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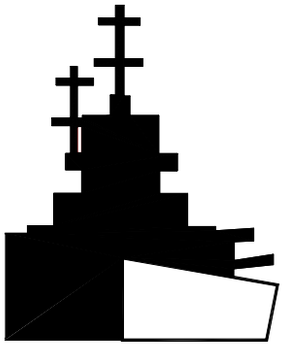

FINAL
THIRD ANNUAL GROUNDWATER MONITORING REPORT
IR SITES 5 AND 7
NAVAL WEAPONS STATION SEAL BEACH
SEAL BEACH, CALIFORNIA

CTO-0002/0937
June 2007

Submitted to:

Naval Facilities Engineering Command Southwest
1220 Pacific Highway
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COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

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EXECUTIVE SUMMARY

This Third Annual Groundwater Monitoring Report has been prepared by Bechtel Environmental, Inc., under the Comprehensive Long-Term Environmental Action Navy 3 Program, Contract No. N68711-95-D-7526. This report presents the findings, conclusions, and recommendations resulting from groundwater monitoring to be conducted at two Navy Installation Restoration (IR) Program sites at Naval Weapons Station Seal Beach, Seal Beach, California. Monitoring is being conducted to evaluate groundwater conditions and chemical composition at the Clean Fill Disposal Area (IR Site 5) and the Station Landfill (IR Site 7).

This report presents data collected during the third annual sampling event conducted in October 2006, and evaluates relevant historical data in addition to all data collected during the first 3 years of the groundwater monitoring program (from October 2003 through October 2006) at IR Sites 5 and 7. The technical approach used for data collection and evaluation is based on the data quality objectives (DQOs) developed in the final Work Plan for Groundwater Monitoring at IR Sites 4, 5, 6, and 7 (BEI 2003) in accordance with the United States Environmental Protection Agency (U.S. EPA) seven-step DQO process.

The initial scope of the groundwater monitoring program, defined in the approved Work Plan (BEI 2003), included groundwater sampling and analysis at IR Sites 4, 5, 6, and 7, and surface water and sediment sampling and analysis at IR Site 5. Based on the findings, conclusions, and recommendations in the final First Annual Groundwater Monitoring Report (BEI 2005), IR Sites 4 and 6 were removed from the monitoring program, and the scope of monitoring to be conducted during the second year at IR Sites 5 and 7 was defined. At the conclusion of the second year, further refinements to the scope of monitoring to be conducted during the third year at IR Sites 5 and 7 were recommended in the final Second Annual Groundwater Monitoring Report (MARRS 2006). Pursuant to those recommendations, the following activities were conducted during the third year of the groundwater monitoring program:

- measurements of groundwater levels
- annual sampling of 11 monitoring wells (3 at IR Site 5 and 8 at IR Site 7)
- laboratory analyses of groundwater samples for a range of potential chemical contaminants
- verification and validation of analytical data
- data evaluation and preparation of this Annual Groundwater Monitoring Report

Groundwater analytical results were compared to screening values established in the Work Plan (BEI 2003). These screening values include stationwide upper limit background values (ULBV) and water quality criteria from U.S. EPA's California Toxics Rule (CTR) Criteria for Enclosed Bays and Estuaries, Saltwater Aquatic Life Protection (U.S. EPA 2000). Where gaps existed in the CTR criteria, supplemental screening values were developed from ambient water quality criteria and scientific literature. Contaminant concentration trends were assessed using time series concentration plots and the Mann-Kendall statistical test for trends.

Results, conclusions, and recommendations from the groundwater monitoring conducted at IR Sites 5 and 7 from October 2003 through October 2006 are summarized below.

IR SITE 5 – CLEAN FILL DISPOSAL AREA

Groundwater-level measurements collected during the third annual monitoring event, conducted in October 2006, indicate a groundwater flow direction that is generally northeast with a horizontal gradient across the site of approximately 0.007 foot per foot. This is consistent with previous measurements collected between December 1998 and October 2005 where flow direction was generally northeast to east-northeast with a gradient from 0.0001 to 0.01 foot per foot.

As recommended in the final Second Annual Groundwater Monitoring Report (MARRS 2006), groundwater samples were collected from monitoring wells MW-05-02, -03, and -04 during the third annual sampling event in October 2006. Samples collected from well MW-05-02 were analyzed for the metals hexavalent chromium, nickel, and zinc, and samples collected from well MW-05-04 were analyzed for the volatile organic compound methyl tert-butyl ether (MTBE). At the request of the Regional Water Quality Control Board (RWQCB), Santa Ana Region, samples collected from all three wells were also analyzed for perchlorate. Two analytical methods were employed for perchlorate with method detection limits (MDLs) and method reporting limits (MRLs) as low as 0.051 micrograms per liter (µg/L).

During the third annual sampling event, none of the metals were reported above detection limits. MTBE was reported in well MW-05-04 at a concentration of 50 µg/L, which is below the established screening value of 440 µg/L. Perchlorate was not reported above the MDL/MRL in any sample.

Data obtained over the course of the IR Site 5 groundwater monitoring program (from October 2003 to October 2006) were evaluated using the decision rules established in the Work Plan (BEI 2003). Results and conclusions are summarized as follows.

- **Metals**. While there is a potential for the hexavalent chromium, nickel, and zinc reported in well MW-05-02 to reach a hypothetical point of discharge to nearby surface water, the potential to affect surface water at concentrations above screening values is considered extremely low. The time series concentration plots and Mann-Kendall trend analysis indicate decreasing trends for nickel and zinc. Trends were not determined for hexavalent chromium due to the predominance of nondetect results (i.e., low frequency of detection).
- **MTBE**. Concentrations of MTBE reported in well MW-05-04 have remained well below the screening value and are unlikely to adversely affect the marine environment. However, MTBE concentrations are increasing, and the source of the MTBE is likely the petroleum hydrocarbon plume at IR Site 14, which is located adjacent to and upgradient of IR Site 5.
- **Perchlorate**. Perchlorate was not reported above detection limits in samples collected from wells MW-05-02, -03, and -04, and is not a chemical of potential concern (COPC).

From this evaluation, the following recommendations are made for IR Site 5.

- Discontinue IR Site 5 groundwater sampling and groundwater-level monitoring.

- Include the evaluation of MTBE in well MW-05-04 as part of the IR Site 14 groundwater monitoring program and retain all other IR Site 5 wells for potential future use in monitoring the IR Site 14 petroleum hydrocarbon plume.

IR SITE 7 – STATION LANDFILL

Groundwater-level measurements collected during the third annual monitoring event in October 2006 indicate a groundwater flow direction that is generally east to northeast with a horizontal gradient across the site of approximately 0.004 foot per foot. A comparison to historical data indicates little variation in the gradient, but considerable variation in flow direction. From November 1988 to October 2006, groundwater gradient ranged from 0.0003 to 0.008 foot per foot. Over this same period, the predominant flow direction across the site appears to be east to northeast; however, flow directions to the southeast and southwest have also been recorded. The groundwater-level measurements at IR Site 7 continue to indicate a complex groundwater flow pattern due to tidal influence and the presence of nearby surface water bodies.

As recommended in the final Second Annual Groundwater Monitoring Report (MARRS 2006), groundwater samples were collected from eight monitoring wells during the third annual sampling event conducted in October 2006. Samples collected from all wells were analyzed for pesticides. Five wells were sampled for cyanide and two for metals (cobalt and cadmium only). At the request of the RWQCB, Santa Ana Region, samples collected from three wells were also analyzed for perchlorate. Two analytical methods were employed for perchlorate with MDLs and MRLs as low as 0.051 µg/L.

During the third annual sampling event, cobalt was reported in well W-41 at a concentration of 34.6 µg/L, which exceeds the established screening value (stationwide ULBV) of 16.6 µg/L. Cadmium was reported in well W-45 below its screening value. Six pesticides were reported above detection limits in one or more wells; however, only one pesticide, 4,4′-dichlorodiphenyltrichloroethane in well W-42, exceeded a screening value deemed protective of the marine environment. Cyanide was reported above detection limits in four of five wells, with concentrations ranging from 3 to 20 µg/L, which exceed the cyanide screening value (CTR criterion) of 1 µg/L. Perchlorate was not reported above the MDL/MRL in any sample.

Data obtained over the course of the IR Site 7 groundwater monitoring program (from October 2003 to October 2006) and during prior groundwater investigations (from November 1988 to September 1998) were evaluated using the decision rules established in the Work Plan (BEI 2003). Results and conclusions are summarized as follows.

- **Metals**. While there is a potential for cadmium in well W-45 and cobalt in well W-41 to reach hypothetical points of discharge to nearby surface waters, the potential to affect surface waters at concentrations above screening values is extremely low. The time series concentration plots and Mann-Kendall trend analysis for cadmium in well W-45 indicate stable or decreasing trends. For cobalt in well W-41, an increasing trend is apparent for the period of April 1994 to October 2006; however, concentrations appear to have stabilized over the course of the groundwater monitoring program (October 2003 to October 2006).

- **Pesticides**. While there is a potential for selected pesticides to reach hypothetical points of discharge to nearby surface waters, the potential to affect surface waters at concentrations above screening values is extremely low. Trends were not determined for pesticides due to the predominance of nondetect results (i.e., low frequency of detection).
- **Cyanide**. The fate and transport evaluation of cyanide reported in groundwater at IR Site 7 concluded that the low concentrations and chemical properties of cyanide, and the geochemical and physical conditions of the groundwater and surface water near the site, preclude the possibility that this contaminant would persist or pose a significant risk to aquatic receptors. The concentration plots and trend analysis indicate no increasing or decreasing trends for cyanide reported in wells 07M01 and W-42. Trends were not determined for cyanide reported in wells MW-04-02, -03, and -04 due to the predominance of nondetect results (i.e., low frequency of detection).
- **Perchlorate**. Perchlorate was not reported above detection limits in samples collected from wells W-42, -43, or -45, and is not a COPC.

From this evaluation, the following recommendations are made for IR Site 7.

- Discontinue groundwater sampling and groundwater-level monitoring.
- Remove (destroy) all IR Sites 4 and 7 monitoring wells.

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ACRONYMS/ABBREVIATIONS

BHC	benzene hexachloride
°C	degrees Celsius
CLEAN	Comprehensive Long-Term Environmental Action Navy
COPC	chemical of potential concern
CTO	contract task order
CTR	California Toxics Rule
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DO	dissolved oxygen
DQO	data quality objective
Eh	redox (electrical) potential
ESI	electrospray ionization
HPLC	high performance liquid chromatography
IR	Installation Restoration (Program)
µg/L	micrograms per liter
µS/cm	microsiemens per centimeter
MDL	method detection limit
mg/L	milligrams per liter
MRL	method reporting limit
MS	mass spectrometry
MSL	mean sea level
MTBE	methyl tert-butyl ether
NAVWPNSTA	Naval Weapons Station
NTU	nephelometric turbidity unit
NWR	(Seal Beach) National Wildlife Refuge
OE	ordnance and explosives
ORP	oxidation-reduction potential
PCB	polychlorinated biphenyl
PG	Professional Geologist
QC	quality control

redox	oxidation-reduction
RI	remedial investigation
RSE	removal site evaluation
RWQCB	(California) Regional Water Quality Control Board
SAP	sampling and analysis plan
SC	specific conductance
SVOC	semivolatile organic compound
ULBV	upper limit background value
U.S. EPA	United States Environmental Protection Agency
VOC	volatile organic compound

Section 1
INTRODUCTION

This Third Annual Groundwater Monitoring Report presents the findings, conclusions, and recommendations resulting from groundwater monitoring conducted between October 2003 and October 2006 at Installation Restoration (IR) Program Sites 5 and 7, Naval Weapons Station (NAVWPNSTA) Seal Beach, California (Figures 1, 2, and 3). Bechtel Environmental, Inc., prepared this report for Naval Facilities Engineering Command Southwest under Contract Task Order 0002 of the Comprehensive Long-Term Environmental Action Navy 3 Program, Contract No. N68711-95-D-7526.

1.1 PURPOSE

The purpose of the groundwater monitoring program is to evaluate groundwater conditions and chemical composition at the following IR Program sites within NAVWPNSTA Seal Beach:

- IR Site 5 – Clean Fill Disposal Area
- IR Site 7 – Station Landfill

1.2 SCOPE

The initial scope of the groundwater monitoring program, defined in the approved Work Plan (BEI 2003), included groundwater sampling and analysis at IR Sites 4, 5, 6, and 7, and surface water and sediment sampling and analysis at IR Site 5. Based on the findings, conclusions, and recommendations in the final First Annual Groundwater Monitoring Report (BEI 2005), IR Sites 4 and 6 were removed from the monitoring program, and the scope of monitoring to be conducted during the second year at IR Sites 5 and 7 was defined. At the conclusion of the second year, further refinements to the scope of monitoring to be conducted during the third year at IR Sites 5 and 7 were recommended in the final Second Annual Groundwater Monitoring Report (MARRS 2006). In accordance with those recommendations, the following activities were conducted during the third year of the groundwater monitoring program:

- measurements of groundwater levels
- annual sampling of 11 monitoring wells (3 at IR Site 5 and 8 at IR Site 7)
- laboratory analyses of groundwater samples for a range of potential chemical contaminants
- verification and validation of analytical data
- data evaluation and preparation of this Annual Groundwater Monitoring Report

This report presents data collected during the third annual sampling event conducted in October 2006, and evaluates relevant historical data in addition to all data collected during the first 3 years of the groundwater monitoring program at IR Sites 5 and 7 (October 2003 to October 2006). Using the decision rules established in the final Work Plan, this report evaluates the data and makes recommendations regarding future groundwater monitoring and/or the need for further action.

Data collected during the third year of groundwater monitoring provide information on geochemical properties, chemical concentrations, hydrogeology, seasonal variations, and temporal trends that will be used to support or refine previous recommendations. The technical approach used for data collection and evaluation is based on the data quality objectives (DQOs) developed in the final Work Plan (BEI 2003) in accordance with the United States Environmental Protection Agency (U.S. EPA) seven-step DQO process (U.S. EPA 1994). The DQOs for IR Sites 5 and 7 are summarized in Appendix A, Tables A-1 and A-2, respectively.

1.3 BACKGROUND

The following sections provide a brief description of each site and summarize the previous investigations that form the basis for groundwater monitoring.

1.3.1 IR Site 5 – Clean Fill Disposal Area

IR Site 5 is an area of approximately 4.1 acres situated in the southwest quadrant of the station, near the southeast corner of Kitts Highway and Bolsa Avenue (Figures 1 and 2). Approximately 3.3 acres of this site was formerly covered with disposal fill materials. IR Site 5 is located within the boundaries of the Seal Beach National Wildlife Refuge (NWR).

In 1944, during the initial construction of NAVWPNSTA Seal Beach, construction debris and clean fill were disposed in this area. During the initial assessment study, the site was observed to be approximately 3 feet above the adjacent salt marsh and covered with vegetation (NEESA 1985). Ordnance and explosives (OE) were reportedly found at this site. In the past, trucks had been observed at the site off-loading ordnance-related material such as shell casings mixed with construction debris.

As part of the removal site evaluation (RSE), soil, sediment, and groundwater samples were collected and analyzed to characterize and delineate the lateral and vertical extent of chemicals of potential concern (COPCs) (BNI 2001). The RSE concluded that confirmatory groundwater monitoring is needed to further evaluate the effect of ammonia, hexavalent chromium, manganese, and nitrate on groundwater. It also recommended that the potential for the presence of OE items be further evaluated and any OE items identified by that evaluation be removed.

A non-time-critical removal action was performed at this site between September 2001 and April 2002. The fill material was excavated and sifted to remove OE items and construction debris. OE items were removed from the site and disposed of or destroyed under the direction of trained OE personnel. Construction debris and hazardous soil were removed from the site and disposed in an appropriate landfill. Hazardous soil that was disposed could have contained residual COPCs identified during the RSE, thus potentially reducing these low COPC concentrations even further. Clean soil was staged on-base for use as backfill at another IR site. The remaining nonhazardous soil was used as backfill to bring a portion of IR Site 5 up to the adjacent wetland grade. This portion of the site, now part of the wetland, is periodically inundated. The project Closeout Report (FWENC 2003) noted that confirmatory surface water and sediment sampling and

analysis would be conducted in addition to the confirmatory groundwater monitoring recommended in the RSE.

1.3.2 IR Site 7 – Station Landfill

IR Site 7 is an area of approximately 33 acres that was used by the station for disposal of various wastes (Figures 1 and 3) (CH2M Hill 2002). It is located near the southern boundary of the station and at the eastern boundary of the Seal Beach NWR. Operations began at this site between October 1955 and December 1957 and continued until about 1973 when a contract was awarded for off-site disposal of wastes. The largest volume of waste was reportedly empty paint and solvent containers, mostly 1- and 5-gallon cans. Some cans were supposedly full to partially full or contained rags or sludge. Empty 1- to 5-gallon cans of zinc-chromate paint, mineral spirits, alcohol, solvents, and lacquer thinner were also suspected of being disposed in the landfill. In addition, other empty or partially full 55-gallon drums of solvent, including trichloroethene, carbon tetrachloride, and oil, were disposed at IR Site 7. More than 78,000 empty spray paint cans were estimated to have been disposed. Other reported wastes include paint booth filters and 55-gallon drums containing mercury batteries, transformer oil, asbestos, waste lumber, and metal banding. Although no well-defined plumes exist, water quality data collected during a groundwater monitoring study (CH2M Hill 1999) suggest that IR Site 7 groundwater has been impacted by prior site activities (NEESA 1985, CH2M Hill 2002). Exploratory drilling and trenching conducted as part of a supplemental characterization of the landfill identified primarily inert materials (FWENC 1999).

Seven potentially contaminated strata were identified at IR Site 7: five soil, one sediment, and one groundwater. The potentially contaminated soil strata consist of three trenches, the area outside the trenches, and a lead "hot spot." In general, relatively low levels of tetrachloroethene, semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs) (Aroclors 1248 and 1254), various metals, and cyanide were identified as COPCs in the five soil strata. The remedial investigation (RI) (JEG 1995) confirmed the presence of the lead hot spot stratum and concluded that it was probably associated with the contamination at adjacent IR Site 4, Perimeter Road. Pesticides and some metals were identified as COPCs in the ditch sediment stratum. Low levels and/or infrequent detections of chlorinated volatile organic compounds (VOCs), aromatic compounds, SVOCs, pesticides, metals, asbestos, and cyanide were identified as COPCs in the groundwater stratum. On the basis of the results of human-health and ecological risk assessments, the RI recommended that a 5-year-long periodic groundwater sampling and analysis program be conducted as part of landfill postclosure operations (JEG 1995). A groundwater monitoring study was conducted at the site in 1998 to better assess groundwater conditions and chemical composition and further define the requirements for a groundwater monitoring program. The study recommended that, during the 5-year monitoring program, groundwater samples be collected and analyzed for metals, cyanide, VOCs, SVOCs, pesticides, and PCBs (CH2M Hill 1999).

A non-time-critical removal action was conducted at IR Site 7 between 02 December 2003 and 08 April 2004. In Area 1 (northeast portion of the site), the removal action consisted of repairing the existing landfill soil cover by providing a minimum 2-foot-thick soil cover

over the buried waste and grading the cover to provide adequate runoff away from the landfill surface. The removal action in Areas 3 and 4 (in the northwest portion of the site), and Area 6 (in the southeast portion of the site) involved removal of surface and near-surface debris. In Area 5 (which forms the eastern shoreline of Perimeter Pond and lies between Perimeter Pond and East Pond), the removal action consisted of excavation of buried metallic debris and trash, and off-site disposal of excavated waste (TtFW 2004).

1.4 REPORT ORGANIZATION

This Third Annual Groundwater Monitoring Report is organized as follows.

- Section 1 summarizes the scope and purpose of the groundwater monitoring program, and provides a brief overview of each site.
- Section 2 summarizes the field activities conducted in October 2006.
- Section 3 summarizes the results of groundwater-level monitoring and groundwater sampling conducted in October 2006.
- Section 4 evaluates selected historical data and all the data collected during the first 3 years of the groundwater monitoring program at IR Sites 5 and 7.
- Section 5 presents the conclusions and recommendations for each site.
- Section 6 lists the reference materials (documents and information sources) cited throughout this report.
- Figures and tables cited in Sections 1 through 5 are provided with separate tabs following Section 6.
- Appendix A contains the DQOs and decision flow diagrams developed in the final Work Plan (BEI 2003).
- Appendix B presents the groundwater-level measurement data, a summary of historical groundwater gradients and flow directions, hydrographs, and precipitation data.
- Appendix C provides field parameter readings.
- Appendix D presents the laboratory analytical results from the third year of groundwater monitoring.
- Appendix E summarizes the screening values used to evaluate analytical data.
- Appendix F provides time series concentration plots for those analytes reported above detection limits at least three times in a given well.
- Appendix G provides the results of the Mann-Kendall trend analysis for selected monitoring wells and analytes.
- Appendix H contains a detailed evaluation of cyanide fate and transport at IR Site 7.
- Appendix I contains monitoring well construction logs and a table summarizing well construction data.
- Appendix J discusses deviations from the Work Plan (BEI 2003).

- Appendix K contains responses to comments from the California Environmental Protection Agency Department of Toxic Substances Control and California Regional Water Quality Control Board (RWQCB).

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Section 2
ANNUAL FIELD ACTIVITIES

Field activities conducted in October 2006 included measurement of groundwater levels, collection of field parameters, and collection and analysis of groundwater samples from selected locations. These activities are summarized below.

2.1 GROUNDWATER-LEVEL MONITORING

During annual groundwater-level monitoring, wells at IR Sites 5 and 7 were inspected for damage and evidence of tampering. Groundwater-level measurements were taken using a two-conductor, battery-powered, water-level indicator at IR Site 5 on 10 October 2006, and at IR Site 7 on 09 October 2006. The groundwater-level measurements are presented in Appendix B, Table B-1.

2.2 GROUNDWATER SAMPLING

Groundwater samples were collected from IR Sites 5 and 7 on 09 and 10 October 2006. The groundwater sampling locations are shown on Figures 2 and 3. Groundwater sampling was conducted in accordance with the methods and procedures specified in the Work Plan (BEI 2003).

During low-flow purging, six field indicator parameters were monitored using a MicroPurge Flow Cell, Model FC4000. The six field indicator parameters were water temperature, pH, specific conductance (SC), dissolved oxygen (DO), oxidation-reduction (redox) potential (ORP), and turbidity. Throughout purging, field parameter data were recorded in a logbook at approximately 5-minute intervals. Groundwater field parameters measured at the time of sample collection from each monitoring well during the third annual sampling event are shown in Table 1. The field parameters measured over the course of the groundwater monitoring program are shown in Appendix C, Table C-1.

Purging was performed at each sampling location until pH measurements were within 0.5 of the two previous values and temperature, SC, DO, ORP, and turbidity had stabilized within 10 percent of the two previously measured values for each parameter. Ideally, turbidity declined to less than 5 nephelometric turbidity units (NTUs) prior to sample collection. However, if the turbidity measurements stabilized at a level greater than 5 NTUs during purging, sampling was conducted once the other five parameters had stabilized as specified above.

2.3 LABORATORY ANALYSES

In accordance with the analytical requirements presented in the Work Plan (BEI 2003) and in Addendum No. 1 to the final Sampling and Analysis Plan (SAP) (BEI 2006), groundwater samples from IR Sites 5 and 7 were submitted to Columbia Analytical Services laboratory for analyses. Field duplicate and field quality control (QC) samples were also submitted to the laboratory for analyses as required by the Work Plan. The field QC samples included trip blanks (for shipments containing samples requiring VOC analyses) and matrix spike/matrix spike duplicate samples. Source water and rinsate blanks were not required because dedicated sampling equipment was used.

The laboratory analyses and methods specified for each sampling location are summarized in Table 2.

Section 3
ANNUAL MONITORING RESULTS

This section summarizes the results of groundwater-level monitoring and groundwater sampling and analysis conducted at IR Sites 5 and 7 during the third annual monitoring event in October 2006.

3.1 GROUNDWATER-LEVEL MONITORING

Groundwater-level measurements collected in October 2006 were used to calculate groundwater elevations by subtracting the groundwater-level depths from the surveyed top-of-casing elevations relative to mean sea level (MSL). The measurements and corresponding elevations are presented in Appendix B, Table B-1. Hydrographs and precipitation data are presented on Figures B-1 through B-3. Groundwater elevation contours are shown on Figures 4 and 5.

3.2 ANALYTICAL RESULTS

All laboratory analytical results from the October 2006 annual sampling event are presented by IR site in Appendix D, which also presents the analytical results for the field QC samples. Laboratory analytical results were verified and validated as required by the Work Plan (BEI 2003).

Of the 11 monitoring wells included in the October 2006 groundwater sampling event, 5 were installed and sampled during previous investigations. The sampling history is summarized in Table 3. Analytical results from the previous investigations and five sampling events conducted under the present groundwater monitoring program (including the October 2006 results discussed below) are shown in Table 4. The analytical results are compared to the screening values developed in the Work Plan (BEI 2003) and summarized in Appendix E.

3.2.1 IR Site 5 – Clean Fill Disposal Area

Analytes reported in the IR Site 5 groundwater samples collected in October 2006 are summarized in Table 4 and shown on Figure 6.

Metals. One sample was collected from well MW-05-02 and analyzed for hexavalent chromium, nickel, and zinc. None of these metals were reported above detection limits.

VOCs. One sample was collected from well MW-05-04 and analyzed for the VOC methyl tert-butyl ether (MTBE). The concentration was reported at 50 micrograms per liter (µg/L), which is below the established screening value of 440 µg/L.

General Chemistry. Samples collected from wells MW-05-02, -03, and -04, were analyzed for perchlorate as requested by the RWQCB, Santa Ana Region. Each sample was analyzed using two methods:

- U.S. EPA Method 314.0 with a method detection limit (MDL) of 0.2 µg/L and method reporting limit (MRL) of 1 µg/L, and

- laboratory-specific high performance liquid chromatography/electrospray ionization/mass spectrometry (HPLC/ESI/MS) with an MDL and MRL of 0.051 µg/L.

Perchlorate was not reported above the MDL/MRL in any sample.

3.2.2 IR Site 7 – Station Landfill

Analytes reported in the IR Site 7 groundwater samples (which included samples from three IR Site 4 wells) collected in October 2006 are summarized in Table 4 and shown on Figure 7.

Metals. One sample collected from well W-41 was analyzed for cobalt and the concentration was reported at 34.6 µg/L, which exceeds the established screening value of 16.6 µg/L. One sample collected from well W-45 was analyzed for cadmium and the concentration was reported at 3.1 µg/L, which is below the screening value of 16.4 µg/L.

Pesticides. Samples collected from all eight wells at IR Site 7 were analyzed for pesticides. Five pesticides (4,4′-dichlorodiphenyltrichloroethane [DDT], aldrin, gamma-chlordane, heptachlor, and methoxychlor) were reported above detection limits in one or more wells, thereby exceeding their primary screening value of nondetect. Of the five pesticides reported, only 4,4′-DDT in well W-42 exceeded a secondary screening value deemed protective of the marine environment.

General Chemistry. Cyanide was reported above detection limits in four of the five wells sampled for cyanide. Reported concentrations ranged from 3 to 20 µg/L, which exceed the cyanide screening value of 1 µg/L.

Three samples, collected from wells W-42, -43, and -45, were analyzed for perchlorate as requested by the RWQCB, Santa Ana Region. Each sample was analyzed by the two methods described in Section 3.2.1. Perchlorate was not reported above the MDL/MRL in any sample.

Section 4
DATA EVALUATION

This section presents an evaluation of selected data collected over the course of the groundwater monitoring program at IR Sites 5 and 7 and also presents applicable historical data. The evaluation was performed to address the decision rules that were developed in the Work Plan (BEI 2003) in accordance with the U.S. EPA seven-step DQO process (U.S. EPA 1994). The seven steps of the DQO process for IR Sites 5 and 7 are summarized in Appendix A, Tables A-1 and A-2, respectively. Figure A-1 shows the DQO decision flow process, and Figure A-2 shows the decision flow used to select a monitoring frequency for each well during the next year of the monitoring program. Since discrete groundwater contaminant plumes have not been identified at these sites, decision rules were designed to individually address the site-specific COPCs that were monitored. Responses to each decision rule, provided in Section 5, are based on the following data evaluation.

Groundwater-level measurements collected during the third annual monitoring event, conducted in October 2006, were used to calculate groundwater elevations by subtracting the groundwater-level depths from the surveyed top-of-casing elevations relative to MSL. The measurements and corresponding elevations are shown in Appendix B, Table B-1. Groundwater elevation contours (including gradients and approximate flow directions) for the October 2006 monitoring event are shown on Figures 4 and 5. Historical hydraulic gradients and groundwater flow directions are summarized in Table B-2. Hydrographs depicting the variations in groundwater elevation over the course of the monitoring program are shown on Figures B-1 and B-2.

The groundwater chemistry evaluation includes the assessment of field parameters obtained at the time of groundwater sample collection. The field parameter readings from the October 2006 sampling event are shown in Table 1. The field parameters measured over the course of the groundwater monitoring program (from October 2003 to October 2006) are compiled in Appendix C, Table C-1.

Laboratory analytical results shown in Table 4 were compared to screening values established in the Work Plan (BEI 2003). These screening values consist of California Toxics Rule (CTR) Criteria for Enclosed Bays and Estuaries, Saltwater Aquatic Life Protection (U.S. EPA 2000) and stationwide upper limit background values (ULBVs) (JEG 1997). To address gaps in the CTR criteria, supplemental screening values were developed from ambient water quality criteria and scientific literature in the First Annual Groundwater Monitoring Report (BEI 2005). The screening values are summarized in Appendix E, Table E-1, for the specific analytes reported in groundwater samples collected at IR Sites 5 and 7.

Contaminant concentration trends were assessed using the time series concentration plots shown in Appendix F and the Mann-Kendall test for trends (U.S. EPA 1996) shown in Appendix G and summarized in Table 5.

4.1 IR SITE 5 – CLEAN FILL DISPOSAL AREA

Evaluation of groundwater levels and chemistry at IR Site 5 is presented in the following subsections.

4.1.1 Groundwater Levels

Groundwater elevations measured during the third annual monitoring event in October 2006 ranged from a low of 3.91 feet below MSL at well MW-05-02 to a high of 1.69 feet above MSL at well MW-05-05. The groundwater-level measurements and resultant elevation contours (shown on Figure 4) indicate a groundwater flow direction that is generally northeast with a horizontal gradient across the site of approximately 0.007 foot per foot. A comparison of the most recent (October 2006) data with data obtained between December 1998 and October 2005 (Appendix B, Table B-2) indicates very little variation in flow direction. From December 1998 to October 2006, groundwater flow direction has been generally northeast to east-northeast with a gradient ranging from 0.0001 to 0.01 foot per foot.

4.1.2 Groundwater Chemistry

An evaluation of the field parameters and target analytes recommended in the Second Annual Groundwater Monitoring Report (MARRS 2006) is presented in this subsection.

Field Parameters. The following field parameters, which have been measured over the course of the groundwater monitoring program, are compiled in Appendix C, Table C-1.

- The temperature of IR Site 5 groundwater measured during October 2006 ranged from 18.86 to 21.12 degrees Celsius (°C). These temperatures are consistent with previous fall measurements collected from wells MW-05-02, -03, and -04 during the first 2 years of the groundwater monitoring program.
- During October 2006, pH ranged from 6.12 to 6.58. This range of pH values is consistent with previous measurements from wells MW-05-02, -03, and -04 and indicative of slightly acidic groundwater conditions.
- SC measurements collected from wells MW-05-02, -03, and -04 in October 2006 ranged from 25,280 to 53,652 microsiemens per centimeter (µS/cm). These measurements are consistent with those collected during previous sampling events and indicative of saline groundwater conditions.
- In October 2006, DO levels ranged from 0.85 to 1.37 milligrams per liter (mg/L), and redox (electrical) potential (Eh) ranged from +112.1 to +197 millivolts. Consistent with previous sampling events, these values indicate an aerobic, mildly oxidizing environment in the vicinity of wells MW-05-02, -03, and -04.
- Turbidity, which ranged from 1.4 to 16 NTUs (clear to turbid), was below 5 NTUs in one of the three wells (MW-05-04) in October 2006.

Metals. Over the course of the groundwater monitoring program, the following three metals (hexavalent chromium, nickel, and zinc) have been reported in well MW-05-02 at concentrations exceeding their respective screening values.

- Hexavalent chromium was reported at a concentration of 55.5 J (data qualifier "J" indicates an estimated value) µg/L during the first annual monitoring event (September/October 2004). This concentration exceeded the screening value

(CTR criterion) of 50 µg/L. However, total chromium (which includes trivalent and hexavalent chromium) was not reported above the detection limit of 3 µg/L in this sample. Hexavalent chromium was not reported above detection limits during the two preceding or two subsequent sampling events.

- Nickel was reported above the screening value (stationwide ULBV) of 17.5 µg/L during the October 2003 baseline monitoring event at a concentration of 20.9 µg/L. During the four subsequent monitoring events, reported concentrations ranged from 2 U (data qualifier "U" indicates nondetect) to 5.6 µg/L, which are well below the screening value.
- Zinc was reported above the screening value (CTR criterion) of 81 µg/L during the October 2003 baseline monitoring event at a concentration of 115 µg/L. During the four subsequent monitoring events, reported concentrations ranged from 3 U to 8.38 J µg/L, which are well below the screening value.

VOCs. Over the course of the groundwater monitoring program, MTBE has been reported in well MW-05-04. MTBE was reported in well MW-05-04 at 12 NJ (data qualifier "N" indicates a tentatively identified compound) µg/L in October 2003. During the four subsequent sampling events, MTBE was analyzed as a target analyte and reported at increasing concentrations of 12, 18, 36, and 50 µg/L. The source of the MTBE is likely the petroleum hydrocarbon plume at IR Site 14, which is adjacent to and upgradient of IR Site 5.

Perchlorate. In October 2006, groundwater samples were collected from wells MW-05-02, -03, and -04 and analyzed for perchlorate at the request of RWQCB, Santa Ana Region. Perchlorate was not reported above detection limits in any wells sampled in October 2006. Using U.S. EPA Method 314.0, results were reported at 1 U µg/L. Using the laboratory-specific HPLC/ESI/MS method, results were reported at 0.051 U µg/L.

