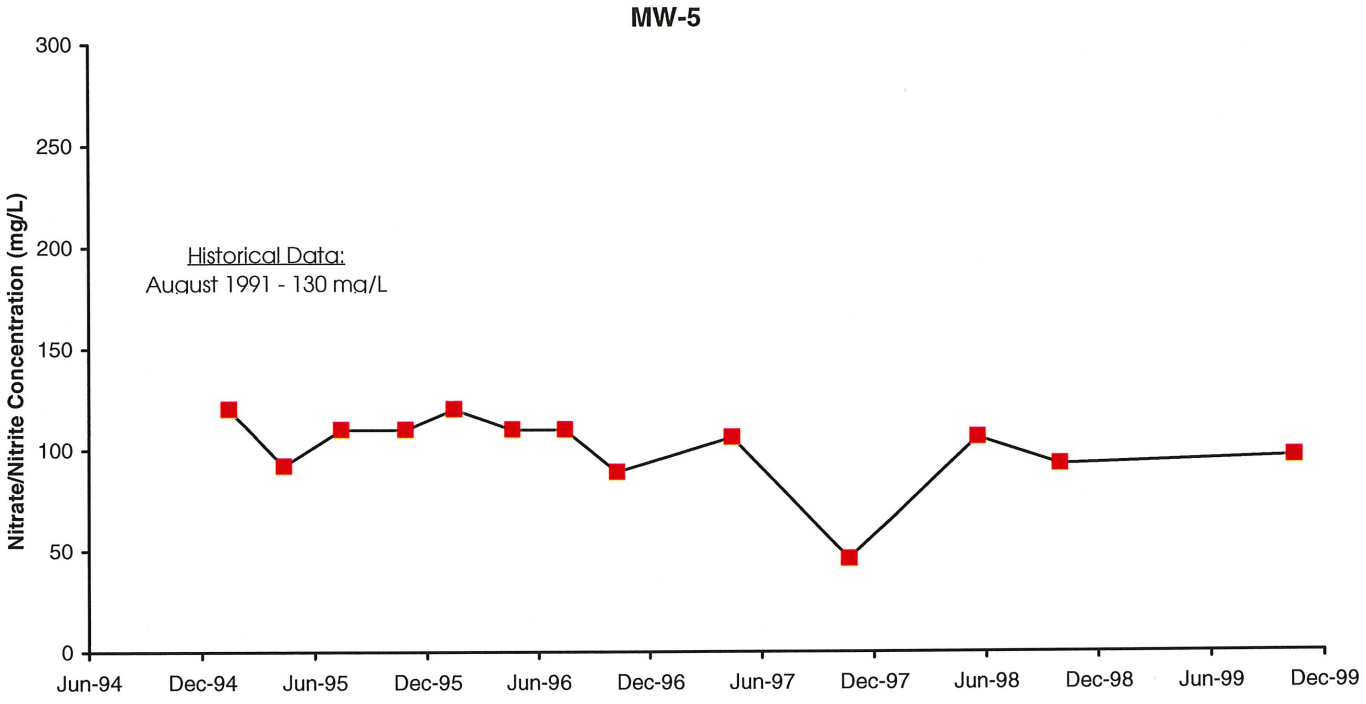
Figure 6

Nitrate/Nitrite Concentrations vs. Time
Wilbur-Ellis Company
Shedd, Oregon



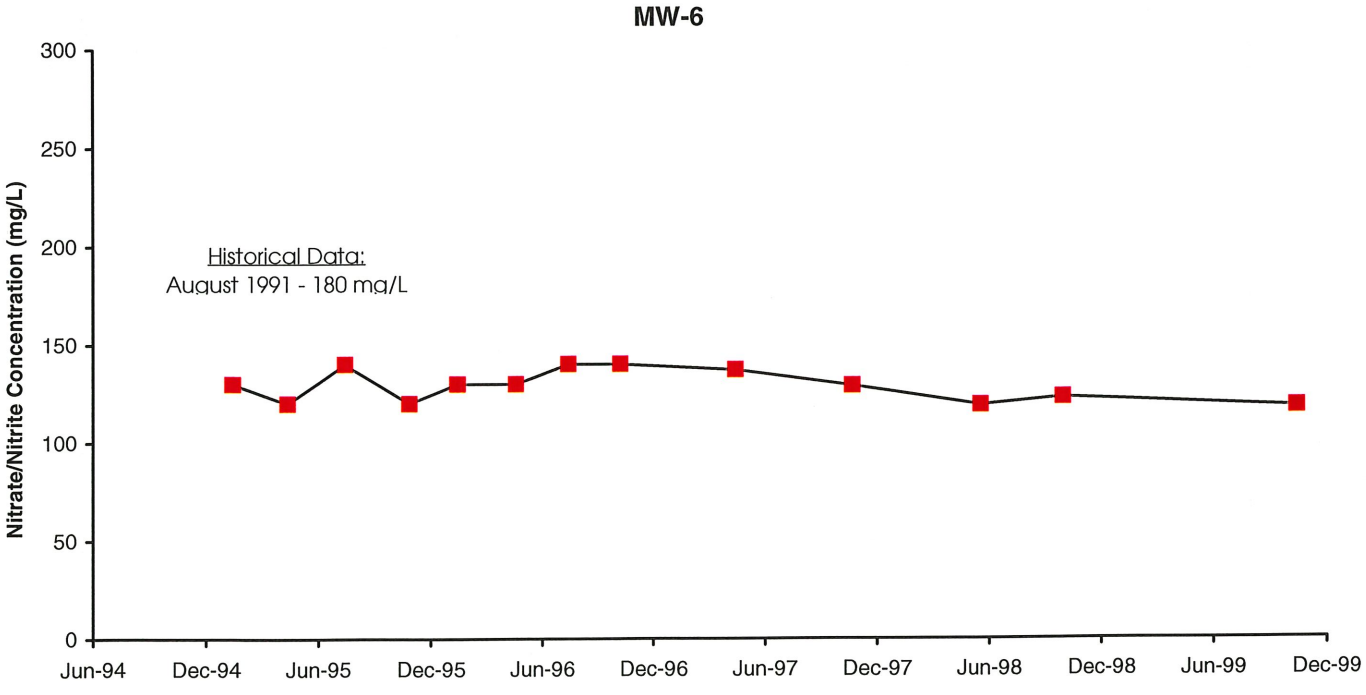


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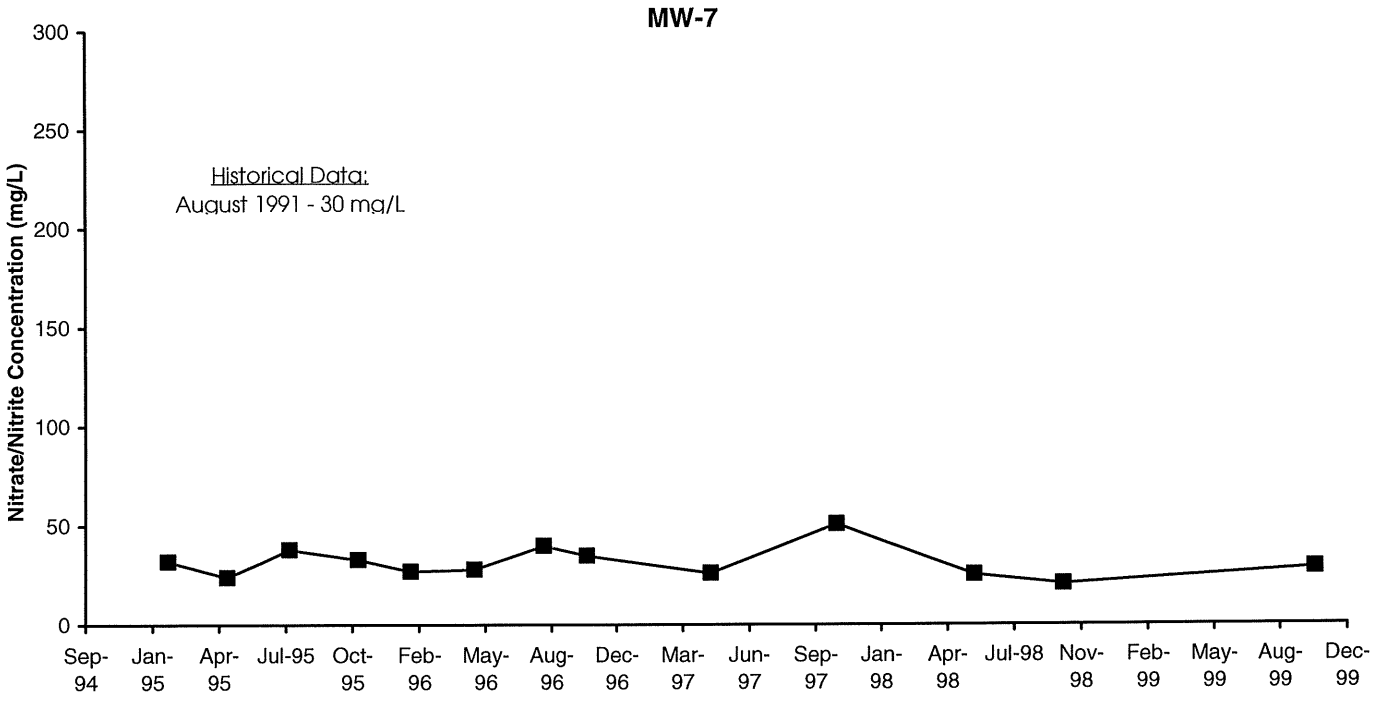
