
Baltimore Inner Harbor Environmental Media Monitoring Plan Quarterly Report No. 93 Fourth Quarter 2012

Prepared for
Honeywell International Inc.

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CH2MHILL®

15010 Conference Center Drive Suite 200
Chantilly, VA 20151

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Acronyms and Abbreviations

EMMP	Environmental Media Monitoring Plan
EPA	U.S. Environmental Protection Agency
MDE	Maryland Department of the Environment
MES	Maryland Environmental Services
ppb	parts per billion
Site	Honeywell Baltimore Inner Harbor Site
SSMP	Surface Soil Monitoring Plan

Introduction

1.1 Purpose

This document represents the partial fulfillment of the Consent Decree entered into by Honeywell (formerly AlliedSignal, Inc.), the U.S. Environmental Protection Agency (EPA), and the Maryland Department of the Environment (MDE) on September 29, 1989. Specifically, this document satisfies Section V.3 of the Consent Decree, Exhibit 4 (RCRA Correction Action Plan Task XV.A.9). This section requires that a progress report be submitted every calendar quarter during the life of the Consent Decree. This report provides the data required by the Environmental Media Monitoring Program, as set forth in the Environmental Media Monitoring Plan (EMMP) and the Surface Soil Monitoring Plan (SSMP), as submitted to MDE and EPA.

This report summarizes the data collected during the fourth quarter of 2012.

1.2 Scope of Work

The scope of work outlined in the EMMP covers sampling and analysis of environmental media before, during, and after dismantlement of the former plant, and the completion of the corrective measures implementation activities at the Honeywell Baltimore Inner Harbor Site (Site). The environmental media sampled as part of the EMMP are air, surface water, groundwater, and sediment.

The scope of work outlined in the SSMP covers sampling and analysis of environmental media after completion of Corrective Measures Implementation activities at the Site. The only environmental medium sampled as part of the SSMP is the drainage layer effluent.

Media are sampled on varying frequencies as required by the EMMP and the SSMP (quarterly, twice annually, annually, and every 3 years). Only data for the media sampled during each quarter are reported in the associated quarterly report.

1.3 Sampling Conducted this Quarter

Surface water samples were collected during the fourth quarter 2012, as well as during the third quarter of 2012. Appendix A provides data associated with sampling during the third quarter; results for the fourth quarter will be provided in the first quarter 2013 report. The surface water sample results for the third quarter 2012 were validated by Critigen, and the validation report for this event is provided in Appendix C. All data quality objectives were met for surface water samples collected during the third quarter of 2012.

1.4 Progress Report Organization

Progress reports prepared in accordance with the Consent Decree are organized by medium. The media section included in this document provides a summary of methodology, the current quarter's sampling plan, and a summary of results. Also provided in the medium section are a discussion of the sampling event; explanations for any deviations from the EMMP or SSMP procedures; data summaries; and discussion of the data, quality control results, and pertinent data trends. Raw data and chain-of-custody records are provided in Appendix A.

This progress report describes the surface water monitoring performed during fourth quarter of 2012. Drainage-layer effluent, sediment, and air monitoring were not performed during the quarter.

Surface Water Monitoring

2.1 Methodology

The surface water monitoring program provides information about surface water quality around the perimeter of the Site, at 18 predetermined stations, and at 2 stations upstream from the Site. Samples are collected at each station during each quarter and analyzed for total dissolved chromium.

Sampling is conducted within 1 hour of low tide and close to the predetermined sampling locations. The pH, temperature, specific conductance, and depth to the river bottom are measured before each sample is collected. A decontaminated Kemmerer sampler is used to collect the samples, which are placed in 500-milliliter plastic bottles. Two samples are collected—the first 1 foot below the water surface and the second 1 foot above the river bottom—at all locations except Station 20, where the water depth may be at or below 1 foot. When this is the case, only one sample is collected at Station 20. A mid-depth sample is required from sampling locations where the depth is more than 10 feet. The lateral placement of each sample location is about 5 feet from the bulkhead/shoreline. Laboratory sampling personnel record measurements and observations on sampling sheets, which are presented in Appendix A.

Surface water sample containers are placed on ice as soon as samples are collected. Field duplicate samples, field blanks, and rinsate blanks are also collected. At the end of the sample round, the samples are filtered and preserved. The samples are then transferred to the laboratory using documented chain-of-custody procedures and a dedicated courier. The samples are analyzed for total dissolved chromium using EPA SW-846 Method 6010B.

The results received from the laboratory are entered into a database in which data for each month are tabulated. When duplicate samples for a given station are taken, the average of the concentrations is used for that station. The analytical results, chain-of-custody documentation, and field sampling reports are presented in Appendix A.

2.2 Current Quarter Results

Surface water sampling for the third and fourth quarters of 2012 was performed by Maryland Environmental Services (MES) at all 20 sampling locations on August 27, 2012, and during the surface water sampling event on October 9, 2012, respectively. The surface water sampling locations are shown on Figure 2-1 (at the end of this section). Results for the surface water samples collected on August 27, 2012, are included in this report. Results of the analysis of the surface water samples collected on October 9, 2012, will be reported in first quarter 2013 report (April 10, 2013). All of the collected samples were transported to Lancaster Laboratories in Lancaster, Pennsylvania, for total dissolved chromium analysis. Summaries of the surface water data and average concentrations for August 2012, including individual sample detection limits and validated data qualifiers, are presented in Table 2-1.

2.3 Data Review

The surface water monitoring program is intended to provide information on surface water quality in the immediate vicinity of the waterside perimeter of the Site. This information is used to assess the performance of the corrective measures.

The Consent Decree, Section V, Part 12, establishes the Surface Water Performance Standard: “The surface water performance standard [...] for total chromium shall be 50 parts per billion (ppb), calculated for each sample location by arithmetically averaging the samples taken at all depths over 4 consecutive days.” In October 2002, the sample frequency was amended to be 1 day of sampling at each sampling location per quarter.

In addition, the EMMP states that Honeywell will review analytical data for results greater than 11-ppb of dissolved hexavalent chromium. The 11-ppb reporting level is based on the following:

- Code of Maryland Regulation 26.08.02.03-1B, which states that the numerical toxic substance criteria for freshwater shall be applied to the surface water near the Site

- National Recommended Water Quality Criteria Correction EPA 822-Z-99-001 (April 1999), which states that the chronic exposure level for dissolved hexavalent chromium in freshwater is 11 ppb

Total dissolved chromium concentrations in surface water reported for fourth quarter 2012 (third quarter 2012 results) are similar to the analytical values reported in third quarter 2012 (second quarter 2012 results). The percentages of actual or average surface water results meeting specific criteria (performance standard, chronic freshwater exposure, and detection limit) are listed in Table 2-1. Results of analyses for total dissolved chromium from each sampling location and each depth are presented in Table 2-2. The average analytical result from each sampling location is presented in Table 2-3.

Table 2-1**Percent of Average or Actual Surface Water Results Below Specific Criteria**

Sample Event	<u>Performance Standard</u> Actual Concentration < 50 ppb	<u>Fresh Water Chronic Exposure Level</u> Actual Concentration <11 ppb	Analytical Detection Limit† Actual Concentration <10 ppb	Method Detection Limit† Actual Concentration <1.1 ppb
August	100%	100%	100%	46%

† The Analytical Detection Limit as determined by the Laboratory QC is ppb

Table 2-2
Surface Water Sampling Data per Location
August 2012

Station Number	Detection Limit	Total Dissolved Chromium (mg/L)
		8/27/2012
3B	0.01	0.0028 J
3T	0.01	0.002 J
4B	0.01	0.0016 J
4T	0.01	0.0017 J *
5B	0.01	0.005 U
5T	0.01	0.0015 J
6B	0.01	0.0018 J
6T	0.01	0.0017 J
7B	0.01	0.0016 J
7T	0.01	0.0016 J
8B	0.01	0.005 U
8T	0.01	0.005 U
9B	0.01	0.005 U *
9T	0.01	0.005 U
10B	0.01	0.005 U
10T	0.01	0.005 U
11B	0.01	0.005 U
11T	0.01	0.005 U
12B	0.01	0.005 U
12T	0.01	0.005 U
13B	0.01	0.0016 J
13T	0.01	0.0012 J
14B	0.01	0.0016 J
14T	0.01	0.00135 J *
15B	0.01	0.005 U
15T	0.01	0.0012 J
16B	0.01	0.002 J
16T	0.01	0.005 U
17B	0.01	0.005 U
17T	0.01	0.005 U
18B	0.01	0.0015 J
18M	0.01	0.005 U *
18T	0.01	0.005 U
19B	0.01	0.0017 J
19T	0.01	0.0017 J
20B	0.01	0.005 U
20T	0.01	0.005 U
Cent B	0.01	0.0014 J
Cent T	0.01	0.0025 J
LADY B	0.01	0.0021 J
LADY T	0.01	0.0029

NOTES

T - Sample collected 1 foot below the surface (TOP)

M - Sample collected from the measured middle of the TOP and BOTTOM measurements (MIDDLE)

B - Sample collected 1 foot from the bottom (BOTTOM)