Concentration Trends. Time series concentration plots were prepared for target analytes that were reported above detection limits at least three times in a given well. The time series concentration plots for IR Site 5 wells are shown in Appendix F, Figure F-1. These plots indicate potentially decreasing trends for nickel and zinc in well MW-05-02, and an increasing trend for MTBE in well MW-05-04. Plots were not generated for hexavalent chromium in well MW-05-02 since this analyte was reported above detection limits only once over the course of five sampling events.

Statistically significant trends in contaminant concentrations were identified using the Mann-Kendall statistical test for trends (U.S. EPA 1996). Results of the trend analysis for IR Site 5 are shown in Appendix G and summarized in Table 5. The results indicate decreasing trends for nickel and zinc in well MW-05-02 and an increasing trend for MTBE in well MW-05-04. A trend analysis was not performed for hexavalent chromium in well MW-05-02 since 80 percent of the results are nondetect.

Uncertainties. Fixed-base laboratory analyses of groundwater samples from IR Site 5 were performed in accordance with the analytical methods required by the Work Plan (BEI 2003) and Addendum No. 1 to the final SAP (BEI 2006). These methods are

summarized in Table 2. For all targeted analytes, the MDLs were below applicable screening values.

4.2 IR SITE 7 – STATION LANDFILL

Evaluation of groundwater levels and chemistry at IR Site 7 is presented in the following subsections.

4.2.1 Groundwater Levels

The groundwater elevations measured during the third annual monitoring event in October 2006 ranged from a low of 1.37 feet below MSL at well W-45 to a high of 3.25 feet above MSL at well W-43. The groundwater-level measurements and resultant elevation contours (shown on Figure 5) indicate a groundwater flow direction that is generally east to northeast with a horizontal gradient across the site of approximately 0.004 foot per foot. A comparison of the most recent (October 2006) data with data obtained between November 1988 and October 2005 (Appendix B, Table B-2) indicates little variation in the gradient, but considerable variation in flow direction. From November 1988 to October 2006, the groundwater gradient has ranged from 0.0003 to 0.008 foot per foot. Over this same time period, the predominant flow direction across the site appears to be east to northeast; however, flow directions to the southeast and southwest have also been reported.

Groundwater-level measurements from IR Site 7 indicate a complex groundwater flow pattern due to tidal influence and the presence of several surface water bodies (tidal pond and channel to the northwest; Perimeter Pond, East Pond, and the interconnecting channel at the west end of the site; the Orange County Flood Control Channel [Bolsa Chica segment] immediately south of the site; and the drainage ditch forming the southeast site boundary). The groundwater gradient at IR Site 7 is likely more influenced by tides and the presence of these surface water bodies than by rainfall and seasonal influences.

4.2.2 Groundwater Chemistry

An evaluation of the field parameters and target analytes recommended in the Second Annual Groundwater Monitoring Report (MARRS 2006) is presented in this subsection.

Field Parameters. The following field parameters, which have been measured over the course of the groundwater monitoring program, are compiled in Appendix C, Table C-1.

- The temperature of IR Site 7 groundwater measured during October 2006 ranged from 19.8 to 22.57 °C. These temperatures are consistent with previous fall measurements collected during the first 2 years of the groundwater monitoring program.
- During October 2006, pH ranged from 5.44 to 6.56. This range of pH values is consistent with previous measurements and indicative of slightly acidic groundwater conditions.
- SC measurements collected from IR Site 7 wells in October 2006 ranged from 60,840 to 77,095 µS/cm. These measurements are consistent with those

collected during previous sampling events and indicative of saline groundwater conditions.

- In October 2006, DO levels ranged from 0.53 to 1.12 mg/L, and Eh ranged from -30.5 to +340.1 millivolts. Consistent with previous sampling events, these values indicate an anaerobic, slightly reducing to slightly oxidizing environment.
- Turbidity, which ranged from 0.3 to 9.3 NTUs (clear to turbid), was equal to or below 5 NTUs in six of the eight wells sampled in October 2006.

Metals. The following two metals (cadmium and cobalt) have been reported above screening values in one or more samples collected from wells W-45 and W-41, respectively.

- Cadmium was reported above detection limits in 9 of 14 samples collected from well W-45 since May 1989. Two samples exceeded the screening value (stationwide ULBV) of 16.4 µg/L, with concentrations of 19.3 µg/L reported in September 1998 and 17 µg/L reported in October 2004. The lowest concentrations of cadmium in well W-45 were reported in November 2005 (4.39 µg/L) and October 2006 (3.1 µg/L).
- Cobalt was reported above detection limits in 11 of 11 samples collected from well W-41 since December 1993. Nine samples were reported at concentrations above the screening value (stationwide ULBV) of 16.6 µg/L. Concentrations ranged from a low of 10.2 B (data qualifier "B" indicates an estimated value) µg/L in July 1998 to a high of 38.6 µg/L in April 2004. Concentrations reported between December 1993 and September 1998 are generally lower than those reported over the course of the current groundwater monitoring program (from October 2003 to October 2006). The most likely source of cobalt in well W-41 is the surface and near-surface metal debris disposed in Areas 3 and 4 (to the west and southwest, respectively) immediately upgradient of the well. As discussed in Section 1.3.2, this debris was removed during the non-time-critical removal action conducted in 2003/2004.

Pesticides. Fifteen pesticides have been reported above the primary screening value (stationwide ULBV) of nondetect in one or more samples collected from IR Site 7 wells. The following six pesticides exceeded screening values deemed protective of the marine environment.

- 4,4′-dichlorodiphenyldichloroethane (DDD) was reported above the supplemental screening value of 0.001 µg/L in one of nine samples collected from well 07M01 since January 1994. A concentration of 0.0032 J µg/L was reported in well 07M01 in April 2004. 4,4′-DDD was also reported above the supplemental screening value in one of nine samples collected from well W-41 since December 1993. A concentration of 0.0056 J µg/L was reported in well W-41 in April 2004. 4,4′-DDD was not reported above detection limits in any other samples collected from these wells.
- 4,4′-dichlorodiphenyldichloroethene (DDE) was reported above the supplemental screening value of 0.001 µg/L in one of nine samples collected

from well W-43 since December 1993. A concentration of 0.0023 J µg/L was reported in April 2004. 4,4′-DDE was not reported above detection limits in any other samples collected from this well.

- 4,4′-DDT was reported above the CTR screening value of 0.001 µg/L in one of nine samples collected from wells W-42, -43, and -45 since December 1993. 4,4′-DDT was reported in well W-42 at 0.0014 J µg/L in October 2006, in well W-43 at 0.0044 J µg/L in April 2004, and in well W-45 at 0.0019 J µg/L in October 2004. 4,4′-DDT was not reported above detection limits in any other samples collected from these wells.
- Dieldrin was reported above the CTR screening value of 0.0019 µg/L in one of nine samples collected from well W-43 since December 1993. A concentration of 0.0026 J µg/L was reported in April 2004. Dieldrin was not reported above detection limits in any other samples collected from this well.
- Gamma-chlordane was reported above the CTR screening value of 0.004 µg/L in one of nine samples collected from well 07M01 since January 1994. A concentration of 0.0049 J µg/L was reported in April 2004. Gamma-chlordane was also reported in this well above detection limits but below the CTR value in October 2006 at a concentration of 0.0016 J µg/L. This pesticide was not reported above detection limits in any other samples collected from well 07M01.
- Heptachlor was reported above the CTR screening value of 0.0036 µg/L in one of nine samples collected from well 07M01 since January 1994. A concentration of 0.0065 J µg/L was reported in October 2004. Heptachlor was also reported in this well above detection limits but below the CTR value in October 2006 at a concentration of 0.0011 J µg/L. This pesticide was not reported above detection limits in any other samples collected from well 07M01.

The remaining pesticides reported in IR Site 7 groundwater samples at concentrations above the stationwide ULBV of nondetect were aldrin, alpha-benzene hexachloride (BHC), beta-BHC, gamma-BHC (lindane), endosulfan I, endosulfan II, endrin ketone, heptachlor epoxide, and methoxychlor. The reported concentrations of these pesticides, however, did not exceed screening values deemed protective of the marine environment.

Cyanide. Cyanide has been reported above detection limits and the screening value (CTR criterion) of 1 µg/L in one or more samples collected from the following IR Site 7 wells.

- For well 07M01, cyanide was reported above detection limits and the CTR screening value in 9 of 11 samples collected since January 1994. Concentrations ranged from 4 J µg/L in October 2004 to 501 µg/L in July 1994.
- For well W-42, cyanide was reported above detection limits and the CTR screening value in 4 of 11 samples collected since December 1993. Concentrations ranged from 3 J µg/L in October 2006 to 15 µg/L in October 1994.
- For wells MW-04-02, -03, and -04, cyanide was reported above detection limits and the CTR screening value in one of five samples collected since the start of the groundwater monitoring program in October 2003. Concentrations were

reported at 3 J µg/L in October 2006 for wells MW-04-02 and -03, and at 3 J µg/L in September 2004 for well MW-04-04.

Perchlorate. In October 2006, groundwater samples were collected from wells W-42, -43, and -45 and analyzed for perchlorate at the request of RWQCB, Santa Ana Region. Perchlorate was not reported above detection limits in any wells sampled in October 2006. Using U.S. EPA Method 314.0, results were reported at 1 U µg/L. Using the laboratory-specific HPLC/ESI/MS method, results were reported at 0.051 U µg/L.

Concentration Trends. Time series concentration plots were prepared for target analytes that were reported above detection limits at least three times in a given well. The time series concentration plots for the following IR Site 7 wells are shown in Appendix F, Figure F-2.

- For well W-41, the plot for cobalt indicates a potentially increasing trend. This apparent trend is driven largely by the step increase in concentrations between previous sampling programs (December 1993 through September 1998) and the current groundwater monitoring program (October 2003 through October 2006). Over the course of the current program, concentrations appear relatively consistent.
- For well W-45, the plot for cadmium indicates an increasing trend between May 1989 and September 1998, followed by a decreasing trend from September 1998 to October 2006.
- For wells 07M01 and W-42, the plots for cyanide are unremarkable in terms of trend assessment.

Statistically significant trends in contaminant concentrations were identified using the Mann-Kendall statistical test for trends (U.S. EPA 1996). Results of the trend analysis for IR Site 7 are shown in Appendix G and summarized in Table 5.

Two cases were evaluated for each target analyte. Case 1 evaluated trends over the last ten sampling events (i.e., the five events conducted from April 1994 to September 1998 prior to the start of the current monitoring program, plus the five events conducted from October 2003 to October 2006 under the current monitoring program). Case 2 evaluated only data collected over the course of the current monitoring program. The Mann-Kendall test for trends was not performed for pesticides since the analytical results consist almost entirely of data at or below detection limits. The following summarizes trend results for the IR Site 7 target analytes.

- For cobalt in well W-41, there is a statistically significant increasing trend at the 80 and 90 percent confidence levels for the period of April 1994 to October 2006 (Case 1). No trends at the 80 and 90 percent confidence levels were exhibited from October 2003 to October 2006 (Case 2). The coefficient of variation test was used to evaluate the stability/instability of the cobalt results. Test results at the 80 percent confidence level indicate that the cobalt results are stable.
- For cadmium in well W-45, no trends were exhibited for the period of April 1994 to October 2006 (Case 1) and the result at the 80 percent confidence level

is stable. From October 2003 to October 2006 (Case 2), a decreasing trend was determined at the 80 percent confidence level with no trend apparent at the 90 percent confidence level.

- For cyanide in well 07M01, no trends were exhibited for either of the two cases evaluated. For Case 1, the no trend result at the 80 percent confidence level is nonstable, while the no trend result for Case 2 is stable.
- For cyanide in well W-42, no trends were exhibited for either of the two cases evaluated, and the no trend results at the 80 percent confidence level are stable. It should be noted, however, that 70 to 80 percent of the cyanide results used in this trend evaluation were reported as nondetect.

Uncertainties. Fixed-base laboratory analyses of groundwater samples from IR Site 7 were performed in accordance with the analytical methods required by the Work Plan (BEI 2003) and Addendum No. 1 to the final SAP (BEI 2006). These methods are summarized in Table 2. For all targeted analytes, with the exception of cyanide, the MDLs were below applicable screening values. All analytical results not reported above the detection limit for cyanide using U.S. EPA Method 335.2 had detection limits greater than the screening value (CTR criterion) of 1 µg/L.

Cyanide generally exists in three forms: free cyanide, simple cyanide, and complex metal cyanides. Free cyanide consists of the cyanide anion and uncharged hydrogen cyanide, which is also known as hydrocyanic acid in the aqueous phase. Simple cyanides include the water soluble compounds of sodium cyanide, potassium cyanide, and calcium cyanide. Complex metal cyanides are made up of strong metal-cyanide complexes of iron, and the weak and moderately strong metal-cyanide complexes of cadmium, copper, mercury, nickel, silver, and zinc.

Analytical results obtained using U.S. EPA Method 335.2 are a measure of total cyanide, which includes free cyanide, simple cyanide, and complex metal cyanides. Over the course of the groundwater monitoring program, the MDLs for total cyanide have generally been in the range of 2 to 4 µg/L with a high of 10 µg/L used during the second annual sampling event in October/November 2005. The screening value (CTR criterion) of 1 µg/L is based on free cyanide and was developed by U.S. EPA using marine species not common to Pacific Coast waters. Two recent studies have estimated site-specific criteria for West Coast locations (Brix et al. 2000, RWQCB 2006). These studies refined the source data by including recent cyanide toxicity data and limiting the species list to West Coast species. These studies proposed revised criteria for free cyanide of 2.9 µg/L for long-term exposure and 9.4 µg/L for short-term exposure.

Comparing the analytical results for total cyanide (obtained using U.S. EPA Method 335.2) to a free cyanide-based screening value intentionally overestimates the potential impact to the marine environment. While there is some uncertainty associated with the extent to which free cyanide may be present at the site, given recent studies there is little uncertainty regarding the potential impact its presence may have on the marine environment.

Section 5
CONCLUSIONS AND RECOMMENDATIONS

This section presents the conclusions and recommendations for IR Sites 5 and 7 based on the evaluation of data obtained through the third year of groundwater monitoring. Conclusions are provided in the form of answers to specific decision questions developed as part of the DQOs. Recommendations for subsequent groundwater monitoring have been determined on the basis of specific decision rules developed as part of the DQOs.

5.1 IR SITE 5 – CLEAN FILL DISPOSAL AREA

The conclusions about groundwater at IR Site 5, based on data obtained through the third year of the groundwater monitoring program, and recommendations for further monitoring are provided below.

5.1.1 Conclusions (Derived From Primary Decision Questions)

The primary objectives of the IR Site 5 groundwater monitoring program are as follows.

- Determine whether COPCs are present in groundwater at concentrations above screening values and whether these COPCs could reach potential discharge points or ecological receptors.
- Determine the extent to which COPC concentrations in groundwater may be changing over time.

These objectives are reflected in the primary decision questions developed in Step 2 of the DQO process (Appendix A, Table A-1). Below are the decision questions and answers.

Will COPCs reach potential points of discharge at concentrations above California Toxics Rule Criteria for Enclosed Bays and Estuaries (Salt Water Aquatic Life Protection 4-day Averages) or stationwide background levels for groundwater and threaten downgradient receptors?

- **Metals**. Hexavalent chromium, nickel, and zinc were each reported above screening values in only one of five samples collected from well MW-05-02 over the course of the groundwater monitoring program. During the other four sampling events, concentrations remained well below screening values. While there is a potential for these metals to reach a hypothetical point of discharge to surface water (located approximately 100 feet downgradient), the potential to affect surface water at concentrations above screening values is considered extremely low.
- **MTBE**. MTBE was reported in five of five samples collected from well MW-05-04 over the course of the groundwater monitoring program; however, concentrations were well below the established screening value. It is therefore unlikely that the MTBE reported in groundwater would adversely affect the marine environment.
- **Perchlorate**. Perchlorate was not reported above detection limits in samples collected from wells MW-05-02, -03, or -04 and is not a COPC.

Are COPC concentrations increasing or decreasing with time?

- **Metals**. The time series concentration plots (Appendix F, Figure F-1) and the Mann-Kendall test for trends (Table 5) indicate decreasing trends for nickel and zinc in well MW-05-02. Trends were not determined for hexavalent chromium due to the predominance of nondetect results.
- **MTBE**. The concentration plots and trend analysis indicate an increasing trend for MTBE in well MW-05-04.

Are all wells needed for continued monitoring?

- All five wells currently installed at IR Site 5 were used during the third year to monitor groundwater chemistry and levels. These wells should be retained for the duration of groundwater monitoring at IR Site 5, subject to the recommendations in Section 5.1.2.

5.1.2 Recommendations (Derived From Decision Rules)

Recommendations for IR Site 5 are summarized as follows.

- Discontinue groundwater sampling and groundwater-level monitoring.
- Include the evaluation of MTBE in well MW-05-04 as part of the IR Site 14 groundwater monitoring program and retain all other IR Site 5 wells for potential future use in monitoring the IR Site 14 petroleum hydrocarbon plume.

These recommendations are based on specific decision rules and their responses as discussed below.

Specific decision rules in the form of "if-then" statements were established in Step 5 of the DQOs (Appendix A, Table A-1) to provide a systematic basis for determining what recommendations should be made for future monitoring. The following decision rules and responses were established for IR Site 5.

If monitoring indicates that COPCs with concentrations in excess of screening values might reach potential discharge points or ecological receptors, then evaluation of additional actions will be recommended.

- **Metals**. While there is a potential for hexavalent chromium, nickel, and zinc reported in well MW-05-02 to reach a hypothetical point of discharge to nearby surface water, the potential to affect surface water at concentrations above screening values is considered extremely low. Therefore, additional actions for these metals are deemed unnecessary.
- **MTBE**. Concentrations of MTBE reported in well MW-05-04 have remained well below the screening value and are unlikely to adversely affect the marine environment. However, the MTBE concentrations are increasing, and as discussed in Section 4.1.2, the source of the MTBE is likely the petroleum hydrocarbon plume at IR Site 14, which is located adjacent to and upgradient of IR Site 5. Any additional actions necessary to assess the extent of MTBE contamination and monitor potential migration should be addressed as part of the ongoing monitoring program at IR Site 14.

If COPC concentrations indicate stable or decreasing trends, then a recommendation will be made to either reduce the monitoring frequency or discontinue monitoring. If COPC concentrations indicate increasing trends, then continued monitoring will be recommended.

- **Metals**. The time series concentration plots and the Mann-Kendall trend analysis indicate decreasing trends for nickel and zinc in well MW-05-02. A trend evaluation was not required for hexavalent chromium due to the predominance of nondetect results. Therefore, no further monitoring is recommended.
- **MTBE**. The concentration plots and trend analysis indicate an increasing trend for MTBE in well MW-05-04. Therefore, evaluation of MTBE in well MW-05-04 as part of the IR Site 14 groundwater monitoring program is recommended.

If wells are not required for monitoring or water-level measurements, then the well(s) will be recommended for abandonment (destruction).

- Although the wells at IR Site 5 are no longer required to support continued monitoring at the site, it is recommended that these wells be retained for potential future use in monitoring the IR Site 14 petroleum hydrocarbon plume.

5.2 IR SITE 7 – STATION LANDFILL

The conclusions about groundwater at IR Site 7, based on data obtained through the third year of the groundwater monitoring program, and recommendations for further monitoring are provided below.

5.2.1 Conclusions (Derived From Primary Decision Questions)

The primary objectives of the IR Site 7 groundwater monitoring program are as follows.

- Determine whether COPCs are present in groundwater at concentrations above screening values and whether these COPCs could reach potential discharge points or ecological receptors.
- Determine the extent to which COPC concentrations in groundwater may be changing over time.

These objectives are reflected in the primary decision questions developed in Step 2 of the DQO process (Appendix A, Table A-2). Below are the decision questions and answers.

Will COPCs reach potential points of discharge at concentrations above California Toxics Rule Criteria for Enclosed Bays and Estuaries (Salt Water Aquatic Life Protection 4-day Averages) or stationwide background levels for groundwater and threaten downgradient receptors?

- **Metals.** Cadmium was reported at concentrations slightly exceeding the screening value (stationwide ULBV) of 16.4 µg/L in 2 of 14 samples collected from well W-45 since May 1989. A concentration of 19.3 µg/L was reported in September 1998 and 17 µg/L was reported in October 2004. The nearest surface water body is the drainage ditch located approximately 280 feet south-southeast

of the well. While there is a potential for cadmium to reach a hypothetical point of discharge to this drainage ditch, the potential to affect surface water at concentrations above the screening value is considered extremely low.

Cobalt was reported in 9 of 11 samples collected from well W-41 since December 1993 at concentrations exceeding the screening value (stationwide ULBV) of 16.6 µg/L. Concentrations reported above the screening value ranged from 19.1 B to 38.6 µg/L. The nearest surface water body is the interconnecting channel between Perimeter Pond and East Pond located approximately 375 feet southwest and upgradient of the well. While there is a potential for cobalt to reach a hypothetical point of discharge to this channel, the potential to affect surface water at concentrations above the screening value is considered extremely low.

Cobalt ($Co^{+2}_{(aq)}$) in the +2 valence state exists in natural groundwater and surface water and is strongly sorbed to inorganic solids (minerals and clays) and organic matter that constitute the matrix. In the pH range of 4.0 to 10.0, distribution coefficients for liquid/solid partitioning are high, ranging from 10^3 to 10^5 milliliters per gram (Serne et al. 1993). Groundwater at IR Site 7 has a mean pH of 6.6 (range 6.05 to 7.12 [slightly acidic to near neutral]). Under these pH conditions, the cobalt reported in well W-41 is expected to strongly adsorb to the surface of inorganic and organic matrix material and would not be readily transported to nearby surface waters. In the unlikely event that cobalt were to discharge to surface water, it would be diluted due to semidiurnal tidal effects, with most of the dilution occurring within approximately 50 feet inland of the groundwater-surface water interface (JEG 1995).

- **Pesticides**. Fifteen pesticides were reported above the primary screening value (stationwide ULBV) of nondetect in one or more samples collected from wells 07M01 and W-41, -42, -43, and -45 over the course of the groundwater monitoring program. Six of these pesticides (4,4′-DDD, 4,4′-DDE, 4,4′-DDT, dieldrin, gamma-chlordane, and heptachlor) exceeded a supplemental screening value deemed protective of the marine environment in only one of nine samples collected from each well since December 1993/January 1994. The nearest surface water bodies include the Orange County flood control channel, 190 feet south of well 07M01 and 75 feet south of well W-42; the interconnecting channel between Perimeter Pond and East Pond, 375 feet southwest of well W-41; East Pond, 110 feet west of well W-43; and the drainage ditch, 280 feet south-southeast of well W-45. While there is a potential for pesticides to reach a hypothetical point of discharge to these surface water bodies, the potential to affect surface water at concentrations above those deemed protective of the marine environment is considered extremely low.

- **Cyanide**. Total cyanide (free, simple, and metal-cyanide complexes) was reported above detection limits and the screening value (CTR criterion) of 1 µg/L (free cyanide) in one or more groundwater samples collected from IR Site 7 between December 1993 and October 2006. For well 07M01, cyanide was reported above detection limits and the CTR screening value in 9 of 11 groundwater samples collected since January 1994 at concentrations from 4 J µg/L in October 2004 to 501 µg/L in July 1994. For well W-42, cyanide was reported above detection limits and the CTR screening value in 4 of

11 groundwater samples collected since December 1993 at concentrations from 3 J µg/L in October 2006 to 15 µg/L in October 1994. For wells MW-04-02, -03, and -04, cyanide was reported above detection limits and the CTR screening value in one of five groundwater samples collected since the start of the groundwater monitoring program in October 2003. Concentrations were reported at 3 J µg/L in October 2006 for wells MW-04-02 and -03, and at 3 J µg/L in September 2004 for well MW-04-04.

A fate and transport evaluation of cyanide reported in groundwater at IR Site 7 (Appendix H) concluded that the low concentrations and chemical properties of cyanide, and the geochemical and physical conditions of the groundwater and surface water near the site, preclude the possibility that this contaminant would persist or pose a significant risk to aquatic receptors.

- **Perchlorate**. Perchlorate was not reported above detection limits in samples collected from wells W-42, -43, or -45 and is not a COPC.

Are COPC concentrations increasing or decreasing with time?

- **Metals**. Time series concentration plots (Appendix F, Figure F-2) and the Mann-Kendall test for trends (Table 5) indicate no increasing or decreasing trend for cadmium in well W-45 during the period from April 1994 to October 2006. Over the course of the groundwater monitoring program (from October 2003 to October 2006), a decreasing trend was determined at the 80 percent confidence level with no trend reported at the 90 percent confidence level.

  For cobalt in well W-41, there is a statistically significant increasing trend at the 80 and 90 percent confidence levels for the period of April 1994 to October 2006. However, no increasing or decreasing trends were exhibited over the course of the groundwater monitoring program (from October 2003 to October 2006), suggesting that cobalt concentrations appear to have stabilized. Given that the most likely source of the cobalt was removed from Areas 3 and 4 during the 2003/2004 non-time-critical removal action, resumption of a long-term upward trend is unlikely.

- **Pesticides**. Trends were not determined for pesticides due to the predominance of nondetect results.

- **Cyanide**. The concentration plots and trend analysis indicate no increasing or decreasing trends for cyanide in wells 07M01 and W-42. Trends were not determined for cyanide reported in wells MW-04-02, -03, and -04 due to the predominance of nondetect results.

Are all wells needed for continued monitoring?

Three wells at IR Site 4 and five wells at IR Site 7 were used during the third year to monitor IR Site 7 groundwater chemistry and levels. These wells should be retained for the duration of groundwater monitoring at IR Site 7, subject to the recommendations in Section 5.2.2.

5.2.2 Recommendations (Derived From Decision Rules)

Recommendations for IR Site 7 are summarized as follows.

- Discontinue groundwater sampling and groundwater-level monitoring.
- Remove (destroy) all IR Sites 4 and 7 monitoring wells.

These recommendations are based on specific decision rules and their responses as discussed below.

Specific decision rules in the form of "if-then" statements were established in Step 5 of the DQOs (Appendix A, Table A-2) to provide a systematic basis for determining what recommendations should be made for future monitoring. The following decision rules and responses were established for IR Site 7.

If monitoring indicates that COPCs with concentrations in excess of screening values might reach potential discharge points or ecological receptors, then evaluation of additional actions will be recommended.

- **Metals**. While there is a potential for cadmium in well W-45 and cobalt in well W-41 to reach hypothetical points of discharge to nearby surface waters, the potential to affect surface waters at concentrations above screening values is extremely low. Therefore, additional actions for these metals are deemed unnecessary.
- **Pesticides**. While there is a potential for selected pesticides to reach hypothetical points of discharge to nearby surface waters, the potential to affect surface waters at concentrations above screening values is extremely low. Therefore, additional actions for pesticides are deemed unnecessary.
- **Cyanide**. The fate and transport evaluation of cyanide reported in groundwater at IR Site 7 (Appendix H) concluded that the low concentrations and chemical properties of cyanide, and the geochemical and physical conditions of the groundwater and surface water near the site, preclude the possibility that this contaminant would persist or pose a significant risk to aquatic receptors. Therefore, additional actions for cyanide are deemed unnecessary.

If COPC concentrations indicate stable or decreasing trends, then a recommendation will be made to either reduce the monitoring frequency or discontinue monitoring. If COPC concentrations indicate increasing trends, then continued monitoring will be recommended.

- **Metals**. The time series concentration plots and Mann-Kendall trend analysis for cadmium in well W-45 indicate stable or decreasing trends. Therefore, no further monitoring for cadmium is recommended. For cobalt in well W-41, an increasing trend is apparent for the period of April 1994 to October 2006. However, concentrations appear to have stabilized over the course of the groundwater monitoring program (October 2003 to October 2006). Therefore, no further monitoring for cobalt is recommended.

- **Pesticides**. Trends were not determined for pesticides due to the predominance of nondetect results. Due to the low frequency of detection, no further monitoring for pesticides is recommended.
- **Cyanide**. The concentration plots and trend analysis indicate no increasing or decreasing trends for cyanide in wells 07M01 and W-42. Trends were not determined for cyanide reported in wells MW-04-02, -03, and -04 due to the predominance of nondetect results. Due to the absence of trends in wells 07M01 and W-42, and the low frequency of detection in wells MW-04-02, -03, and -04, no further monitoring for cyanide is recommended.

If wells are not required for monitoring or groundwater-level measurements, then the well(s) will be recommended for abandonment (destruction).

Since the wells at IR Sites 4 and 7 are not required for continued monitoring or groundwater-level measurements, all wells are recommended for abandonment (destruction).

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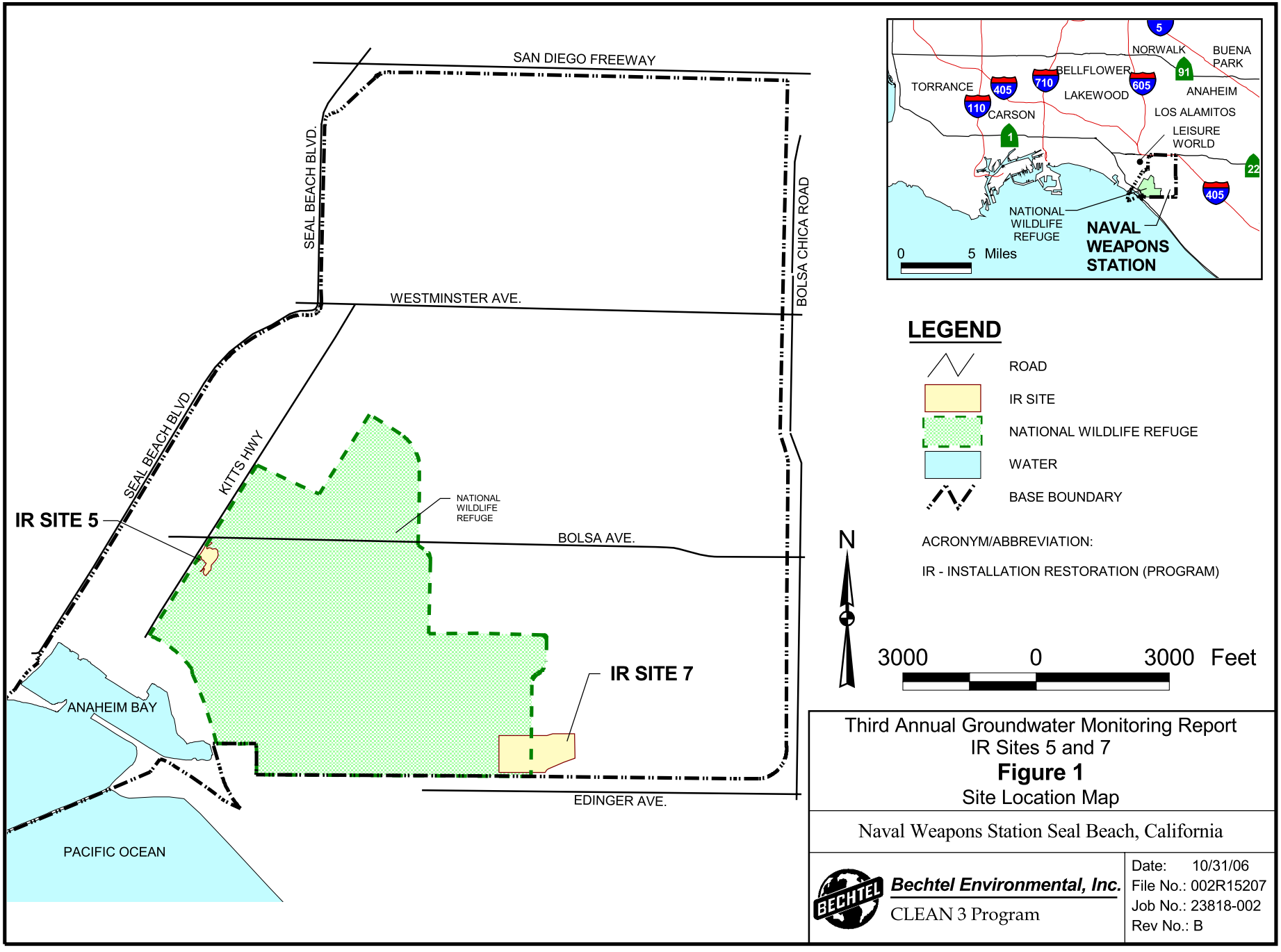
FIGURES



Third Annual Groundwater Monitoring Report
IR Sites 5 and 7

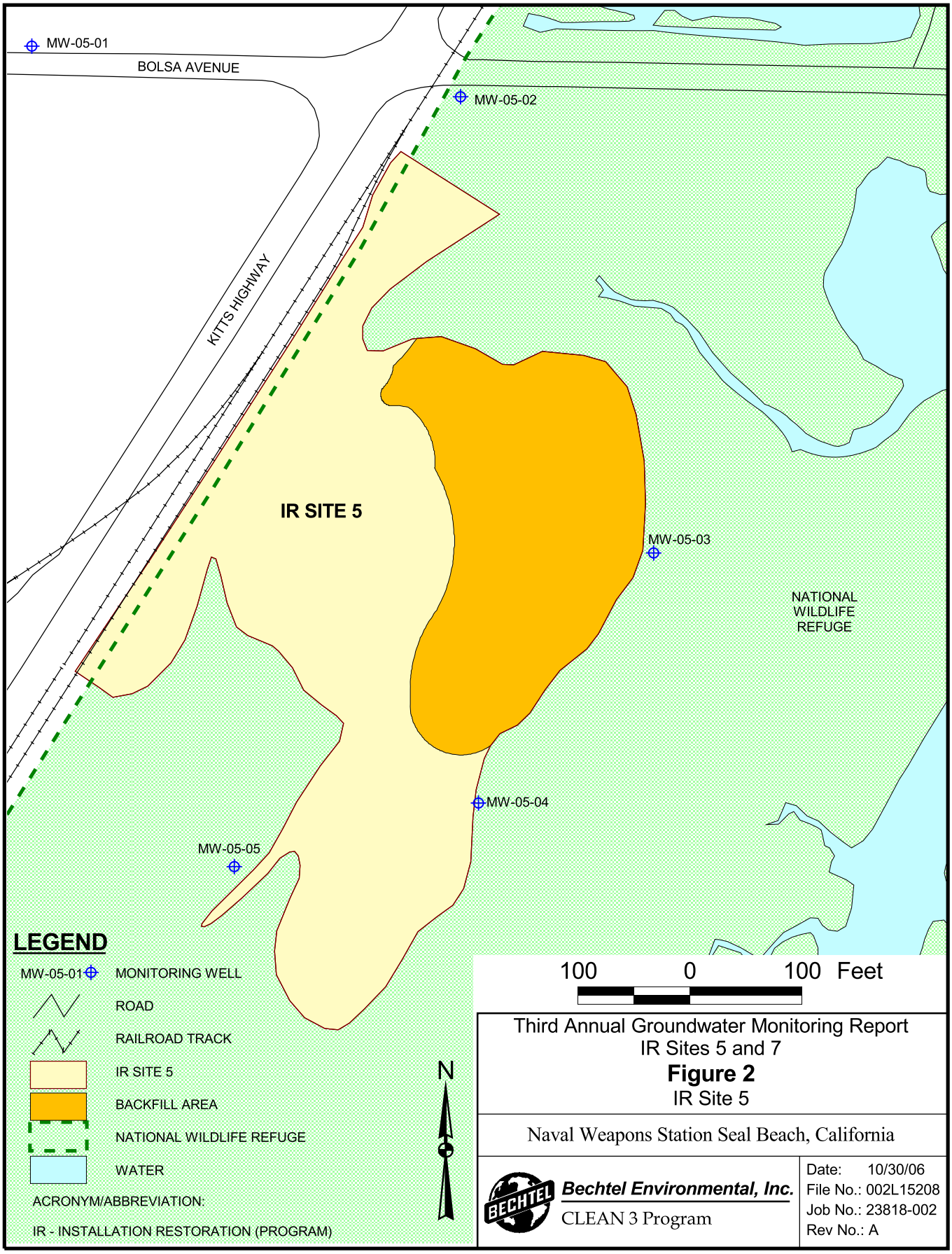
Figure 1

Site Location Map

Naval Weapons Station Seal Beach, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 10/31/06
File No.: 002R15207
Job No.: 23818-002
Rev No.: B