Figure 7

Nitrate/Nitrite Concentrations vs. Time
Wilbur-Ellis Company
Shedd, Oregon



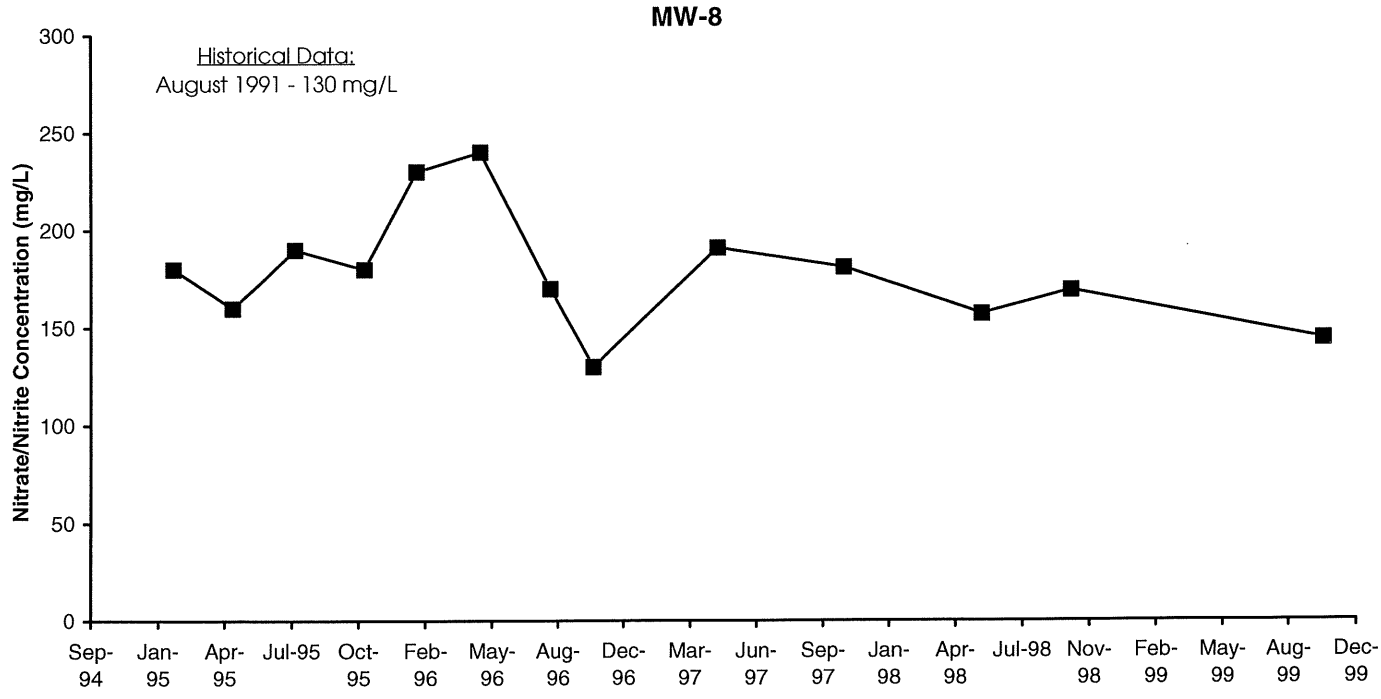


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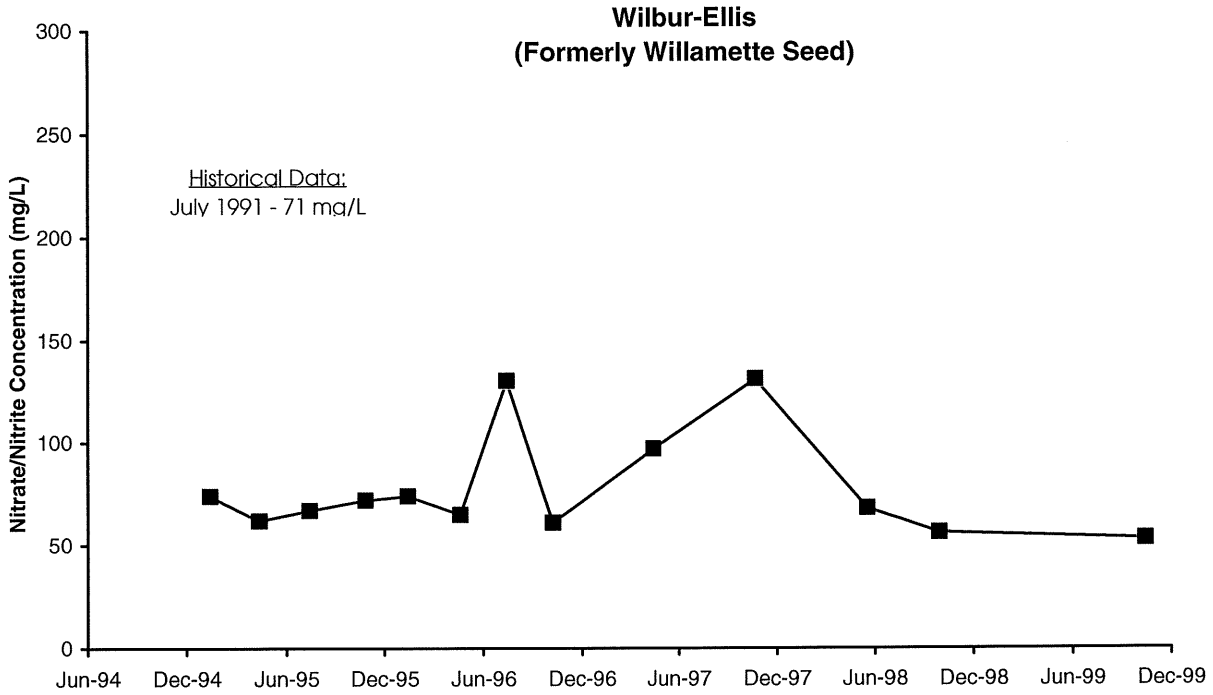
Figure 8