* - Average of the sample and its Field Duplicate

J - Results was reported below the Report Dectection Limit

U - Result below the Method Detection Limit

Table 2-3
 Surface Water Sampling Data per Sampling Station
 August 2012

Station Number	Total Dissolved Chromium (mg/L)
	8/27/2012 Station Average of All Depths
3	< 0.0024
4	< 0.00165
5	0.0033
6	< 0.00175
7	< 0.0016
8	0.0050
9	0.0050
10	0.0050
11	0.0050
12	0.0050
13	< 0.0014
14	< 0.001475
15	0.0031
16	0.003
17	0.0050
18	0.0033
19	< 0.0017
20	0.0050
Cent	< 0.00195
Lady	< 0.0025

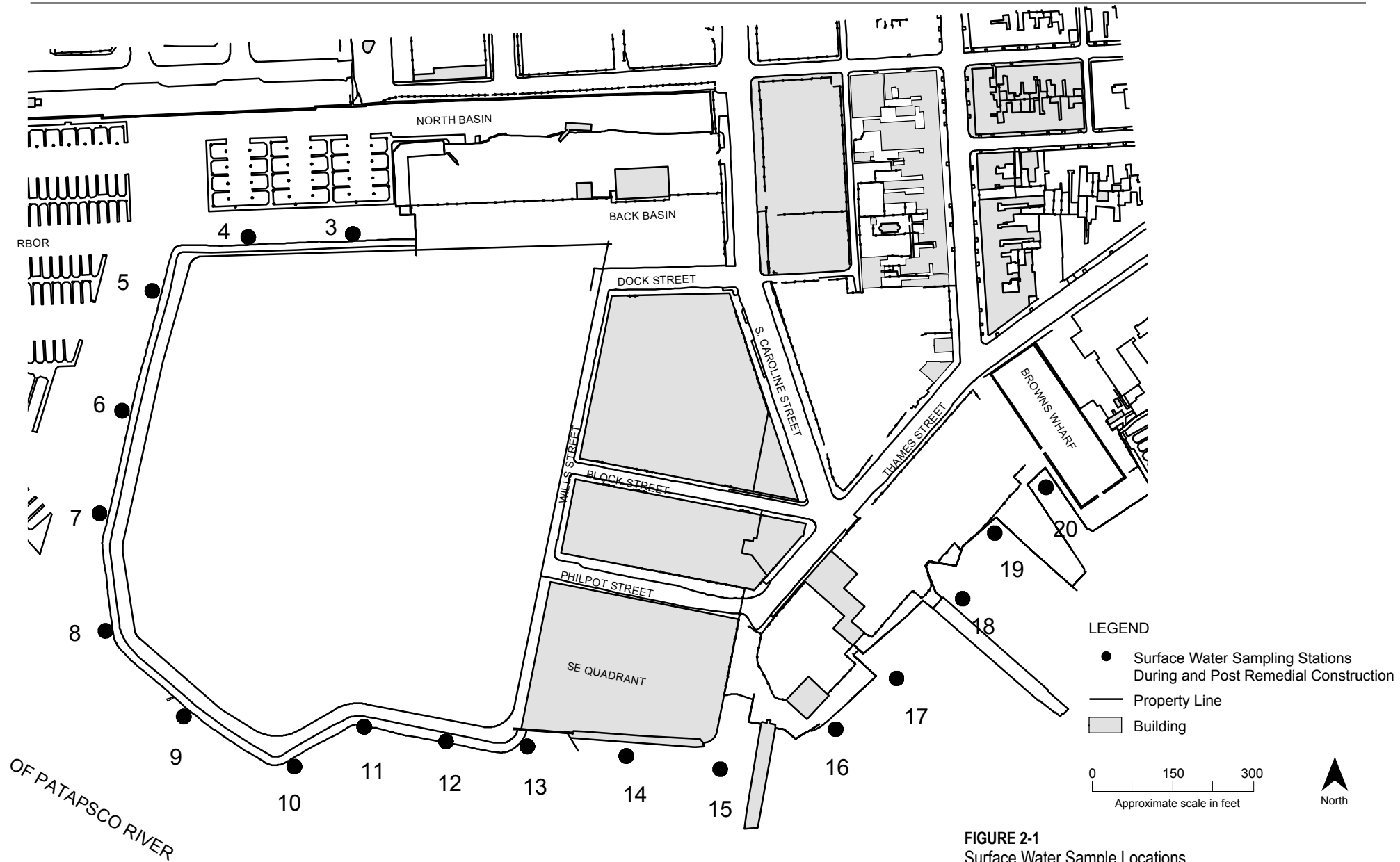


FIGURE 2-1
 Surface Water Sample Locations
 Environmental Media Monitoring

Groundwater Monitoring

3.1 Methodology

The Consent Decree required monthly groundwater monitoring for the first 2 years following completion of remedial construction at nine locations around the perimeter of the site and in three locations (OP-2, OP-11, and NWM-27) in offsite areas. Four of the perimeter locations (SW-06, SW-11, SW-13, and SW-15) are monitored by collecting surface water samples within 1 foot of the bottom, as described in Section 2.1. The other five perimeter locations (OP-3, OP-4, OP-5, OP-7, and OP-9) are monitored by collecting groundwater samples from onsite piezometers. The three offsite locations are monitored by collecting one sample from a conventional monitoring well (NWM-27) and one sample each from two piezometers (OP-2 and OP-11). All monitoring locations are shown in Figure 3-1.

As of January 2002, the groundwater-monitoring frequency was reduced from monthly to twice per year, as described in Sections 1.2.3 and 5.2.3 of the Honeywell Baltimore Works Environmental Media Monitoring Plan, which was approved by EPA and MDE.

Before the monitoring well and piezometers are purged and sampled, measurements of depth to water are recorded on a sampling summary sheet. All designated monitoring wells/piezometers are sampled in accordance with the low-flow sampling procedures detailed in the following documents:

- “Low-Flow (Minimal Drawdown) Groundwater Sampling Procedures” (EPA/540/S-95/504), April 1996, by Robert W. Puls and Michael J. Barcelona
- “Recommended Procedures for Low-Flow Purging and Sampling of Groundwater Monitoring Wells” (Bulletin No. QAD023), August 8, 1994, by EPA Region III

During purging and before sample collection, field measurements—including conductivity, pH, temperature, reduction oxidation potential, dissolved oxygen, and turbidity—are measured until the well stabilizes. The sampling time is recorded. The collected samples are filtered, preserved, placed on ice, and then transferred to the laboratory according to chain-of-custody procedures. The samples are analyzed for total dissolved chromium by the laboratory using EPA SW-846 Method 6010B. Two of the samples (OP-3 and OP-2) are also analyzed for total dissolved cyanide using EPA SW-846 Method 9014. Field blanks, temperature blanks, and rinsate blanks are also collected and analyzed for the same parameters.

Results received from the laboratory are entered into a database. Data for each month, quarter, and year are tabulated, averaged, and compared to previous results.

3.2 Current Quarter Results

Groundwater samples were taken on October 3, 2012. MES performed all sample collection, and Lancaster Laboratories performed the sample analysis. Duplicate samples for chromium were taken during the sampling on October 3, but duplicate samples for cyanide were not collected. A cyanide sample and duplicate for cyanide were collected on October 15, 2012, and submitted to the same laboratory and in the same manner as the cyanide samples collected on October 3, 2012.

3.2.1 Chromium

Total dissolved chromium was detected in all of the groundwater samples collected from piezometers and monitoring wells. There was no significant difference in chromium concentrations between the fourth quarter 2012 monitoring data and the total dissolved chromium concentrations detected at each respective sampling station during monitoring performed over the last 5 years. Sample results for OP-4 were more similar to the historical results than the results from the second quarter of 2012. The analytical data report is attached as Appendix B-3.

Bottom surface water samples collected along the site perimeter from locations proximal to historical groundwater sampling well locations, as described in Section 3.1 of this report, had total dissolved chromium levels below the analytical method detection limit.

3.2.2 Cyanide

Total dissolved cyanide concentrations were within expected variations, based on a review of the historical concentrations. The analytical data report is provided in Appendix B-3.

3.3 Historical Results

3.3.1 Chromium

The fourth quarter 2012 results from groundwater sampling, averaged to represent two sampling events per year for data comparison for each groundwater monitoring location, are presented in Table 3-1. A statistical review of the analytical data, including the minimum, maximum, average, and standard deviations values for each well location, is presented in Table 3-2. Validated analytical groundwater monitoring results with data qualifiers from the fourth quarter of 2012, including annual averages for data collected during the last 5 years, are presented in Table 3-3.

The historical total dissolved chromium concentrations in groundwater for each monitoring location are shown in Figure 3-2. Trends for total dissolved chromium concentrations for each groundwater monitoring location are depicted in Figures 3-3 through 3-9. The historical data in these figures were averaged to allow current data to be compared to past sample rounds. Current groundwater results are in line with the trends anticipated from the past sample analysis concentration.

3.3.2 Cyanide

Groundwater samples were collected from two locations (OP-2 and OP-3) for cyanide analysis. The historical trend of cyanide levels is presented in Table 3-4. The concentrations of cyanide detected in samples collected from each location are presented in Figures 3-10 and 3-11, respectively.