Third Annual Groundwater Monitoring Report
IR Sites 5 and 7

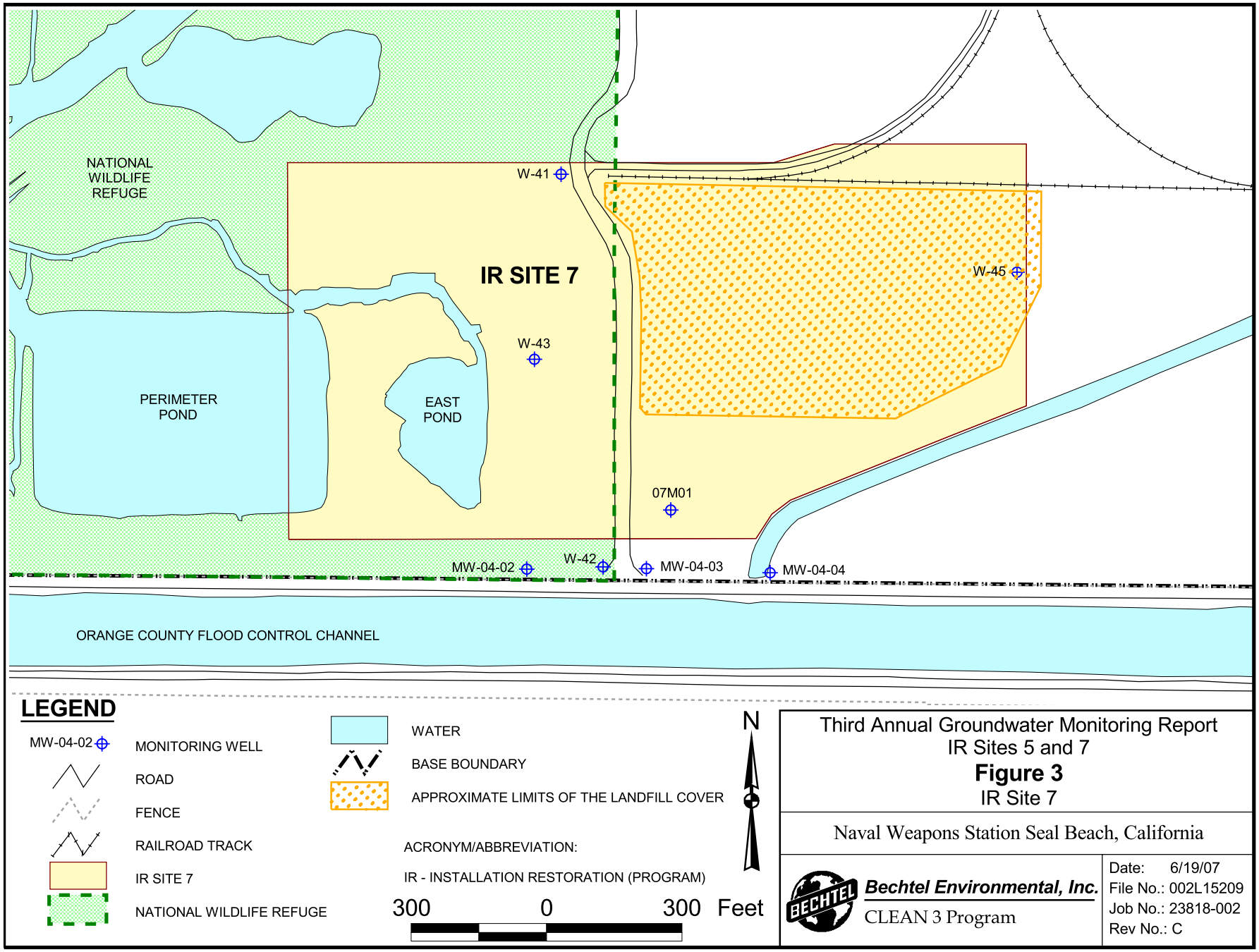
Figure 2

IR Site 5

Naval Weapons Station Seal Beach, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 10/30/06
File No.: 002L15208
Job No.: 23818-002
Rev No.: A



Third Annual Groundwater Monitoring Report
IR Sites 5 and 7

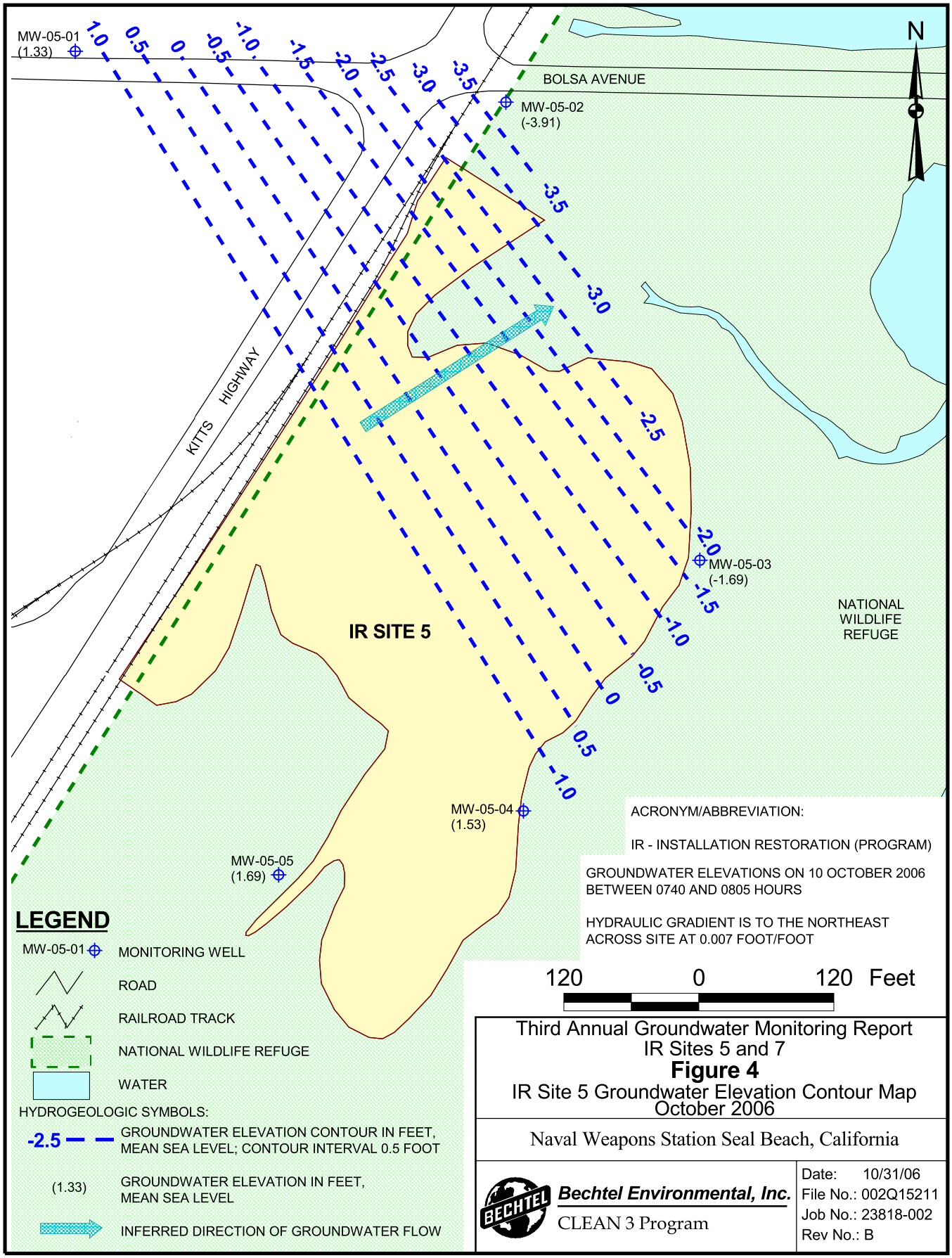
Figure 3

IR Site 7

Naval Weapons Station Seal Beach, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/19/07
File No.: 002L15209
Job No.: 23818-002
Rev No.: C



Third Annual Groundwater Monitoring Report
IR Sites 5 and 7

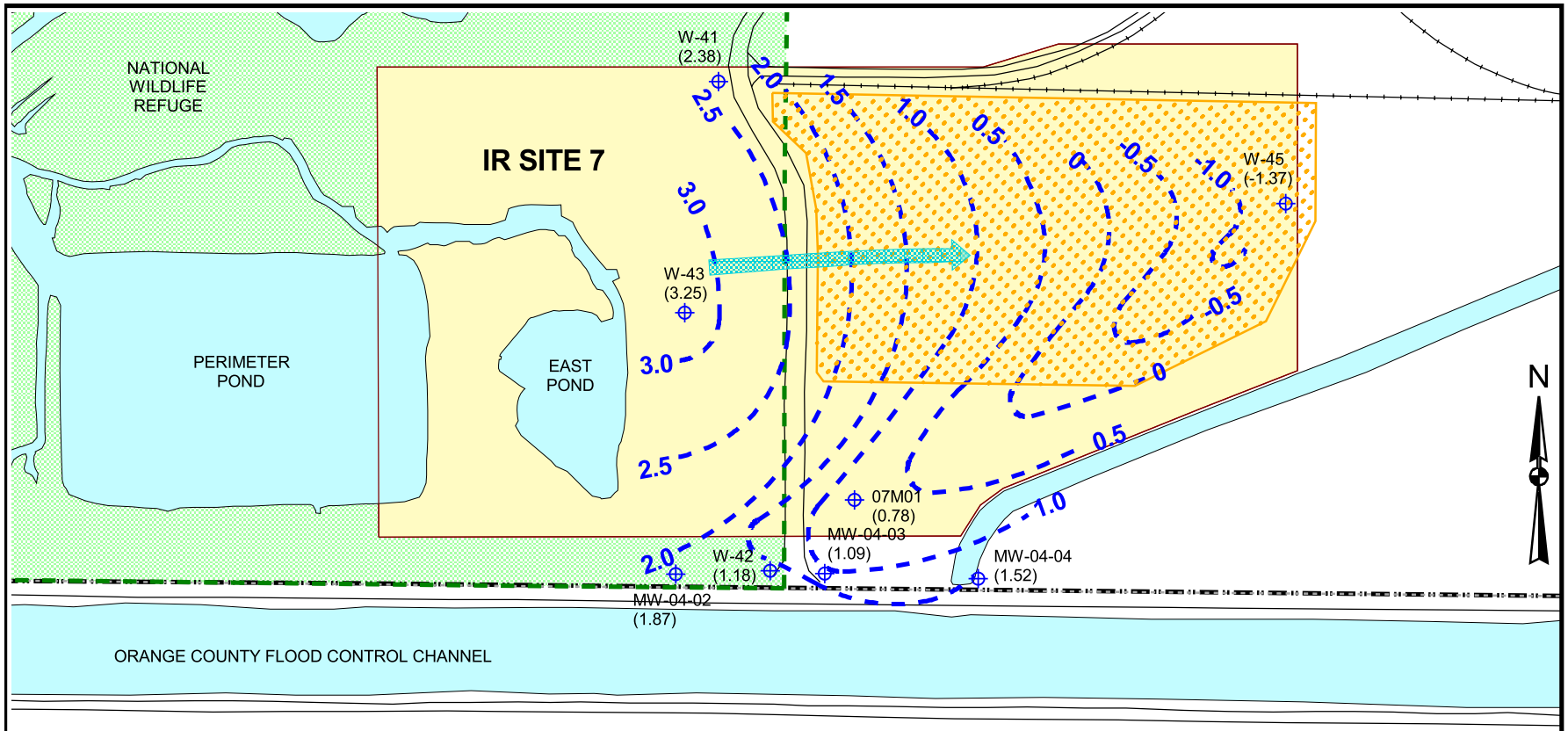
Figure 4

IR Site 5 Groundwater Elevation Contour Map
October 2006

Naval Weapons Station Seal Beach, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 10/31/06
File No.: 002Q15211
Job No.: 23818-002
Rev No.: B



LEGEND

MW-04-02 ⊕ MONITORING WELL

ROAD

FENCE

RAILROAD TRACK

IR SITE 7

NATIONAL WILDLIFE REFUGE

WATER

BASE BOUNDARY

APPROXIMATE LIMITS OF THE LANDFILL COVER

HYDROGEOLOGIC SYMBOLS:

1.0 — GROUNDWATER ELEVATION CONTOUR IN FEET, MEAN SEA LEVEL; CONTOUR INTERVAL 0.5 FOOT

(2.38) GROUNDWATER ELEVATION IN FEET, MEAN SEA LEVEL

INFERRED DIRECTION OF GROUNDWATER FLOW

GROUNDWATER ELEVATIONS ON 09 OCTOBER 2006 BETWEEN 0945 AND 1027 HOURS

HYDRAULIC GRADIENT IS PRIMARILY EAST TO NORTHEAST ACROSS SITE AT APPROXIMATELY 0.004 FOOT/FOOT

GROUNDWATER FLOW DIRECTION AT THIS SITE IS COMPLEX DUE TO TIDAL INFLUENCE AND PRESENCE OF SURFACE WATER BODIES; THEREFORE, CONTOURS ARE AN APPROXIMATION

ACRONYM/ABBREVIATION:

IR - INSTALLATION RESTORATION (PROGRAM)

300 0 300 Feet

Third Annual Groundwater Monitoring Report
IR Sites 5 and 7

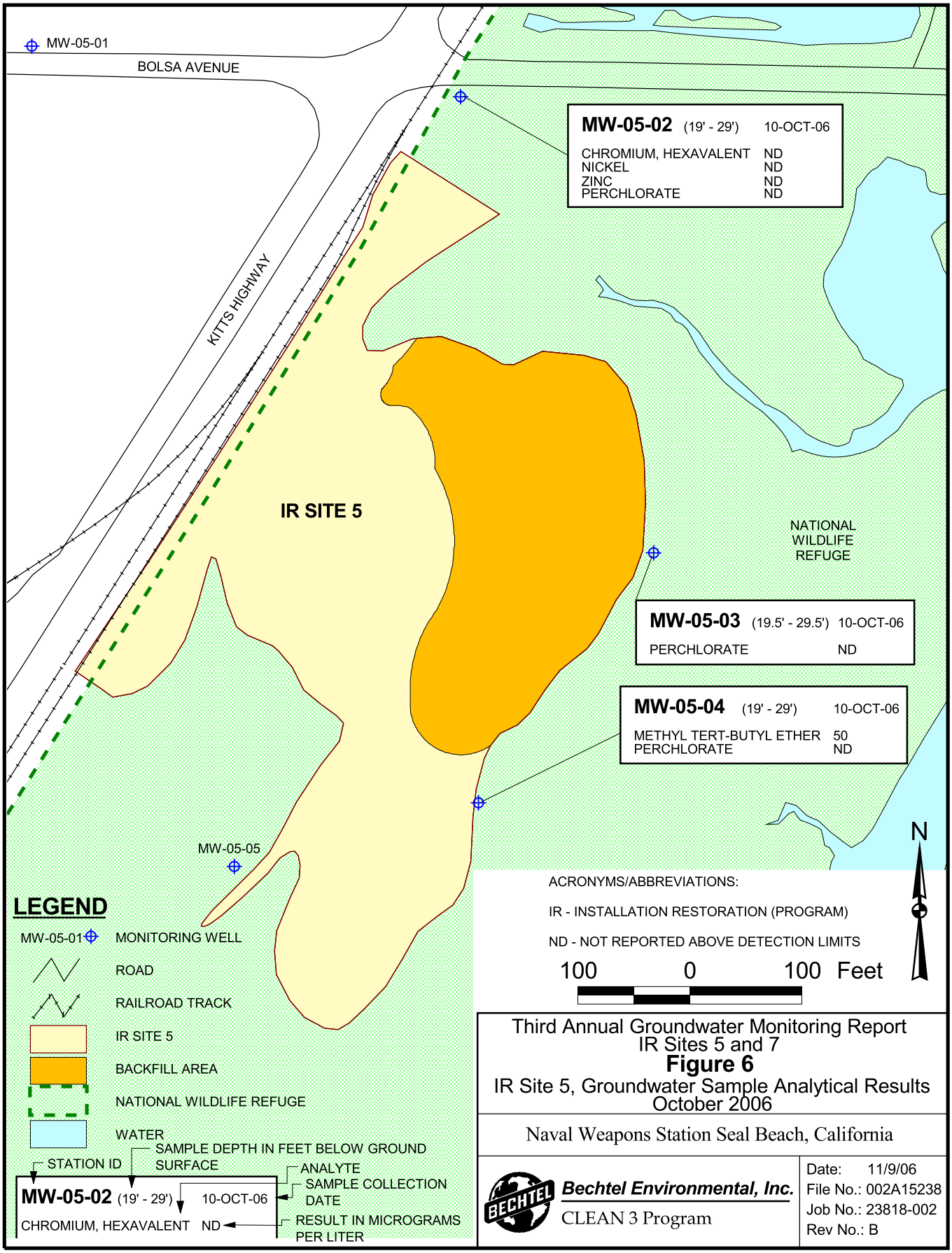
Figure 5

IR Site 7 Groundwater Elevation Contour Map
October 2006

Naval Weapons Station Seal Beach, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/19/07
File No.: 002Q15210
Job No.: 23818-002
Rev No.: B



Third Annual Groundwater Monitoring Report
IR Sites 5 and 7

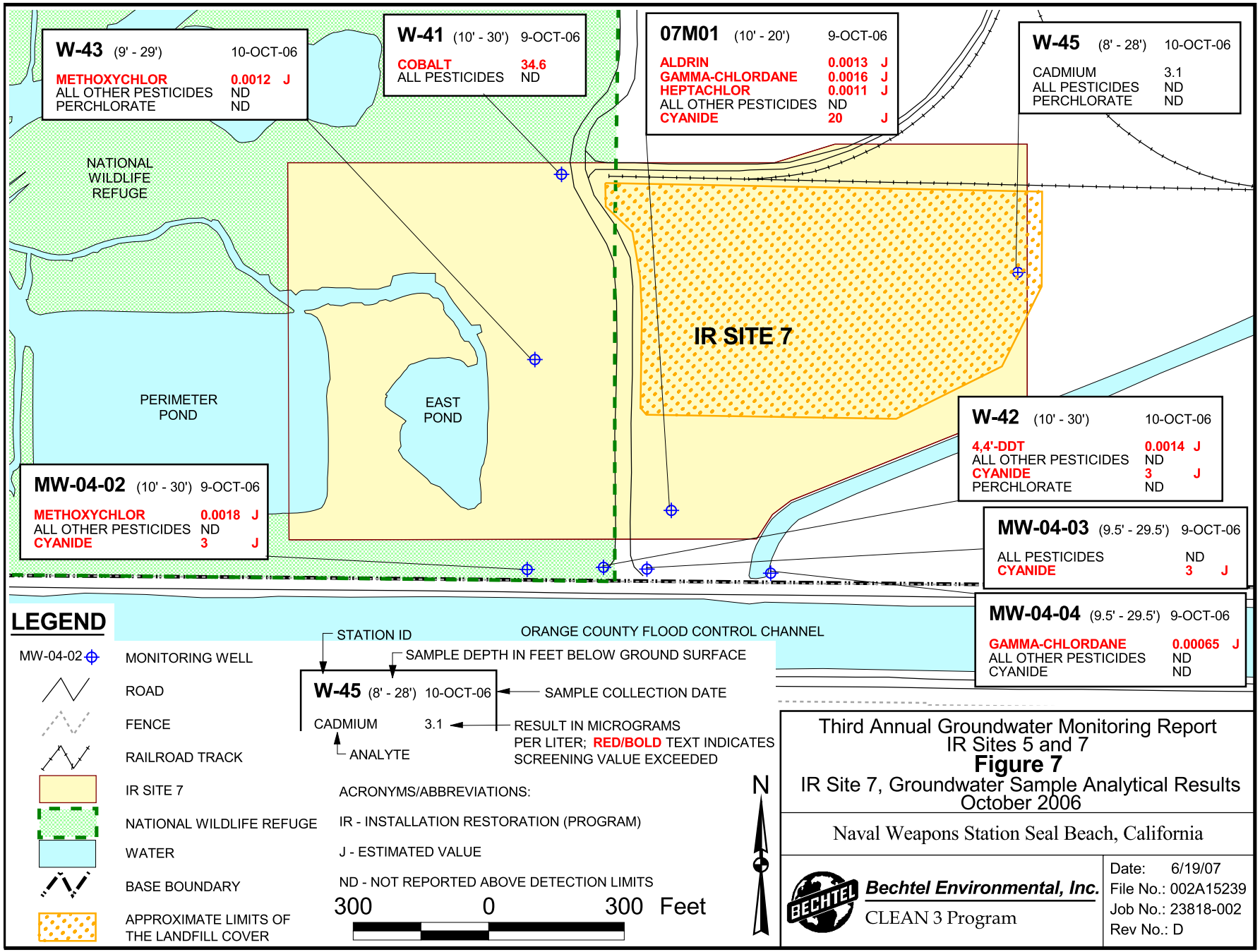
Figure 6

IR Site 5, Groundwater Sample Analytical Results
October 2006

Naval Weapons Station Seal Beach, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 11/9/06
File No.: 002A15238
Job No.: 23818-002
Rev No.: B



Third Annual Groundwater Monitoring Report
IR Sites 5 and 7

Figure 7
IR Site 7, Groundwater Sample Analytical Results
October 2006

Naval Weapons Station Seal Beach, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/19/07
File No.: 002A15239
Job No.: 23818-002
Rev No.: D

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TABLES

Table 1
Field Parameter Readings
October 2006

Well ID	Purge Date	Temperature (°C)	Specific Conductance (µS/cm)	pH	Dissolved Oxygen (mg/L)[a]	Oxidation-Reduction Potential (mV)[a]	Eh (mV)[b]	Turbidity (NTU)
IR Site 5								
MW-05-02	10/10/06	21.12	26,670	6.12	1.37	-87.9	+112.1	16.0
MW-05-03	10/10/06	18.86	53,652	6.27	0.85	-80.0	+120.0	8.5
MW-05-04	10/10/06	19.98	25,280	6.58	0.87	-3.0	+197.0	1.4
IR Site 7								
07M01	10/9/06	20.82	69,261	6.05	8.00[c]	-230.5	-30.5	9.3
W-41	10/9/06	19.80	77,095	6.07	0.76	+140.1	+340.1	5.0
W-42	10/10/06	22.57	68,005	6.25	1.12	+42.1	+242.1	4.0
W-43	10/10/06	20.80	74,111	6.27	0.91	+79.8	+279.8	3.9
W-45	10/10/06	20.72	60,840	5.44	0.87	+135.9	+335.9	6.4
MW-04-02	10/9/06	22.07	72,418	6.56	0.53	+131.9	+331.9	2.5
MW-04-03	10/9/06	21.79	71,280	6.43	0.61	+106.0	+306.0	1.4
MW-04-04	10/9/06	20.32	65,318	6.39	0.59	+113.8	+313.8	0.3

Notes:
[a] dissolved oxygen and oxidation-reduction potential are very sensitive parameters and easily mismeasured; some erroneous measurements may be due to random field error
[b] add 200 mV to oxidation-reduction potential measurement to convert to Eh value, based on use of silver chloride electrode on field measurement instrument
[c] dissolved oxygen probe fouled by algae present in well purgewater; reading is questionable

Acronyms/Abbreviations:
°C – degrees Celsius
Eh – redox (electrical) potential
IR – Installation Restoration (Program)
µS/cm – microsiemens per centimeter
mg/L – milligrams per liter
mV – millivolt
NTU – nephelometric turbidity unit
redox – oxidation-reduction

Table 2
Summary of Laboratory Analyses
October 2006

Well ID	Sample Matrix	ANALYTE (U.S. EPA METHOD)					
		VOCs (8260B)	Pesticides (8081A)	Metals/ICP (6010B/6020)	Hexavalent Chromium (7195A)	Cyanide (335.2/ SW9010B)	Perchlorate (314.0 and HPLC/ESI/MS)
IR Site 5							
MW-05-02	GW			●[a]	●		●
MW-05-03	GW						●
MW-05-04	GW	●[b]					●
IR Site 7							
07M01	GW		●			●	
W-41	GW		●	●[c]			
W-42	GW		●			●	●
W-43	GW		●				●
W-45	GW		●	●[d]			●
MW-04-02	GW		●			●	
MW-04-03	GW		●			●	
MW-04-04	GW		●			●	

Notes:
[a] zinc and nickel only
[b] MTBE only
[c] cobalt only
[d] cadmium only

Acronyms/Abbreviations:
ESI – electrospray ionization
GW – groundwater
HPLC – high performance liquid chromatography
ICP – inductively coupled argon plasma
IR – Installation Restoration (Program)
MS – mass spectrometry
MTBE – methyl tert-butyl ether
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

Table 3
Well Sampling History

Well ID	INVESTIGATION/STUDY* AND SAMPLING DATE														
	Site Inspection (SWDIV 1990)	Remedial Investigation Step One (Weston 1989a,b; 1990)			Remedial Investigation (JEG 1995)				Groundwater Monitoring Study (CH2M HILL 1999)		Groundwater Monitoring Program (BEI 2004a,b; 2005; MARRS 2006)				
	Nov-88	May-89	Aug-89	Nov-89	Dec-93/ Jan-94	Apr-94	Jul-94	Oct-94	Jun/ Jul-98	Sep-98	Oct-03	Mar/ Apr-04	Sep/ Oct-04	Oct/ Nov-05	Oct-06
IR Site 5															
MW-05-02											●	●	●	●	●
MW-05-03											●	●	●	●	●
MW-05-04											●	●	●	●	●
IR Site 7															
07M01					●	●	●	●	●	●	●	●	●	●	●
W-41	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
W-42	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
W-43	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
W-45	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
MW-04-02											●	●	●	●	●
MW-04-03											●	●	●	●	●
MW-04-04											●	●	●	●	●

Note:
* references are listed in Section 6

Acronym/Abbreviation:
IR – Installation Restoration (Program)

Table 4
Summary of Analytical Results[a]

Analyte	Units	Screening Value	Location: IR Site 5 Well ID: MW-05-02 Date Sampled: 10/7/2003	Location: IR Site 5 Well ID: MW-05-02 Date Sampled: 3/30/2004	Location: IR Site 5 Well ID: MW-05-02 Date Sampled: 9/29/2004	Location: IR Site 5 Well ID: MW-05-02 Date Sampled: 11/2/2005	Location: IR Site 5 Well ID: MW-05-02 Date Sampled: 10/10/2006
Volatile Organic Compounds							
methyl tert-butyl ether	µg/L	440	—[b]	—	—	—	—
Pesticides							
aldrin	µg/L	ND	—	—	—	—	—
alpha-BHC	µg/L	ND	—	—	—	—	—
beta-BHC	µg/L	ND	—	—	—	—	—
delta-BHC	µg/L	ND	—	—	—	—	—
gamma-BHC (lindane)	µg/L	ND	—	—	—	—	—
alpha-chlordane	µg/L	ND	—	—	—	—	—
gamma-chlordane	µg/L	ND	—	—	—	—	—
4,4′-DDD	µg/L	ND	—	—	—	—	—
4,4′-DDE	µg/L	ND	—	—	—	—	—
4,4′-DDT	µg/L	ND	—	—	—	—	—
dieldrin	µg/L	ND	—	—	—	—	—
endosulfan I	µg/L	ND	—	—	—	—	—
endosulfan II	µg/L	ND	—	—	—	—	—
endosulfan sulfate	µg/L	ND	—	—	—	—	—
endrin	µg/L	ND	—	—	—	—	—
endrin aldehyde	µg/L	ND	—	—	—	—	—
endrin ketone	µg/L	ND	—	—	—	—	—
heptachlor	µg/L	ND	—	—	—	—	—
heptachlor epoxide	µg/L	ND	—	—	—	—	—
methoxychlor	µg/L	ND	—	—	—	—	—
toxaphene	µg/L	ND	—	—	—	—	—
Metals							
cadmium	µg/L	16.4	—	—	—	—	—
cobalt	µg/L	16.6	—	—	—	—	—
hexavalent chromium	µg/L	50	3 UJ	3 UJ	***55.5 J***[c,d]	10 U	0.6 UJ
nickel	µg/L	17.5	***20.9***	5.6	3 U	4.08	2 U
zinc	µg/L	81	***115***	4.6	3 U	8.38 J	6 U
General Chemistry							
cyanide	µg/L	1	—	—	—	—	—
perchlorate (U.S. EPA 314.0)	µg/L	NE	NA	NA	NA	NA	1 U
perchlorate (HPLC/ESI/MS)	µg/L	NE	NA	NA	NA	NA	0.051 U

Table 4
Summary of Analytical Results[a]

		Location:	IR Site 5	IR Site 5	IR Site 5	IR Site 5	IR Site 5
		Well ID:	MW-05-03	MW-05-03	MW-05-03	MW-05-03	MW-05-03
		Date Sampled:	10/23/2003	4/7/2004	10/7/2004	11/2/2005	10/10/2006
Analyte	**Units**	**Screening Value**					
Volatile Organic Compounds							
methyl tert-butyl ether	µg/L	440	—	—	—	—	—
Pesticides							
aldrin	µg/L	ND	—	—	—	—	—
alpha-BHC	µg/L	ND	—	—	—	—	—
beta-BHC	µg/L	ND	—	—	—	—	—
delta-BHC	µg/L	ND	—	—	—	—	—
gamma-BHC (lindane)	µg/L	ND	—	—	—	—	—
alpha-chlordane	µg/L	ND	—	—	—	—	—
gamma-chlordane	µg/L	ND	—	—	—	—	—
4,4′-DDD	µg/L	ND	—	—	—	—	—
4,4′-DDE	µg/L	ND	—	—	—	—	—
4,4′-DDT	µg/L	ND	—	—	—	—	—
dieldrin	µg/L	ND	—	—	—	—	—
endosulfan I	µg/L	ND	—	—	—	—	—
endosulfan II	µg/L	ND	—	—	—	—	—
endosulfan sulfate	µg/L	ND	—	—	—	—	—
endrin	µg/L	ND	—	—	—	—	—
endrin aldehyde	µg/L	ND	—	—	—	—	—
endrin ketone	µg/L	ND	—	—	—	—	—
heptachlor	µg/L	ND	—	—	—	—	—
heptachlor epoxide	µg/L	ND	—	—	—	—	—
methoxychlor	µg/L	ND	—	—	—	—	—
toxaphene	µg/L	ND	—	—	—	—	—
Metals							
cadmium	µg/L	16.4	—	—	—	—	—
cobalt	µg/L	16.6	—	—	—	—	—
hexavalent chromium	µg/L	50	—	—	—	—	—
nickel	µg/L	17.5	—	—	—	—	—
zinc	µg/L	81	—	—	—	—	—
General Chemistry							
cyanide	µg/L	1	—	—	—	—	—
perchlorate (U.S. EPA 314.0)	µg/L	NE	NA	NA	NA	NA	1 U
perchlorate (HPLC/ESI/MS)	µg/L	NE	NA	NA	NA	NA	0.051 U

Table 4
Summary of Analytical Results[a]

		Location:	IR Site 5	IR Site 5	IR Site 5	IR Site 5	IR Site 5
		Well ID:	MW-05-04	MW-05-04	MW-05-04	MW-05-04	MW-05-04
		Date Sampled:	10/16/2003	4/1/2004	10/7/2004	11/1/2005	10/10/2006
Analyte	**Units**	**Screening Value**					
Volatile Organic Compounds							
methyl tert-butyl ether	µg/L	440	12 NJ	12	18	36	50
Pesticides							
aldrin	µg/L	ND	—	—	—	—	—
alpha-BHC	µg/L	ND	—	—	—	—	—
beta-BHC	µg/L	ND	—	—	—	—	—
delta-BHC	µg/L	ND	—	—	—	—	—
gamma-BHC (lindane)	µg/L	ND	—	—	—	—	—
alpha-chlordane	µg/L	ND	—	—	—	—	—
gamma-chlordane	µg/L	ND	—	—	—	—	—
4,4′-DDD	µg/L	ND	—	—	—	—	—
4,4′-DDE	µg/L	ND	—	—	—	—	—
4,4′-DDT	µg/L	ND	—	—	—	—	—
dieldrin	µg/L	ND	—	—	—	—	—
endosulfan I	µg/L	ND	—	—	—	—	—
endosulfan II	µg/L	ND	—	—	—	—	—
endosulfan sulfate	µg/L	ND	—	—	—	—	—
endrin	µg/L	ND	—	—	—	—	—
endrin aldehyde	µg/L	ND	—	—	—	—	—
endrin ketone	µg/L	ND	—	—	—	—	—
heptachlor	µg/L	ND	—	—	—	—	—
heptachlor epoxide	µg/L	ND	—	—	—	—	—
methoxychlor	µg/L	ND	—	—	—	—	—
toxaphene	µg/L	ND	—	—	—	—	—
Metals							
cadmium	µg/L	16.4	—	—	—	—	—
cobalt	µg/L	16.6	—	—	—	—	—
hexavalent chromium	µg/L	50	—	—	—	—	—
nickel	µg/L	17.5	—	—	—	—	—
zinc	µg/L	81	—	—	—	—	—
General Chemistry							
cyanide	µg/L	1	—	—	—	—	—
perchlorate (U.S. EPA 314.0)	µg/L	NE	NA	NA	NA	NA	1 U
perchlorate (HPLC/ESI/MS)	µg/L	NE	NA	NA	NA	NA	0.051 U