Nitrate/Nitrite Concentrations vs. Time
Wilbur-Ellis Company
Shedd, Oregon



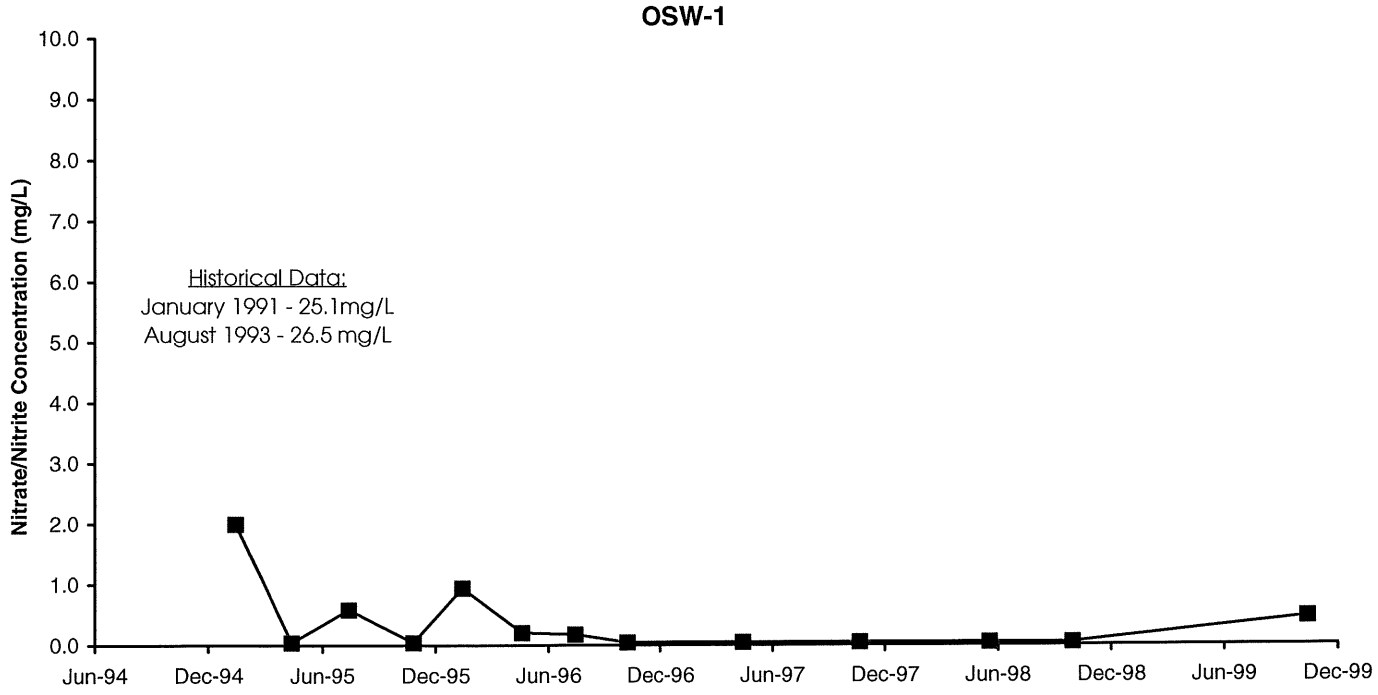


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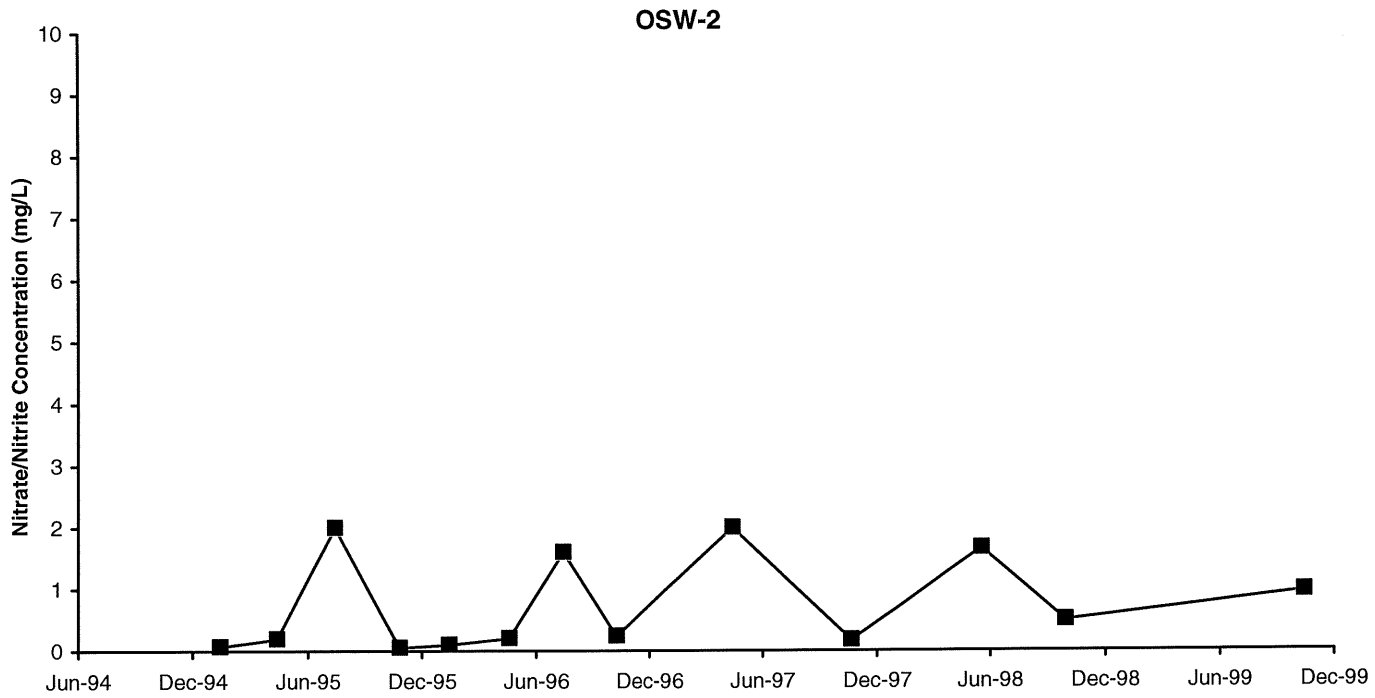
Figure 9