Table 3-1
Total Dissolved Chromium Concentrations in Groundwater (mg/l+)

Monitoring Wells	Elevation (ft) Top of Well Screen	Current Results mg/l	Sample Detection Limit mg/l	Sample Event Dates							
				Oct, 2012	Apr, 2012	Oct, 2011	Jun, 2011	Apr, 2010	Oct, 2009	Apr, 2009	Oct, 2008
<u>Outboard Piezometers</u>		Oct, 2012		Oct, 2012	Apr, 2012	Oct, 2011	Jun, 2011	Apr, 2010	Oct, 2009	Apr, 2009	Oct, 2008
11B		0.0011	0.01	0.0011	0.001	0.0011	0.003	0.003	0.003	0.003	0.003
13B		0.0011	0.01	0.0011	0.002	0.0011	0.003	0.003	0.003	0.003	0.003
15B		0.0011	0.01	0.0011	0.001	0.0014	0.003	0.0034	0.003	0.003	0.003
6B		0.0011	0.01	0.0011	0.001	0.0011	0.003	0.003	0.004	0.003	0.003
NWM-27	32.68	1910	2	1910	2150	2310	1910	1840	1950	2240	174
OP11	44.47	0.751	0.01	0.751	0.507	0.210	0.390	0.470	0.201	0.368	0.192
OP2	64.31	5.14	0.01	5.14	5.20	5.82	5.79	6.31	6.36	6.05	7.12
OP3	68.53	140	0.1	140	126	142	144	146	153	165	6
OP4	69.14	323	0.2	323	17	457	504	503	533	548	616
OP5	60.7	2.96	0.01	2.96	1.89	2.84	4.61	5.03	6.52	5.36	7.720
OP7	55.42	0.002	0.01	0.002	0.012	0.010	0.005	0.006	0.005	0.003	0.004
OP9	47.13	1870	2	1870	1950	2110	2200	2040	2150	2070	5020

<u>Outboard Piezometers</u>	Apr, 2008	Oct, 2007	Apr, 2007	Oct, 2006	Apr, 2006	Oct, 2005	Apr, 2005	Oct, 2004	Apr, 2004	Oct, 2003	Apr, 2003
11B	0.002	0.0023	0.015	0.015	0.015	0.015	0.015	0.005	0.010	0.005	0.005
13B	0.002	0.0023	0.015	0.015	0.015	0.015	0.015	0.005	0.010	0.005	0.005
15B		0.0023	0.015	0.015	0.015	0.015	0.015			0.005	0.005
6B	0.003	0.004	0.015	0.015	0.015	0.015	0.015	0.005	0.010	0.005	0.005
NWM-27	2130	699	1690	710	1540	1010	874	744	422	603	603
OP11	0.483	0.033	0.122	0.015	0.235	0.182	0.026	0.017	0.080	0.005	0.005
OP2	5.77	7.34	6.33	6.39	6.20	6.32	6.08	5.98	5.75	6.16	6.00
OP3	189	166	202	199	219	286	288	297	309	342	342
OP4	601	526	684	584	812	1020	1100	1150	1260	1290	1210
OP5	7.660	8.05	7.8	.8	.3	8.7	11.5	11.9	11.9	13.3	15.4
OP7	0.005	0.002	0.015	0.015	0.015	0.015	0.005	0.005	0.010	0.004	0.006
OP9	4800	3020	3170	3050	2790	2810	2680	2780	2510	2480	2510

**Table 3-1
Total Dissolved Chromium Concentrations in Groundwater (mg/l+)**

<u>Outboard Piezometers</u>	Oct, 2002	Apr, 2002	Jan, 2002	Dec, 2001	Nov, 2001	Oct, 2001	Sep, 2001	Aug, 2001	Jul, 2001	Jun, 2001	May, 2001
11B	0.005	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.010	0.010
13B	0.005	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.010	0.010
15B	0.005	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.010	0.010
6B	0.005	0.008	0.009	0.008	0.008	0.008	0.008	0.008	0.008	0.010	0.010
NWM-27	550	930	1100	690	1300	830	1000	1500	1300	1600	1700
OP11	0.017	0.009	0.029	0.033	0.026	0.032	0.049	0.034	0.032	0.042	0.031
OP2	5.63	4.90	5.50	5.60	4.90	6.20	6.50	5.80	4.80	5.80	6.00
OP3	378	440	440	440	480	570	420	410	450	420	430
OP4	1620	1800	1400	1700	2000	1700	1800	1800	1800	1900	1800
OP5	16.9	21.0	19.5	18.5	20.0	20.5	21.0	17.5	23.5	23.0	23.0
OP7	0.005	0.008	0.008	0.008	0.008	0.012	0.008	0.008	0.008	0.010	0.010
OP9	2410	2500	2200	2500	2650	2500	2600	2400	2500	2500	2400

<u>Outboard Piezometers</u>	Apr, 2001	Mar, 2001	Feb, 2001	Jan, 2001	Dec, 2000	Nov, 2000	Oct, 2000	Sep, 2000	Aug, 2000	Jul, 2000	Jun, 2000
11B	0.010	0.011	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
13B	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
15B	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
6B	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
NWM-27	1300	1500	1600	1600	1600	1700	1700	1800	1700	1600	1700
OP11	0.010	0.050	0.014	0.012	0.015	0.022	0.011	0.010	0.011	0.010	0.010
OP2	5.75	4.90	6.20	6.10	6.00	5.90	6.10	5.85	5.90	3.15	3.60
OP3	460	470	450	470	480	500	490	500	510	530	540
OP4	1900	1900	2000	2000	2100	2100	2400	2250	2400	2400	2400
OP5	24.0	25.0	25.5	26.0	25.0	26.0	28.0	25.0	24.0	18.0	34.0
OP7	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.013	0.010	0.012	0.041
OP9	2400	2400	2300	2600	2500	2400	2700	2500	2500	2400	2400

**Table 3-1
Total Dissolved Chromium Concentrations in Groundwater (mg/l+)**

<u>Outboard Piezometers</u>	May, 2000	Apr, 2000	Mar, 2000	Feb, 2000	Dec, 1999	Aug, 1999	May, 1999	Mar, 1999	Dec, 1998	Sep, 1998	Jun, 1998
11B	0.01	0.01	0.01	0.002							
13B	0.01	0.010125	0.0105	0.002							
15B	0.01	0.01	0.01	0.002							
6B	0.01	0.01	0.01	0.002							
NWM-27	1700	1800	3600	2600	1800	2300	1900	1400	1000		
OP11	0.01	0.01	0.004	0.047	0.020	0.010	0.010	.03	0.01	2.7	
OP2	3.7	5.4	8.00	4.40	7.30	6.50	1.80	2.40	2.8	4.6	
OP3	580	570	1045	630	670	800	670	690	750	780	890
OP4	2800	2500	3300	2300	2900	3800	2900	2000	3000	1900	2000
OP5	27	33	47.0	44.0	42.0	31.0	59.0	45.0	58.0	65	70
OP7	0.05	0.051	0.002	0.002	0.020	0.010	.01	.06	1.600	8.600	0.300
OP9	2800	2500	4500	2400	3200	2200	1800	3200	2200	2300	2800

<u>Outboard Piezometers</u>	Mar, 1998	Dec, 1997
11B		
13B		
15B		
6B		
NWM-27	610	
OP11		
OP2		
OP3	2200	2400
OP4	2500	3700
OP5	130	150
OP7	0.02	0.02
OP9	3600	

Table 3-2
Current and Annual Total Dissolved Chromium Concentrations in Groundwater (mg/l)

Monitoring Wells	Elevation (ft) Top of Well Screen	Current Results ppm	Sample Detection Limit ppm	Last Sample Round Results ppm	Average					Notes
					2012	2011	2010	2009	2008	
<u>Outboard Piezometers</u>										
OP-3	-53.5	140	0.1	126	133	139	145	160	97	4
OP-4	-57.1	323	0.2	16.6	169.8	457	504	548	614	4
OP-5	-51.3	2.96	0.01	1.89	2.43	3.10	4.82	5.94	7.69	4
OP-7	-47.6	0.0017	0.01	0.0118	ND	0.0103	ND	ND	ND	4
OP-9	-37.8	1870	2	1950	1910	2045	2120	2110	4910	4
<u>Deep Surface Water</u>										
SW-06	NA	0.0011	0.01	0.0011	ND	ND	ND	ND	ND	4
SW-11	NA	0.0011	0.01	0.0013	ND	ND	ND	ND	ND	4
SW-13	NA	0.0011	0.01	0.0023	ND	ND	ND	ND	ND	4
SW-15	NA	0.0011	0.01	0.0011	ND	ND	ND	ND	N/S	4
<u>Offsite Wells</u>										
OP-2	-48.0	5.14	0.01	5.2	5.17	5.81	6.11	6.21	6.45	4
OP-11	-35.5	0.891	0.01	0.507	0.699	0.381	0.442	0.285	0.338	4
NWM-27	-24.7	1910	2	2150	2030	2270	1875	2095	1152	4

NA - Not Applicable

ND - Not Detected

ERROR - Numerical data not reported for some portion of the referenced time period

U - Not detected validated results

B - Indicates that the calibration blank had some carryover contamination from these sample

* - Average of the sample and its duplicate

1 - Consists of averages of monthly data

2 - Consists of averages of quarterly data

3 - Consists of twice annual data (single data point)

4 - Average consists of all available data

Table 3-3 - Groundwater Trend Analysis ⁽¹⁾

Wells	Sample Dates	Data Points	Minimum	Maximum	Average	Standard Deviation	Current Quarter Concentrations
<u>Outboard Piezometers</u>							
OP-3	December,31 1980 to December,31 2011	62	6	2400	484	405	140
OP-4	December,31 1980 to December,31 2011	60	17	3800	1667	883	323
OP-5	December,31 1980 to December,31 2011	72	0.27	150	24	25	2.96
OP-7	December,31 1980 to December,31 2011	57	0.002	9	0.197	1.153	0.002
OP-9	December,31 1980 to December,31 2011	57	1800	5020	2625	616	1870
<u>Offsite Wells</u>							
OP-2	December,31 1980 to December,31 2011	64	1.80	8.00	5.57	1.18	5.14
OP-11	December,31 1980 to December,31 2011	56	0.004	2.700	0.176	0.405	0.891
NWM-27	December,31 1980 to December,31 2011	52	174	3600	1476	643	1910

1 - Trend analysis based on Sample Event Results stored in central electronic database.