Table 4
Summary of Analytical Results[a]

		Location:	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7
		Well ID:	07M01	07M01	07M01	07M01	07M01	07M01	07M01	07M01
		Date Sampled:	1/4/1994	4/7/1994	7/15/1994	10/13/1994	6/29/1998	9/22/1998	10/13/2003	4/6/2004
Analyte	**Units**	**Screening Value**								
Volatile Organic Compounds										
methyl tert-butyl ether	µg/L	440	—	—	—	—	—	—	—	—
Pesticides										
aldrin	µg/L	ND	0.05 U	0.05 U	5 U	0.05 U	NA	NA	0.48 U	0.097 U
alpha-BHC	µg/L	ND	0.05 U	0.05 U	5 U	0.05 U	NA	NA	0.48 U	0.097 U
beta-BHC	µg/L	ND	0.05 U	0.05 U	5 U	0.05 U	NA	NA	0.48 U	0.097 U
delta-BHC	µg/L	ND	0.05 U	0.05 U	5 U	0.05 U	NA	NA	0.48 U	0.097 U
gamma-BHC (lindane)	µg/L	ND	0.05 U	0.05 U	5 U	0.05 U	NA	NA	0.48 U	0.097 U
alpha-chlordane	µg/L	ND	0.05 U	0.05 U	5 U	0.05 U	NA	NA	0.48 U	0.097 U
gamma-chlordane	µg/L	ND	0.05 U	0.05 U	5 U	0.05 U	NA	NA	0.48 U	0.097 U
4,4′-DDD	µg/L	ND	0.1 U	0.1 U	10 U	0.1 U	NA	NA	0.48 U	0.097 U
4,4′-DDE	µg/L	ND	0.1 U	0.1 U	10 U	0.1 U	NA	NA	0.48 U	0.097 U
4,4′-DDT	µg/L	ND	0.1 U	0.1 U	10 U	0.1 U	NA	NA	0.48 U	0.097 U
dieldrin	µg/L	ND	***0.0013 JP***	0.1 U	10 U	0.1 U	NA	NA	0.48 U	0.097 U
endosulfan I	µg/L	ND	0.05 U	0.05 U	5 U	0.05 U	NA	NA	0.48 U	0.097 U
endosulfan II	µg/L	ND	0.1 U	0.1 U	10 U	0.1 U	NA	NA	0.48 U	0.097 U
endosulfan sulfate	µg/L	ND	0.1 U	0.1 U	10 U	0.1 U	NA	NA	0.48 U	0.097 U
endrin	µg/L	ND	0.1 U	0.1 U	10 U	0.1 U	NA	NA	0.48 U	0.097 U
endrin aldehyde	µg/L	ND	0.1 U	0.1 U	10 U	0.1 U	NA	NA	0.48 U	0.097 U
endrin ketone	µg/L	ND	0.1 U	0.1 U	10 U	0.1 U	NA	NA	0.48 U	0.097 U
heptachlor	µg/L	ND	0.05 U	0.05 U	5 U	0.05 U	NA	NA	0.48 U	0.097 U
heptachlor epoxide	µg/L	ND	0.05 U	0.05 U	5 U	0.05 U	NA	NA	0.48 U	0.097 U
methoxychlor	µg/L	ND	0.5 U	0.5 U	50 U	0.5 U	NA	NA	0.48 U	0.097 U
toxaphene	µg/L	ND	5 U	5 U	500 U	5 U	NA	NA	24 U	4.9 U
Metals										
cadmium	µg/L	16.4	—	—	—	—	—	—	—	—
cobalt	µg/L	16.6	—	—	—	—	—	—	—	—
hexavalent chromium	µg/L	50	—	—	—	—	—	—	—	—
nickel	µg/L	17.5	—	—	—	—	—	—	—	—
zinc	µg/L	81	—	—	—	—	—	—	—	—
General Chemistry										
cyanide	µg/L	1	***96.5***	***13***	***501***	***26 ******	5 U	10 U	***80***[e]	***230 J***[e]
perchlorate (U.S. EPA 314.0)	µg/L	NE	—	—	—	—	—	—	—	—
perchlorate (HPLC/ESI/MS)	µg/L	NE	—	—	—	—	—	—	—	—

Table 4
Summary of Analytical Results[a]

		Location:	IR Site 7	IR Site 7	IR Site 7
		Well ID:	07M01	07M01	07M01
		Date Sampled:	10/6/2004	10/31/2005	10/9/2006
Analyte	**Units**	**Screening Value**			
Volatile Organic Compounds					
methyl tert-butyl ether	µg/L	440	—	—	—
Pesticides					
aldrin	µg/L	ND	0.011 U	0.02 U	***0.0013 J***
alpha-BHC	µg/L	ND	0.011 U	0.02 U	0.0096 U
beta-BHC	µg/L	ND	0.011 U	0.02 UJ	0.0096 U
delta-BHC	µg/L	ND	0.011 U	0.02 U	0.0096 U
gamma-BHC (lindane)	µg/L	ND	0.011 U	0.02 U	0.0096 U
alpha-chlordane	µg/L	ND	0.011 U	0.02 U	0.0096 U
gamma-chlordane	µg/L	ND	***0.0049 J***[e]	0.02 U	***0.0016 J***
4,4′-DDD	µg/L	ND	***0.0032 J***[f]	0.039 U	0.0096 U
4,4′-DDE	µg/L	ND	0.011 U	0.039 U	0.0096 U
4,4′-DDT	µg/L	ND	0.011 U	0.039 U	0.0096 U
dieldrin	µg/L	ND	0.011 U	0.039 U	0.0096 UJ
endosulfan I	µg/L	ND	0.011 U	0.02 U	0.0096 U
endosulfan II	µg/L	ND	0.011 U	0.039 U	0.0096 U
endosulfan sulfate	µg/L	ND	0.011 U	0.039 UJ	0.0096 U
endrin	µg/L	ND	0.011 U	0.039 U	0.0096 U
endrin aldehyde	µg/L	ND	0.011 U	0.039 U	0.0096 U
endrin ketone	µg/L	ND	0.011 U	0.039 U	0.0096 U
heptachlor	µg/L	ND	***0.0065 J***[e]	0.02 U	***0.0011 J***
heptachlor epoxide	µg/L	ND	0.011 U	0.02 U	0.0096 U
methoxychlor	µg/L	ND	0.011 U	0.2 U	0.0096 U
toxaphene	µg/L	ND	0.52 U	0.39 U	0.48 U
Metals					
cadmium	µg/L	16.4	—	—	—
cobalt	µg/L	16.6	—	—	—
hexavalent chromium	µg/L	50	—	—	—
nickel	µg/L	17.5	—	—	—
zinc	µg/L	81	—	—	—
General Chemistry					
cyanide	µg/L	1	***4 J***[g]	***123***	***20 J***
perchlorate (U.S. EPA 314.0)	µg/L	NE	—	—	—
perchlorate (HPLC/ESI/MS)	µg/L	NE	—	—	—

Table 4
Summary of Analytical Results[a]

Analyte	Units	Screening Value	Location: IR Site 7 Well ID: W-41 Date Sampled: 11/16/1988	IR Site 7 W-41 5/25/1989	IR Site 7 W-41 8/30/1989	IR Site 7 W-41 11/18/1989	IR Site 7 W-41 12/29/1993	IR Site 7 W-41 4/5/1994	IR Site 7 W-41 7/13/1994	IR Site 7 W-41 10/12/1994
Volatile Organic Compounds										
methyl tert-butyl ether	µg/L	440	—	—	—	—	—	—	—	—
Pesticides										
aldrin	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.0064 U
alpha-BHC	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
beta-BHC	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
delta-BHC	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
gamma-BHC (lindane)	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
alpha-chlordane	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
gamma-chlordane	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
4,4′-DDD	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
4,4′-DDE	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
4,4′-DDT	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
dieldrin	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
endosulfan I	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
endosulfan II	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
endosulfan sulfate	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
endrin	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
endrin aldehyde	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
endrin ketone	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
heptachlor	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
heptachlor epoxide	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
methoxychlor	µg/L	ND	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U
toxaphene	µg/L	ND	NA	NA	NA	NA	5 U	5 U	5 U	5 U
Metals										
cadmium	µg/L	16.4	—	—	—	—	—	—	—	—
cobalt	µg/L	16.6	NA	NA	NA	NA	***22.4 B***	***19.1 B***	***20.7 BN***	***24.9 B***
hexavalent chromium	µg/L	50	—	—	—	—	—	—	—	—
nickel	µg/L	17.5	—	—	—	—	—	—	—	—
zinc	µg/L	81	—	—	—	—	—	—	—	—
General Chemistry										
cyanide	µg/L	1	—	—	—	—	—	—	—	—
perchlorate (U.S. EPA 314.0)	µg/L	NE	—	—	—	—	—	—	—	—
perchlorate (HPLC/ESI/MS)	µg/L	NE	—	—	—	—	—	—	—	—

Table 4
Summary of Analytical Results[a]

Analyte	Units	Screening Value	Location: IR Site 7 Well ID: W-41 Date Sampled: 7/2/1998	IR Site 7 W-41 9/22/1998	IR Site 7 W-41 10/10/2003	IR Site 7 W-41 4/2/2004	IR Site 7 W-41 10/5/2004	IR Site 7 W-41 10/31/2005	IR Site 7 W-41 10/9/2006
Volatile Organic Compounds									
methyl tert-butyl ether	µg/L	440	—	—	—	—	—	—	—
Pesticides									
aldrin	µg/L	ND	NA	NA	0.012 U	0.0096 U	0.011 U	0.019 U	0.0096 U
alpha-BHC	µg/L	ND	NA	NA	0.012 U	***0.0012 J***	0.011 U	0.019 U	0.0096 U
beta-BHC	µg/L	ND	NA	NA	0.012 U	0.0096 U	0.011 U	0.019 UJ	0.0096 U
delta-BHC	µg/L	ND	NA	NA	0.012 UJ	0.0096 U	0.011 U	0.019 U	0.0096 U
gamma-BHC (lindane)	µg/L	ND	NA	NA	0.012 U	0.0096 U	0.011 U	0.019 U	0.0096 U
alpha-chlordane	µg/L	ND	NA	NA	0.012 U	0.0096 U	0.011 U	0.019 U	0.0096 U
gamma-chlordane	µg/L	ND	NA	NA	0.012 U	0.0096 U	0.011 U	0.019 U	0.0096 U
4,4′-DDD	µg/L	ND	NA	NA	0.012 U	***0.0056 J***	0.011 U	0.039 U	0.0096 U
4,4′-DDE	µg/L	ND	NA	NA	0.012 U	0.0096 U	0.011 U	0.039 U	0.0096 U
4,4′-DDT	µg/L	ND	NA	NA	0.012 U	0.0096 U	0.011 U	0.039 U	0.0096 U
dieldrin	µg/L	ND	NA	NA	0.012 U	0.0096 U	0.011 U	0.039 U	0.0096 UJ
endosulfan I	µg/L	ND	NA	NA	0.012 UJ	0.0096 U	0.011 U	0.019 U	0.0096 U
endosulfan II	µg/L	ND	NA	NA	0.012 U	0.0096 UJ	***0.0036 J***	0.039 U	0.0096 U
endosulfan sulfate	µg/L	ND	NA	NA	0.012 UJ	0.0096 UJ	0.011 UJ	0.039 UJ	0.0096 U
endrin	µg/L	ND	NA	NA	0.012 U	0.0096 U	0.011 U	0.039 U	0.0096 U
endrin aldehyde	µg/L	ND	NA	NA	0.012 U	0.0096 UJ	0.011 UJ	0.039 U	0.0096 U
endrin ketone	µg/L	ND	NA	NA	0.012 UJ	0.0096 UJ	0.011 U	0.039 U	0.0096 U
heptachlor	µg/L	ND	NA	NA	0.012 U	0.0096 U	0.011 U	0.019 U	0.0096 U
heptachlor epoxide	µg/L	ND	NA	NA	0.012 U	0.0096 U	0.011 U	0.019 U	0.0096 U
methoxychlor	µg/L	ND	NA	NA	0.012 U	0.0096 UJ	0.011 U	0.19 U	0.0096 U
toxaphene	µg/L	ND	NA	NA	0.56 U	0.48 UJ	0.54 U	0.39 U	0.48 U
Metals									
cadmium	µg/L	16.4	—	—	—	—	—	—	—
cobalt	µg/L	16.6	10.2 B	12 B	***35.9***	***38.6***	***32.5***	***32.1***	***34.6***
hexavalent chromium	µg/L	50	—	—	—	—	—	—	—
nickel	µg/L	17.5	—	—	—	—	—	—	—
zinc	µg/L	81	—	—	—	—	—	—	—
General Chemistry									
cyanide	µg/L	1	—	—	—	—	—	—	—
perchlorate (U.S. EPA 314.0)	µg/L	NE	—	—	—	—	—	—	—
perchlorate (HPLC/ESI/MS)	µg/L	NE	—	—	—	—	—	—	—

Table 4
Summary of Analytical Results[a]

		Location:	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7
		Well ID:	W-42	W-42	W-42	W-42	W-42	W-42	W-42	W-42
		Date Sampled:	11/16/1988	5/25/1989	8/30/1989	11/18/1989	12/29/1993	4/8/1994	7/19/1994	10/15/1994
Analyte	**Units**	**Screening Value**								
Volatile Organic Compounds										
methyl tert-butyl ether	µg/L	440	—	—	—	—	—	—	—	—
Pesticides										
aldrin	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.0027 U
alpha-BHC	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
beta-BHC	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
delta-BHC	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
gamma-BHC (lindane)	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
alpha-chlordane	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
gamma-chlordane	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
4,4′-DDD	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
4,4′-DDE	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
4,4′-DDT	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
dieldrin	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
endosulfan I	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
endosulfan II	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
endosulfan sulfate	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
endrin	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
endrin aldehyde	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
endrin ketone	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
heptachlor	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
heptachlor epoxide	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
methoxychlor	µg/L	ND	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U
toxaphene	µg/L	ND	NA	NA	NA	NA	5 U	5 U	5 U	5 U
Metals										
cadmium	µg/L	16.4	—	—	—	—	—	—	—	—
cobalt	µg/L	16.6	—	—	—	—	—	—	—	—
hexavalent chromium	µg/L	50	—	—	—	—	—	—	—	—
nickel	µg/L	17.5	—	—	—	—	—	—	—	—
zinc	µg/L	81	—	—	—	—	—	—	—	—
General Chemistry										
cyanide	µg/L	1	NA	NA	NA	NA	***11***	***5.9 B***	5 U	***15 ****
perchlorate (U.S. EPA 314.0)	µg/L	NE	NA	NA	NA	NA	NA	NA	NA	NA
perchlorate (HPLC/ESI/MS)	µg/L	NE	NA	NA	NA	NA	NA	NA	NA	NA

Table 4
Summary of Analytical Results[a]

		Location:	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7
		Well ID:	W-42	W-42	W-42	W-42	W-42	W-42	W-42
		Date Sampled:	7/2/1998	9/22/1998	10/9/2003	4/2/2004	10/4/2004	10/31/2005	10/10/2006
Analyte	**Units**	**Screening Value**							
Volatile Organic Compounds									
methyl tert-butyl ether	µg/L	440	—	—	—	—	—	—	—
Pesticides									
aldrin	µg/L	ND	NA	NA	0.012 U	0.012 U	0.012 U	0.019 U	0.0096 U
alpha-BHC	µg/L	ND	NA	NA	0.012 U	***0.0019 J***	0.012 U	0.019 U	0.0096 U
beta-BHC	µg/L	ND	NA	NA	0.012 U	0.012 U	0.012 UJ	0.019 UJ	0.0096 U
delta-BHC	µg/L	ND	NA	NA	0.012 UJ	0.012 U	0.012 UJ	0.019 U	0.0096 U
gamma-BHC (lindane)	µg/L	ND	NA	NA	0.012 U	0.012 U	0.012 U	0.019 U	0.0096 U
alpha-chlordane	µg/L	ND	NA	NA	0.012 U	0.012 U	0.012 U	0.019 U	0.0096 U
gamma-chlordane	µg/L	ND	NA	NA	0.012 U	0.012 U	0.012 U	0.019 U	0.0096 U
4,4′-DDD	µg/L	ND	NA	NA	0.012 U	0.012 U	0.012 U	0.038 U	0.0096 U
4,4′-DDE	µg/L	ND	NA	NA	0.012 U	0.012 U	0.012 U	0.038 U	0.0096 U
4,4′-DDT	µg/L	ND	NA	NA	0.012 U	0.012 U	0.012 UJ	0.038 U	***0.0014 J***
dieldrin	µg/L	ND	NA	NA	0.012 U	0.012 U	0.012 U	0.038 U	0.0096 UJ
endosulfan I	µg/L	ND	NA	NA	0.012 UJ	0.012 U	0.012 UJ	0.019 U	0.0096 U
endosulfan II	µg/L	ND	NA	NA	0.012 U	0.012 UJ	0.012 UJ	0.038 U	0.0096 U
endosulfan sulfate	µg/L	ND	NA	NA	0.012 UJ	0.012 UJ	0.012 UJ	0.038 UJ	0.0096 U
endrin	µg/L	ND	NA	NA	0.012 U	0.012 U	0.012 U	0.038 U	0.0096 U
endrin aldehyde	µg/L	ND	NA	NA	0.012 U	0.012 UJ	0.012 UJ	0.038 U	0.0096 U
endrin ketone	µg/L	ND	NA	NA	0.012 UJ	0.012 UJ	0.012 UJ	0.038 U	0.0096 U
heptachlor	µg/L	ND	NA	NA	0.012 U	0.012 U	0.012 U	0.019 U	0.0096 U
heptachlor epoxide	µg/L	ND	NA	NA	0.012 U	0.012 U	0.012 U	0.019 U	0.0096 U
methoxychlor	µg/L	ND	NA	NA	0.012 U	0.012 UJ	0.012 UJ	0.19 U	0.0096 U
toxaphene	µg/L	ND	NA	NA	0.56 U	0.56 UJ	0.56 U	0.38 U	0.48 U
Metals									
cadmium	µg/L	16.4	—	—	—	—	—	—	—
cobalt	µg/L	16.6	—	—	—	—	—	—	—
hexavalent chromium	µg/L	50	—	—	—	—	—	—	—
nickel	µg/L	17.5	—	—	—	—	—	—	—
zinc	µg/L	81	—	—	—	—	—	—	—
General Chemistry									
cyanide	µg/L	1	5 U	10 U	10 U	10 U	10 U	10 U	***3 J***
perchlorate (U.S. EPA 314.0)	µg/L	NE	NA	NA	NA	NA	NA	NA	1 U
perchlorate (HPLC/ESI/MS)	µg/L	NE	NA	NA	NA	NA	NA	NA	0.051 U

Table 4
Summary of Analytical Results[a]

		Location:	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7
		Well ID:	W-43	W-43	W-43	W-43	W-43	W-43	W-43	W-43
		Date Sampled:	11/16/1988	5/25/1989	8/30/1989	11/18/1989	12/29/1993	4/6/1994	7/13/1994	10/12/1994
Analyte	**Units**	**Screening Value**								
Volatile Organic Compounds										
methyl tert-butyl ether	µg/L	440	—	—	—	—	—	—	—	—
Pesticides										
aldrin	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.0024 U
alpha-BHC	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
beta-BHC	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
delta-BHC	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
gamma-BHC (lindane)	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
alpha-chlordane	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
gamma-chlordane	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
4,4′-DDD	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
4,4′-DDE	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
4,4′-DDT	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
dieldrin	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
endosulfan I	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
endosulfan II	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
endosulfan sulfate	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
endrin	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
endrin aldehyde	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
endrin ketone	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
heptachlor	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
heptachlor epoxide	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
methoxychlor	µg/L	ND	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U
toxaphene	µg/L	ND	NA	NA	NA	NA	5 U	5 U	5 U	5 U
Metals										
cadmium	µg/L	16.4	—	—	—	—	—	—	—	—
cobalt	µg/L	16.6	—	—	—	—	—	—	—	—
hexavalent chromium	µg/L	50	—	—	—	—	—	—	—	—
nickel	µg/L	17.5	—	—	—	—	—	—	—	—
zinc	µg/L	81	—	—	—	—	—	—	—	—
General Chemistry										
cyanide	µg/L	1	—	—	—	—	—	—	—	—
perchlorate (U.S. EPA 314.0)	µg/L	NE	NA	NA	NA	NA	NA	NA	NA	NA
perchlorate (HPLC/ESI/MS)	µg/L	NE	NA	NA	NA	NA	NA	NA	NA	NA

Table 4
Summary of Analytical Results[a]

Analyte	Units	Screening Value	Location: IR Site 7 Well ID: W-43 Date Sampled: 7/6/1998	IR Site 7 W-43 9/22/1998	IR Site 7 W-43 10/16/2003	IR Site 7 W-43 4/6/2004	IR Site 7 W-43 10/7/2004	IR Site 7 W-43 11/1/2005	IR Site 7 W-43 10/10/2006
Volatile Organic Compounds									
methyl tert-butyl ether	µg/L	440	—	—	—	—	—	—	—
Pesticides									
aldrin	µg/L	ND	NA	NA	0.011 U	***0.0023 J***	0.011 U	0.019 U	0.0098 U
alpha-BHC	µg/L	ND	NA	NA	0.011 U	***0.0021 J***	0.011 U	0.019 U	0.0098 U
beta-BHC	µg/L	ND	NA	NA	0.011 U	0.0097 U	0.011 U	0.019 UJ	0.0098 U
delta-BHC	µg/L	ND	NA	NA	0.011 U	0.0097 U	0.011 U	0.019 U	0.0098 U
gamma-BHC (lindane)	µg/L	ND	NA	NA	0.011 U	***0.0015 J***	0.011 U	0.019 U	0.0098 U
alpha-chlordane	µg/L	ND	NA	NA	0.011 U	0.0097 U	0.011 U	0.019 U	0.0098 U
gamma-chlordane	µg/L	ND	NA	NA	0.011 U	0.0097 U	0.011 U	0.019 U	0.0098 U
4,4′-DDD	µg/L	ND	NA	NA	0.011 U	0.0097 U	0.011 U	0.038 U	0.0098 U
4,4′-DDE	µg/L	ND	NA	NA	0.011 U	***0.0023 J***	0.011 U	0.038 U	0.0098 U
4,4′-DDT	µg/L	ND	NA	NA	0.011 UJ	***0.0044 J***	0.011 U	0.038 U	0.0098 U
dieldrin	µg/L	ND	NA	NA	0.011 U	***0.0026 J***	0.011 U	0.038 U	0.0098 UJ
endosulfan I	µg/L	ND	NA	NA	0.011 U	***0.0023 J***	0.011 U	0.019 U	0.0098 U
endosulfan II	µg/L	ND	NA	NA	0.011 U	0.0097 U	0.011 U	0.038 U	0.0098 U
endosulfan sulfate	µg/L	ND	NA	NA	0.011 U	0.0097 U	0.011 U	0.038 UJ	0.0098 U
endrin	µg/L	ND	NA	NA	0.011 U	0.0097 U	0.011 U	0.038 U	0.0098 U
endrin aldehyde	µg/L	ND	NA	NA	0.011 UJ	0.0097 U	0.011 U	0.038 U	0.0098 U
endrin ketone	µg/L	ND	NA	NA	0.011 U	***0.0023 J***	0.011 U	0.038 U	0.0098 U
heptachlor	µg/L	ND	NA	NA	0.011 U	0.0097 U	0.011 U	0.019 U	0.0098 U
heptachlor epoxide	µg/L	ND	NA	NA	0.011 U	0.0097 U	0.011 U	0.019 U	0.0098 U
methoxychlor	µg/L	ND	NA	NA	0.011 UJ	***0.0061 J***	0.011 U	0.19 U	***0.0012 J***
toxaphene	µg/L	ND	NA	NA	0.55 UJ	0.49 U	0.55 U	0.38 U	0.49 U
Metals									
cadmium	µg/L	16.4	—	—	—	—	—	—	—
cobalt	µg/L	16.6	—	—	—	—	—	—	—
hexavalent chromium	µg/L	50	—	—	—	—	—	—	—
nickel	µg/L	17.5	—	—	—	—	—	—	—
zinc	µg/L	81	—	—	—	—	—	—	—
General Chemistry									
cyanide	µg/L	1	—	—	—	—	—	—	—
perchlorate (U.S. EPA 314.0)	µg/L	NE	NA	NA	NA	NA	NA	NA	1 U
perchlorate (HPLC/ESI/MS)	µg/L	NE	NA	NA	NA	NA	NA	NA	0.051 U

Table 4
Summary of Analytical Results[a]

		Location:	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7
		Well ID:	W-45	W-45	W-45	W-45	W-45	W-45	W-45	W-45
		Date Sampled:	11/17/1988	5/26/1989	8/30/1989	11/16/1989	12/30/1993	4/11/1994	7/19/1994	10/17/1994
Analyte	**Units**	**Screening Value**								
Volatile Organic Compounds										
methyl tert-butyl ether	µg/L	440	—	—	—	—	—	—	—	—
Pesticides										
aldrin	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
alpha-BHC	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
beta-BHC	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
delta-BHC	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
gamma-BHC (lindane)	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
alpha-chlordane	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
gamma-chlordane	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
4,4′-DDD	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
4,4′-DDE	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
4,4′-DDT	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
dieldrin	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
endosulfan I	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
endosulfan II	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
endosulfan sulfate	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
endrin	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
endrin aldehyde	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
endrin ketone	µg/L	ND	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
heptachlor	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
heptachlor epoxide	µg/L	ND	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
methoxychlor	µg/L	ND	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U
toxaphene	µg/L	ND	NA	NA	NA	NA	5 U	5 U	5 U	5 U
Metals										
cadmium	µg/L	16.4	NA	5 U	7.2	8.1	4 U	6.5 U	6 U	6 U
cobalt	µg/L	16.6	—	—	—	—	—	—	—	—
hexavalent chromium	µg/L	50	—	—	—	—	—	—	—	—
nickel	µg/L	17.5	—	—	—	—	—	—	—	—
zinc	µg/L	81	—	—	—	—	—	—	—	—
General Chemistry										
cyanide	µg/L	1	—	—	—	—	—	—	—	—
perchlorate (U.S. EPA 314.0)	µg/L	NE	NA	NA	NA	NA	NA	NA	NA	NA
perchlorate (HPLC/ESI/MS)	µg/L	NE	NA	NA	NA	NA	NA	NA	NA	NA

Table 4
Summary of Analytical Results[a]

		Location:	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7	IR Site 7
		Well ID:	W-45	W-45	W-45	W-45	W-45	W-45	W-45
		Date Sampled:	7/2/1998	9/23/1998	10/15/2003	4/7/2004	10/8/2004	11/1/2005	10/10/2006
Analyte	**Units**	**Screening Value**							
Volatile Organic Compounds									
methyl tert-butyl ether	µg/L	440	—	—	—	—	—	—	—
Pesticides									
aldrin	µg/L	ND	NA	NA	0.01 U	0.012 U	0.011 U	0.019 U	0.0096 U
alpha-BHC	µg/L	ND	NA	NA	0.01 U	0.012 U	0.011 U	0.019 U	0.0096 U
beta-BHC	µg/L	ND	NA	NA	0.01 U	0.012 U	0.011 U	0.019 UJ	0.0096 U
delta-BHC	µg/L	ND	NA	NA	0.01 U	0.012 U	0.011 U	0.019 U	0.0096 U
gamma-BHC (lindane)	µg/L	ND	NA	NA	0.01 U	0.012 U	0.011 U	0.019 U	0.0096 U
alpha-chlordane	µg/L	ND	NA	NA	0.01 U	0.012 U	0.011 U	0.019 U	0.0096 U
gamma-chlordane	µg/L	ND	NA	NA	0.01 U	0.012 U	0.011 U	0.019 U	0.0096 U
4,4′-DDD	µg/L	ND	NA	NA	0.01 U	0.012 U	0.011 U	0.038 U	0.0096 U
4,4′-DDE	µg/L	ND	NA	NA	0.01 U	0.012 U	0.011 U	0.038 U	0.0096 U
4,4′-DDT	µg/L	ND	NA	NA	0.01 UJ	0.012 U	***0.0019 J***	0.038 U	0.0096 U
dieldrin	µg/L	ND	NA	NA	0.01 U	0.012 U	0.011 U	0.038 U	0.0096 UJ
endosulfan I	µg/L	ND	NA	NA	0.01 U	0.012 U	0.011 U	0.019 U	0.0096 U
endosulfan II	µg/L	ND	NA	NA	0.01 U	0.012 U	***0.0078 J***	0.038 U	0.0096 U
endosulfan sulfate	µg/L	ND	NA	NA	0.01 U	0.012 U	0.011 U	0.038 UJ	0.0096 U
endrin	µg/L	ND	NA	NA	0.01 U	0.012 U	0.011 U	0.038 U	0.0096 U
endrin aldehyde	µg/L	ND	NA	NA	0.01 UJ	0.012 U	0.011 U	0.038 U	0.0096 U
endrin ketone	µg/L	ND	NA	NA	0.01 U	0.012 U	0.011 U	0.038 U	0.0096 U
heptachlor	µg/L	ND	NA	NA	0.01 U	0.012 U	0.011 U	0.019 U	0.0096 U
heptachlor epoxide	µg/L	ND	NA	NA	0.01 U	0.012 U	0.011 U	0.019 U	0.0096 U
methoxychlor	µg/L	ND	NA	NA	0.01 UJ	0.012 U	0.011 U	0.19 U	0.0096 U
toxaphene	µg/L	ND	NA	NA	0.5 UJ	0.56 U	0.53 U	0.38 U	0.48 U
Metals									
cadmium	µg/L	16.4	13.9	***19.3***	11.7	9.4	***17***	4.39	3.1
cobalt	µg/L	16.6	—	—	—	—	—	—	—
hexavalent chromium	µg/L	50	—	—	—	—	—	—	—
nickel	µg/L	17.5	—	—	—	—	—	—	—
zinc	µg/L	81	—	—	—	—	—	—	—
General Chemistry									
cyanide	µg/L	1	—	—	—	—	—	—	—
perchlorate (U.S. EPA 314.0)	µg/L	NE	NA	NA	NA	NA	NA	NA	1 U
perchlorate (HPLC/ESI/MS)	µg/L	NE	NA	NA	NA	NA	NA	NA	0.051 U

Table 4
Summary of Analytical Results[a]

Analyte	Units	Screening Value	Location: IR Site 7 Well ID: MW-04-02 Date Sampled: 10/8/2003	Location: IR Site 7 Well ID: MW-04-02 Date Sampled: 3/31/2004	Location: IR Site 7 Well ID: MW-04-02 Date Sampled: 10/4/2004	Location: IR Site 7 Well ID: MW-04-02 Date Sampled: 10/31/2005	Location: IR Site 7 Well ID: MW-04-02 Date Sampled: 10/9/2006
Volatile Organic Compounds							
methyl tert-butyl ether	µg/L	440	—	—	—	—	—
Pesticides							
aldrin	µg/L	ND	0.012 UJ	0.011 UJ	0.012 U	0.019 U	0.0096 U
alpha-BHC	µg/L	ND	0.012 UJ	0.011 UJ	0.012 U	0.019 U	0.0096 U
beta-BHC	µg/L	ND	0.012 UJ	0.011 UJ	0.012 UJ	***0.019 J***	0.0096 U
delta-BHC	µg/L	ND	0.012 UJ	0.011 UJ	0.012 UJ	0.019 U	0.0096 U
gamma-BHC (lindane)	µg/L	ND	0.012 UJ	0.011 UJ	0.012 U	0.019 U	0.0096 U
alpha-chlordane	µg/L	ND	0.012 UJ	0.011 U	0.012 U	0.019 U	0.0096 U
gamma-chlordane	µg/L	ND	0.012 UJ	0.011 U	0.012 U	0.019 U	0.0096 U
4,4′-DDD	µg/L	ND	0.012 UJ	0.011 U	0.012 U	0.038 U	0.0096 U
4,4′-DDE	µg/L	ND	0.012 UJ	0.011 U	0.012 U	0.038 U	0.0096 U
4,4′-DDT	µg/L	ND	0.012 UJ	0.011 UJ	0.012 UJ	0.038 U	0.0096 U
dieldrin	µg/L	ND	0.012 UJ	0.011 U	0.012 U	0.038 U	0.0096 UJ
endosulfan I	µg/L	ND	0.012 UJ	0.011 UJ	0.012 UJ	0.019 U	0.0096 U
endosulfan II	µg/L	ND	0.012 UJ	0.011 UJ	0.012 UJ	0.038 U	0.0096 U
endosulfan sulfate	µg/L	ND	0.012 UJ	0.011 UJ	0.012 UJ	0.038 UJ	0.0096 U
endrin	µg/L	ND	0.012 UJ	0.011 U	0.012 U	0.038 U	0.0096 U
endrin aldehyde	µg/L	ND	0.012 UJ	0.011 UJ	0.012 UJ	0.038 U	0.0096 U
endrin ketone	µg/L	ND	0.012 UJ	0.011 UJ	0.012 UJ	0.038 U	0.0096 U
heptachlor	µg/L	ND	0.012 UJ	0.011 U	0.012 U	0.019 U	0.0096 U
heptachlor epoxide	µg/L	ND	0.012 UJ	0.011 U	0.012 U	0.019 U	0.0096 U
methoxychlor	µg/L	ND	0.012 UJ	0.011 U	0.012 UJ	0.19 U	***0.0018 J***
toxaphene	µg/L	ND	0.56 UJ	0.53 UJ	0.57 U	0.38 U	0.48 U
Metals							
cadmium	µg/L	16.4	—	—	—	—	—
cobalt	µg/L	16.6	—	—	—	—	—
hexavalent chromium	µg/L	50	—	—	—	—	—
nickel	µg/L	17.5	—	—	—	—	—
zinc	µg/L	81	—	—	—	—	—
General Chemistry							
cyanide	µg/L	1	10 U	10 U	10 U	10 U	***3 J***
perchlorate (U.S. EPA 314.0)	µg/L	NE	—	—	—	—	—
perchlorate (HPLC/ESI/MS)	µg/L	NE	—	—	—	—	—