Nitrate/Nitrite Concentrations vs. Time
Wilbur-Ellis Company
Shedd, Oregon



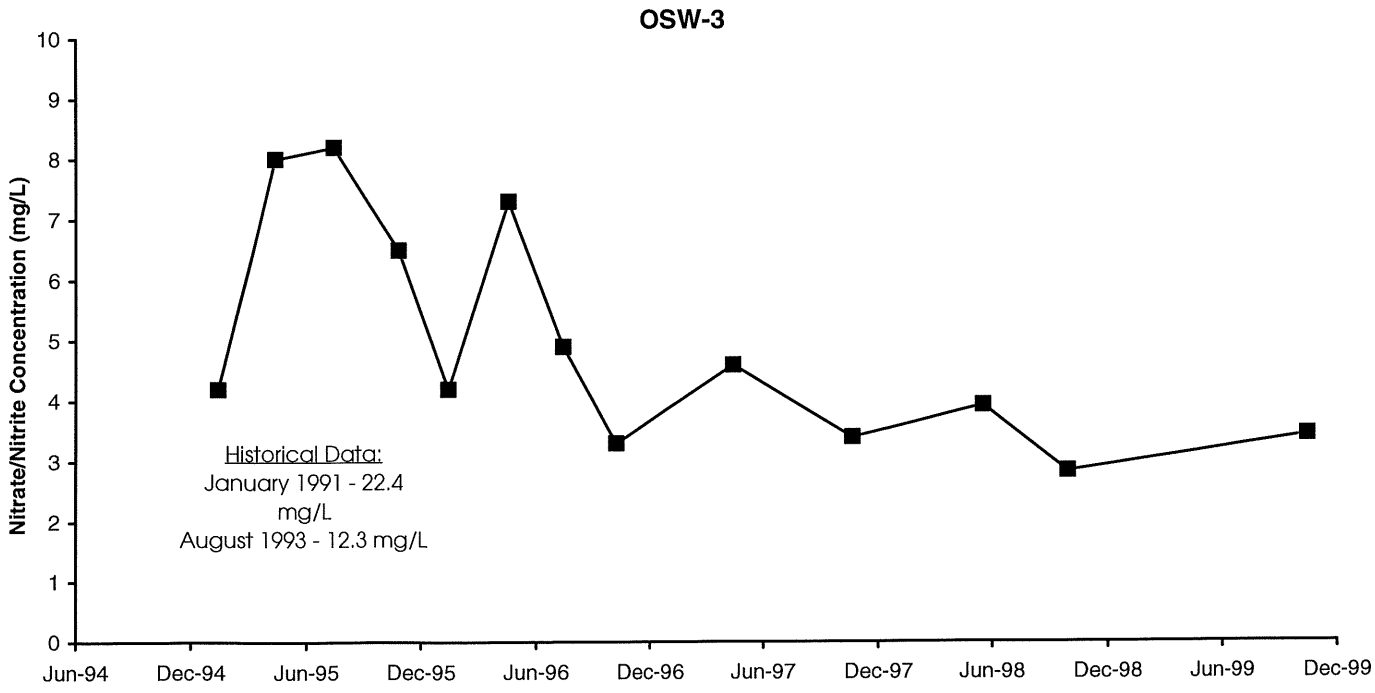


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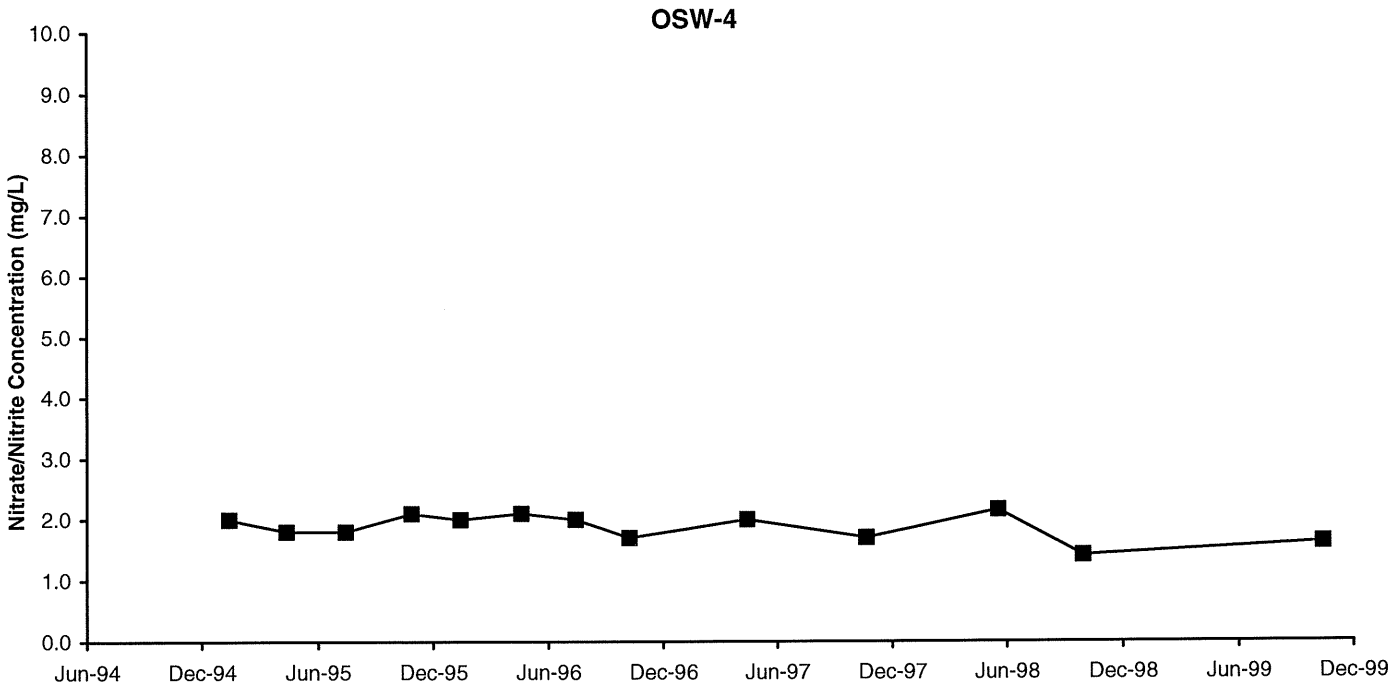
Figure 10