Table 3-4
Current and Annual Total Dissolved Cyanide Concentrations in Groundwater (ug/l)

Monitoring Wells	Elevation (ft) Top of Well Screen	Current Results ug/l	Sample Detection Limit ug/l	Sample Event Dates							
				Apr, 2012	Oct, 2011	Jun, 2011	Sep, 2010	Apr, 2010	Oct, 2009	Apr, 2009	Oct, 2008
<u>Outboard Piezometers</u>		Oct, 2012		Apr, 2012	Oct, 2011	Jun, 2011	Sep, 2010	Apr, 2010	Oct, 2009	Apr, 2009	Oct, 2008
OP2	64.31	5.00	10	5.00	5.0	5.0	11.00	23.00	5.00	5.00	5.00
OP3	68.53	17.0	10	9.5	13.0	13.00	24.0	5.0	18.0	19.0	12.00

<u>Outboard Piezometers</u>	Apr, 2008	Oct, 2007	Apr, 2007	Oct, 2006	Apr, 2006	Oct, 2005	Apr, 2005	Oct, 2004	Apr, 2004	Oct, 2003	Apr, 2003
OP2	5.0	5.0	10.0	10.0	10.0	10.0	10.0	10.00	10.00	5.00	5.0
OP3	25.0	9.5	26.0	22.0	10.0	35.0	17.0	34.0	20.0	30.0	36.0

<u>Outboard Piezometers</u>	Oct, 2002	Apr, 2002	Jan, 2002	Nov, 2001	Aug, 2001	May, 2001	Feb, 2001	Nov, 2000	Aug, 2000	May, 2000	Feb, 2000
OP2	5.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.00	10.00
OP3	40.4	24.0	15.0	47.0	42.0	18.0	37.0	10.0	41	53	110.0

<u>Outboard Piezometers</u>	Dec, 1999	Aug, 1999	May, 1999	Mar, 1999	Dec, 1998	Dec, 1998	Sep, 1998	Jun, 1998	Mar, 1998
OP2	5.00	5.00	5.00	5.00	5.00	5.00			
OP3	110.0	37.0	69.0	55.0	29.0	29.0	9.00	14.0	1.00