Table 4
Summary of Analytical Results[a]

Analyte	Units	Screening Value	Location: IR Site 7 Well ID: MW-04-03 Date Sampled: 10/10/2003	Location: IR Site 7 Well ID: MW-04-03 Date Sampled: 4/1/2004	Location: IR Site 7 Well ID: MW-04-03 Date Sampled: 9/29/2004	Location: IR Site 7 Well ID: MW-04-03 Date Sampled: 10/31/2005	Location: IR Site 7 Well ID: MW-04-03 Date Sampled: 10/9/2006
Volatile Organic Compounds							
methyl tert-butyl ether	µg/L	440	—	—	—	—	—
Pesticides							
aldrin	µg/L	ND	0.012 U	0.011 UJ	0.01 U	0.019 U	0.0096 U
alpha-BHC	µg/L	ND	0.012 U	***0.0022 J***[e]	0.01 U	0.019 U	0.0096 U
beta-BHC	µg/L	ND	0.012 U	0.011 U	0.01 U	0.019 UJ	0.0096 U
delta-BHC	µg/L	ND	0.012 UJ	0.011 U	0.01 U	0.019 U	0.0096 U
gamma-BHC (lindane)	µg/L	ND	0.012 U	0.011 U	0.01 U	0.019 U	0.0096 U
alpha-chlordane	µg/L	ND	0.012 U	0.011 U	0.01 U	0.019 U	0.0096 U
gamma-chlordane	µg/L	ND	0.012 U	0.011 U	0.01 U	0.019 U	0.0096 U
4,4′-DDD	µg/L	ND	0.012 U	0.011 U	0.01 U	0.038 U	0.0096 U
4,4′-DDE	µg/L	ND	0.012 U	0.011 U	0.01 U	0.038 U	0.0096 U
4,4′-DDT	µg/L	ND	0.012 U	0.011 UJ	0.01 U	0.038 U	0.0096 U
dieldrin	µg/L	ND	0.012 U	0.011 U	0.01 U	0.038 U	0.0096 UJ
endosulfan I	µg/L	ND	0.012 UJ	0.011 U	0.01 U	0.019 U	0.0096 U
endosulfan II	µg/L	ND	0.012 U	0.011 U	0.01 U	0.038 U	0.0096 U
endosulfan sulfate	µg/L	ND	0.012 UJ	0.011 U	0.01 U	0.038 UJ	0.0096 U
endrin	µg/L	ND	0.012 U	0.011 U	0.01 U	0.038 U	0.0096 U
endrin aldehyde	µg/L	ND	0.012 U	0.011 U	0.01 U	0.038 U	0.0096 U
endrin ketone	µg/L	ND	0.012 UJ	0.011 U	0.01 U	0.038 U	0.0096 U
heptachlor	µg/L	ND	0.012 U	0.011 U	0.01 U	0.019 U	0.0096 U
heptachlor epoxide	µg/L	ND	0.012 U	0.011 U	***0.00091 J***[f]	0.019 U	0.0096 U
methoxychlor	µg/L	ND	0.012 U	0.011 UJ	0.01 U	0.19 U	0.0096 U
toxaphene	µg/L	ND	0.56 U	0.53 U	0.5 U	0.38 U	0.48 U
Metals							
cadmium	µg/L	16.4	—	—	—	—	—
cobalt	µg/L	16.6	—	—	—	—	—
hexavalent chromium	µg/L	50	—	—	—	—	—
nickel	µg/L	17.5	—	—	—	—	—
zinc	µg/L	81	—	—	—	—	—
General Chemistry							
cyanide	µg/L	1	10 U	10 U	10 U	10 U	***3 J***
perchlorate (U.S. EPA 314.0)	µg/L	NE	—	—	—	—	—
perchlorate (HPLC/ESI/MS)	µg/L	NE	—	—	—	—	—

Table 4
Summary of Analytical Results[a]

Analyte	Units	Screening Value	Location: IR Site 7 Well ID: MW-04-04 Date Sampled: 10/9/2003	IR Site 7 MW-04-04 3/31/2004	IR Site 7 MW-04-04 9/30/2004	IR Site 7 MW-04-04 11/1/2005	IR Site 7 MW-04-04 10/9/2006
Volatile Organic Compounds							
methyl tert-butyl ether	µg/L	440	—	—	—	—	—
Pesticides							
aldrin	µg/L	ND	0.012 U	0.011 UJ	0.011 U	0.019 U	0.0096 U
alpha-BHC	µg/L	ND	0.012 U	0.011 UJ	0.011 U	0.019 U	0.0096 U
beta-BHC	µg/L	ND	0.012 U	0.011 UJ	0.011 U	***0.043 J***	0.0096 U
delta-BHC	µg/L	ND	0.012 UJ	0.011 UJ	0.011 U	0.019 U	0.0096 U
gamma-BHC (lindane)	µg/L	ND	0.012 U	0.011 UJ	0.011 U	0.019 U	0.0096 U
alpha-chlordane	µg/L	ND	0.012 U	0.011 U	0.011 U	0.019 U	0.0096 U
gamma-chlordane	µg/L	ND	0.012 U	0.011 U	0.011 U	0.019 U	***0.00065 J***
4,4′-DDD	µg/L	ND	0.012 U	0.011 U	0.011 U	0.038 U	0.0096 U
4,4′-DDE	µg/L	ND	0.012 U	0.011 U	0.011 U	0.038 U	0.0096 U
4,4′-DDT	µg/L	ND	0.012 U	0.011 UJ	0.011 U	0.038 U	0.0096 U
dieldrin	µg/L	ND	0.012 U	0.011 U	0.011 U	0.038 U	0.0096 UJ
endosulfan I	µg/L	ND	0.012 UJ	0.011 UJ	0.011 U	0.019 U	0.0096 U
endosulfan II	µg/L	ND	0.012 U	0.011 UJ	0.011 U	0.038 U	0.0096 U
endosulfan sulfate	µg/L	ND	0.012 UJ	0.011 UJ	0.011 U	0.038 UJ	0.0096 U
endrin	µg/L	ND	0.012 U	0.011 U	0.011 U	0.038 U	0.0096 U
endrin aldehyde	µg/L	ND	0.012 U	0.011 UJ	0.011 U	0.038 U	0.0096 U
endrin ketone	µg/L	ND	0.012 UJ	0.011 UJ	0.011 U	0.038 U	0.0096 U
heptachlor	µg/L	ND	0.012 U	0.011 U	0.011 U	0.019 U	0.0096 U
heptachlor epoxide	µg/L	ND	0.012 U	0.011 U	0.011 U	0.019 U	0.0096 U
methoxychlor	µg/L	ND	0.012 U	0.011 U	0.011 U	0.19 U	0.0096 U
toxaphene	µg/L	ND	0.59 U	0.53 UJ	0.53 U	0.38 U	0.48 U
Metals							
cadmium	µg/L	16.4	—	—	—	—	—
cobalt	µg/L	16.6	—	—	—	—	—
hexavalent chromium	µg/L	50	—	—	—	—	—
nickel	µg/L	17.5	—	—	—	—	—
zinc	µg/L	81	—	—	—	—	—
General Chemistry							
cyanide	µg/L	1	10 U	10 U	***3 J***	10 U	10 UJ
perchlorate (U.S. EPA 314.0)	µg/L	NE	—	—	—	—	—
perchlorate (HPLC/ESI/MS)	µg/L	NE	—	—	—	—	—

Table 4
Summary of Analytical Results

Notes:

[a] for a given monitoring well, analytical results are shown only for the target analytes recommended for monitoring during year 3 in the final Second Annual Groundwater Monitoring Report (MARRS 2006)

[b] dash denotes nontarget analytes

[c] shading indicates that analyte was reported above detection limits

[d] ***boldface italics*** indicates reported concentration exceeds screening value

[e] analyte reported above detection limits in the regular and field duplicate sample; the higher of the two results is shown

[f] analyte reported above detection limits in the regular sample only; field duplicate sample was below detection limits

[g] analyte reported above detection limits in the field duplicate sample only; regular sample was below detection limits

Acronyms/Abbreviations:

BHC – benzene hexachloride
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
ESI – electrospray ionization
HPLC – high performance liquid chromatography
IR – Installation Restoration (Program)
µg/L – micrograms per liter
MS – mass spectrometry
NA – not analyzed
ND – not reported above detection limits (nondetect)
NE – not established
U.S. EPA – United States Environmental Protection Agency

Data Qualifiers:

Organic Compounds
- J – estimated value
- N – result is presumptive; analyte was tentatively identified but a confirmation analysis was not performed
- P – quantitative value from two analytical columns differs by greater than 25 percent (potential false positive)
- U – not detected

Inorganic Compounds
- B – estimated value
- J – estimated value
- N – matrix spike sample recovery not within control limits
- U – not detected
- * – duplicate analysis not within control limits

Table 5
Summary of Concentration Trends[a]

Well ID/Analyte	TREND ≥ 80 Percent Confidence Level	TREND ≥ 90 Percent Confidence Level	STABILITY If No Trend Exists at 80 Percent Confidence
MW-05-02			
nickel	Decreasing	Decreasing	NA
zinc	Decreasing	No Trend	NA
MW-05-04			
methyl tert-butyl ether	Increasing	Increasing	NA
07M01			
cyanide (Case 1)[b]	No Trend	No Trend	Nonstable
cyanide (Case 2)[c]	No Trend	No Trend	Stable
W-41			
cobalt (Case 1)	Increasing	Increasing	NA
cobalt (Case 2)	No Trend	No Trend	Stable
W-42			
cyanide (Case 1)	No Trend[d]	No Trend[d]	Stable[d]
cyanide (Case 2)	No Trend[d]	No Trend[d]	Stable[d]
W-45			
cadmium (Case 1)	No Trend	No Trend	Stable
cadmium (Case 2)	Decreasing	No Trend	NA

Notes:
[a] summarized from the Mann-Kendall test for trends (Appendix G)
[b] Case 1 includes the analytical results obtained over the last ten sampling events (i.e., the five events conducted from April 1994 to September 1998, and the five events conducted from October 2003 to October 2006 under the current groundwater monitoring program)
[c] Case 2 includes only the analytical results obtained over the last five sampling events conducted from October 2003 to October 2006 under the current groundwater monitoring program
[d] trend results for well W-42 are based on analytical data consisting of 70 to 80 percent nondetect

Acronym/Abbreviation:
NA – not applicable

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APPENDICES

APPENDIX A

DATA QUALITY OBJECTIVES AND DECISION FLOW DIAGRAMS

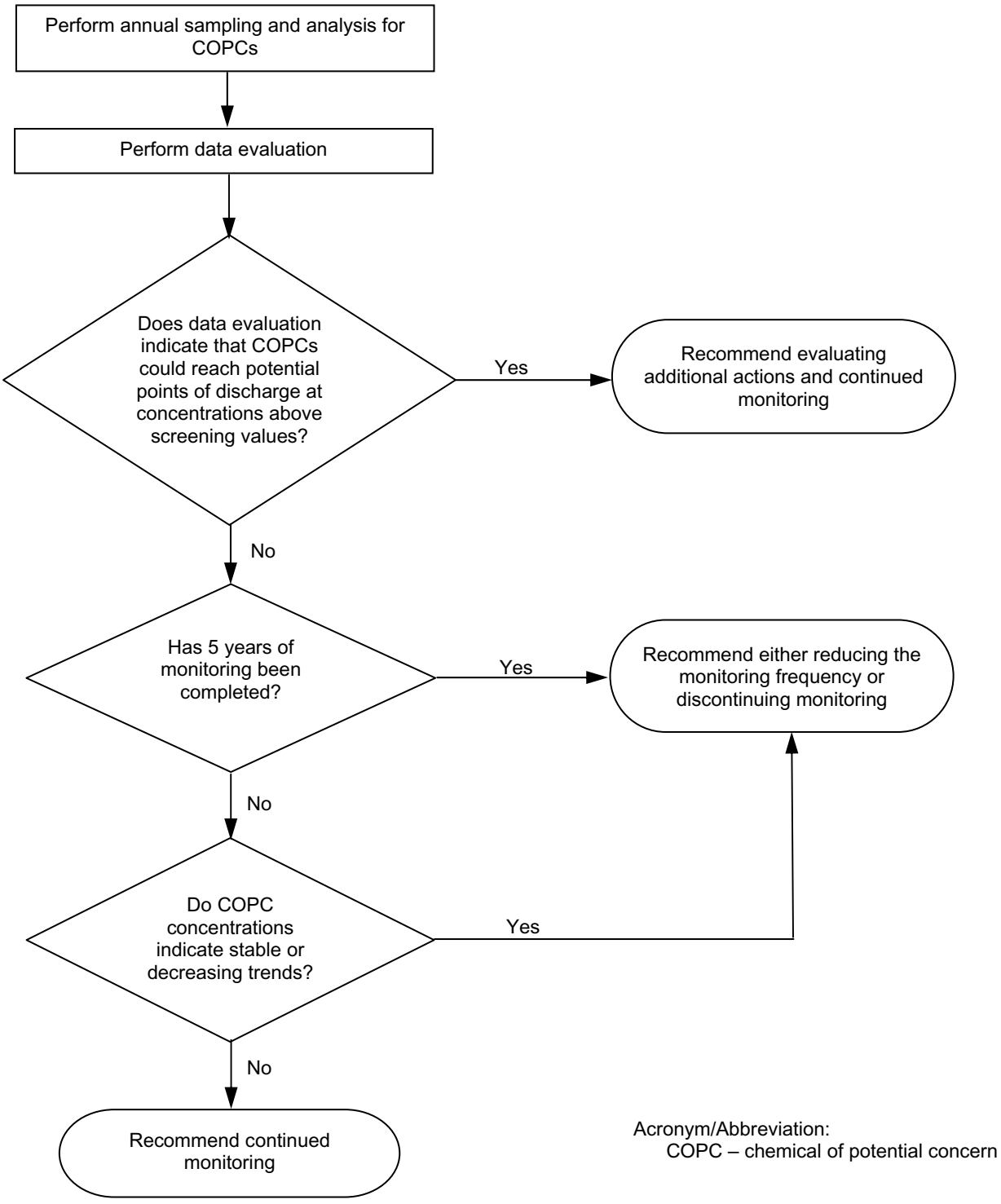

Figure A-1
Data Quality Objectives Decision Flow Diagram

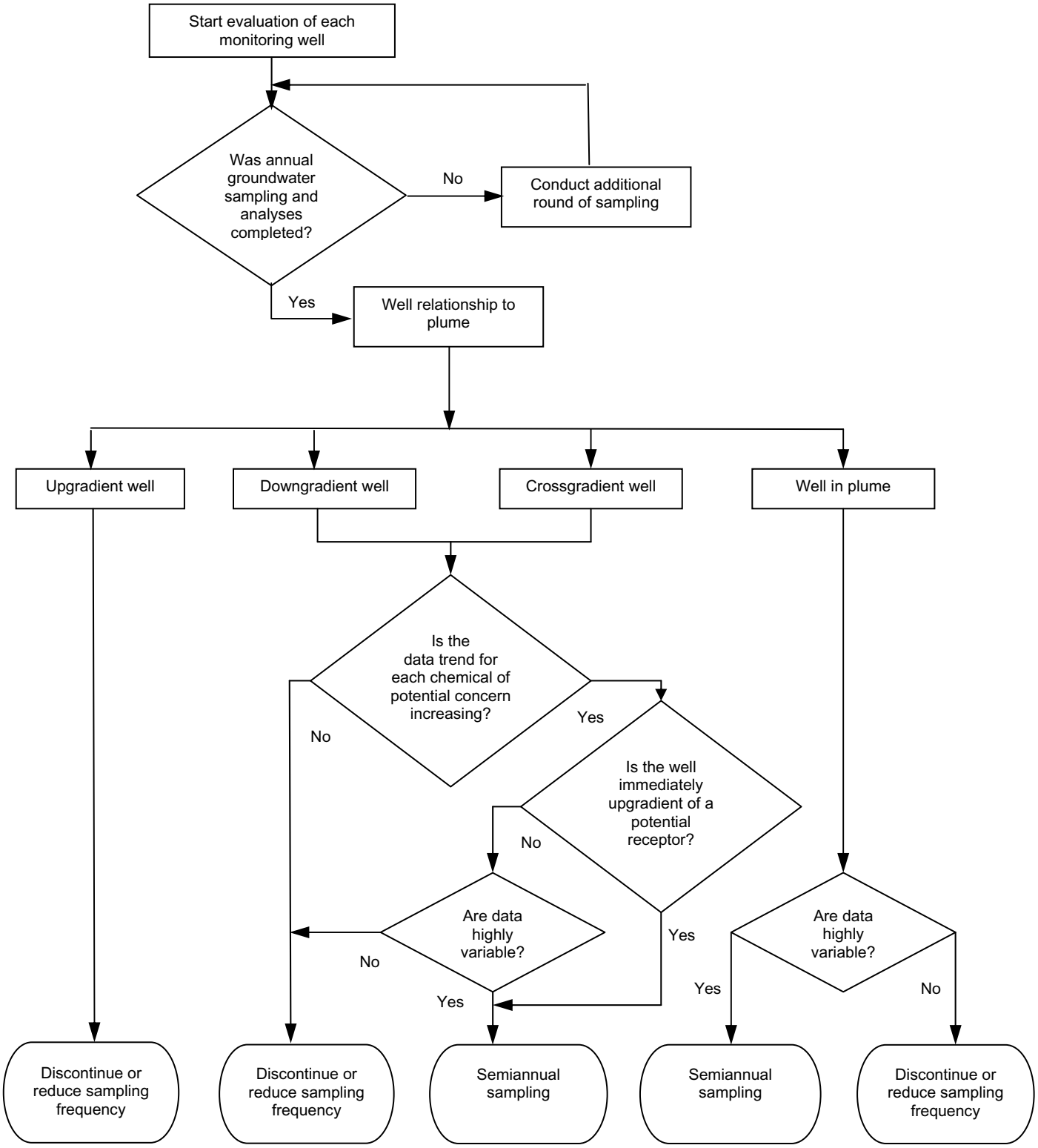

Figure A-2
Monitoring Frequency Decision Flow Diagram

Table A-1
Summary of Data Quality Objectives for IR Site 5

Step 1: State the Problem
Hexavalent chromium, manganese, ammonia, and nitrate were reported above the groundwater screening criteria and might affect groundwater at a hypothetical point of discharge.
Step 2: Identify the Decisions
Will COPCs reach potential points of discharge at concentrations above California Toxics Rule Criteria for Enclosed Bays and Estuaries (Saltwater Aquatic Life Protection 4-day Averages) or stationwide background levels for groundwater and threaten downgradient receptors?
Are COPC concentrations increasing or decreasing with time?
Are all wells needed for continued monitoring?
Step 3: Identify the Decision Inputs
Groundwater depth, flow direction, and gradient
COPC concentrations in groundwater
Screening values and background concentrations for COPCs in groundwater
Site stratigraphy and hydrogeology
Historical data from the IAS, RFA, PA, SI, SBSR, EAR, and RSE
Planned land use
Step 4: Define the Study Boundaries
The lateral boundaries of the monitoring program will encompass areas upgradient, crossgradient, and downgradient of the reported COPCs.
Vertical boundaries of the monitoring program will encompass the water-bearing intervals to a depth of approximately 30 feet below ground surface.
The duration of the monitoring program is 1 to 5 years.
Step 5: Develop the Decision Rules
If monitoring indicates that COPCs with concentrations in excess of screening values might reach potential discharge points or ecological receptors, *then* evaluation of additional actions will be recommended.
If COPC concentrations indicate stable or decreasing trends, *then* a recommendation will be made to either reduce the monitoring frequency or discontinue monitoring. *If* COPC concentrations indicate increasing trends, *then* continued monitoring will be recommended.
If wells are not required for monitoring or water-level measurements, *then* the well(s) will be recommended for abandonment.
Step 6: Specify Tolerable Limits on Decision Errors
Sampling will be conducted using a judgmental sampling approach. Available geologic and chemical concentration data will be evaluated conservatively to guide the sampling.
Step 7: Optimize the Sampling Design
Groundwater samples will be collected semiannually during year 1 from one existing and four newly installed monitoring wells.
Groundwater samples will be analyzed for VOCs, PAHs, TAL metals, hexavalent chromium, anions, and ammonia.

Table A-1 (continued)

Step 7 (continued)
During each quarter of the first year of monitoring, groundwater levels at selected wells will be measured continuously during a 72-hour period using an electronic data logger and a pressure-sensitive transducer. Remaining wells will be measured manually.
The duration of the monitoring program is 1 to 5 years.

Acronyms/Abbreviations:
- COPC – chemical of potential concern
- EAR – ecological assessment report
- IAS – initial assessment study
- IR – Installation Restoration (Program)
- PA – preliminary assessment
- PAH – polynuclear aromatic hydrocarbon
- RCRA – Resource Conservation and Recovery Act
- RFA – RCRA facility assessment
- RSE – removal site evaluation
- SBSR – stationwide background study report
- SI – site inspection
- TAL – target analyte list
- VOC – volatile organic compound

Source: Modified from Table 3-2 of the final Work Plan (BEI 2003)

References: Listed in Section 6 of this Third Annual Groundwater Monitoring Report

Table A-2
Summary of Data Quality Objectives for IR Site 7

Step 1: State the Problem

VOCs, SVOCs, PCBs, pesticides, and cyanide were identified as COPCs in soil samples and could affect groundwater at the site. They also could present a risk to ecological receptors at a hypothetical point of discharge.

VOCs, SVOCs, pesticides, metals, and cyanide were reported in groundwater and identified as COPCs at the site*. They could present a risk to receptors at a hypothetical point of discharge.

* Asbestos was inadvertently listed as a COPC in Table 3-4 of the Work Plan (BEI 2003); however, based on the results of the RI (JEG 1995) and groundwater monitoring study (CH2M Hill 1999), asbestos was not recommended for inclusion in the groundwater monitoring program.

Step 2: Identify the Decisions

Will COPCs reach potential points of discharge at concentrations above California Toxics Rule Criteria for Enclosed Bays and Estuaries (Saltwater Aquatic Life Protection 4-day Averages) or stationwide background levels for groundwater and threaten downgradient receptors?

Are COPC concentrations increasing or decreasing with time?

Are all wells needed for continued monitoring?

Step 3: Identify the Decision Inputs

Groundwater depth, flow direction, and gradient

COPC concentrations in groundwater

Lateral and vertical extent of COPCs in groundwater

Screening values and background concentrations for COPCs in groundwater

Site stratigraphy and hydrogeology

Historical data from the IAS, RFA, POA/SI, and RI

Planned land use

Step 4: Define the Study Boundaries

The lateral boundaries of the monitoring program will encompass areas upgradient, crossgradient, and downgradient of the reported COPCs.

Vertical boundaries of the monitoring program will encompass the water-bearing intervals to a depth of approximately 30 feet below ground surface.

The duration of the monitoring program is 1 to 5 years.

Step 5: Develop the Decision Rules

If monitoring indicates that COPCs with concentrations in excess of screening values might reach potential discharge points or ecological receptors, *then* evaluation of additional actions will be recommended.

If COPC concentrations indicate stable or decreasing trends, *then* a recommendation will be made to either reduce the monitoring frequency or discontinue monitoring. *If* COPC concentrations indicate increasing trends, *then* continued monitoring will be recommended.

If wells are not required for monitoring or water-level measurements, *then* the well(s) will be recommended for abandonment.

Step 6: Specify Tolerable Limits on Decision Errors

Sampling will be conducted using a judgmental sampling approach. Available geologic and chemical concentration data will be evaluated conservatively to guide the sampling.

Table A-2 (continued)

Step 7: Optimize the Sampling Design
Groundwater samples will be collected semiannually during year 1 from five existing monitoring wells.
Groundwater samples will be analyzed for VOCs, SVOCs, pesticides, PCB compounds, TAL metals, hexavalent chromium, and cyanide.
Manual groundwater level measurements will be taken quarterly during the first year of monitoring.
The duration of the monitoring program is 1 to 5 years.

Acronyms/Abbreviations:
COPC – chemical of potential concern
IAS – initial assessment study
IR – Installation Restoration (Program)
PCB – polychlorinated biphenyl
POA – plan of action
RCRA – Resource Conservation and Recovery Act
RFA – RCRA facility assessment
RI – remedial investigation
SI – site inspection
SVOC – semivolatile organic compound
TAL – target analyte list
VOC – volatile organic compound

Source: Modified from Table 3-4 of the final Work Plan (BEI 2003)

References: Listed in Section 6 of this Third Annual Groundwater Monitoring Report

APPENDIX B

GROUNDWATER-LEVEL MEASUREMENTS, HYDROGRAPHS, AND PRECIPITATION DATA

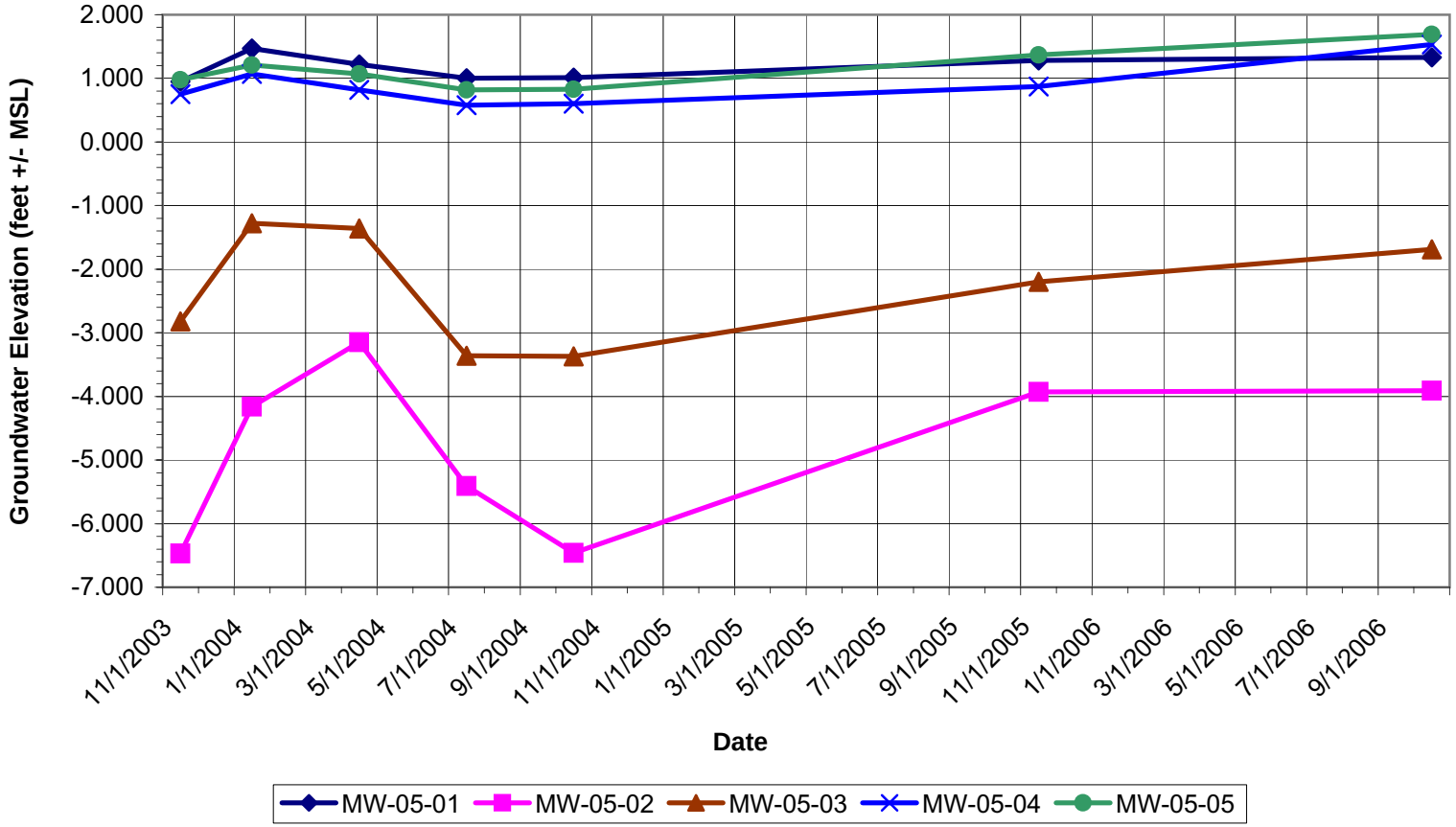

Figure B-1
IR Site 5 Hydrographs

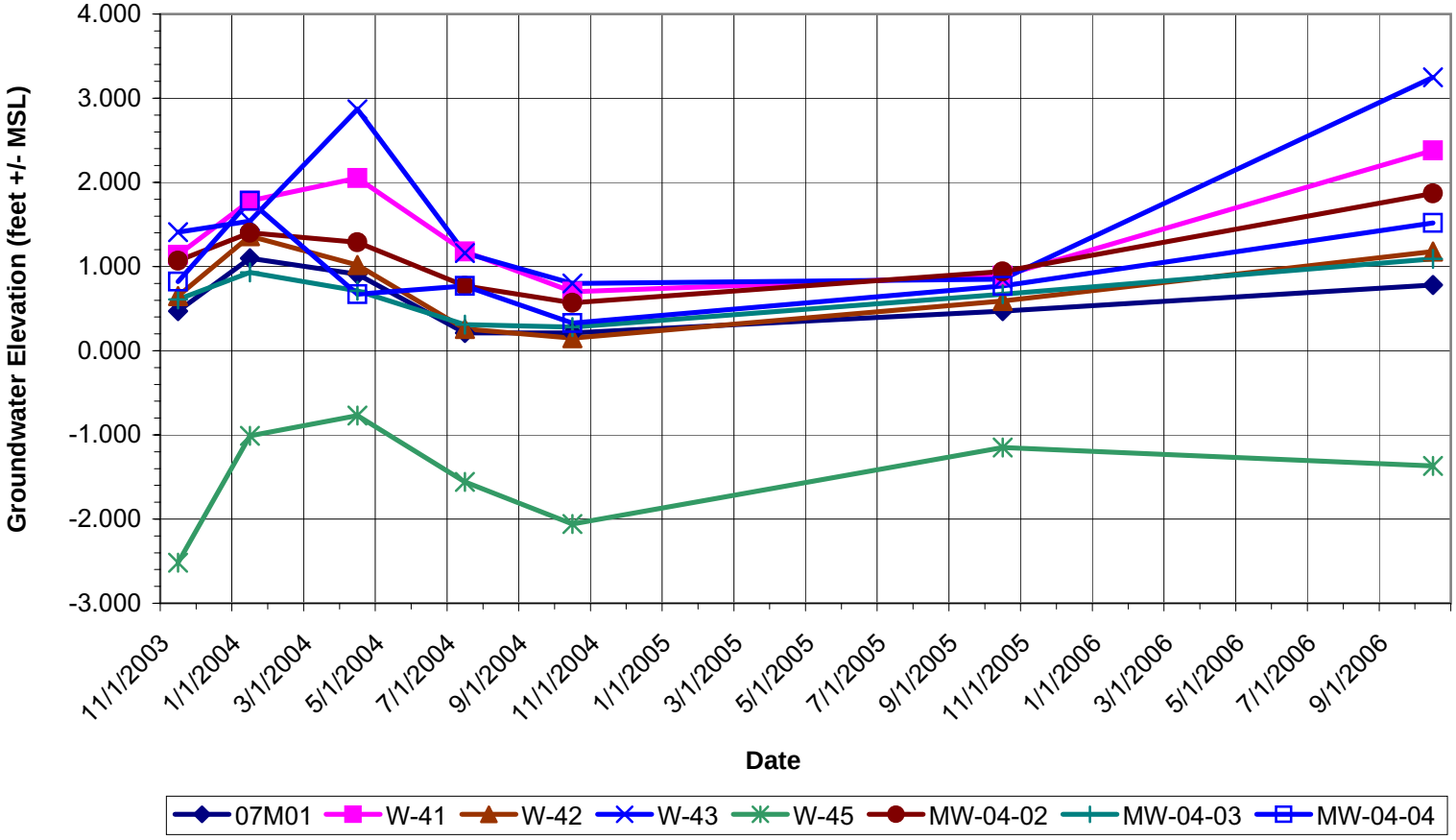

Figure B-2
IR Site 7 Hydrographs

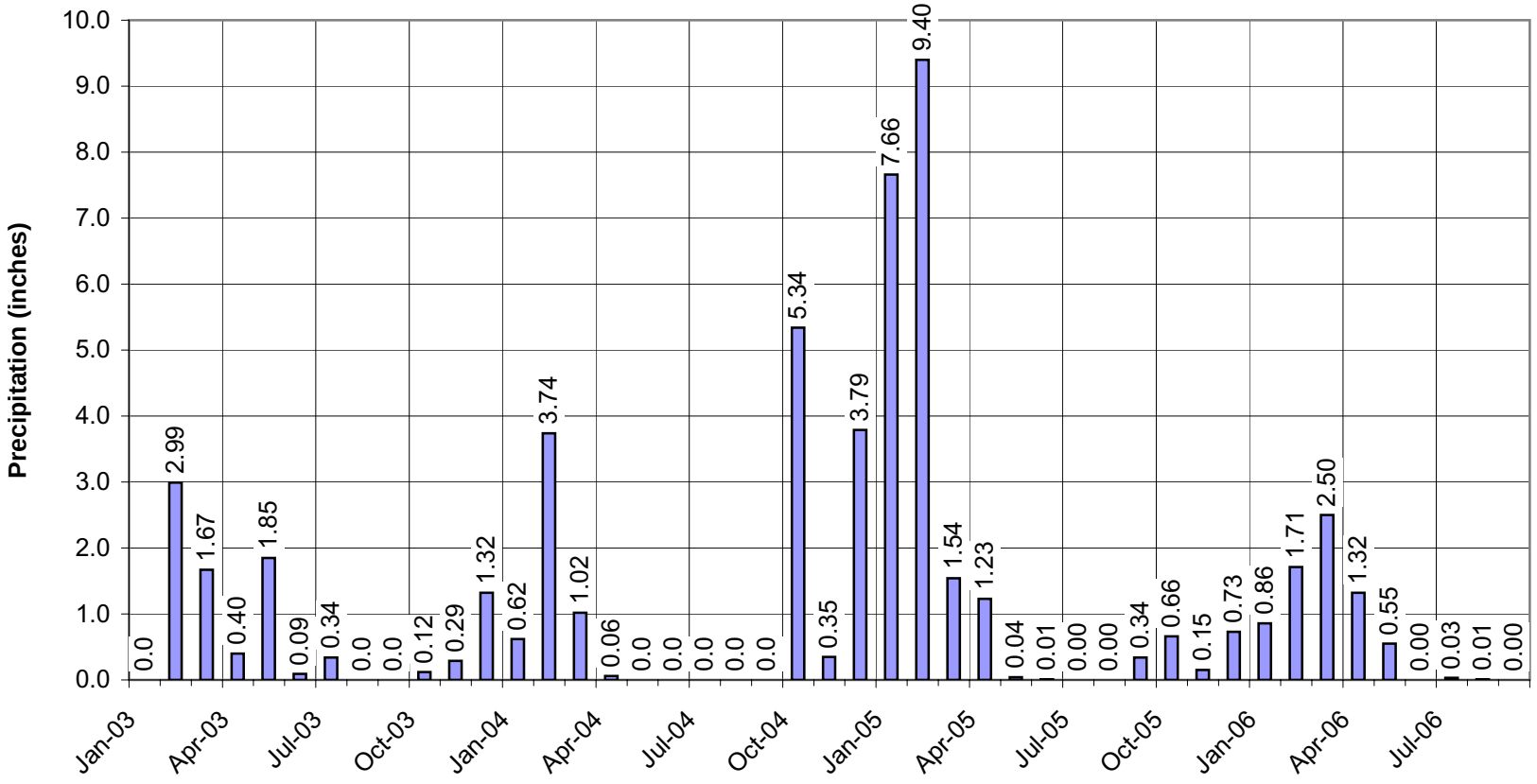

Figure B-3
Monthly Precipitation
(1-Jan-03 through 30-Sep-06)

Data Source: Western Regional Climate Center, Local Climatological Data for Long Beach Airport

Zero to trace levels of precipitation are reported as zero.