Nitrate/Nitrite Concentrations vs. Time
Wilbur-Ellis Company
Shedd, Oregon



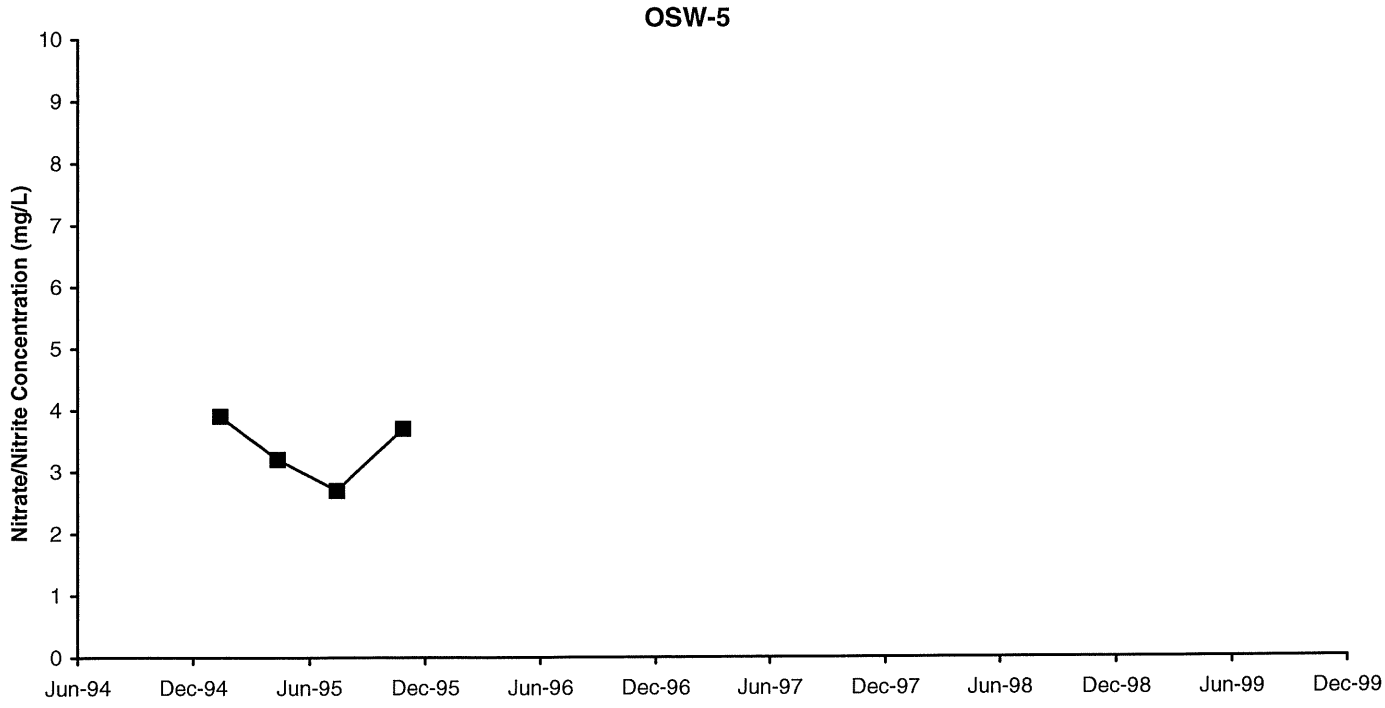


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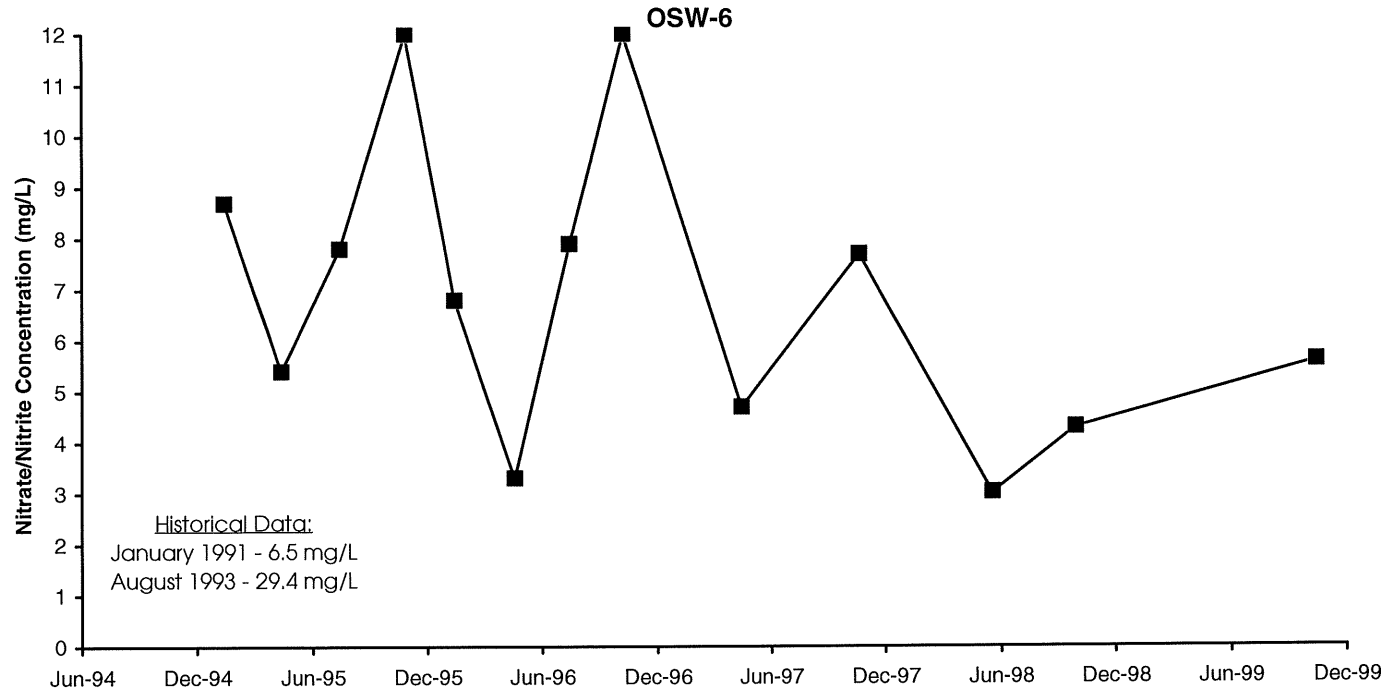
Figure 11