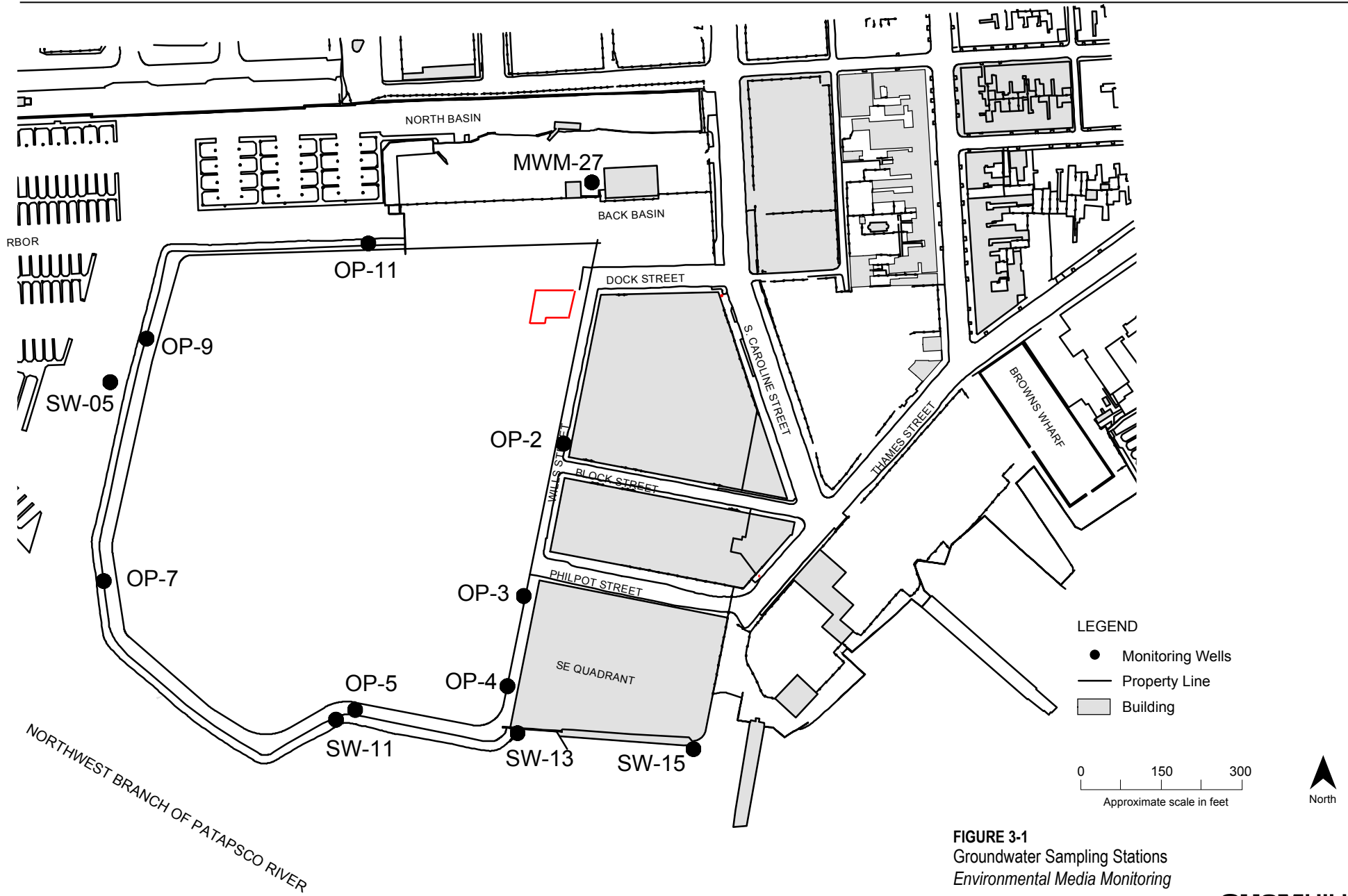


FIGURE 3-1
 Groundwater Sampling Stations
 Environmental Media Monitoring

Figure 3-2
Historical Total Dissolved Chromium Concentrations in Groundwater

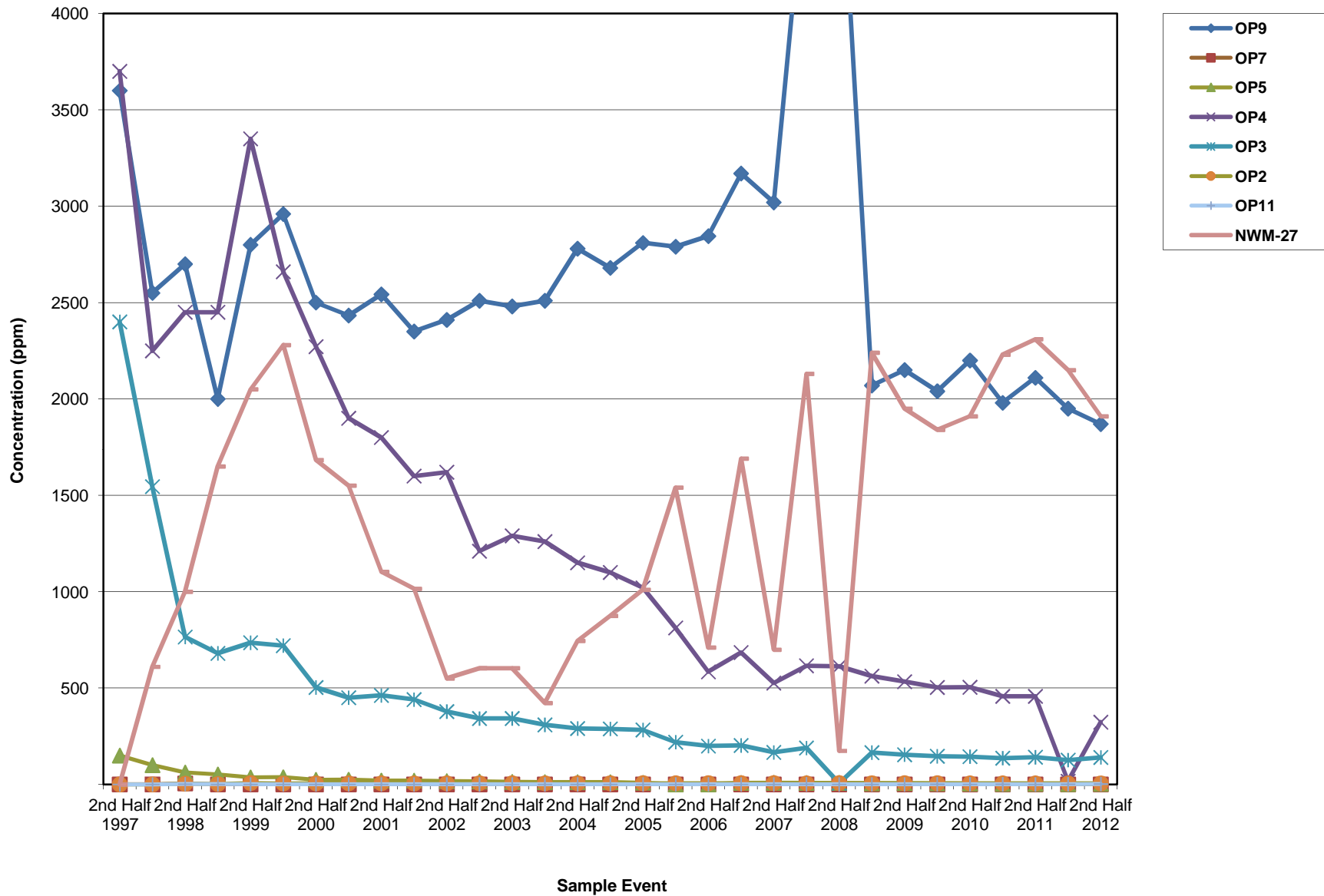
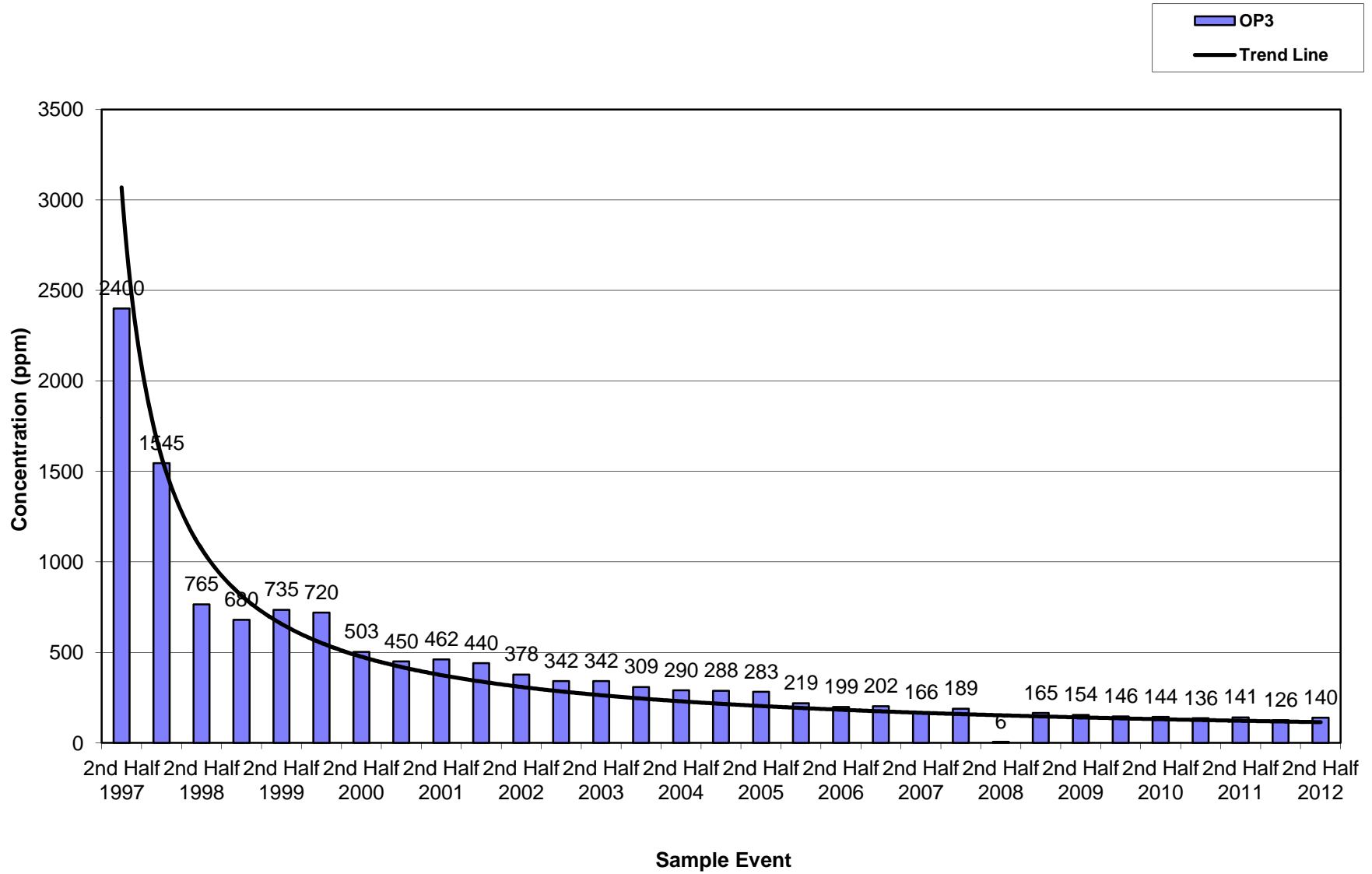