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Table B-1
Groundwater-Level Measurements

Well ID	TOC Elevation (feet above MSL)[a]	BASELINE			FIRST QUARTER			SECOND QUARTER		
		Date	Depth to Water (feet below TOC)	Elevation (feet +/- MSL)[a]	Date	Depth to Water (feet below TOC)	Elevation (feet +/- MSL)[a]	Date	Depth to Water (feet below TOC)	Elevation (feet +/- MSL)[a]
IR Site 5										
MW-05-01	14.33	11/21/03	13.38[b]	+0.95	1/24/04	12.87[b]	+1.47	4/12/04	13.11[b]	+1.22
MW-05-02	10.35	11/14/03	16.82	-6.47	1/15/04	14.51	-4.16	4/8/04	13.50	-3.15
MW-05-03	4.85	11/21/03	7.67[b]	-2.82	1/24/04	6.13[b]	-1.28	4/12/04	6.21[b]	-1.36
MW-05-04	5.49	11/14/03	4.74	+0.75	1/15/04	4.42	+1.07	4/8/04	4.67	+0.82
MW-05-05	5.81	11/21/03	4.83[b]	+0.98	1/24/04	4.60[b]	+1.21	4/12/04	4.74[b]	+1.07
IR Site 7										
07M01	4.87	11/14/03	4.40	+0.47	1/15/04	3.77	+1.10	4/8/04	3.96	+0.91
W-41	7.24	11/14/03	6.10	+1.14	1/15/04	5.46	+1.78	4/8/04	5.19	+2.05
W-42	9.36	11/14/03	8.71	+0.65	1/15/04	8.00	+1.36	4/8/04	8.34	+1.02
W-43	6.36	11/14/03	4.95	+1.41	1/15/04	4.82	+1.54	4/8/04	3.49	+2.87
W-45	6.94	11/14/03	9.46	-2.52	1/15/04	7.95	-1.01	4/8/04	7.71	-0.77
MW-04-02	8.98	11/14/03	7.91	+1.07	1/15/04	7.58	+1.40	4/8/04	7.69	+1.29
MW-04-03	9.32	11/14/03	8.71	+0.61	1/15/04	8.39	+0.93	4/8/04	8.61	+0.71
MW-04-04	9.57	11/14/03	8.75	+0.82	1/15/04	7.79	+1.78	4/8/04	8.90	+0.67

Table B-1 (continued)

Well ID	TOC Elevation (feet above MSL)[a]	THIRD QUARTER Date	THIRD QUARTER Depth to Water (feet below TOC)	THIRD QUARTER Elevation (feet +/- MSL)[a]	FOURTH QUARTER Date	FOURTH QUARTER Depth to Water (feet below TOC)	FOURTH QUARTER Elevation (feet +/- MSL)[a]	SECOND ANNUAL Date	SECOND ANNUAL Depth to Water (feet below TOC)	SECOND ANNUAL Elevation (feet +/- MSL)[a]
IR Site 5										
MW-05-01	14.33	7/25/04	13.33[b]	+1.00	10/10/04	13.32[b]	+1.01	11/1/05	13.05	+1.28
MW-05-02	10.35	7/23/04	15.76	-5.41	10/8/04	16.81	-6.46	11/1/05	14.28	-3.93
MW-05-03	4.85	7/25/04	8.21[b]	-3.36	10/10/04	8.22[b]	-3.37	11/1/05	7.05	-2.20
MW-05-04	5.49	7/23/04	4.91	+0.58	10/8/04	4.89	+0.60	11/1/05	4.62	+0.87
MW-05-05	5.81	7/25/04	4.99[b]	+0.82	10/10/04	4.98[b]	+0.83	11/1/05	4.44	+1.37
IR Site 7										
07M01	4.87	7/23/04	4.66	+0.21	10/8/04	4.66	+0.21	10/31/05	4.40	+0.47
W-41	7.24	7/23/04	6.06	+1.18	10/8/04	6.54	+0.70	10/31/05	6.35	+0.89
W-42	9.36	7/23/04	9.10	+0.26	10/8/04	9.21	+0.15	10/31/05	8.77	+0.59
W-43	6.36	7/23/04	5.20	+1.16	10/8/04	5.56	+0.80	10/31/05	5.51	+0.85
W-45	6.94	7/23/04	8.50	-1.56	10/8/04	9.00	-2.06	10/31/05	8.09	-1.15
MW-04-02	8.98	7/23/04	8.21	+0.77	10/8/04	8.41	+0.57	10/31/05	8.04	+0.94
MW-04-03	9.32	7/23/04	9.01	+0.31	10/8/04	9.04	+0.28	10/31/05	8.65	+0.67
MW-04-04	9.57	7/23/04	8.80	+0.77	10/8/04	9.24	+0.33	10/31/05	8.80	+0.77

Table B-1 (continued)

Well ID	TOC Elevation (feet above MSL)[a]	THIRD ANNUAL Date	Depth to Water (feet below TOC)	Elevation (feet +/- MSL)[a]
IR Site 5				
MW-05-01	14.33	10/10/06	13.00	+1.33
MW-05-02	10.35	10/10/06	14.26	-3.91
MW-05-03	4.85	10/10/06	6.54	-1.69
MW-05-04	5.49	10/10/06	3.96	+1.53
MW-05-05	5.81	10/10/06	4.12	+1.69
IR Site 7				
07M01	4.87	10/9/06	4.09	+0.78
W-41	7.24	10/9/06	4.86	+2.38
W-42	9.36	10/9/06	8.18	+1.18
W-43	6.36	10/9/06	3.11	+3.25
W-45	6.94	10/9/06	8.31	-1.37
MW-04-02	8.98	10/9/06	7.11	+1.87
MW-04-03	9.32	10/9/06	8.23	+1.09
MW-04-04	9.57	10/9/06	8.05	+1.52

Notes:

[a] elevations are based on National Geodetic Vertical Datum of 1929; to convert to North American Vertical Datum 1988, add 2.395 feet to the elevation shown

[b] data reflect the mean water levels determined from 71 consecutive hourly electronic water-level measurements; date shown is for hour 36

Acronyms/Abbreviations:

IR – Installation Restoration (Program)
MSL – mean sea level
TOC – top of casing

Table B-2
Historical Hydraulic Gradients and Groundwater Flow Directions

Date Groundwater Levels Measured	Hydraulic Gradient (foot/foot)	Groundwater Flow Direction	Source
IR Site 5			
December 1998	0.0001	East northeast	RSE (BNI 2001)
November 2003	0.009	East northeast	GMP (BEI 2005)
January 2004	0.008	East northeast	GMP (BEI 2005)
April 2004	0.007	East northeast	GMP (BEI 2005)
July 2004	0.009	East northeast	GMP (BEI 2005)
October 2004	0.008	East northeast	GMP (BEI 2005)
October 2005	0.007 to 0.01	East and northeast	GMP (MARRS 2006)
IR Site 7			
November 1988	0.007	Northeast	SI (SWDIV 1990)
May 1989	0.005	Northeast	RISO (Weston 1989a)
August 1989	0.008	Northeast	RISO (Weston 1989b)
November 1989	Not determined	Northeast	RISO (Weston 1990)
September 1993	0.002	North to northeast	RI (JEG 1995)
February/March 1998	0.001	Southwest	GMS (CH2M Hill 1999)
July 1998	0.004 to 0.001	Southeast and east	GMS (CH2M Hill 1999)
November 2003	0.0003 to 0.002	Northeast to east	GMP (BEI 2005)
January 2004	0.0007 to 0.004	Northwest to southwest to east	GMP (BEI 2005)
April 2004	0.001 to 0.006	East to south southwest	GMP (BEI 2005)
July 2004	0.002 to 0.005	East southeast to north northeast	GMP (BEI 2005)
October 2004	0.0008 to 0.002	East to north northeast	GMP (BEI 2005)
October 2005	0.002	East and northeast	GMP (MARRS 2006)

References: Listed in Section 6 of this Third Annual Groundwater Monitoring Report

Acronyms/Abbreviations:
GMP – groundwater monitoring program
GMS – groundwater monitoring study
IR – Installation Restoration (Program)
RI – remedial investigation
RISO – remedial investigation step one
RSE – removal site evaluation
SI – site inspection

APPENDIX C

FIELD PARAMETERS

Table C-1
Field Parameter Readings

Station Number	Screened Interval (feet bgs)	Date	Temperature (°C)	Specific Conductance (µS/cm)	pH	Dissolved Oxygen (mg/L)[a]	Salinity (g/kg)	Oxidation-Reduction Potential (mV)[a]	Eh (mV)[b]	Turbidity (NTU)
IR Site 5										
MW-05-01	10–30	10/7/03	21.54	1,570	7.21	0.30	—[c]	+191.3	+391.3	0.1
		3/29/04	21.85	1,798	7.20	0.77	—	+28.0	+228.0	1.1
		9/27/04	20.55	2,034	7.18	0.80	—	+156.5	+356.5	0.0
		11/2/05	21.93	1,650	7.88	0.51	0.83	+44.0	—	1.8
MW-05-02	19–29	10/7/03	20.92	21,603	6.92	1.07	—	+42.4	+242.4	0.8
		3/30/04	19.23	24,482	6.41	1.16	—	-66.5	+133.5	0.9
		9/29/04	20.45	26,062	6.33	0.80	—	-60.4	+139.6	2.0
		11/2/05	21.10	25,900	6.45	0.23	15.72	-239.0	—	1.5
		10/10/06	21.12	26,670	6.12	1.37	—	-87.9	+112.1	16.0
MW-05-03	19.5–29.5	10/23/03	19.77	50,338	6.32	3.05	—	+213.2	+413.2	0.0
		4/7/04	17.97	56,863	6.50	2.62	—	-52.6	+147.4	—
		10/7/04	19.39	57,477	6.42	1.25	—	-55.2	+144.8	4.8
		11/2/05	19.56	57,200	6.43	0.18	37.73	-278.0	—	1.1
		10/10/06	18.86	53,652	6.27	0.85	—	-80.0	+120.0	8.5
MW-05-04	19–29	10/16/03	19.75	41,472	6.80	1.57	—	-34.1	+165.9	0.0
		4/1/04	18.07	28,486	6.62	1.32	—	+54.2	+254.2	1.6
		10/7/04	20.04	28,358	6.62	0.34	—	+32.4	+232.4	4.6
		11/1/05	20.22	27,460	7.34	0.58	16.74	-6.66	—	1.2
		10/10/06	19.98	25,280	6.58	0.87	—	-3.0	+197.0	1.4
MW-05-05	19–29	10/15/03	20.08	20,392	6.91	0.94	—	+68.2	+268.2	3.7
		4/1/04	19.04	17,919	6.73	1.06	—	+54.3	+254.3	1.4
		10/6/04	23.26	16,657	6.71	1.01	—	-48.6	+151.4	16.1
		11/1/05	20.17	13,280	6.77	0.12	7.61	-316.0	—	1.97

Table C-1 (continued)

Station Number	Screened Interval (feet bgs)	Date	Temperature (°C)	Specific Conductance (µS/cm)	pH	Dissolved Oxygen (mg/L)[a]	Salinity (g/kg)	Oxidation-Reduction Potential (mV)[a]	Eh (mV)[b]	Turbidity (NTU)
IR Site 7										
07M01	10–20	10/13/03	20.95	57,555	6.62	0.36	—	-347.0	-147.0	3.5
		4/6/04	18.02	62,333	6.54	0.0	—	-355.8	-155.8	0.8
		10/6/04	20.17	63,810	6.23	0.49	—	-342.8	-142.8	3.9
		10/31/05	22.23	62,200	7.03	0.37	41.67	-386.0	—	1.3
		10/9/06	20.82	69,261	6.05	8.00[d]	—	-230.5	-30.5	9.3
W-41	10–30	10/10/03	20.47	74,457	6.15	0.09	—	+13.9	+213.9	5.0
		4/2/04	17.86	69,599	6.13	3.08	—	+19.2	+219.2	24.9
		10/5/04	19.47	74,573	5.90	0.36	—	+15.7	+215.7	4.9
		10/31/05	21.02	68,500	6.19	0.36	46.45	+3.0	—	5.53
		10/9/06	19.80	77,095	6.07	0.76	—	+140.1	+340.1	5.0
W-42	9–29	10/9/03	21.07	60,576	6.61	0.28	—	+11.8	+211.8	1.2
		4/2/04	18.70	46,533	6.78	2.45	—	+109.7	+309.7	1.6
		10/4/04	22.60	62,720	6.42	0.26	—	-7.1	+192.9	10.0
		10/31/05	24.21	62,700	6.59	0.24	42.26	-199.0	—	1.3
		10/10/06	22.57	68,005	6.25	1.12	—	+42.1	+242.1	4.0
W-43	9–29	10/16/03	20.79	10,079	6.52	0.38	—	+64.2	+264.2	0.0
		4/6/04	17.71	70,257	6.65	1.48	—	-80.1	+119.9	3.2
		10/7/04	20.07	70,244	6.53	0.31	—	+36.9	+236.9	6.2
		10/31/05	21.28	72,570	6.56	0.13	49.61	-3.19	—	3.55
		10/10/06	20.80	74,111	6.27	0.91	—	+79.8	+279.8	3.9
W-45	8–28	10/15/03	21.35	69,832	5.87	2.58	—	+154.7	+354.7	3.6
		4/7/04	18.43	56,486	5.83	4.65	—	+97.4	+297.4	4.1
		10/8/04	19.69	57,933	5.74	0.37	—	+120.6	+320.6	25.0
		11/1/05	20.82	61,030	5.86	0.26	40.67	-297.0	—	6.9
		10/10/06	20.72	60,840	5.44	0.87	—	+135.9	+335.9	6.4

Table C-1 (continued)

Station Number	Screened Interval (feet bgs)	Date	Temperature (°C)	Specific Conductance (µS/cm)	pH	Dissolved Oxygen (mg/L)[a]	Salinity (g/kg)	Oxidation-Reduction Potential (mV)[a]	Eh (mV)[b]	Turbidity (NTU)
MW-04-02	10–30	10/8/03	22.27	52,389	6.56	0.15	—	+38.9	+238.9	0.0
		3/31/04	18.62	48,296	6.59	5.25	—	+21.6	+221.6	1.1
		10/4/04	22.08	61,836	6.40	0.30	—	+23.7	+223.7	1.6
		11/1/05	22.06	59,430	6.56	0.16	39.61	-239.0	—	4.13
		10/9/06	22.07	72,418	6.56	0.53	—	+131.9	+331.9	2.5
MW-04-03	9.5–29.5	10/10/03	21.14	59,241	6.56	0.47	—	+11.5	+211.5	0.3
		4/1/04	19.50	58,002	6.46	2.56	—	-36.8	+163.2	0.9
		9/29/04	22.17	59,531	6.44	0.81	—	-25.4	+174.6	3.0
		11/1/05	22.84	62,970	7.05	0.48	42.46	-6.0	—	2.23
		10/9/06	21.79	71,280	6.43	0.61	—	+106.0	+306.0	1.4
MW-04-04	9.5–29.5	10/9/03	20.15	50,629	6.61	0.35	—	+111.5	+311.5	0.3
		3/31/04	19.52	49,414	6.53	0.45	—	+110.6	+310.6	2.0
		9/30/04	21.23	56,722	6.45	0.57	—	+24.4	+224.4	3.0
		11/1/05	20.74	53,000	7.12	0.49	34.7	+25.33	—	—
		10/9/06	20.32	65,318	6.39	0.59	—	+113.8	+313.8	0.3

Notes:

[a] dissolved oxygen and oxidation-reduction potential are very sensitive parameters and easily mismeasured; some erroneous measurements may be due to random field error

[b] add 200 mV to oxidation-reduction potential measurement to convert to Eh value, based on use of silver chloride electrode on field measurement instrument

[c] dash indicates parameter was not measured or recorded

[d] dissolved oxygen probe fouled by algae in well purgewater; reading is questionable

Acronyms/Abbreviations:

bgs – below ground surface
°C – degrees Celsius
Eh – electrical potential
g/kg – grams per kilogram
IR – Installation Restoration (Program)
µS/cm – microsiemens per centimeter
mg/L – milligrams per liter
mV – millivolt
NTU – nephelometric turbidity unit

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APPENDIX D

LABORATORY ANALYTICAL RESULTS

Appendix D
LABORATORY ANALYTICAL RESULTS

Laboratory analytical results from the third annual sampling event conducted at IR Sites 5 and 7 on 09 and 10 October 2006 are shown in Table D-1. All results shown in the table have been verified and validated. The following acronyms, abbreviations, definitions, and notes apply.

Sample Type

FD	field duplicate
REG	regular sample
TB	trip blank

Matrix Code

BW	blank water for field quality control samples
GW	groundwater

Filter Code

F	sample was field filtered using a 0.45-micron disposable filter
U	sample was unfiltered

Result Units

MG/L	milligrams per liter
UG/L	micrograms per liter

Lab Qualifiers (Lab qualifiers apply to analytical results prior to data validation)

B	result (for metals) is an estimated concentration that is less than the method reporting limit (MRL) but greater than the method detection limit (MDL)
D	reported result is from a dilution
E	result is an estimate because the value exceeded the instrument calibration range
I	the MRL/MDL has been elevated due to a chromatographic interference
J	result (for organics) is an estimated concentration that is less than the MRL but greater than the MDL
P	confirmation criteria was exceeded; for pesticides, the relative percent difference is greater than 25 percent between the two analytical results
U	the compound was analyzed for but was not detected (nondetect) at or above the MRL/MDL

Review (Val) Qualifiers (Review qualifiers apply to analytical results after data validation)

J	result is an estimated concentration that is less than the MRL but greater than the MDL
R	quality control indicates that data are not usable, i.e., data are rejected
U	the compound was analyzed for but was not detected (nondetect) at or above the MRL/MDL

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Table D-1

Annual Sampling Event (October 2006)

Groundwater and Quality Control Sample Analytical Results

ANALYTICAL RESULTS --- CTO: C002

Facility: NWSSB

Site: 00004 OIL ON ROADS (PERIMETER ROAD)

Data retrieved from BEIDMS on 06-Nov-20 at 9:27 AM 06

Station ID	Sample Information					Filter Code	Analyte Name	Results	Qualifiers			Date Information		
	Matrix	Type	Top Depth	Container ID	Method Code				Lab	Val	Result Type	Collect	Prepare	Analyze
Pay Item : VOCS WITH TICS														
FQC	BW	TB		C002RQ8002	EPA 8260B	U	METHYL TERT-BUTYL ETHER	0.5 UG/L	U	U	000 REG	10/10/2006	10/19/2006	10/19/2006
Pay Item : PESTICIDES ONLY														
MW-04-02	GW	REG	10	C002R00910	EPA 8081A	U	4,4'-DDD	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-02	GW	REG	10	C002R00910	EPA 8081A	U	4,4'-DDE	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-02	GW	REG	10	C002R00910	EPA 8081A	U	4,4'-DDT	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-02	GW	REG	10	C002R00910	EPA 8081A	U	ALDRIN	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-02	GW	REG	10	C002R00910	EPA 8081A	U	ALPHA-BHC	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-02	GW	REG	10	C002R00910	EPA 8081A	U	ALPHA-CHLORDANE	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-02	GW	REG	10	C002R00910	EPA 8081A	U	BETA-BHC	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-02	GW	REG	10	C002R00910	EPA 8081A	U	DELTA-BHC	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-02	GW	REG	10	C002R00910	EPA 8081A	U	DIELDRIN	0.0096 UG/L	U	UJ	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-02	GW	REG	10	C002R00910	EPA 8081A	U	ENDOSULFAN I	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-02	GW	REG	10	C002R00910	EPA 8081A	U	ENDOSULFAN II	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-02	GW	REG	10	C002R00910	EPA 8081A	U	ENDOSULFAN SULFATE	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-02	GW	REG	10	C002R00910	EPA 8081A	U	ENDRIN	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-02	GW	REG	10	C002R00910	EPA 8081A	U	ENDRIN ALDEHYDE	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-02	GW	REG	10	C002R00910	EPA 8081A	U	ENDRIN KETONE	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-02	GW	REG	10	C002R00910	EPA 8081A	U	GAMMA-BHC (LINDANE)	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-02	GW	REG	10	C002R00910	EPA 8081A	U	GAMMA-CHLORDANE	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-02	GW	REG	10	C002R00910	EPA 8081A	U	HEPTACHLOR	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-02	GW	REG	10	C002R00910	EPA 8081A	U	HEPTACHLOR EPOXIDE	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-02	GW	REG	10	C002R00910	EPA 8081A	U	METHOXYCHLOR	0.0018 UG/L	J	J	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-02	GW	REG	10	C002R00910	EPA 8081A	U	TOXAPHENE	0.48 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-03	GW	REG	9.5	C002R01010	EPA 8081A	U	4,4'-DDD	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-03	GW	REG	9.5	C002R01010	EPA 8081A	U	4,4'-DDE	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/17/2006

ANALYTICAL RESULTS --- CTO: C002

Facility: NWSSB

Site: 00004 OIL ON ROADS (PERIMETER ROAD)

Data retrieved from BEIDMS on 06-Nov-20 at 9:27 AM 06

Station ID	Sample Information					Filter Code	Analyte Name	Results	Qualifiers			Date Information		
	Matrix	Type	Top Depth	Container ID	Method Code				Lab	Val	Result Type	Collect	Prepare	Analyze
MW-04-03	GW	REG	9.5	C002R01010	EPA 8081A	U	4,4'-DDT	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-03	GW	REG	9.5	C002R01010	EPA 8081A	U	ALDRIN	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-03	GW	REG	9.5	C002R01010	EPA 8081A	U	ALPHA-BHC	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-03	GW	REG	9.5	C002R01010	EPA 8081A	U	ALPHA-CHLORDANE	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-03	GW	REG	9.5	C002R01010	EPA 8081A	U	BETA-BHC	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-03	GW	REG	9.5	C002R01010	EPA 8081A	U	DELTA-BHC	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-03	GW	REG	9.5	C002R01010	EPA 8081A	U	DIELDRIN	0.0096 UG/L	U	UJ	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-03	GW	REG	9.5	C002R01010	EPA 8081A	U	ENDOSULFAN I	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-03	GW	REG	9.5	C002R01010	EPA 8081A	U	ENDOSULFAN II	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-03	GW	REG	9.5	C002R01010	EPA 8081A	U	ENDOSULFAN SULFATE	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-03	GW	REG	9.5	C002R01010	EPA 8081A	U	ENDRIN	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-03	GW	REG	9.5	C002R01010	EPA 8081A	U	ENDRIN ALDEHYDE	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-03	GW	REG	9.5	C002R01010	EPA 8081A	U	ENDRIN KETONE	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-03	GW	REG	9.5	C002R01010	EPA 8081A	U	GAMMA-BHC (LINDANE)	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-03	GW	REG	9.5	C002R01010	EPA 8081A	U	GAMMA-CHLORDANE	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-03	GW	REG	9.5	C002R01010	EPA 8081A	U	HEPTACHLOR	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-03	GW	REG	9.5	C002R01010	EPA 8081A	U	HEPTACHLOR EPOXIDE	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-03	GW	REG	9.5	C002R01010	EPA 8081A	U	METHOXYCHLOR	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-03	GW	REG	9.5	C002R01010	EPA 8081A	U	TOXAPHENE	0.48 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-04	GW	REG	9.5	C002R01110	EPA 8081A	U	4,4'-DDD	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-04	GW	REG	9.5	C002R01110	EPA 8081A	U	4,4'-DDE	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-04	GW	REG	9.5	C002R01110	EPA 8081A	U	4,4'-DDT	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-04	GW	REG	9.5	C002R01110	EPA 8081A	U	ALDRIN	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-04	GW	REG	9.5	C002R01110	EPA 8081A	U	ALPHA-BHC	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-04	GW	REG	9.5	C002R01110	EPA 8081A	U	ALPHA-CHLORDANE	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-04	GW	REG	9.5	C002R01110	EPA 8081A	U	BETA-BHC	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-04	GW	REG	9.5	C002R01110	EPA 8081A	U	DELTA-BHC	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/17/2006

ANALYTICAL RESULTS --- CTO: C002

Facility: NWSSB

Site: 00004 OIL ON ROADS (PERIMETER ROAD)

Data retrieved from BEIDMS on 06-Nov-20 at 9:27 AM 06

Station ID	Sample Information					Filter Code	Analyte Name	Results	Qualifiers			Date Information		
	Matrix	Type	Top Depth	Container ID	Method Code				Lab	Val	Result Type	Collect	Prepare	Analyze
MW-04-04	GW	REG	9.5	C002R01110	EPA 8081A	U	DIELDRIN	0.0096 UG/L	UI	UJ	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-04	GW	REG	9.5	C002R01110	EPA 8081A	U	ENDOSULFAN I	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-04	GW	REG	9.5	C002R01110	EPA 8081A	U	ENDOSULFAN II	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-04	GW	REG	9.5	C002R01110	EPA 8081A	U	ENDOSULFAN SULFATE	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-04	GW	REG	9.5	C002R01110	EPA 8081A	U	ENDRIN	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-04	GW	REG	9.5	C002R01110	EPA 8081A	U	ENDRIN ALDEHYDE	0.0096 UG/L	J	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-04	GW	REG	9.5	C002R01110	EPA 8081A	U	ENDRIN KETONE	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-04	GW	REG	9.5	C002R01110	EPA 8081A	U	GAMMA-BHC (LINDANE)	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-04	GW	REG	9.5	C002R01110	EPA 8081A	U	GAMMA-CHLORDANE	0.00065 UG/L	JP	J	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-04	GW	REG	9.5	C002R01110	EPA 8081A	U	HEPTACHLOR	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-04	GW	REG	9.5	C002R01110	EPA 8081A	U	HEPTACHLOR EPOXIDE	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-04	GW	REG	9.5	C002R01110	EPA 8081A	U	METHOXYCHLOR	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/17/2006
MW-04-04	GW	REG	9.5	C002R01110	EPA 8081A	U	TOXAPHENE	0.48 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
Pay Item : CYANIDE														
MW-04-02	GW	REG	10	C002R00920	EPA 335.4	U	CYANIDE	0.003 MG/L	J	J	000 REG	10/9/2006	10/12/2006	10/12/2006
MW-04-03	GW	REG	9.5	C002R01020	EPA 335.4	U	CYANIDE	0.003 MG/L	J	J	000 REG	10/9/2006	10/12/2006	10/12/2006
MW-04-04	GW	REG	9.5	C002R01120	EPA 335.4	U	CYANIDE	0.01 MG/L	U	UJ	000 REG	10/9/2006	10/12/2006	10/12/2006
Pay Item : VOCS WITH TICS														
MW-05-04	GW	REG	19	C002R00301	EPA 8260B	U	METHYL TERT-BUTYL ETHER	50 UG/L	D		DL1 REG	10/10/2006	10/19/2006	10/19/2006
MW-05-04	GW	REG	19	C002R00302	EPA 8260B	U	METHYL TERT-BUTYL ETHER	55 UG/L	E	R	000 REG	10/10/2006	10/19/2006	10/19/2006
Pay Item : HEXAVALENT CR														
MW-05-02	GW	FD	19	C002R10140	EPA 7191	U	CHROMIUM, HEXAVALENT	0.6 UG/L	UN	UJ	000 REG	10/10/2006	10/11/2006	10/18/2006
MW-05-02	GW	REG	19	C002R00140	EPA 7191	U	CHROMIUM, HEXAVALENT	0.6 UG/L	UN	UJ	000 REG	10/10/2006	10/11/2006	10/18/2006
Pay Item : ICP PER ELEMENT														
MW-05-02	GW	FD	19	C002R10140	EPA 6010B	F	NICKEL	2 UG/L	U	U	000 REG	10/10/2006	10/15/2006	10/17/2006
MW-05-02	GW	FD	19	C002R10140	EPA 6010B	F	ZINC	6 UG/L	U	U	000 REG	10/10/2006	10/15/2006	10/17/2006

ANALYTICAL RESULTS --- CTO: C002

Facility: NWSSB

Site: 00005 CLEAN FILL DISPOSAL

Data retrieved from BEIDMS on 06-Nov-20 at 9:27 AM 06

Station ID	Sample Information: Matrix	Type	Top Depth	Container ID	Method Code	Filter Code	Analyte Name	Results	Qualifiers: Lab	Val	Result Type	Date Information: Collect	Prepare	Analyze
MW-05-02	GW	REG	19	C002R00140	EPA 6010B	F	NICKEL	2 UG/L	U	U	000 REG	10/10/2006	10/15/2006	10/17/2006
MW-05-02	GW	REG	19	C002R00140	EPA 6010B	F	ZINC	6 UG/L	U	U	000 REG	10/10/2006	10/15/2006	10/17/2006
Pay Item : PERCHLORATE 314.0														
MW-05-02	GW	FD	19	C002R10130	EPA 314.0	U	PERCHLORATE	1 UG/L	U	U	000 REG	10/10/2006	10/19/2006	10/19/2006
MW-05-02	GW	REG	19	C002R00130	EPA 314.0	U	PERCHLORATE	1 UG/L	U	U	000 REG	10/10/2006	10/19/2006	10/19/2006
MW-05-03	GW	REG	19.5	C002R00230	EPA 314.0	U	PERCHLORATE	1 UG/L	U	U	000 REG	10/10/2006	10/19/2006	10/19/2006
MW-05-04	GW	REG	19	C002R00330	EPA 314.0	U	PERCHLORATE	1 UG/L	U	U	000 REG	10/10/2006	10/19/2006	10/19/2006
Pay Item : PERCHLORATE LAB SOP LCMS														
MW-05-02	GW	FD	19	C002R10131	LAB SOP LCMS	U	PERCHLORATE	0.051 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/12/2006
MW-05-02	GW	REG	19	C002R00131	LAB SOP LCMS	U	PERCHLORATE	0.051 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/12/2006
MW-05-03	GW	REG	19.5	C002R00231	LAB SOP LCMS	U	PERCHLORATE	0.051 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/12/2006
MW-05-04	GW	REG	19	C002R00331	LAB SOP LCMS	U	PERCHLORATE	0.051 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/12/2006
Pay Item : PESTICIDES ONLY														
07M01	GW	REG	10	C002R00410	EPA 8081A	U	4,4'-DDD	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/19/2006
07M01	GW	REG	10	C002R00410	EPA 8081A	U	4,4'-DDE	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/19/2006
07M01	GW	REG	10	C002R00410	EPA 8081A	U	4,4'-DDT	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/19/2006
07M01	GW	REG	10	C002R00410	EPA 8081A	U	ALDRIN	0.0013 UG/L	JP	J	000 REG	10/9/2006	10/12/2006	10/19/2006
07M01	GW	REG	10	C002R00410	EPA 8081A	U	ALPHA-BHC	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/19/2006
07M01	GW	REG	10	C002R00410	EPA 8081A	U	ALPHA-CHLORDANE	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/19/2006
07M01	GW	REG	10	C002R00410	EPA 8081A	U	BETA-BHC	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/19/2006
07M01	GW	REG	10	C002R00410	EPA 8081A	U	DELTA-BHC	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/19/2006
07M01	GW	REG	10	C002R00410	EPA 8081A	U	DIELDRIN	0.0096 UG/L	UI	UJ	000 REG	10/9/2006	10/12/2006	10/19/2006
07M01	GW	REG	10	C002R00410	EPA 8081A	U	ENDOSULFAN I	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/19/2006
07M01	GW	REG	10	C002R00410	EPA 8081A	U	ENDOSULFAN II	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/19/2006
07M01	GW	REG	10	C002R00410	EPA 8081A	U	ENDOSULFAN SULFATE	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/19/2006
07M01	GW	REG	10	C002R00410	EPA 8081A	U	ENDRIN	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/19/2006