Nitrate/Nitrite Concentrations vs. Time
Wilbur-Ellis Company
Shedd, Oregon



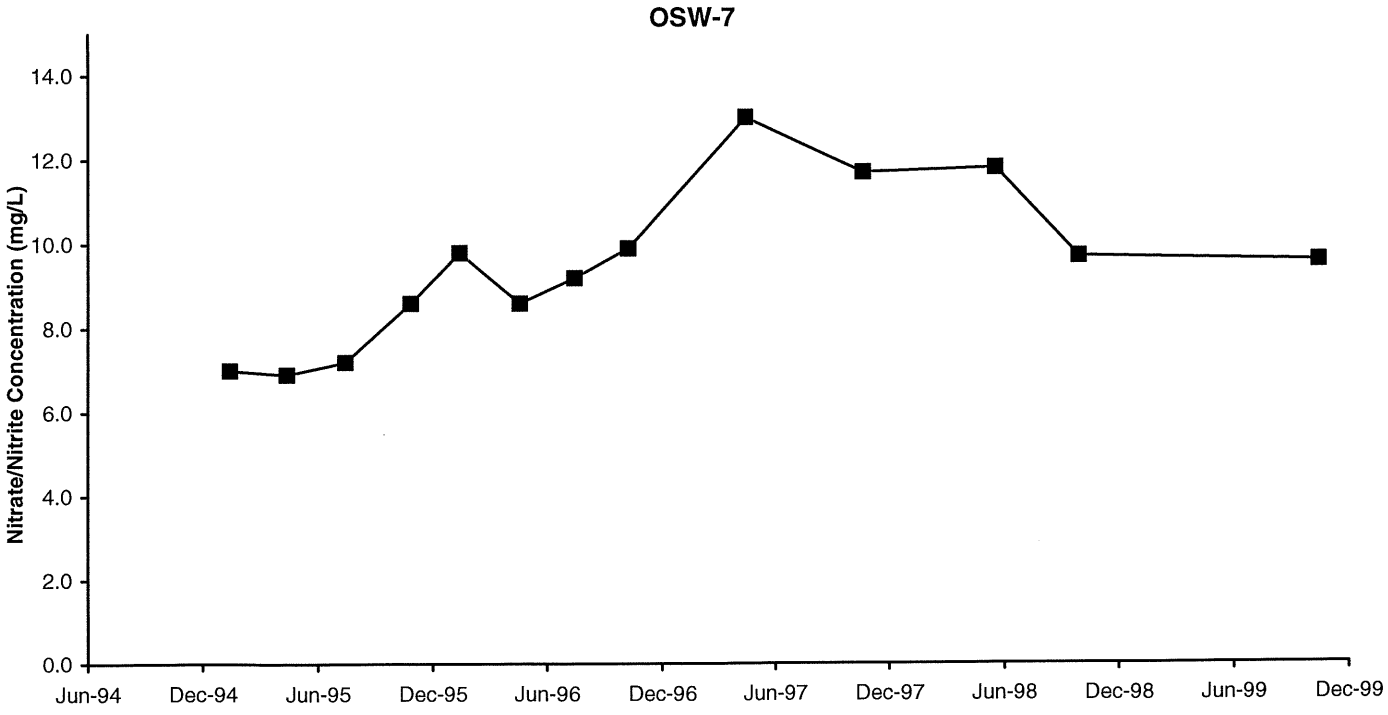


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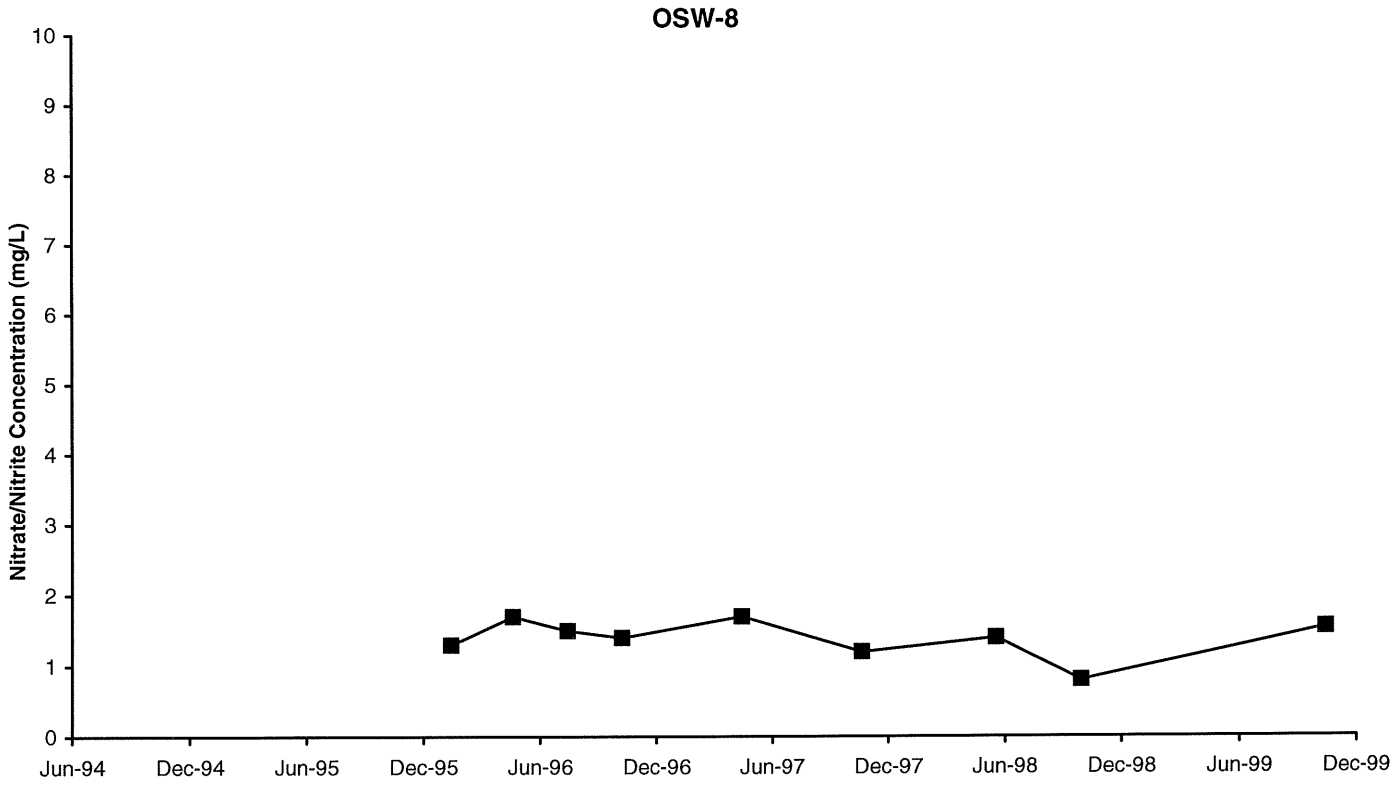
Figure 12

Nitrate/Nitrite Concentrations vs. Time
Wilbur-Ellis Company
Shedd, Oregon



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J-5144-06 *11/98*

Figure 13

ATTACHMENT A
GROUNDWATER SAMPLING AND QA/QC PROCEDURES

ATTACHMENT A
GROUNDWATER SAMPLING AND QA/QC PROCEDURES

This attachment presents the procedures that Hart Crowser used to complete the field and analytical work for this project. The procedures discussed include groundwater sampling and quality assurance/quality control (QA/QC).

Groundwater Sampling Procedures

Static Water Level Measurements

Water levels in the groundwater monitoring wells located on the fertilizer facility (MW-1 through MW-8) were measured to the nearest 0.01 foot using an electronic probe. The measurements were referenced to the top of the well casings.

Well Purging

Monitoring Wells MW-1 through MW-8. After the groundwater levels were measured, each well was purged using a thoroughly decontaminated stainless steel bailer. Purging was considered complete after three well volumes of groundwater had been removed or the well was bailed dry. We monitored field parameters (pH, temperature, and electroconductivity) following removal of each well volume. Field parameters had stabilized within ten percent of previous measurements after removal of three well volumes. We documented observations made during purging in our field notes.

Purge water was disposed of in the fertilizer facility's runoff collection system. Water that is collected in this system is pumped to a holding tank and eventually transported off-site for delivery to a nearby field irrigation system.

Domestic Wells with Access Through the Well Head. All domestic wells, except OSW-4, OSW-6, OSW-7, and the Wilbur-Ellis supply well, were accessible through the well head.

The purging procedure for wells with access through the well head involved collecting an initial sample from the well for measurement of field parameters (pH, temperature, and electroconductivity). The sample was collected through a length of new, clean, PVC tubing inserted into the access port in the well head. An initial water sample was withdrawn through the tubing using a peristaltic pump and the field parameters were measured and recorded. Then a nearby tap connected to the well was opened and allowed to run until the well pump had cycled on and off one time. A second groundwater sample was then

collected from the well using the peristaltic sampling pump for measurement of field parameters. This procedure was repeated until field parameters had stabilized to within ten percent of the previous set of measurements. In general, field parameters stabilized after collecting three sets of parameter measurements.

Domestic Wells with No Access Through the Well Head. The well heads for OSW-4, OSW-6, and OSW-7 are buried and not currently accessible. The Wilbur-Ellis well can no longer be sampled through the well head because the access port is blocked by a piece of PVC sample tubing that was broken off inside the well during a previous sampling attempt. The "purging" procedures used for the inaccessible wells is described below.

An outside tap was opened and the water was allowed to run for about one minute to clear the lines. A sample was collected from the tap for measurements of field parameters. The tap was then allowed to run for another four minutes before collecting another sample for the measurement of field parameters. This procedure was repeated until three or four sets of field parameter measurements were taken. Generally, field parameters had stabilized to within ten percent of the previous measurements after performing the "purging" process three or four times.

Groundwater Sample Collection

Monitoring Wells MW-1 through MW-8. Groundwater samples were obtained using the same stainless steel bailer used to purge the well. If the well was purged dry, it was allowed to recover to at least 80 percent of its original volume before sampling was accomplished.

Domestic Wells with Access Through the Well Head. Following completion of purging procedures as described above, the groundwater sample was withdrawn directly from the well into the sample container using the peristaltic pump.

Domestic Wells with No Access Through the Well Head. Following completion of "purging" procedures as described above, the groundwater sample was collected directly from the tap.

Sample Storage and Shipment

Sample containers were provided by the laboratory ready for sample collection, including the required sulfuric acid preservative. The samples of groundwater were placed in an ice chest cooled to a temperature of 4° C for transport to the

analytical laboratory under chain of custody. Samples were delivered to the laboratory within 24 hours of collection.

Field Parameter Measurements

Electrical conductivity, temperature, and pH were measured periodically during the purging procedure as described above. Field parameters were measured in one-liter sample aliquots to reduce the potential for interference from aboveground ambient conditions. Results of these measurements were included in our field notes.