Figure 3-3
Total Dissolved Chromium Concentrations in Groundwater for OP- 3



**Figure 3-4
Total Dissolved Chromium Concentrations in Groundwater for OP-4**

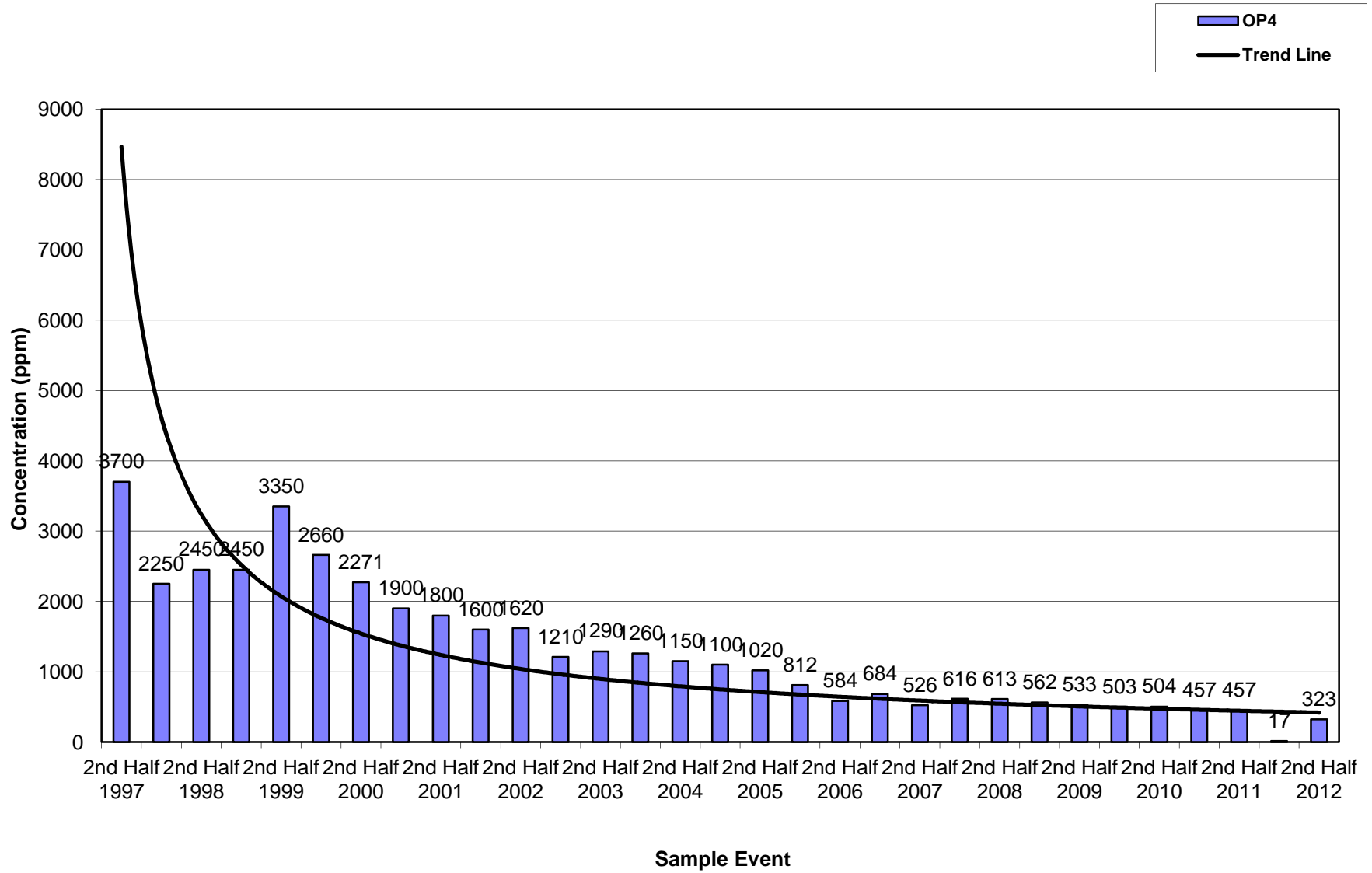


Figure 3-5
Total Dissolved Chromium Concentrations in Groundwater for OP-5

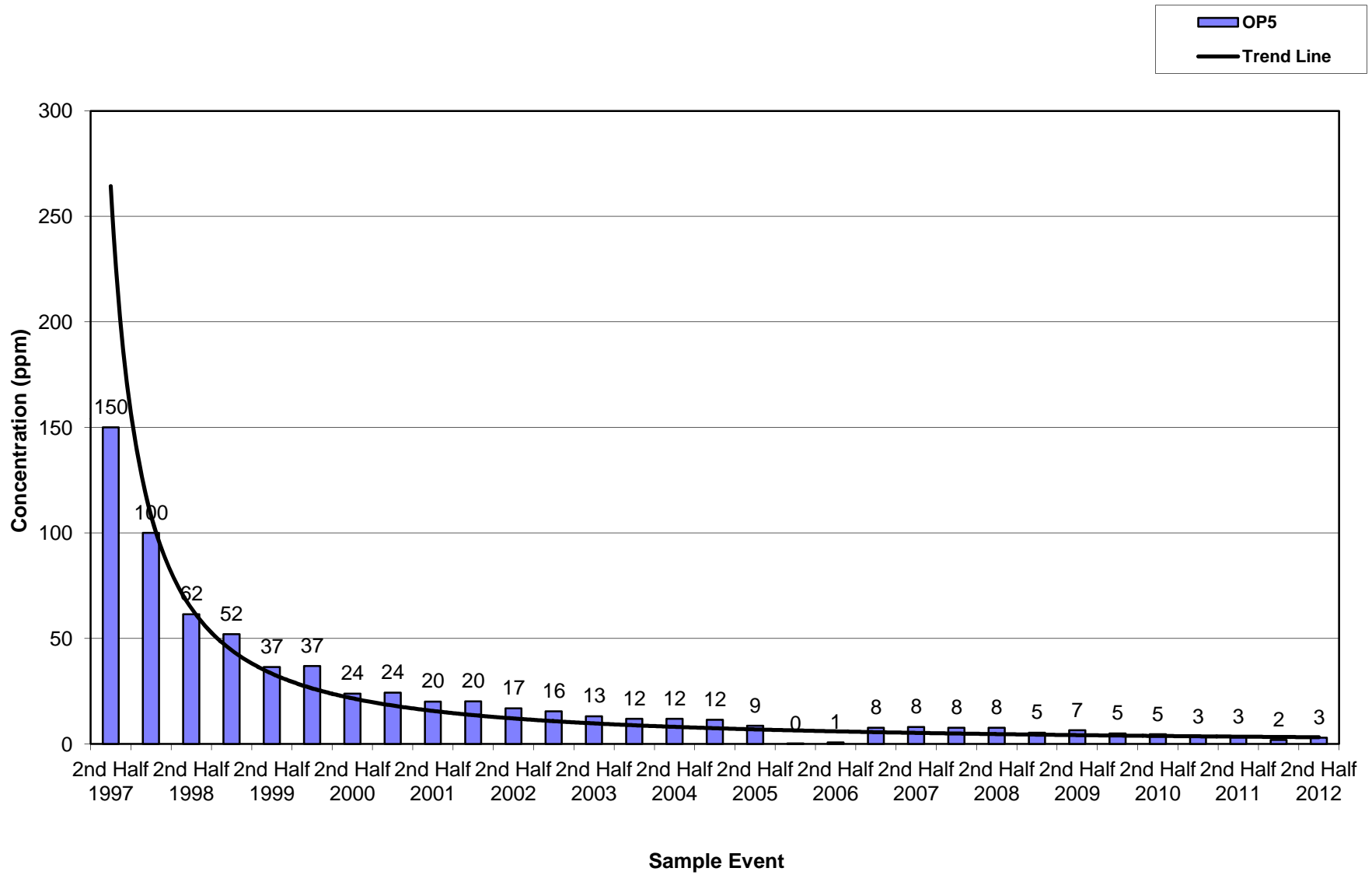


Figure 3-6
Total Dissolved Chromium Concentrations in Groundwater for OP-7