ANALYTICAL RESULTS --- CTO: C002

Data retrieved from BEIDMS on 06-Nov-20 at 9:27 AM 06

Facility: NWSSB

Site: 00007 STATION LANDFILL

Station ID	Sample Information			Container ID	Method Code	Filter Code	Analyte Name	Results	Qualifiers		Result Type	Date Information		
	Matrix	Type	Top Depth						Lab	Val		Collect	Prepare	Analyze
07M01	GW	REG	10	C002R00410	EPA 8081A	U	ENDRIN ALDEHYDE	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/19/2006
07M01	GW	REG	10	C002R00410	EPA 8081A	U	ENDRIN KETONE	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/19/2006
07M01	GW	REG	10	C002R00410	EPA 8081A	U	GAMMA-BHC (LINDANE)	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/19/2006
07M01	GW	REG	10	C002R00410	EPA 8081A	U	GAMMA-CHLORDANE	0.0016 UG/L	J	J	000 REG	10/9/2006	10/12/2006	10/19/2006
07M01	GW	REG	10	C002R00410	EPA 8081A	U	HEPTACHLOR	0.0011 UG/L	J	J	000 REG	10/9/2006	10/12/2006	10/19/2006
07M01	GW	REG	10	C002R00410	EPA 8081A	U	HEPTACHLOR EPOXIDE	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/19/2006
07M01	GW	REG	10	C002R00410	EPA 8081A	U	METHOXYCHLOR	0.0096 UG/L	UI	U	000 REG	10/9/2006	10/12/2006	10/19/2006
07M01	GW	REG	10	C002R00410	EPA 8081A	U	TOXAPHENE	0.48 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/19/2006
W-41	GW	REG	10	C002R00510	EPA 8081A	U	4,4'-DDD	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
W-41	GW	REG	10	C002R00510	EPA 8081A	U	4,4'-DDE	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
W-41	GW	REG	10	C002R00510	EPA 8081A	U	4,4'-DDT	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
W-41	GW	REG	10	C002R00510	EPA 8081A	U	ALDRIN	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
W-41	GW	REG	10	C002R00510	EPA 8081A	U	ALPHA-BHC	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
W-41	GW	REG	10	C002R00510	EPA 8081A	U	ALPHA-CHLORDANE	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
W-41	GW	REG	10	C002R00510	EPA 8081A	U	BETA-BHC	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
W-41	GW	REG	10	C002R00510	EPA 8081A	U	DELTA-BHC	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
W-41	GW	REG	10	C002R00510	EPA 8081A	U	DIELDRIN	0.0096 UG/L	U	UJ	000 REG	10/9/2006	10/12/2006	10/17/2006
W-41	GW	REG	10	C002R00510	EPA 8081A	U	ENDOSULFAN I	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
W-41	GW	REG	10	C002R00510	EPA 8081A	U	ENDOSULFAN II	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
W-41	GW	REG	10	C002R00510	EPA 8081A	U	ENDOSULFAN SULFATE	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
W-41	GW	REG	10	C002R00510	EPA 8081A	U	ENDRIN	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
W-41	GW	REG	10	C002R00510	EPA 8081A	U	ENDRIN ALDEHYDE	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
W-41	GW	REG	10	C002R00510	EPA 8081A	U	ENDRIN KETONE	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
W-41	GW	REG	10	C002R00510	EPA 8081A	U	GAMMA-BHC (LINDANE)	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
W-41	GW	REG	10	C002R00510	EPA 8081A	U	GAMMA-CHLORDANE	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
W-41	GW	REG	10	C002R00510	EPA 8081A	U	HEPTACHLOR	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
W-41	GW	REG	10	C002R00510	EPA 8081A	U	HEPTACHLOR EPOXIDE	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006

ANALYTICAL RESULTS --- CTO: C002

Facility: NWSSB

Site: 00007 STATION LANDFILL

Data retrieved from BEIDMS on 06-Nov-20 at 9:27 AM 06

Station ID	Sample Information			Container ID	Method Code	Filter Code	Analyte Name	Results	Qualifiers		Result Type	Date Information		
	Matrix	Type	Top Depth						Lab	Val		Collect	Prepare	Analyze
W-41	GW	REG	10	C002R00510	EPA 8081A	U	METHOXYCHLOR	0.0096 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
W-41	GW	REG	10	C002R00510	EPA 8081A	U	TOXAPHENE	0.48 UG/L	U	U	000 REG	10/9/2006	10/12/2006	10/17/2006
W-42	GW	REG	10	C002R00610	EPA 8081A	U	4,4'-DDD	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-42	GW	REG	10	C002R00610	EPA 8081A	U	4,4'-DDE	0.0096 UG/L	UI	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-42	GW	REG	10	C002R00610	EPA 8081A	U	4,4'-DDT	0.0014 UG/L	JP	J	000 REG	10/10/2006	10/12/2006	10/17/2006
W-42	GW	REG	10	C002R00610	EPA 8081A	U	ALDRIN	0.0096 UG/L	UI	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-42	GW	REG	10	C002R00610	EPA 8081A	U	ALPHA-BHC	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-42	GW	REG	10	C002R00610	EPA 8081A	U	ALPHA-CHLORDANE	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-42	GW	REG	10	C002R00610	EPA 8081A	U	BETA-BHC	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-42	GW	REG	10	C002R00610	EPA 8081A	U	DELTA-BHC	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-42	GW	REG	10	C002R00610	EPA 8081A	U	DIELDRIN	0.0096 UG/L	U	UJ	000 REG	10/10/2006	10/12/2006	10/17/2006
W-42	GW	REG	10	C002R00610	EPA 8081A	U	ENDOSULFAN I	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-42	GW	REG	10	C002R00610	EPA 8081A	U	ENDOSULFAN II	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-42	GW	REG	10	C002R00610	EPA 8081A	U	ENDOSULFAN SULFATE	0.0096 UG/L	UI	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-42	GW	REG	10	C002R00610	EPA 8081A	U	ENDRIN	0.0096 UG/L	UI	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-42	GW	REG	10	C002R00610	EPA 8081A	U	ENDRIN ALDEHYDE	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-42	GW	REG	10	C002R00610	EPA 8081A	U	ENDRIN KETONE	0.0096 UG/L	UI	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-42	GW	REG	10	C002R00610	EPA 8081A	U	GAMMA-BHC (LINDANE)	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-42	GW	REG	10	C002R00610	EPA 8081A	U	GAMMA-CHLORDANE	0.0096 UG/L	UI	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-42	GW	REG	10	C002R00610	EPA 8081A	U	HEPTACHLOR	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-42	GW	REG	10	C002R00610	EPA 8081A	U	HEPTACHLOR EPOXIDE	0.0096 UG/L	UI	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-42	GW	REG	10	C002R00610	EPA 8081A	U	METHOXYCHLOR	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-42	GW	REG	10	C002R00610	EPA 8081A	U	TOXAPHENE	0.48 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-43	GW	REG	9	C002R00710	EPA 8081A	U	4,4'-DDD	0.0098 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-43	GW	REG	9	C002R00710	EPA 8081A	U	4,4'-DDE	0.0098 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-43	GW	REG	9	C002R00710	EPA 8081A	U	4,4'-DDT	0.0098 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-43	GW	REG	9	C002R00710	EPA 8081A	U	ALDRIN	0.0098 UG/L	UI	U	000 REG	10/10/2006	10/12/2006	10/17/2006

ANALYTICAL RESULTS --- CTO: C002

Facility: NWSSB

Site: 00007 STATION LANDFILL

Data retrieved from BEIDMS on 06-Nov-20 at 9:27 AM 06

Station ID	Sample Information			Container ID	Method Code	Filter Code	Analyte Name	Results	Qualifiers		Result Type	Date Information		
	Matrix	Type	Top Depth						Lab	Val		Collect	Prepare	Analyze
W-43	GW	REG	9	C002R00710	EPA 8081A	U	ALPHA-BHC	0.0098 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-43	GW	REG	9	C002R00710	EPA 8081A	U	ALPHA-CHLORDANE	0.0098 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-43	GW	REG	9	C002R00710	EPA 8081A	U	BETA-BHC	0.0098 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-43	GW	REG	9	C002R00710	EPA 8081A	U	DELTA-BHC	0.0098 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-43	GW	REG	9	C002R00710	EPA 8081A	U	DIELDRIN	0.0098 UG/L	U	UJ	000 REG	10/10/2006	10/12/2006	10/17/2006
W-43	GW	REG	9	C002R00710	EPA 8081A	U	ENDOSULFAN I	0.0098 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-43	GW	REG	9	C002R00710	EPA 8081A	U	ENDOSULFAN II	0.0098 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-43	GW	REG	9	C002R00710	EPA 8081A	U	ENDOSULFAN SULFATE	0.0098 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-43	GW	REG	9	C002R00710	EPA 8081A	U	ENDRIN	0.0098 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-43	GW	REG	9	C002R00710	EPA 8081A	U	ENDRIN ALDEHYDE	0.0098 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-43	GW	REG	9	C002R00710	EPA 8081A	U	ENDRIN KETONE	0.0098 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-43	GW	REG	9	C002R00710	EPA 8081A	U	GAMMA-BHC (LINDANE)	0.0098 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-43	GW	REG	9	C002R00710	EPA 8081A	U	GAMMA-CHLORDANE	0.0098 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-43	GW	REG	9	C002R00710	EPA 8081A	U	HEPTACHLOR	0.0098 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-43	GW	REG	9	C002R00710	EPA 8081A	U	HEPTACHLOR EPOXIDE	0.0098 UG/L	UI	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-43	GW	REG	9	C002R00710	EPA 8081A	U	METHOXYCHLOR	0.0012 UG/L	J	J	000 REG	10/10/2006	10/12/2006	10/17/2006
W-43	GW	REG	9	C002R00710	EPA 8081A	U	TOXAPHENE	0.49 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-45	GW	REG	8	C002R00810	EPA 8081A	U	4,4'-DDD	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-45	GW	REG	8	C002R00810	EPA 8081A	U	4,4'-DDE	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-45	GW	REG	8	C002R00810	EPA 8081A	U	4,4'-DDT	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-45	GW	REG	8	C002R00810	EPA 8081A	U	ALDRIN	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-45	GW	REG	8	C002R00810	EPA 8081A	U	ALPHA-BHC	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-45	GW	REG	8	C002R00810	EPA 8081A	U	ALPHA-CHLORDANE	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-45	GW	REG	8	C002R00810	EPA 8081A	U	BETA-BHC	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-45	GW	REG	8	C002R00810	EPA 8081A	U	DELTA-BHC	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-45	GW	REG	8	C002R00810	EPA 8081A	U	DIELDRIN	0.0096 UG/L	U	UJ	000 REG	10/10/2006	10/12/2006	10/17/2006
W-45	GW	REG	8	C002R00810	EPA 8081A	U	ENDOSULFAN I	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006

ANALYTICAL RESULTS --- CTO: C002

Facility: NWSSB

Site: 00007 STATION LANDFILL

Data retrieved from BEIDMS on 06-Nov-20 at 9:27 AM 06

Station ID	Sample Information: Matrix	Type	Top Depth	Container ID	Method Code	Filter Code	Analyte Name	Results	Qualifiers: Lab	Val	Result Type	Date Information: Collect	Prepare	Analyze
W-45	GW	REG	8	C002R00810	EPA 8081A	U	ENDOSULFAN II	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-45	GW	REG	8	C002R00810	EPA 8081A	U	ENDOSULFAN SULFATE	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-45	GW	REG	8	C002R00810	EPA 8081A	U	ENDRIN	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-45	GW	REG	8	C002R00810	EPA 8081A	U	ENDRIN ALDEHYDE	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-45	GW	REG	8	C002R00810	EPA 8081A	U	ENDRIN KETONE	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-45	GW	REG	8	C002R00810	EPA 8081A	U	GAMMA-BHC (LINDANE)	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-45	GW	REG	8	C002R00810	EPA 8081A	U	GAMMA-CHLORDANE	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-45	GW	REG	8	C002R00810	EPA 8081A	U	HEPTACHLOR	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-45	GW	REG	8	C002R00810	EPA 8081A	U	HEPTACHLOR EPOXIDE	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-45	GW	REG	8	C002R00810	EPA 8081A	U	METHOXYCHLOR	0.0096 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
W-45	GW	REG	8	C002R00810	EPA 8081A	U	TOXAPHENE	0.48 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/17/2006
Pay Item : ICP PER ELEMENT														
W-41	GW	REG	10	C002R00550	EPA 6010B	F	COBALT	34.6 UG/L			000 REG	10/9/2006	10/15/2006	10/17/2006
W-45	GW	REG	8	C002R00850	EPA 6010B	F	CADMIUM	3.1 UG/L	B		000 REG	10/10/2006	10/15/2006	10/17/2006
Pay Item : CYANIDE														
07M01	GW	REG	10	C002R00420	EPA 335.4	U	CYANIDE	0.02 MG/L		J	000 REG	10/9/2006	10/12/2006	10/12/2006
W-42	GW	REG	10	C002R00620	EPA 335.4	U	CYANIDE	0.003 MG/L	J	J	000 REG	10/10/2006	10/12/2006	10/12/2006
Pay Item : PERCHLORATE 314.0														
W-42	GW	REG	10	C002R00630	EPA 314.0	U	PERCHLORATE	1 UG/L	U	U	000 REG	10/10/2006	10/19/2006	10/19/2006
W-43	GW	REG	9	C002R00730	EPA 314.0	U	PERCHLORATE	1 UG/L	U	U	000 REG	10/10/2006	10/19/2006	10/19/2006
W-45	GW	REG	8	C002R00830	EPA 314.0	U	PERCHLORATE	1 UG/L	U	U	000 REG	10/10/2006	10/19/2006	10/19/2006
Pay Item : PERCHLORATE LAB SOP LCMS														
W-42	GW	REG	10	C002R00631	LAB SOP LCMS	U	PERCHLORATE	0.051 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/12/2006
W-43	GW	REG	9	C002R00731	LAB SOP LCMS	U	PERCHLORATE	0.051 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/12/2006
W-45	GW	REG	8	C002R00831	LAB SOP LCMS	U	PERCHLORATE	0.051 UG/L	U	U	000 REG	10/10/2006	10/12/2006	10/12/2006

APPENDIX E

SCREENING VALUES

Table E-1
Screening Values for Analytes Reported in Groundwater Samples
(micrograms per liter)

Analyte	Applicable Screening Value	PRIMARY CRITERIA		Supplemental Criteria[c]
		California Toxics Rule Criteria[a]	Stationwide Background[b]	
Volatile Organic Compounds				
methyl tert-butyl ether	440	NE	NE	440
Organochlorine Pesticides				
aldrin	ND	1.3[d]	ND	0.13
alpha-BHC	ND	NE	ND	0.016
beta-BHC	ND	NE	ND	NE
gamma-BHC (lindane)	ND	0.16[d]	ND	0.016
chlordane	ND	0.004	ND	NE
4,4′-DDD	ND	NE	ND	0.001
4,4′-DDE	ND	NE	ND	0.001
4,4′-DDT	ND	0.001	ND	NE
dieldrin	ND	0.0019	ND	NE
endosulfan I	ND	0.0087[e]	ND	NE
endosulfan II	ND	0.0087[e]	ND	NE
endrin aldehyde	ND	NE	ND	NE
endrin ketone	ND	NE	ND	0.0023
heptachlor	ND	0.0036	ND	NE
heptachlor epoxide	ND	0.0036	ND	NE
methoxychlor	ND	0.03[f]	ND	NE
Metals				
cadmium	16.4	8.8[f]	16.4	NE
chromium, hexavalent	50	50	NE	NE
cobalt	16.6	NE	16.6	10
nickel	17.5	8.2	17.5	NE
zinc	81	81	32.4	NE
Other				
cyanide	1	1	NE	NE
perchlorate	NE	NE	NE	NE

Reference: modified from Table 3-7 of BEI 2003, final Work Plan for Groundwater Monitoring at Installation Restoration Sites 4, 5, 6, and 7, Naval Weapons Station Seal Beach, Seal Beach, California, August

Notes:

[a] water quality criteria obtained from U.S. EPA 2000, California Toxics Rule Criteria, Enclosed Bays & Estuaries, Saltwater Aquatic Life Protection, continuous concentration (4-day average), unless noted otherwise

[b] stationwide upper limit background value; from JEG 1997, final Technical Memorandum, Stationwide Background Study – Phase II, Naval Weapons Station Seal Beach, Seal Beach, California, 14 March

[c] supplemental criteria obtained from BEI 2005, final First Annual Groundwater Monitoring Report, IR Sites 4, 5, 6, and 7, Naval Weapons Station Seal Beach, California, June, Appendix D, Table D-5

Table E-1 (continued)

Notes (continued):

[d] instantaneous maximum value

[e] criterion most appropriately applied to the sum of endosulfan I and endosulfan II

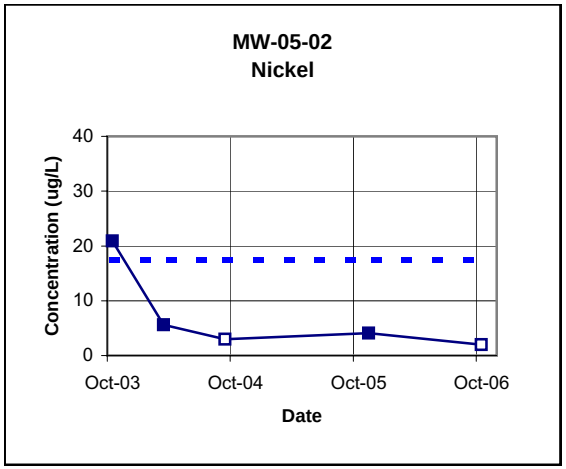
[f] criteria from U.S. EPA 2002, National Recommended Water Quality Criteria for Saltwater Aquatic Life Protection, continuous concentration (4-day average), EPA-822-R-02-047, November

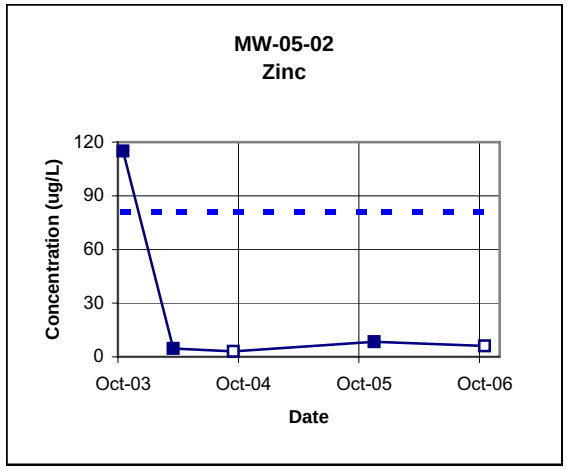
Acronyms/Abbreviations:

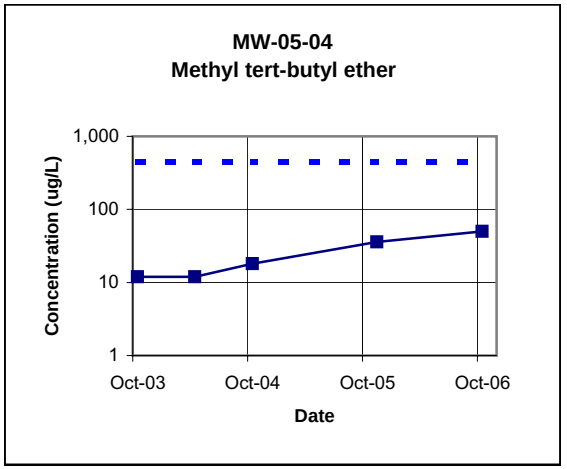
BHC – benzene hexachloride
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
IR – Installation Restoration (Program)
μg/L – micrograms per liter
ND – not reported above detection limits (nondetect)
NE – not established
U.S. EPA – United States Environmental Protection Agency

APPENDIX F

TIME SERIES CONCENTRATION PLOTS







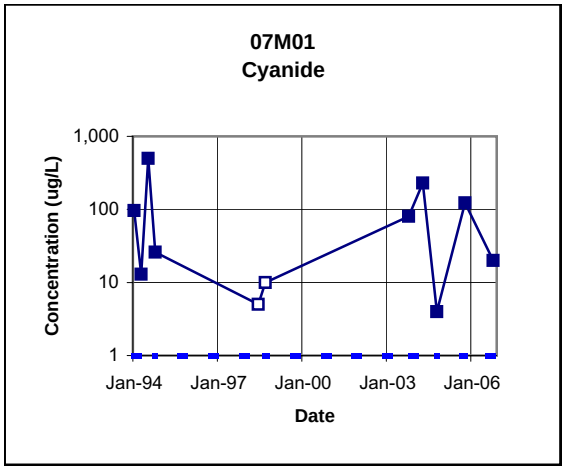
Legend

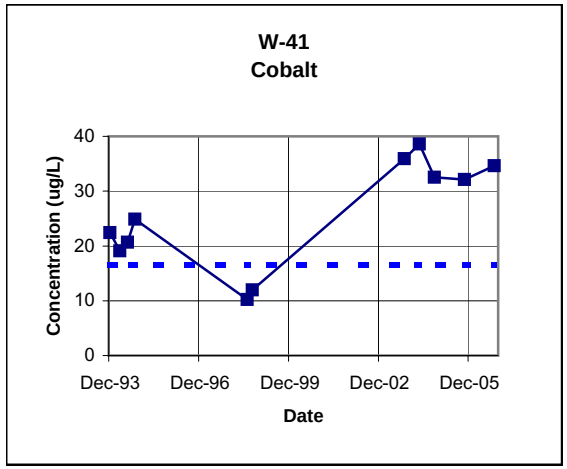
Detected Values

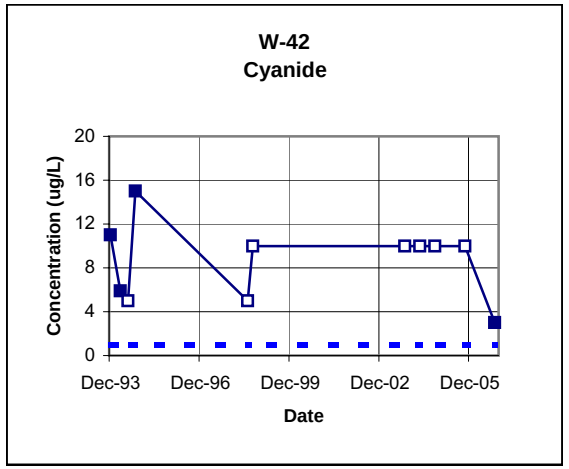
Not Detected (reporting limit shown)

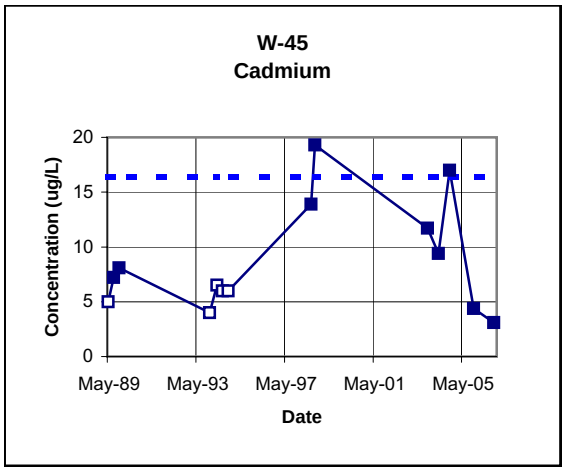
Screening Value

Figure F-1
Time Series Concentration Plots
IR Site 5









Legend

Detected Values

Not Detected (reporting limit shown)

Screening Value

Figure F-2
Time Series Concentration Plots
IR Site 7

APPENDIX G

MANN-KENDALL TREND ANALYSIS

Appendix G
MANN-KENDALL TREND ANALYSIS

As required by the final Work Plan (BEI 2003), the Mann-Kendall test for trends was used to identify statistically significant trends in contaminant concentrations at Installation Restoration (IR) Program Sites 5 and 7. This method is applicable to small data sets (with four to ten sample results), does not assume a particular sampling frequency distribution, and can be used when several values are below the detection limit. The method is described in detail in the United States Environmental Protection Agency (U.S. EPA) Guidance for Data Quality Assessment (U.S. EPA 1996). The steps for conducting the Mann-Kendall trend analysis are summarized as follows.

- *Step 1.* List the data in the order collected over time. For nondetect results, assign a value of one-half the method reporting limit (MRL). If the data set contains more than one nondetect result, assign a value of one-half the lowest MRL to each nondetect result.
- *Step 2.* Compute the sign of all possible mathematical differences between sampling results for the series of time-ordered concentrations (i.e., positive [+ sign], zero [not included in the test statistic], and/or negative [- sign]).
- *Step 3.* Compute the Mann-Kendall statistic (S) that is the number of positive signs minus the number of negative signs.
- *Step 4.* Determine the probability (p) using Table A-11 of U.S. EPA Guidance for Data Quality Assessment (U.S. EPA 1996) based on the sample size and the absolute value of the statistic S.
- *Step 5.* Test for the null hypothesis. If the null hypothesis is zero, no trend is indicated. Otherwise, a trend is indicated and will be evaluated. When evaluating the trend, if S is a large negative value, there is evidence of a decreasing trend; if S is a large positive value, then there is evidence of an increasing trend.

As required in Step 1, analytical results for selected wells at IR Sites 5 and 7 were compiled and appropriate substitutions identified for nondetect results (Table G-1). The data were then evaluated for trends, as required in Steps 2 through 5, using spreadsheet Form 4400-215 (2/2001) developed by the State of Wisconsin, Department of Natural Resources (WDNR 2001). Using the Mann-Kendall method, this spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If an increasing or decreasing trend is not present, an additional coefficient of variation test is performed to check for stability.

For IR Site 7, two cases were evaluated for each target analyte. Case 1 evaluated trends over the course of the last ten sampling events (i.e., the five events conducted from April 1994 to September 1998 prior to the start of the current monitoring program, plus the five events conducted from October 2003 to October 2006 under the current monitoring program). Case 2 evaluated only data collected over the course of the current monitoring program. The Mann-Kendall test for trends was not performed for pesticides since the analytical results consist almost entirely of data at or below detection limits.

Results of the Mann-Kendall test for trends are shown in the spreadsheets at the end of this appendix.

REFERENCES

Bechtel Environmental, Inc. 2003. Final Work Plan for Groundwater Monitoring at Installation Restoration Sites 4, 5, 6, and 7, Naval Weapons Station Seal Beach, Seal Beach, California (including Attachment A – Sampling and Analysis Plan). August.

BEI. *See* Bechtel Environmental, Inc.

State of Wisconsin, Department of Natural Resources. 2001. Mann-Kendall Statistical Test, Form 4400-215 (2/2001). 19 February. (Note: This form is available for download at the following website: http://dnr.wi.gov/org/aw/rr/archives/pub_index.html#forms).

United States Environmental Protection Agency. 1996. Guidance for Data Quality Assessment. Practical Methods for Data Analysis. EPA QA/G-9.QA 96 Version. July.

U.S. EPA. *See* United States Environmental Protection Agency.

WDNR. *See* State of Wisconsin, Department of Natural Resources.

Table G-1
Mann-Kendall Data

Well/Analyte	Number of Samples	Number of Detects	Sampling Date and Reported Results (µg/L)										Use for Nondetect Values [a]
MW-05-02			10/7/03	3/30/04	9/29/04	11/2/05	10/10/06						
nickel	5	3	20.9	5.6	3 U	4.08	**2 U**[b]						1
zinc	5	3	115	4.6	**3 U**	8.38 J	6 U						1.5
MW-05-04			10/16/03	4/1/04	10/7/04	11/1/05	10/10/06						
MTBE	5	5	12 NJ	12	18	36	50						NA
07M01			4/7/94	7/15/94	10/13/94	6/29/98	9/22/98	10/13/03	4/6/04	10/6/04	10/31/05	10/9/06	
cyanide	10	8	13	501	26 *	**5 U**	10 U	80	230 J	4 J	123	20 J	2.5
W-41			4/5/94	7/13/94	10/12/04	7/2/98	9/22/98	10/10/03	4/2/04	10/5/04	10/31/05	10/9/06	
cobalt	10	10	19.1 B	20.7 BN	24.9 B	10.2 B	12 B	35.9	38.6	32.5	32.1	34.6	NA
W-42			4/8/94	7/19/94	10/15/94	7/2/98	9/22/98	10/9/03	4/2/04	10/4/04	10/31/05	10/10/06	
cyanide	10	3	5.9 B	**5 U**	15 *	**5 U**	10 U	10 U	10 U	10 U	10 U	3 J	2.5
W-45			4/11/94	7/19/94	10/17/94	7/2/98	9/23/98	10/15/03	4/7/04	10/8/04	11/1/05	10/10/06	
cadmium	10	8	6.5 U	**6 U**	**6 U**	13.9	19.3	11.7	9.4	17	4.39	3.1	3

Notes:

[a] 1/2 the lowest MRL for the given analyte

[b] shading denotes the lowest MRL for the given analyte

Acronyms/Abbreviations:

µg/L – micrograms per liter
MRL – method reporting limit
MTBE – methyl tert-butyl ether
NA – not applicable

Data Qualifiers:

B – estimated value
J – estimated value
N – for inorganic, matrix spike sample not within control limits; for organic, result is presumptive (analyte tentatively identified)
U – not detected
* – duplicate analysis not within control limits

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Naval Weapons Station, Seal Beach, CA — **Mann-Kendall Statistical Test**
Installation Restoration Site 5 — **Well No.: MW-05-02**
Clean Fill Disposal Area

NOTE: This spreadsheet evaluates trends in groundwater monitoring data using the Mann-Kendall statistical test for trends, and is based on Form 4400-215 (2/2001) developed by the State of Wisconsin, Department of Natural Resources, Remediation and Redevelopment Program.

	Compound ->	**Nickel**	**Zinc**				
Event Number	Sampling Date (most recent last)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)
1	10/7/2003	20.9	115				
2	3/30/2004	5.6	4.6				
3	9/29/2004	1	1.5				
4	11/2/2005	4.08	8.38				
5	10/10/2006	1	1.5				
6							
7							
8							
9							
10							
	Mann Kendall Statistic (S)	-7	-5	0	0	0	0
	Number of Rounds (n)	5	5	0	0	0	0
	Average	6.52	26.20	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Standard Deviation	8.284	49.724	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Coefficient of Variation (CV)	1.271	1.898	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected				n<4	n<4	n<4	n<4
Trend ≥ 80% Confidence Level		**DECREASING**	**DECREASING**	n<4	n<4	n<4	n<4
Trend ≥ 90% Confidence Level		**DECREASING**	No Trend	n<4	n<4	n<4	n<4
Stability Test, If No Trend Exists at 80% Confidence Level		NA	NA	n<4 n<4	n<4 n<4	n<4 n<4	n<4 n<4

Data Entry By: R. Schilling — Date: 7-Nov-06

Naval Weapons Station, Seal Beach, CA — **Mann-Kendall Statistical Test**
Installation Restoration Site 5 — **Well No.: MW-05-04**
Clean Fill Disposal Area

NOTE: This spreadsheet evaluates trends in groundwater monitoring data using the Mann-Kendall statistical test for trends, and is based on Form 4400-215 (2/2001) developed by the State of Wisconsin, Department of Natural Resources, Remediation and Redevelopment Program.

	Compound ->	MTBE					
Event Number	Sampling Date (most recent last)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)
1	10/16/2003	12					
2	4/1/2004	12					
3	10/7/2004	18					
4	11/1/2005	36					
5	10/10/2006	50					
6							
7							
8							
9							
10							
	Mann Kendall Statistic (S)	9	0	0	0	0	0
	Number of Rounds (n)	5	0	0	0	0	0
	Average	25.60	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Standard Deviation	16.817	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Coefficient of Variation (CV)	0.657	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected			n<4	n<4	n<4	n<4	n<4
Trend ≥ 80% Confidence Level		INCREASING	n<4	n<4	n<4	n<4	n<4
Trend ≥ 90% Confidence Level		INCREASING	n<4	n<4	n<4	n<4	n<4
Stability Test, If No Trend Exists at 80% Confidence Level		NA	n<4 n<4	n<4 n<4	n<4 n<4	n<4 n<4	n<4 n<4
	Data Entry By:	R. Schilling	Date:	7-Nov-06			

Naval Weapons Station, Seal Beach, CA
Installation Restoration Site 7
Station Landfill

Mann-Kendall Statistical Test
Well No.: 07M01

NOTE: This spreadsheet evaluates trends in groundwater monitoring data using the Mann-Kendall statistical test for trends, and is based on Form 4400-215 (2/2001) developed by the State of Wisconsin, Department of Natural Resources, Remediation and Redevelopment Program.

	Compound ->	Cyanide (Case 1)	Cyanide (Case 2)				
Event Number	Sampling Date (most recent last)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)
1	4/7/1994	13					
2	7/15/1994	501					
3	10/13/1994	26					
4	6/29/1998	2.5					
5	9/22/1998	2.5					
6	10/13/2003	80	80				
7	4/6/2004	230	230				
8	10/6/2004	4	4				
9	10/31/2005	123	123				
10	10/9/2006	20	20				
	Mann Kendall Statistic (S)	2	-2	0	0	0	0
	Number of Rounds (n)	10	5	0	0	0	0
	Average	100.20	91.40	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Standard Deviation	158.571	90.933	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Coefficient of Variation (CV)	1.583	0.995	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected				n<4	n<4	n<4	n<4
Trend ≥ 80% Confidence Level		No Trend	No Trend	n<4	n<4	n<4	n<4
Trend ≥ 90% Confidence Level		No Trend	No Trend	n<4	n<4	n<4	n<4
Stability Test, If No Trend Exists at 80% Confidence Level		CV > 1 NON-STABLE	CV <= 1 STABLE	n<4 n<4	n<4 n<4	n<4 n<4	n<4 n<4

Data Entry By: R. Schilling Date: 7-Nov-06

Naval Weapons Station, Seal Beach, CA | **Mann-Kendall Statistical Test**
Installation Restoration Site 7 | **Well No.: W-41**
Station Landfill

NOTE: This spreadsheet evaluates trends in groundwater monitoring data using the Mann-Kendall statistical test for trends, and is based on Form 4400-215 (2/2001) developed by the State of Wisconsin, Department of Natural Resources, Remediation and Redevelopment Program.

	Compound ->	**Cobalt (Case 1)**	**Cobalt (Case 2)**				
Event Number	Sampling Date (most recent last)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)
1	4/5/1994	19.1					
2	7/13/1994	20.7					
3	10/12/1994	24.9					
4	7/2/1998	10.2					
5	9/22/1998	12					
6	10/10/2003	35.9	35.9				
7	4/2/2004	38.6	38.6				
8	10/5/2004	32.5	32.5				
9	10/31/2005	32.1	32.1				
10	10/9/2006	34.6	34.6				
	Mann Kendall Statistic (S)	19	-4	0	0	0	0
	Number of Rounds (n)	10	5	0	0	0	0
	Average	26.06	34.74	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Standard Deviation	10.180	2.658	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Coefficient of Variation (CV)	0.391	0.077	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected				n<4	n<4	n<4	n<4
Trend ≥ 80% Confidence Level		INCREASING	No Trend	n<4	n<4	n<4	n<4
Trend ≥ 90% Confidence Level		INCREASING	No Trend	n<4	n<4	n<4	n<4
Stability Test, If No Trend Exists at			CV <= 1	n<4	n<4	n<4	n<4
80% Confidence Level		NA	STABLE	n<4	n<4	n<4	n<4

Data Entry By: R. Schilling Date: 7-Nov-06

Naval Weapons Station, Seal Beach, CA — **Mann-Kendall Statistical Test**
Installation Restoration Site 7 — **Well No.: W-42**
Station Landfill

NOTE: This spreadsheet evaluates trends in groundwater monitoring data using the Mann-Kendall statistical test for trends, and is based on Form 4400-215 (2/2001) developed by the State of Wisconsin, Department of Natural Resources, Remediation and Redevelopment Program.