The field parameters were measured using the following equipment:

- Oakton pocket temperature probe;
- Oakton pocket conductivity/TDS testers (one probe each for 10 to 1990 mS and 100 to 19900 mS ranges); and
- Oakton pocket pH meter.

A portion of the groundwater sample was placed in a one-liter container. Each probe was placed in the water sample and was left long enough to obtain a stable reading.

Any peculiarities observed in the measurements, such as unusual drifting of readings, were noted in our field notes and measurements were repeated.

Decontamination Procedures

This section describes the decontamination procedures used on sampling equipment before it was taken to the site and between sampling locations. Sampling equipment requiring decontamination included only the stainless steel bailer. The bailer rope was replaced with new, clean rope after each sampling. All tubing used for the peristaltic pump was discarded after each sampling and replaced with clean, unused tubing.

The stainless steel bailer was cleaned before field use and between each sample collection according to the following procedures:

1. Detergent and tap water wash.
2. Tap water rinse.
3. Distilled-deionized water rinse.

All water generated from the decontamination procedures was disposed of in the fertilizer facilities runoff collection system.

Quality Assurance/Quality Control

Field QA/QC. QA/QC was practiced throughout field activities. As discussed above, sampling equipment was disposable or decontaminated between each sampling event. The PVC rope used on the bailer was replaced between each purging or sampling event to minimize cross-contamination. All laboratory containers were marked with identifying information to prevent sample mix-up. Chain of custody was maintained and documented at all times.

We collected one duplicate groundwater sample (MW-9) from monitoring well MW-3 for analysis. This sample served as a check on laboratory quality as well as the potential variability of the sample matrix. The nitrate concentration in MW-3 was 177 mg/L compared with 177 mg/L in its duplicate (MW-9).

We collected one rinsate sample ("Rinse") by collecting deionized water after running it through a stainless steel bailer. The rinsate sample serves to check for the possibility of sample contamination due to inadequate decontamination of sampling equipment. Nitrate was not detected in the rinsate sample.

Laboratory QA/QC. Additional QA/QC checks were conducted by the analytical laboratory. These included analysis of method blanks, laboratory control samples, laboratory duplicates, and matrix spikes/matrix spike duplicates. Acceptability or control limits for analyses were statistically derived by the laboratory in accordance with EPA guidelines. In reviewing the QA/QC information, we found the chemical data suitable for our intended purpose.

A laboratory, or method blank, is a sample prepared in the laboratory along with the actual samples and analyzed for the same parameters at the same time. It is used to assess if detected contaminants may have been the result of contamination of the samples in the laboratory. We reviewed the method blank results in the laboratory reports and found no target compounds detected at the reporting limits noted on the data sheets.

In a laboratory control sample, a known concentration of the constituent of interest is measured. The analysis assesses the accuracy of a chemical measurement by comparing the measured value to the actual value. We reviewed the QA/QC data in the attached laboratory report and found the laboratory control sample recovery to be within the established control limits.

In a separate analysis, a laboratory duplicate is prepared by splitting a sample from one of the field samples and analyzed for the constituent of interest. This is compared to the field sample to assess the precision of the analytical method. This comparison is normally expressed by the relative percent difference (RPD) between the field sample and the laboratory duplicate. We reviewed the laboratory duplicate and RPD results in the laboratory report and found the recoveries and RPDs to be within the established QC limits.

In a matrix spike analysis, a sample is spiked with known levels of the constituents of interest. These analyses are used to assess the potential for matrix interference with recovery or detection of the constituents of interest and the accuracy of the determination. The spiked sample results are compared to the expected result (i.e., sample concentration plus spike amount) and reported as percent recovery. The percent recovery for the matrix spike analysis was within reporting limits.

In addition, a second matrix spike sample (a.k.a. the matrix spike duplicate) is prepared as above and analyzed. This is compared to the initial matrix spike to assess the precision of the analytical method (i.e., RPD). The percent recovery and RPD for the matrix spike duplicate were within reporting limits.

ATTACHMENT B
LABORATORY ANALYSES TEST DECUMENTATION

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Hart Crowser	Project:	SHEDD, OR	Sampled: 10/21/99 to 10/22/99
Five Centerpointe Drive	Project Number:	S144-03	Received: 10/22/99
Lake Oswego, OR 97035	Project Manager:	Greg Kupillas	Reported: 11/3/99 23:22

ANALYTICAL REPORT FOR SAMPLES:

Sample Description	Laboratory Sample Number	Sample Matrix	Date Sampled
MW-1	P910446-01	Water	10/21/99
MW-2	P910446-02	Water	10/21/99
MW-3	P910446-03	Water	10/21/99
MW-4	P910446-04	Water	10/21/99
MW-5	P910446-05	Water	10/21/99
MW-6	P910446-06	Water	10/21/99
MW-7	P910446-07	Water	10/21/99
MW-8	P910446-08	Water	10/21/99
MW-9	P910446-09	Water	10/21/99
OSW-1	P910446-10	Water	10/22/99
OSW-2	P910446-11	Water	10/22/99
OSW-3	P910446-12	Water	10/22/99
OSW-4	P910446-13	Water	10/22/99
OSW-6	P910446-14	Water	10/22/99
OSW-7	P910446-15	Water	10/22/99
OSW-8	P910446-16	Water	10/22/99
WILLAMETTE SEED	P910446-17	Water	10/22/99
RINSE	P910446-18	Water	10/21/99

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Hart Crowser	Project:	SHEDD, OR	Sampled: 10/21/99 to 10/22/99
Five Centerpointe Drive	Project Number:	S144-03	Received: 10/22/99
Lake Oswego, OR 97035	Project Manager:	Greg Kupillas	Reported: 11/3/99 23:22

Anions per EPA Method 300.0
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
MW-1			**P910446-01**				**Water**	
Nitrate-Nitrogen	1090672	10/22/99	10/22/99	EPA 300.0	10.0	**81.7**	mg/l	
MW-2			**P910446-02**				**Water**	
Nitrate-Nitrogen	1090672	10/22/99	10/22/99	EPA 300.0	10.0	**72.8**	mg/l	
MW-3			**P910446-03**				**Water**	
Nitrate-Nitrogen	1090672	10/22/99	10/22/99	EPA 300.0	10.0	**177**	mg/l	
MW-4			**P910446-04**				**Water**	
Nitrate-Nitrogen	1090672	10/22/99	10/22/99	EPA 300.0	10.0	**118**	mg/l	
MW-5			**P910446-05**				**Water**	
Nitrate-Nitrogen	1090672	10/22/99	10/22/99	EPA 300.0	10.0	**96.4**	mg/l	
MW-6			**P910446-06**				**Water**	
Nitrate-Nitrogen	1090672	10/22/99	10/22/99	EPA 300.0	10.0	**118**	mg/l	
MW-7			**P910446-07**				**Water**	
Nitrate-Nitrogen	1090672	10/22/99	10/22/99	EPA 300.0	1.00	**28.6**	mg/l	
MW-8			**P910446-08**				**Water**	
Nitrate-Nitrogen	1090672	10/22/99	10/22/99	EPA 300.0	10.0	**144**	mg/l	
MW-9			**P910446-09**				**Water**	
Nitrate-Nitrogen	1090672	10/22/99	10/22/99	EPA 300.0	10.0	**177**	mg/l	
OSW-1			**P910446-10**				**Water**	
Nitrate-Nitrogen	1090672	10/22/99	10/23/99	EPA 300.0	0.100	**0.463**	mg/l	
OSW-2			**P910446-11**				**Water**	
Nitrate-Nitrogen	1090672	10/22/99	10/23/99	EPA 300.0	0.100	**0.960**	mg/l	
OSW-3			**P910446-12**				**Water**	
Nitrate-Nitrogen	1090672	10/22/99	10/23/99	EPA 300.0	0.100	**3.44**	mg/l	
OSW-4			**P910446-13**				**Water**	
Nitrate-Nitrogen	1090672	10/22/99	10/23/99	EPA 300.0	0.100	**1.62**	mg/l	