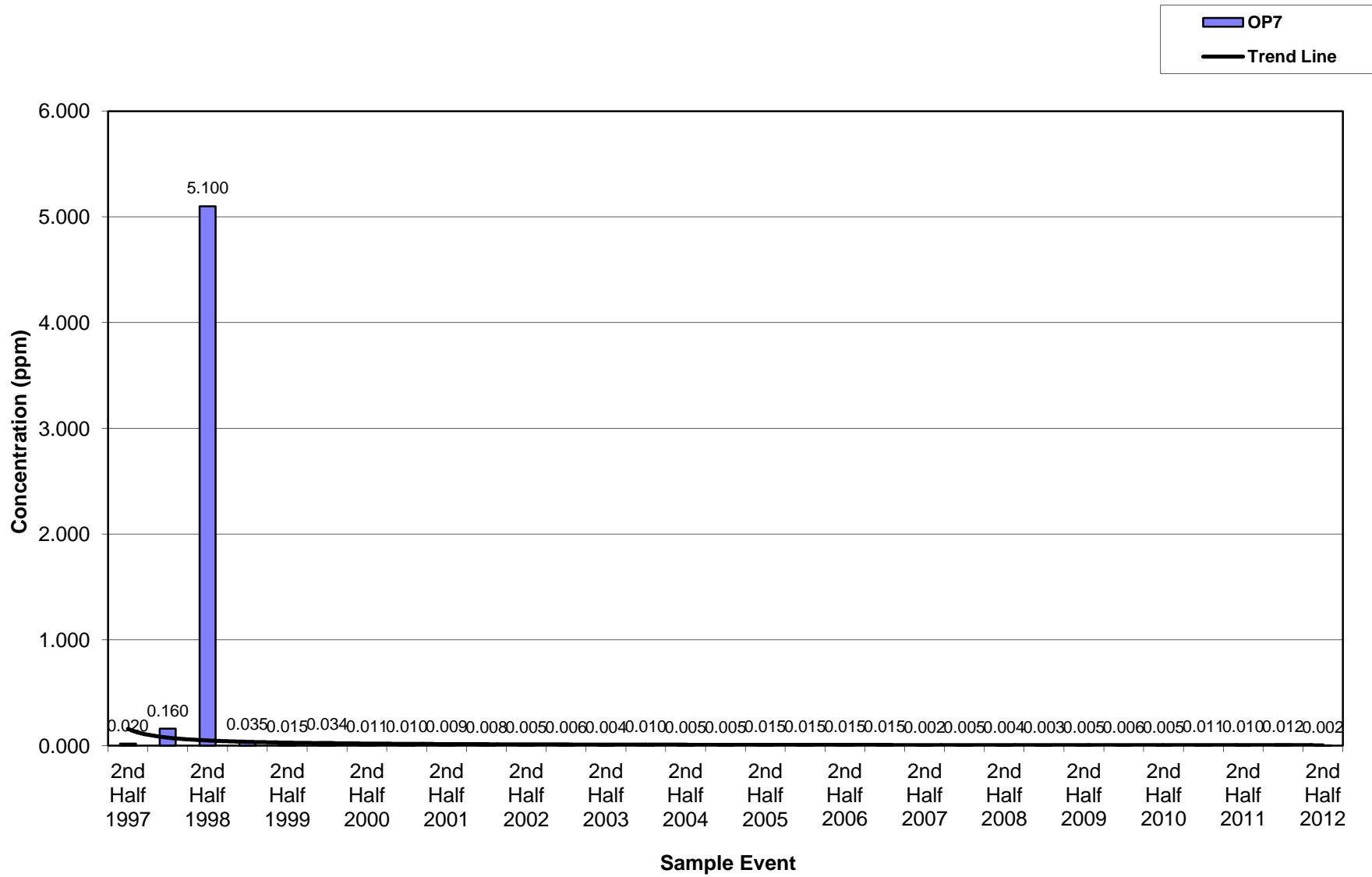


Figure 3-7
Total Dissolved Chromium Concentrations in Groundwater for OP-9

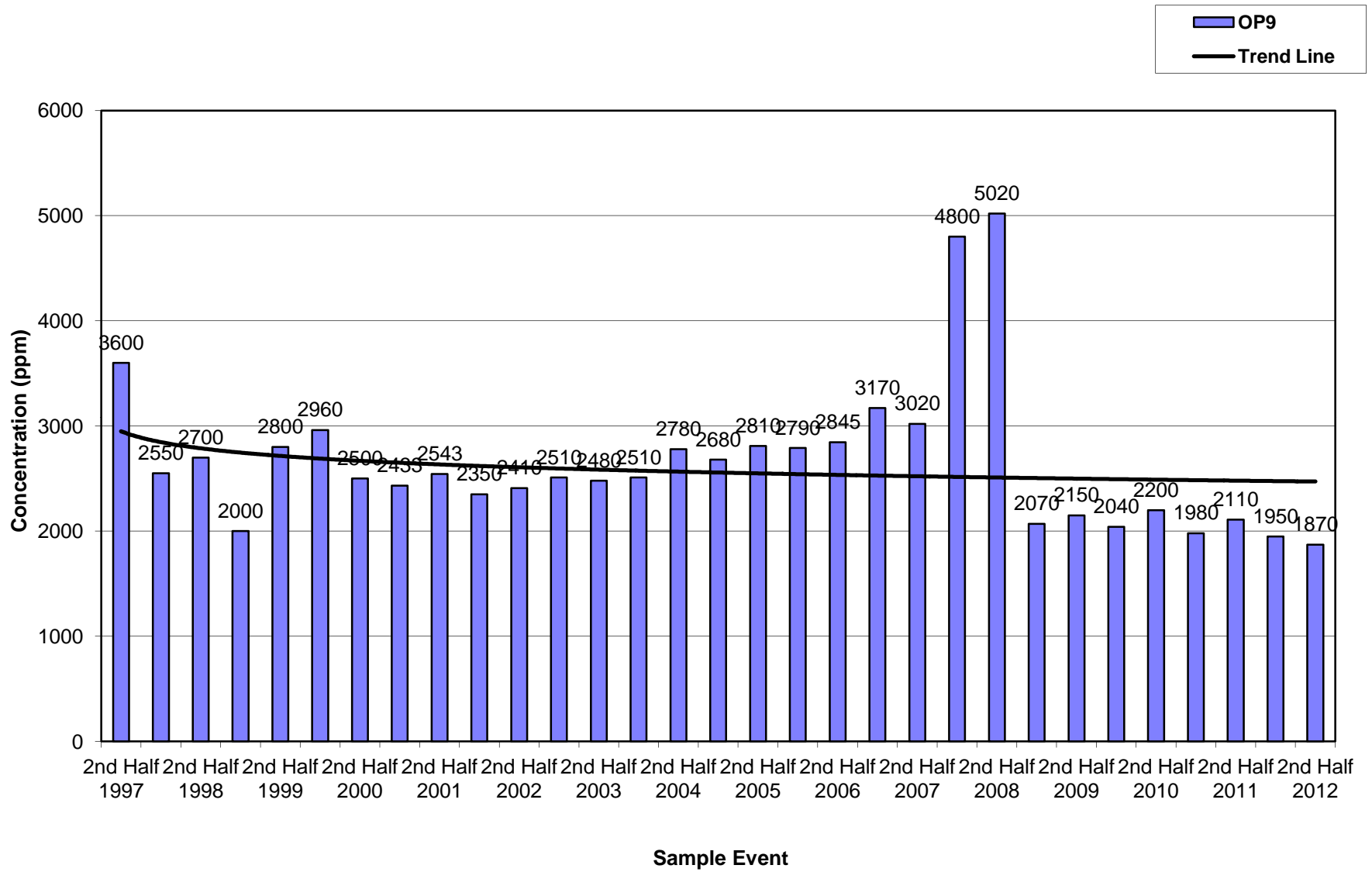


Figure 3-8
Total Dissolved Chromium Concentrations in Groundwater for OP- 2

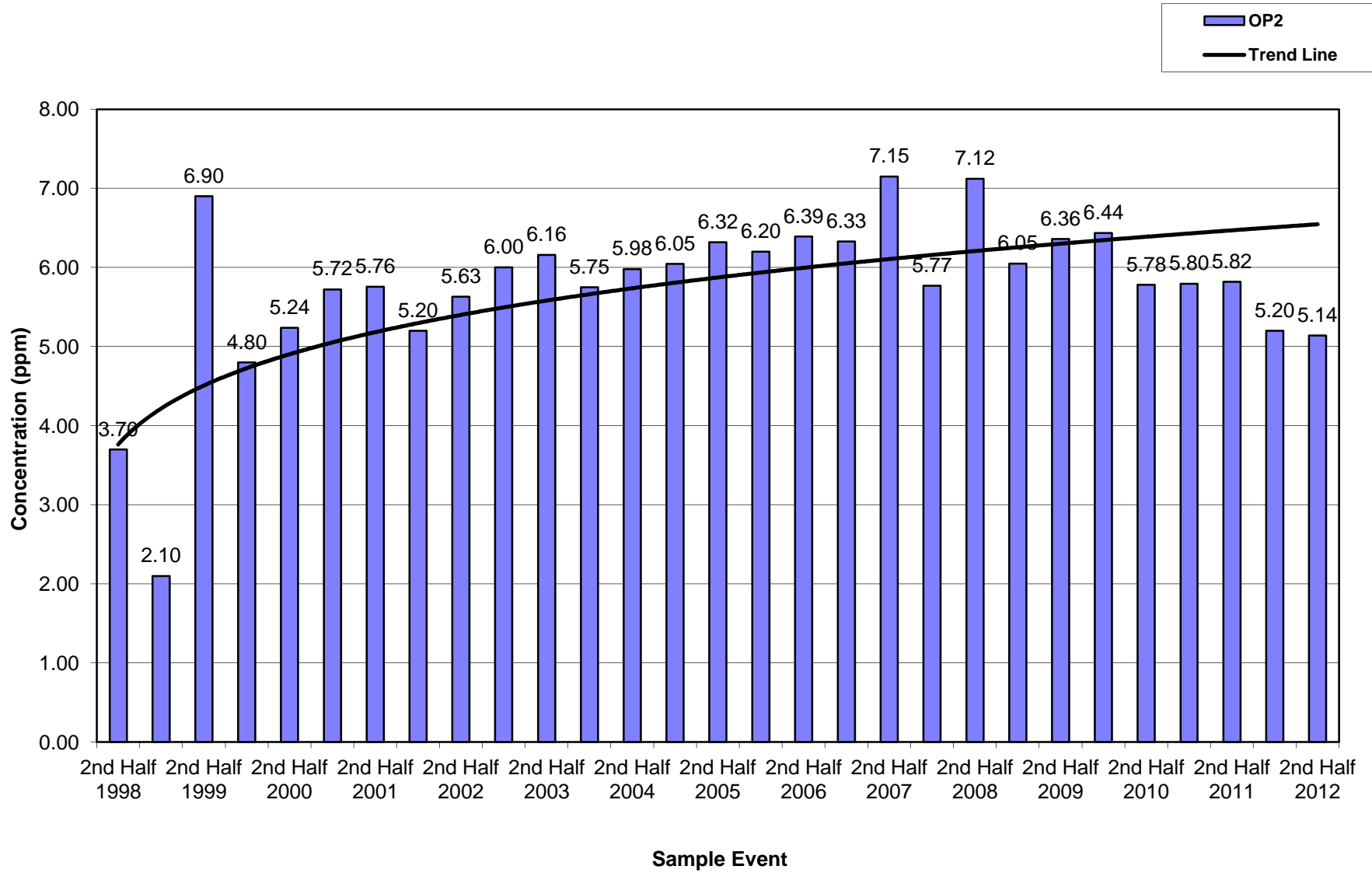


Figure 3-9
Total Dissolved Chromium Concentrations in Groundwater for OP-11

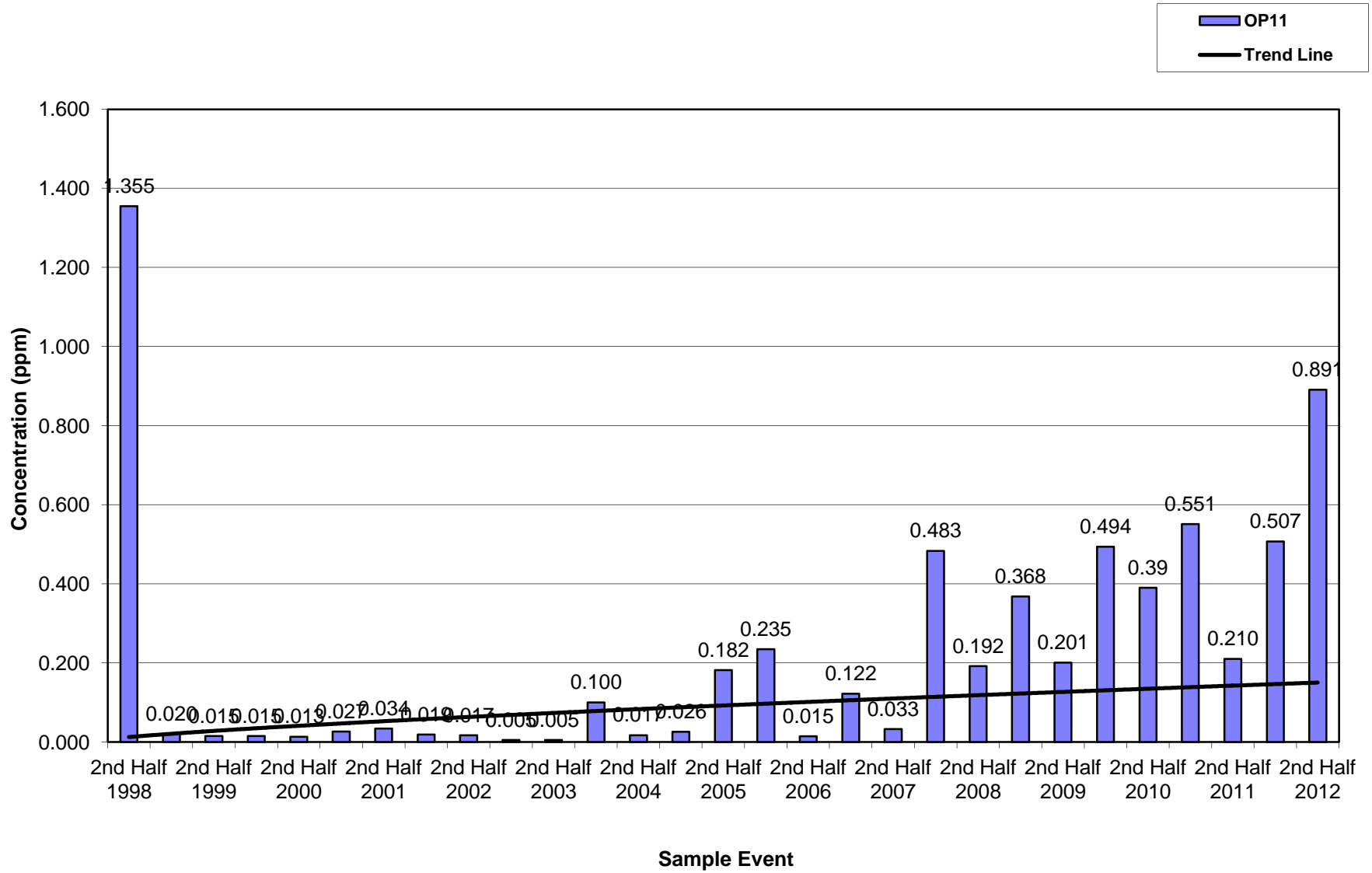


Figure 3-10
Total Dissolved Chromium Concentrations in Groundwater for NWM-27

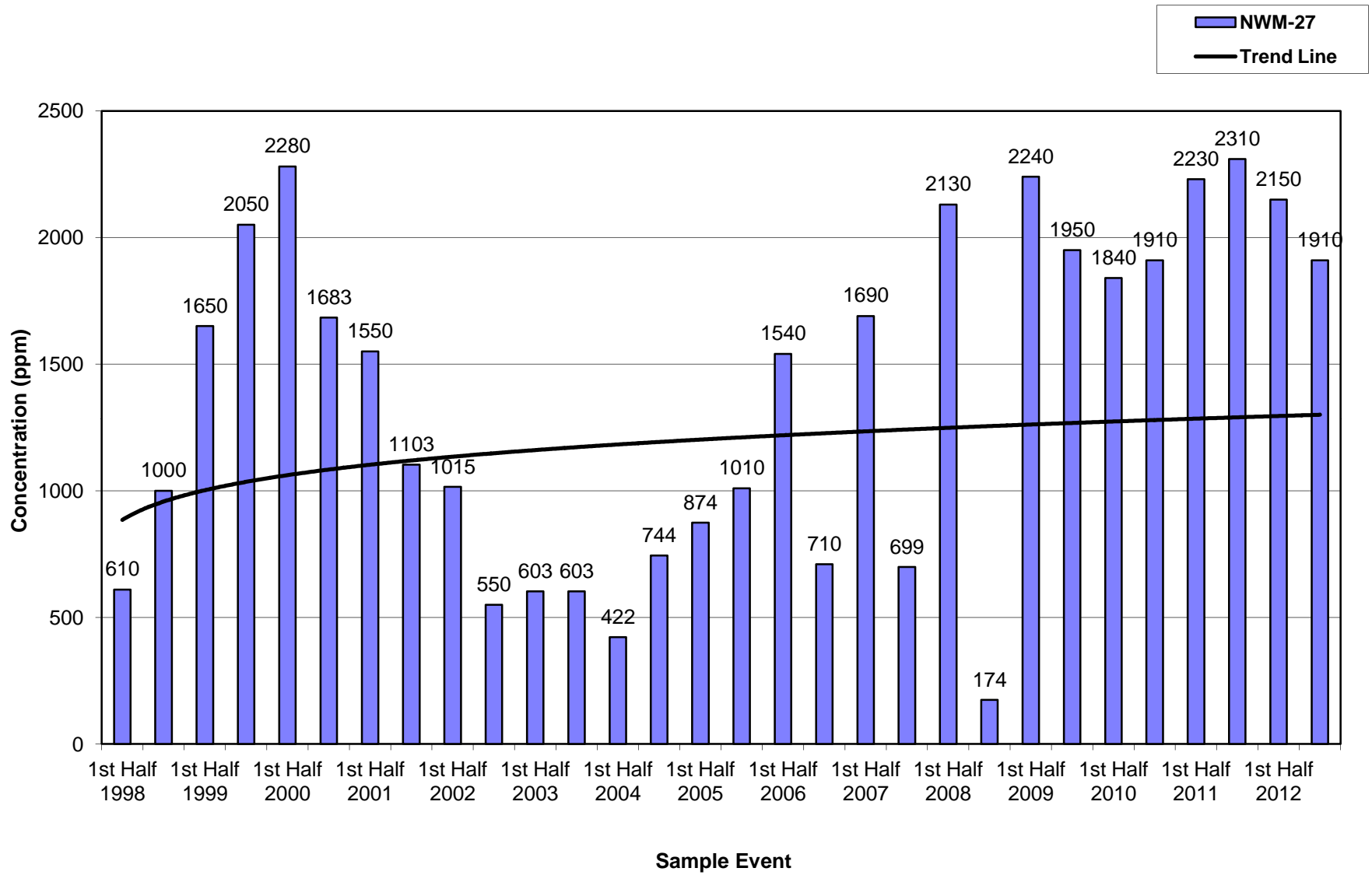


Figure 3-11
Total Dissolved Cyanide Concentrations in Groundwater OP-2

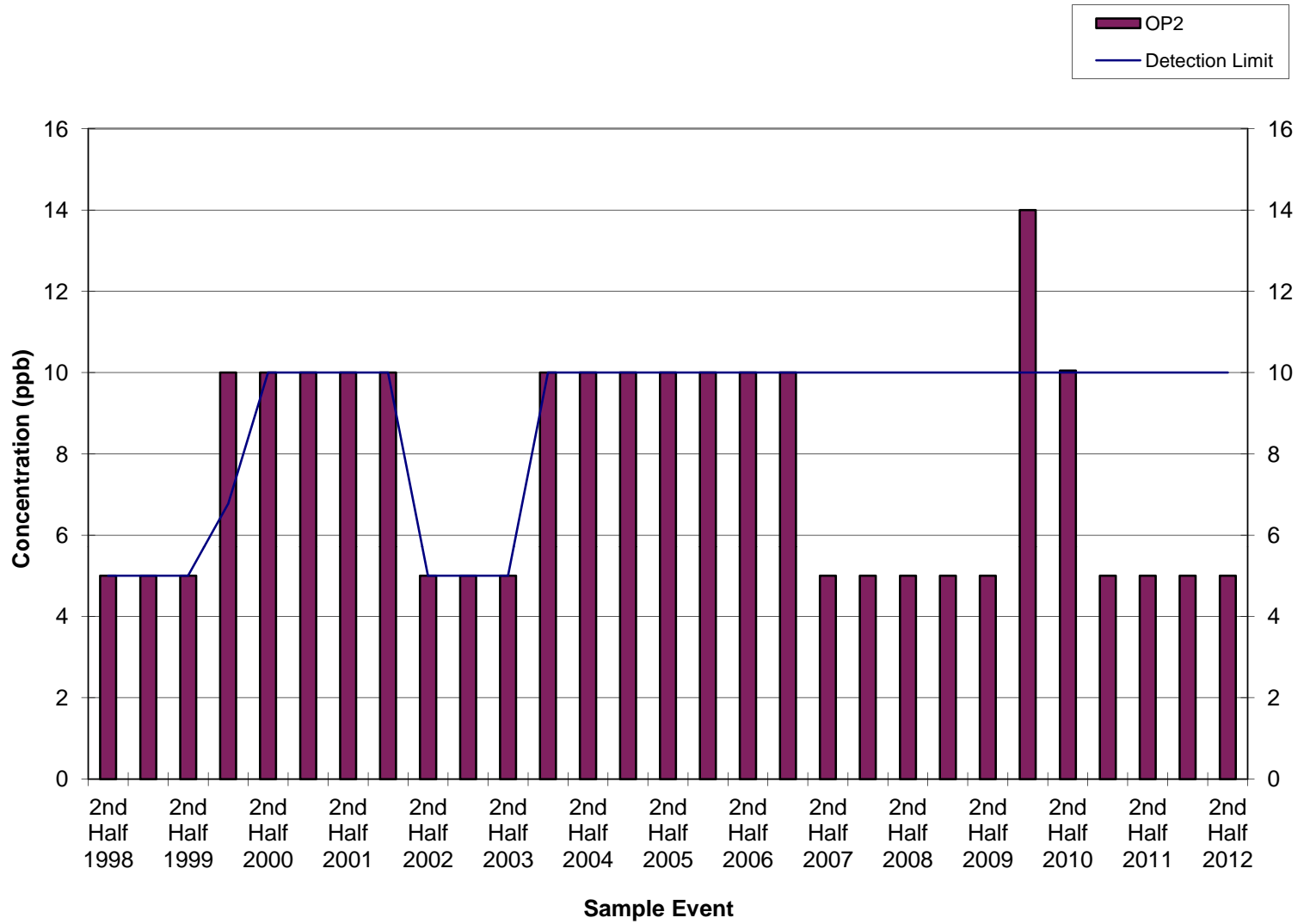


Figure 3-12
Total Dissolved Cyanide Concentrations in Groundwater OP-3