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**Refer to end of report for text of notes and definitions.*

Philip Nerenberg, Laboratory Manager

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Hart Crowser	Project:	SHEDD, OR	Sampled:	10/21/99 to 10/22/99
Five Centerpointe Drive	Project Number:	S144-03	Received:	10/22/99
Lake Oswego, OR 97035	Project Manager:	Greg Kupillas	Reported:	11/3/99 23:22

Anions per EPA Method 300.0
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
OSW-6			**P910446-14**				**Water**	
Nitrate-Nitrogen	1090672	10/22/99	10/23/99	EPA 300.0	1.00	**5.60**	mg/l	
OSW-7			**P910446-15**				**Water**	
Nitrate-Nitrogen	1090672	10/22/99	10/23/99	EPA 300.0	1.00	**9.59**	mg/l	
OSW-8			**P910446-16**				**Water**	
Nitrate-Nitrogen	1090672	10/22/99	10/23/99	EPA 300.0	0.100	**1.54**	mg/l	
WILLAMETTE SEED			**P910446-17**				**Water**	
Nitrate-Nitrogen	1090672	10/22/99	10/23/99	EPA 300.0	10.0	**53.1**	mg/l	
RINSE			**P910446-18**				**Water**	
Nitrate-Nitrogen	1090672	10/22/99	10/23/99	EPA 300.0	0.100	ND	mg/l	

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Hart Crowser	Project:	SHEDD, OR	Sampled: 10/21/99 to 10/22/99
Five Centerpointe Drive	Project Number:	S144-03	Received: 10/22/99
Lake Oswego, OR 97035	Project Manager:	Greg Kupillas	Reported: 11/3/99 23:22

Anions per EPA Method 300.0/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 1090672	**Date Prepared: 10/22/99**					**Extraction Method: Wet Chem**				
Blank	**1090672-BLK1**									
Nitrate-Nitrogen	10/22/99			**ND**	mg/l	**0.100**				
LCS	**1090672-BS1**									
Nitrate-Nitrogen	10/22/99	0.452		0.444	mg/l	85.0-115	98.2			
Duplicate	**1090672-DUP1**		**P910446-15**							
Nitrate-Nitrogen	10/23/99		9.59	9.68	mg/l			20.0	**0.934**	
Matrix Spike	**1090672-MS1**		**P910446-15**							
Nitrate-Nitrogen	10/23/99	2.22	9.59	11.8	mg/l	75.0-125	**99.5**			
Matrix Spike Dup	**1090672-MSD1**		**P910446-15**							
Nitrate-Nitrogen	10/23/99	2.22	9.59	11.8	mg/l	75.0-125	**99.5**	40.0	**0**	

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Hart Crowser	Project:	SHEDD, OR	Sampled:	10/21/99 to 10/22/99
Five Centerpointe Drive	Project Number:	S144-03	Received:	10/22/99
Lake Oswego, OR 97035	Project Manager:	Greg Kupillas	Reported:	11/3/99 23:22

Notes and Definitions

#	Note
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
Recov.	Recovery
RPD	Relative Percent Difference

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Philip Nerenberg, Laboratory Manager

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CHAIN OF CUSTODY REPORT

Work Order #: 910446

CLIENT: HART CROWSER
REPORT TO: GREG KUFFNER
ADDRESS: PINE CORPORATE DRIVE SUITE 240 LAKE OSWEGO OR 97035
PHONE: 503-620-7284 FAX: 503-620-6918

INVOICE TO:

P.O. NUMBER:

PROJECT NAME: SHEDD, OR
PROJECT NUMBER: J-5144-03
SAMPLED BY: JOANN HAMILTON

TURNAROUND REQUEST in Business Days*

Organic & Inorganic Analyses: 10 | 7 | 5 | 4 | 3 | 2 | 1 | <1

Petroleum Hydrocarbon Analyses (STD.): 5 | 4 | 3 | 2 | 1 | <1

OTHER: STANDARD

*Turnaround Requests less than standard may incur Rush Charges.

REQUESTED ANALYSES

	CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	300 NITRATE	300 NITRITE	MATRIX (W, S, O)	# OF CONT.	COMMENTS	NCD ID
1.	MW-1	10-21-99 / 1148	X	X	W	1		
2.	MW-2	1003						
3.	MW-3	1234						
4.	MW-4	1045						
5.	MW-5	1133						
6.	MW-6	922						
7.	MW-7	1032						
8.	MW-8	1221						
9.	MW-9	1234						
10.	OSW-1	10-22-99 1119						
11.	OSW-2	1048						
12.	OSW-3	931						
13.	OSW-4	1136						
14.	OSW-6	1151						
15.	OSW-7	840						

RELINQUISHED BY: Joann Hamilton — DATE: 10-22-99
PRINT NAME: JOANN HAMILTON — FIRM: HART CROWSER — TIME: 1452

RECEIVED BY: Bob Fahsholz — DATE: 10/22
PRINT NAME: Bob Fahsholz — FIRM: NCA — TIME: 1452

RELINQUISHED BY: — DATE:
PRINT NAME: — FIRM: — TIME:

RECEIVED BY: — DATE:
PRINT NAME: — FIRM: — TIME:

ADDITIONAL REMARKS:

TEMP:

COC REV 3/99

PAGE 1 OF 2

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CHAIN OF CUSTODY REPORT

Work Order #: P910446

CLIENT: HART CROWSER

REPORT TO: GREG KYPRIOS

ADDRESS: FIVE CENTER POINTE DR SUITE 240
LAKE OSWEGO OR 97035

PHONE: 503-620-7284 FAX: 503 620 6918

INVOICE TO:

P.O. NUMBER:

PROJECT NAME: SHEDD, OR

PROJECT NUMBER: 5-[redacted]5144-03

SAMPLED BY: DOANN HAMILTON

TURNAROUND REQUEST in Business Days*

Organic & Inorganic Analyses: 10 | 7 | 5 | 4 | 3 | 2 | 1 | <1

STD. Petroleum Hydrocarbon Analyses: 5 | 4 | 3 | 2 | 1 | <1

STD. OTHER Please Specify STANDARD

*Turnaround Requests less than standard may incur Rush Charges.

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	300 NITRATE	300 NITRITE	MATRIX (W, S, O)	# OF CONT.	COMMENTS	NCA LAB ID
1. OSW-8	10-22-99 / 1000	X	X	W	1		
2. WELLHEAD SPRD	10-22-99 / 1207	〃	〃	〃	〃		
3. RINSE	10-21-99 / 1254	〃	〃	〃	〃	—	
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							
14.							
15.							

REQUESTED ANALYSES

RELINQUISHED BY: Doan Hamil DATE: 10-22-99
PRINT NAME: DOANN HAMILTON FIRM: HART CROWSER TIME: 1452

RECEIVED BY: Bob Fahsbolz DATE: 10/22
PRINT NAME: Bob Fahsbolz FIRM: NCA TIME: 1452

RELINQUISHED BY: DATE:
PRINT NAME: FIRM: TIME:

RECEIVED BY: DATE:
PRINT NAME: FIRM: TIME:

ADDITIONAL REMARKS:

TEMP:

COC REV 3/99