	Compound ->	**Cyanide (Case 1)**	**Cyanide (Case 2)**				
Event Number	Sampling Date (most recent last)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)
1	4/8/1994	5.9					
2	7/19/1994	2.5					
3	10/15/1994	15					
4	7/2/1998	2.5					
5	9/22/1998	2.5					
6	10/9/2003	2.5	2.5				
7	4/2/2004	2.5	2.5				
8	10/4/2004	2.5	2.5				
9	10/31/2005	2.5	2.5				
10	10/10/2006	3	3				
	Mann Kendall Statistic (S)	-6	4	0	0	0	0
	Number of Rounds (n)	10	5	0	0	0	0
	Average	4.14	2.60	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Standard Deviation	3.960	0.224	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Coefficient of Variation (CV)	0.957	0.086	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected				n<4	n<4	n<4	n<4
Trend ≥ 80% Confidence Level		No Trend	No Trend	n<4	n<4	n<4	n<4
Trend ≥ 90% Confidence Level		No Trend	No Trend	n<4	n<4	n<4	n<4
Stability Test, If No Trend Exists at 80% Confidence Level		**CV <= 1 STABLE**	**CV <= 1 STABLE**	n<4 n<4	n<4 n<4	n<4 n<4	n<4 n<4

Data Entry By: R. Schilling Date: 7-Nov-06

Naval Weapons Station, Seal Beach, CA
Installation Restoration Site 7
Station Landfill

Mann-Kendall Statistical Test
Well No.: W-45

NOTE: This spreadsheet evaluates trends in groundwater monitoring data using the Mann-Kendall statistical test for trends, and is based on Form 4400-215 (2/2001) developed by the State of Wisconsin, Department of Natural Resources, Remediation and Redevelopment Program.

	Compound ->	**Cadmium (Case 1)**	**Cadmium (Case 2)**				
Event Number	Sampling Date (most recent last)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)	Concentration (leave blank if no data)
1	4/11/1994	3					
2	7/19/1994	3					
3	10/17/1994	3					
4	7/2/1998	13.9					
5	9/23/1998	19.3					
6	10/15/2003	11.7	11.7				
7	4/7/2004	9.4	9.4				
8	10/8/2004	17	17				
9	11/1/2005	4.39	4.39				
10	10/10/2006	3.1	3.1				
	Mann Kendall Statistic (S)	8	-6	0	0	0	0
	Number of Rounds (n)	10	5	0	0	0	0
	Average	8.78	9.12	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Standard Deviation	6.369	5.645	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Coefficient of Variation (CV)	0.726	0.619	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Error Check, Blank if No Errors Detected				n<4	n<4	n<4	n<4
Trend ≥ 80% Confidence Level		No Trend	**DECREASING**	n<4	n<4	n<4	n<4
Trend ≥ 90% Confidence Level		No Trend	No Trend	n<4	n<4	n<4	n<4
Stability Test, If No Trend Exists at 80% Confidence Level		**CV <= 1 STABLE**	NA	n<4 n<4	n<4 n<4	n<4 n<4	n<4 n<4
	Data Entry By:	R. Schilling	Date:	7-Nov-06			

APPENDIX H

CYANIDE FATE AND TRANSPORT

Appendix H
CYANIDE FATE AND TRANSPORT

This appendix presents an evaluation of cyanide reported in groundwater at Naval Weapons Station (NAVWPNSTA) Seal Beach, Installation Restoration (IR) Site 7. The evaluation addresses the general chemistry of cyanide, nature and extent of cyanide contamination in IR Site 7 groundwater, and probable fate and transport of cyanide in groundwater and surface water.

H1 GENERAL CHEMISTRY

Cyanide (CN^-) is an extremely useful organic anion because of its reactive nature and high toxicity. These properties allow cyanide to be used as an integral component in many man-made chemical compounds. Its chemical reactivity is a beneficial characteristic for the formation of useful salts with alkali earths, metal-cyanide complexes, and nitriles (organic compounds containing cyanide) of varying strengths.

The stability and toxicity of cyanide salts in solution are dependent on the cation, ionic strength (total dissolved solids [TDS] concentration), hydrogen ion (H^+) strength measured as pH, oxidation-reduction (redox) potential (electrical potential [Eh]), temperature, and pressure.

Salts of sodium (Na), potassium (K), and calcium (Ca) cyanide are very toxic, highly soluble in water, and readily go into solution (completely dissolve). The processes of dissolution form free cyanide (defined as CN^- and uncharged hydrogen cyanide [HCN]) and other aqueous species of the cations Na^+, K^+, and Ca^+. Free cyanide in solution, if ingested, is highly toxic to human and aquatic life.

The relative amount of each of these cyanide species (CN^- and HCN) present and available in solution is controlled by pH (Figure H-1). At a pH of 7.0 (neutral), $HCN_{(aq)}$

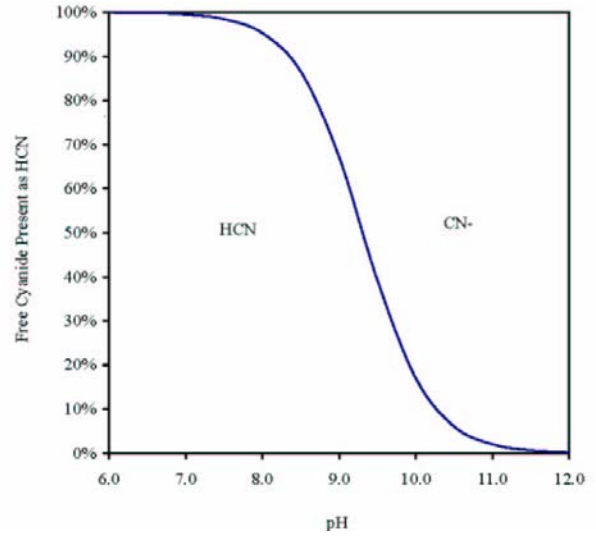

Figure H-1
General pH Plot for Free Cyanide Species (Cyantists 2006)

is the dominant cyanide species. At a pH of 9.3, the solution comprises 50 percent $HCN_{(aq)}$ and 50 percent $CN^-_{(aq)}$. At a pH of less than 9.3, the dominant aqueous free cyanide in solution is volatile $HCN_{(aq/g)}$. HCN, based on its Henry's law constant (5.1×10^{-2} atmosphere cubic meter per mole [atm-m^3/mol]), will volatize and partition between the $HCN_{(aq)}$ and $HCN_{(g)}$ gas. A laboratory study indicated that the volatilization half-life of hydrogen cyanide from solutions at concentrations of 25 to 200 micrograms per liter (µg/L) ranged from 1 day (22 hours) to 4.5 days (110 hours). The rate of HCN loss was observed to increase by a factor of 2 to 2.5 in outdoor experiments conducted during moderate wind conditions (ATSDR 2006).

Eh and pH are two chemical properties of an aqueous system that control the dominant aqueous species present under given conditions. To understand the aqueous cyanide oxidation reaction path(s) and products, the carbon-nitrogen Eh versus pH (in the absence of nitrogen gas) plot is included as Figure H-2.

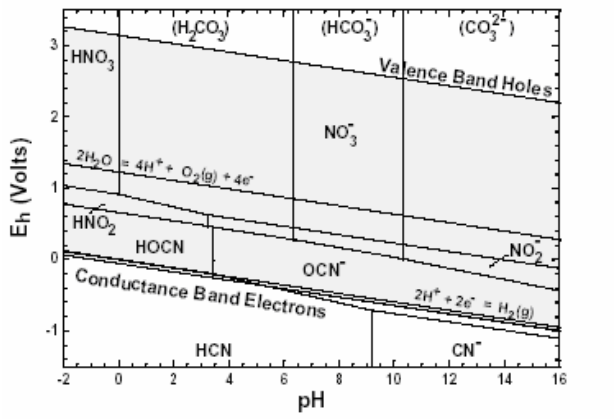

Figure H-2
Carbon Versus Nitrogen Eh-pH Plot in the Absence of Nitrogen Gas (Montana Tech 1997)

The dominant cyanide species at a pH up to 16.0 (highly basic) at a stable Eh of -1 volt (indicative of reducing conditions) would be uncharged $HCN_{(aq)}$ or $CN^-_{(aq)}$. As Eh increases to 0 volt (neutral between reducing or oxidizing conditions), the dominant aqueous species would be either hydrogen cyanate ($HOCN_{(aq)}$, also known as cyanic acid) at a pH less than approximately 3.5 or cyanate ($OCN^-_{(aq)}$) at a pH of greater than 3.5. $HOCN_{(aq)}$ and $OCN^-_{(aq)}$ are less toxic than $HCN_{(aq)}$. Hydrogen gas ($H_{2(g)}$) would be released to the atmosphere by oxidation when the pH is 3.5 or more and the Eh is 0 to approximately 0.5 volt. Above an Eh of approximately 0.5 volt the aqueous system becomes oxidizing and the stable aqueous cyanide species would be $HOCN_{(aq)}$ (pH of less than 3.5), $OCN^-_{(aq)}$ (pH of 3.5 to 13.0), and the nitrite anion ($NO_2^-{}_{(aq)}$) (above pH of 13.0). Dependent on pH and Eh, oxygen gas ($O_{2(g)}$) or hydrogen gas ($H_{2(g)}$) would be released to the atmosphere. At all pHs and above an Eh of 1 volt, no cyanide aqueous

species would be expected to remain in solution. Carbonate and nitrate species then become dominant in the aqueous system.

Metal-cyanide complexes, depending on the cation present and other chemical factors, will disassociate in an aqueous system at different rates. As a generalization, metal-cyanide complexes may be grouped as weak (those that readily break down), moderately strong, and strong (those that are more persistent and resist breaking down). The metal-cyanides complexes that have zinc or cadmium as a cation are known to break down rapidly. Copper, nickel, and silver cyanides are examples of moderately strong complexes. Their rate of decomposition is intermediate between weak and strong metal-cyanide complexes. Examples of strong metal-cyanide complexes are those with iron, cobalt, or gold as a cation. These complexes are slow to chemically degrade. Some of the strong metal-cyanides complexes (e.g., iron and cobalt cyanide complexes) are known to photodissociate to form HCN.

H2 NATURE AND EXTENT OF CONTAMINATION AT IR SITE 7

IR Site 7 is the location of the former station landfill that operated between the 1950s and 1973. Almost any type of waste generated at NAVWPNSTA Seal Beach may have been disposed at the landfill. The primary types of waste reported to have been disposed of include small, mostly empty containers that once held paints, petroleum products, various solvents, used rags, batteries, asbestos, and inert construction debris. Wastes were buried in a series of large, roughly rectangular trenches (reportedly 80 by 300 feet) located throughout the approximately 22-acre site to a reported 10 feet below ground surface, which was probably the depth at which shallow groundwater was encountered at the time (JEG 1995).

Total cyanide (free, simple, and metal-cyanide complexes) has been reported above detection limits and the screening value (California Toxics Rule [CTR] criterion) of 1 µg/L in one or more groundwater samples collected at IR Site 7 between December 1993 and October 2006. For well 07M01, cyanide was reported above detection limits and the CTR screening value in 9 of 11 groundwater samples collected since January 1994. Concentrations ranged from 4 J µg/L (data qualifier "J" indicates an estimated value) in October 2004 to 501 µg/L in July 1994. For well W-42, cyanide was reported above detection limits and the CTR screening value in 4 of 11 groundwater samples collected since December 1993. Concentrations ranged from 3 J µg/L in October 2006 to 15 µg/L in October 1994. For wells HW-04-02, -03, and -04, cyanide was reported above detection limits and the CTR screening value in one of five groundwater samples collected since the start of the groundwater monitoring program in October 2003. Concentrations were reported at 3 J µg/L in October 2006 for wells MW-04-02 and -03, and at 3 J µg/L in September 2004 for well MW-04-04. Cyanide is a commonly encountered contaminant in leachate generated from landfills (ATSDR 2006).

H3 FATE AND TRANSPORT

The probable fate and transport of total cyanide in IR Site 7 groundwater and possibly surface water are discussed in this section. This discussion directly relates to aqueous

cyanide and is based on its known chemical and physical characteristics. A general discussion of fate and transport processes and mechanisms is provided in the Remedial Investigation Report (JEG 1995).

Eh was determined from field measurements of redox potential at IR Site 7. The values were then converted to Eh for evaluation and interpretation of cyanide fate and transport in groundwater and surface water at IR Site 7. Total cyanide (free, simple, and metal-cyanide complexes) was analyzed for and reported when concentrations were greater than or equal to the method detection limit. The toxicity of cyanide varies and is dependent on the species present in groundwater. Free, simple, and metal-cyanide complexes are listed in order of decreasing toxicity. The discussion of fate and transport concentrates on the most toxic species, free cyanide.

Uncharged $HCN_{(aq)}$ is the most toxic cyanide species that likely migrated from the landfill into the saturated zone (groundwater). Groundwater at IR Site 7 has a mean pH of 6.6 (range of 6.05 to 7.12 [slightly acidic to near neutral]), TDS concentrations from 24,000 to 53,000 milligrams per liter (saline to hypersaline), and is slightly reducing (Eh -0.15 volt) to slightly oxidizing (Eh 0.33 volt). The groundwater is unsuitable as a drinking water source because of high salinity.

Cyanate ($OCN^-_{(aq)}$), the dominant cyanide species at these geochemical conditions, is persistent and highly mobile. Retardation (partitioning between groundwater and solids) would be negligible. The main fate and transport processes active would be advection, dispersion, transformation, and diffusion. Volatilization (partitioning between groundwater and air) into the open pore system would be of secondary importance. The lack of a "cyanide" groundwater plume in the area of IR Site 7 verifies that advection, dispersion, diffusion, transformation, and volatilization are the active fate and transport mechanisms that have effectively reduced the concentration of $HCN_{(aq)}$ in groundwater.

Any remaining $HCN_{(aq)}$ and $OCN^-_{(aq)}$ in groundwater may migrate to surface water at NAVWPNSTA Seal Beach, and this eventuality needs to be considered in the fate and transport evaluation. The likelihood of toxic $HCN_{(aq)}$ or less toxic $OCN^-_{(aq)}$ persisting in surface water is negligible. $HCN_{(aq)}$ would quickly volatilize to $HCN_{(g)}$, and $OCN^-_{(aq)}$ would transform to aqueous nitrogen at nontoxic concentrations and carbonate species.

Three surface water bodies are located near the area where total cyanide contaminated groundwater was reported at IR Site 7. East Pond, which is part of the surface waters (tidal sloughs) within the Seal Beach National Wildlife Refuge, is located in the western half of IR Site 7. One monitoring well (W-43) is located approximately 100 feet east of the shore of East Pond. Total cyanide has not been reported above detection limits in groundwater samples collected from this monitoring well. Cyanide reported in other IR Site 7 wells would not be expected to reach East Pond since groundwater flow direction in this area is away from this surface water body.

Two additional surface water bodies are located near IR Site 7: the Orange County Flood Control Channel and a drainage ditch. The unlined flood control channel parallels Perimeter Road and the station property boundary south of IR Site 7 and discharges storm water runoff to the Pacific Ocean. During periods of precipitation, water flows swiftly

(aerated) from east to west in the flood control channel. The direction of flow within the channel is also affected by ocean tides. During flood currents (before flood slack), the direction is west to east, and during ebb currents (after flood slack), the direction is east to west. The unlined drainage ditch parallels the southeast boundary of the site. The drainage ditch connects to the flood control channel during high water (oxidizing) conditions through engineered drainage pipes that go under Perimeter Road and the flood control channel easement and penetrate the flood control channel wall.

The monitoring wells where total cyanide was reported in groundwater (07M01, W-42, MW-04-02, MW-04-03, and MW-04-04) are nearest to these two surface water bodies. Groundwater samples from monitoring wells W-42, MW-04-02, and MW-04-03, which have similar total cyanide concentrations of 3 J µg/L, are located approximately 70 to 75 feet north of the flood control channel. Well 07M01, with the highest reported total cyanide concentration in groundwater (4 J µg/L in October 2004 to 501 µg/L in July 1994), is located approximately 190 feet north of the Orange County Flood Control Channel. Monitoring well MW-04-04 (total cyanide concentration of 3 J µg/L reported in September 2004) is located near the eastern shore of the drainage ditch. This well is located across the drainage ditch, approximately 300 feet southeast of the monitoring well (07M01).

Hydraulic gradients are from 0.0003 to 0.008 foot per foot at IR Site 7. Commonly, groundwater flow direction is to the east and northeast, primarily away from these two surface water bodies. Groundwater flow directions have at times been reported to be towards the flood control channel and drainage ditch. This condition most likely occurs during dry/drought conditions when the flood control channel and drainage ditch are potentially gaining water from groundwater. Under these conditions, groundwater contaminated with $HCN_{(aq)}$, conservatively measured as total cyanide, could discharge to surface water. The geochemical properties of the groundwater and the fate and transport processes that control $HCN_{(aq)}$ rapidly change when groundwater mixes with surface water at NAVWPNSTA Seal Beach.

Volatilization of $HCN_{(aq)}$ (Henry's law constant 5.1×10^{-2} atm-m^3/mol) from surface water to $HCN_{(g)}$ would be the dominant fate and transport process and would quickly reduce cyanide contamination in the water. Transformation to less toxic and innocuous aqueous species would be secondary. The rate of transformation of cyanide aqueous species, while rapid, would vary slightly based on the redox condition of the surface water (slower in reducing surface water and rapid in oxidizing surface water). Aerobic or anaerobic biodegradation, under either redox condition, would become important transformation mechanisms. The half-life of $HCN_{(aq)}$ is reported to be approximately 1 to 4.5 days (U.S. EPA 1979).

Aquatic receptors are present in the Orange County Flood Control Channel and drainage ditch. If cyanide were to reach surface water in the flood control channel and drainage ditch, it would quickly volatize and transform to less toxic and innocuous aqueous species.

Saltwater organisms have shown acute toxicity to cyanide, ranging from 4.9 µg/L for rock crab to more than 10,000 µg/L for slippershell snail (U.S. EPA 1985). Chronic

toxicity to cyanide was reported from 36 µg/L for minnows to 70 ug/L for mysid shrimps (U.S. EPA 1985). Based on available data, two water quality criteria (concentration maximum criterion [CMC] and concentration continuous criterion [CCC]) were both calculated at 1 ug/L to be protective of saltwater organisms for short-term and long-term exposure to cyanide. While cyanide is able to cross biological membranes and cause acute and chronic effects, it does not bioaccumulate in the food chain as it is readily metabolized within organisms (U.S. EPA 1985). Two recent studies have estimated site-specific criteria for West Coast locations (Brix et al. 2000, RWQCB 2006). These studies refined the source data by including recent cyanide toxicity data and limiting the species list to West Coast species. These studies proposed revised criteria for free cyanide of 2.9 µg/L for long-term exposure (CCC) and 9.4 µg/L for short-term exposure (CMC).

The concentrations of total cyanide reported in groundwater at IR Site 7 are extremely low. The low concentrations and chemical properties of cyanide, and the geochemical and physical conditions of the groundwater and surface water near the site, preclude the possibility that this contaminant would persist or pose a significant risk to aquatic receptors.

H4 REFERENCES

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RWQCB. *See* California Regional Water Quality Control Board, San Francisco Bay Region.

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———. 1985. Ambient Water Quality Criteria for Cyanide – 1984. U.S. Environmental Protection Agency. Office of Water. Washington, D.C. EPA-440-5-84-028. January.

U.S. EPA. *See* United States Environmental Protection Agency.

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APPENDIX I

WELL CONSTRUCTION LOGS

Table I-1
Monitoring Well Construction Data

Parameter	MW-05-01[a]	MW-05-02	MW-05-03	MW-05-04	MW-05-05	07M01	W-41
Date Installed	12/3/1998	9/22/2003	10/20/2003	9/23/2003	9/22/2003	12/22/1993	11/4/1988
Coordinates, NAD83/CA Zone VI (feet)[b]							
Northing	2219636.19	2219591.15	2219183.74	2218960.65	2218903.76	2214390.86	2215135.61
Easting	6003393.59	6003776.37	6003948.87	6003792.24	6003574.37	6011107.28	6010864.62
Construction Depths (feet bgs)							
Borehole	31.00	30.50	30.50	30.00	30.50	22.00	30.00
Filter Pack – Top	7.90	17.00	18.00	17.00	17.00	8.00	5.00
Filter Pack – Bottom	30.00	30.50	30.50	30.00	30.50	22.00	30.00
Screen – Top	10.00	19.00	19.50	19.00	19.00	10.00	10.00
Screen – Bottom	30.00	29.00	29.50	29.00	29.00	20.00	30.00
Elevations, NGVD29 (feet +/- MSL)[b]							
ToC	14.33	10.35	4.85	5.49	5.81	4.87	7.24
Ground Surface	11.62	8.25	1.75	2.97	2.93	2.90	4.06
Filter Pack – Top	3.72	-8.75	-16.25	-14.03	-14.07	-5.10	-0.94
Filter Pack – Bottom	-18.38	-22.25	-28.75	-27.03	-27.57	-19.10	-25.94
Screen – Top	1.62	-10.75	-17.75	-16.03	-16.07	-7.10	-5.94
Screen – Bottom	-18.38	-20.75	-27.75	-26.03	-26.07	-17.10	-25.94
Screen Diminsions							
Length (feet)	20.00	10.00	10.00	10.00	10.00	10.00	20.00
Diameter (inches)	4	4	4	4	4	4	2
Slot Size (inches)	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Well Maintenance							
Date Last Developed	12/8/1998	9/29/2003	10/22/2003	9/30/2003	9/30/2003	Unknown	Unknown
Well Depth (feet below ToC)	32.90	32.00	33.00	32.00	32.60	23.10	29.30
Date Measured	12/14/2004	12/14/2004	12/14/2004	12/14/2004	12/14/2004	12/14/2004	12/14/2004

Table I-1 (continued)

Parameter	W-42	W-43	W-45	MW-04-02[c]	MW-04-03[c]	MW-04-04[c]
Date Installed	11/4/1988	11/7/1988	11/10/1988	9/29/2003	9/25/2003	9/25/2003
Coordinates, NAD83/CA Zone VI (feet)[b]						
Northing	2214264.86	2214724.44	2214918.44	2214259.37	2214260.45	2214251.25
Easting	6010957.29	6010804.78	6011874.75	6010788.50	6011053.57	6011327.24
Construction Depths (feet bgs)						
Borehole	30.00	30.00	28.00	31.00	30.50	30.50
Filter Pack – Top	5.50	5.50	3.00	8.00	7.50	7.50
Filter Pack – Bottom	30.00	30.00	28.00	31.00	30.50	30.50
Screen – Top	9.00	9.00	8.00	10.00	9.50	9.50
Screen – Bottom	29.00	29.00	28.00	30.00	29.50	29.50
Elevations, NGVD29 (feet +/- MSL)[b]						
ToC	9.36	6.36	6.94	8.98	9.32	9.57
Ground Surface	6.51	3.47	4.00	6.90	8.64	7.48
Filter Pack – Top	1.01	-2.03	1.00	-1.10	1.14	-0.02
Filter Pack – Bottom	-23.49	-26.53	-24.00	-24.10	-21.86	-23.02
Screen – Top	-2.49	-5.53	-4.00	-3.10	-0.86	-2.02
Screen – Bottom	-22.49	-25.53	-24.00	-23.10	-20.86	-22.02
Screen Diminsions						
Length (feet)	20.00	20.00	20.00	20.00	20.00	20.00
Diameter (inches)	2	2	2	4	4	4
Slot Size (inches)	0.010	0.010	0.010	0.010	0.010	0.010
Well Maintenance						
Date Last Developed	Unknown	10/15/2003	10/15/2003	10/1/2003	10/1/2003	9/30/2003
Well Depth (feet below ToC)	32.40	32.30	29.10	33.00	32.80	32.85
Date Measured	12/14/2004	12/14/2004	12/14/2004	12/13/2004	12/13/2004	12/13/2004

Notes:

[a] coordinates and elevations differ from those recorded on the well construction logs, which are based on earlier land survey results

[b] Source: Cal Vada Surveying, Inc. 2003. Professional Land Survey Report. 06 November.

[c] well is located at IR Site 4 but used to monitor groundwater from adjacent IR Site 7

Acronyms/Abbreviations:

bgs – below ground surface
IR – Installation Restoration (Program)
MSL – mean sea level
NAD83/CA Zone VI – North American Datum of 1983, California Coordinate System of 1983, Zone VI
NGVD29 – National Geodetic Vertical Datum of 1929
ToC – top of casing

Monitoring Well Log

Project Name	Job Number	Sheet Number	Well Number
IR Site 4	23818 - 002	1 of 1	MW-04-02

Drilling Company	Project Site and Location	Started	Completed
Water Development Corp.	Seal Beach Naval Weapons Station	09-29-03	09-30-03

Ground Water Depth (bgs)	Elevation (amsl)	Coordinates	Logged By	TD of Well (ft)	TD of Hole (ft)
7.5	-0.60	N 2,214,259.4 E 6,010,788.5	S. Barden	30.5	31.0

Top of Casing Elevation (amsl)	Ground Elevation (amsl)	Checked By	Hole Size (in)	Update
8.98	6.90	J. Stock	10	12-04-03

Well Construction Details

Above-ground stick up well monument.
Concrete backfill 0 to 1 feet bgs.

Portland cement with 5% bentonite gel from 1 to 3 feet bgs
Bentonite Seal (medium chips) from 3 to 8 feet bgs
Riser Casing from 0 to 10 feet bgs. 4-inch PVC, Sch. 40.

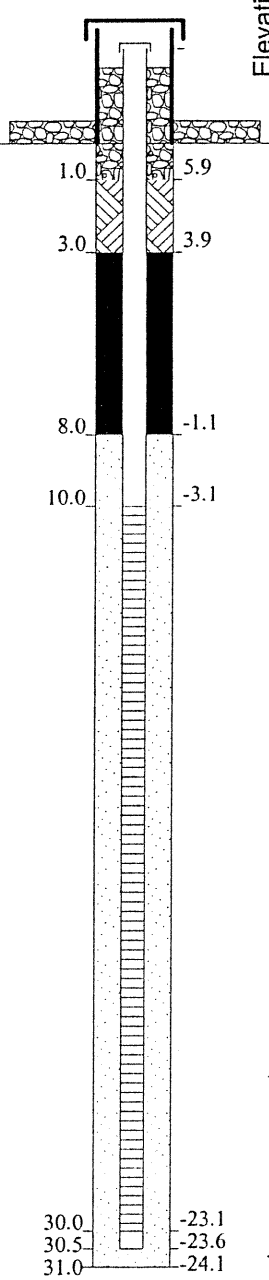
Filter pack (#2/16 Monterey) from 8 to 31 feet bgs

Well Screen from 10 to 30 feet bgs. 4-inch PVC, 0.010-inch slot.

PVC endcap from 30 to 30.5 feet bgs.

REGISTERED GEOLOGIST
JEREMIAH STOCK
NO. 6387
STATE OF CALIFORNIA

Well Graphics



Graphics

Geologic Description and Classification

SILTY SAND (SM): very dark grayish brown (10YR, 3/2), dry, sand is very fine grained

-3.1

SAND (SP): wet, very fine to fine grained, trace silt

-9.1

SILT (ML): greenish gray (5GY, 5/1), moist, trace clay

-19.1

SILTY SAND (SM): greenish gray (5GY, 5/1), wet, sand is very fine to fine grained

-24.1

SITE and LOCATION	HOLE NO.
Seal Beach Naval Weapons Station	MW-04-02

Report Form: CTO-02A MW LOG Time: 10:07:03 AM

Monitoring Well Log

Project Name	Job Number	Sheet Number	Well Number
IR Site 4	23818 - 002	1 of 1	MW-04-03

Drilling Company	Project Site and Location	Started	Completed
Water Development Corp.	Seal Beach Naval Weapons Station	09-25-03	09-29-03

Ground Water Depth (bgs)	Elevation (amsl)	Coordinates	Logged By	TD of Well (ft)	TD of Hole (ft)
7.3	1.34	N 2,214,260.5 E 6,011,053.6	S. Barden	30.0	30.5

Top of Casing Elevation (amsl)	Ground Elevation (amsl)	Checked By	Hole Size (in)	Update
9.32	8.64	J. Stock	10	12-04-03

Well Construction Details

Above-ground stick up well monument. Concrete backfill 0 to 1 feet bgs.

Portland cement with 5% bentonite gel from 1 to 4 feet bgs

Bentonite Seal (medium chips) from 4 to 7.5 feet bgs

Riser Casing from 0 to 9.5 feet bgs. 4-inch PVC, Sch. 40.

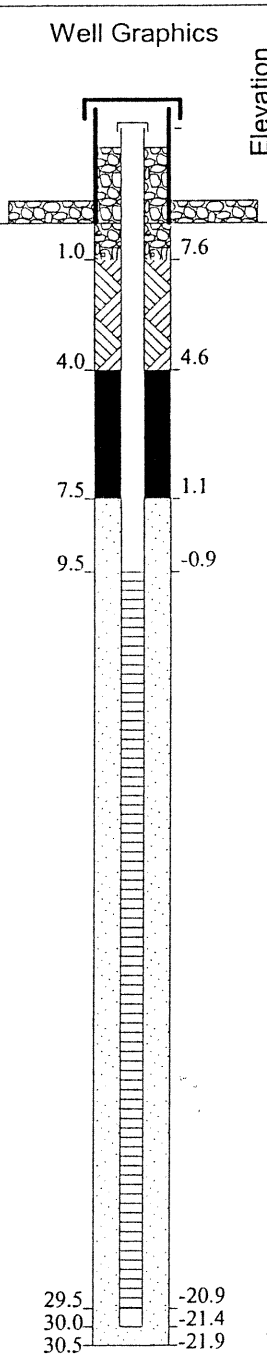
Filter pack (#2/16 Monterey) from 7.5 to 30.5 feet bgs

Well Screen from 9.5 to 29.5 feet bgs. 4-inch PVC, 0.010-inch slot.

PVC endcap from 29.5 to 30 feet bgs.

REGISTERED GEOLOGIST
JEREMIAH STOCK
NO. 6387
STATE OF CALIFORNIA

Well Graphics



Graphics

Geologic Description and Classification

SILTY SAND (SM): very dark grayish brown (10YR, 3/2), dry, sand is very fine grained.

-6.4

SAND (SP): dark grayish brown (2.5Y, 4/2), moist, very fine to fine grained, laminated, sand layers alternating with black CLAYEY SILT.

-13.9

CLAYEY SILT (ML): very dark gray (5Y, 3/1), moist, alternating with some 1 cm thick layers of very fine SAND.

-21.9

SITE and LOCATION	HOLE NO.
Seal Beach Naval Weapons Station	MW-04-03

Report Form: CTO-02A MW LOG Time: 10:07:12 AM

Monitoring Well Log

Project Name	Job Number	Sheet Number	Well Number
IR Site 4	23818 - 002	1 of 1	MW-04-04

Drilling Company	Project Site and Location	Started	Completed
Water Development Corp.	Seal Beach Naval Weapons Station	09-25-03	09-30-03

Ground Water Depth (bgs)	Elevation (amsl)	Coordinates	Logged By	TD of Well (ft)	TD of Hole (ft)
10	-2.52	N 2,214,251.3 E 6,011,327.2	S. Barden	30.0	30.5

Top of Casing Elevation (amsl)	Ground Elevation (amsl)	Checked By	Hole Size (in)	Update
9.57	7.48	J. Stock	10	12-04-03

Well Construction Details	Well Graphics	Geologic Description and Classification
Above-ground stick up well monument. Concrete backfill 0 to 1 feet bgs. Portland cement with 5% bentonite gel from 1 to 3 feet bgs Bentonite Seal (medium chips) from 3 to 7.5 feet bgs Riser Casing from 0 to 9.5 feet bgs. 4-inch PVC, Sch. 40. Filter pack (#2/16 Monterey) from 7.5 to 30.5 feet bgs Well Screen from 9.5 to 29.5 feet bgs. 4-inch PVC, 0.010-inch slot. PVC endcap from 29.5 to 30 feet bgs.	Depth in Feet / Elevation in Feet / Graphics 1.0 / 6.5 3.0 / 4.5 7.5 / 0.0 9.5 / -2.0 29.5 / -22.0 30.0 / -22.5 30.5 / -23.0 3.0 -13.5 -23.0	SILTY SAND (SM): very dark grayish brown (10YR, 3/2), moist SILT (ML): dark grayish brown (2.5Y, 4/2), moist, trace very fine grained sand, trace clay, some clay laminations. SILTY CLAY (CL): dark greenish gray (5GY, 4/1), moist.

REGISTERED GEOLOGIST
JEREMIAH STOCK
NO. 6387
STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
Seal Beach Naval Weapons Station	MW-04-04

Report Form: CTO-02A MW LOG Time: 10:07:21 AM

WELL CONSTRUCTION DETAILS

Project and Job Number: CLEAN II, 22214-151			Sheet No.: 1 of 1	Well No.: MW-05-01
Project Site and Location: IRP Site 5, WPNSTA, S.B.			Started: 12-03-98	Completed: 12-03-98
Driller: Water Development Corporation	Coordinates: N 2,219,635.7 E 6,003,393.7	Logged By: K. Umbarger	TD of Well: 31'	TD of Borehole: 31'
Elev.: Top of Casing /Ground (MSL): 14.89	Groundwater Depth (ft. BTOC)/Elev.: ▽ 10.0/ on ▽ / on	Checked By: S. Draper, R.G.	Hole Size: 8"	Update: 07-13-9

Well Construction Details

Surface Completion:
Dia. & Type 8" round stainless steel well monument with locking cap set in 3'x3' concrete pad

Well Monument
Bottom: 6 ft BGS

Bentonite Seal:
Type: Enviroplug 3/8" bentonite pellets
Top: 6 ft BGS
Bottom: 7.9 ft BGS

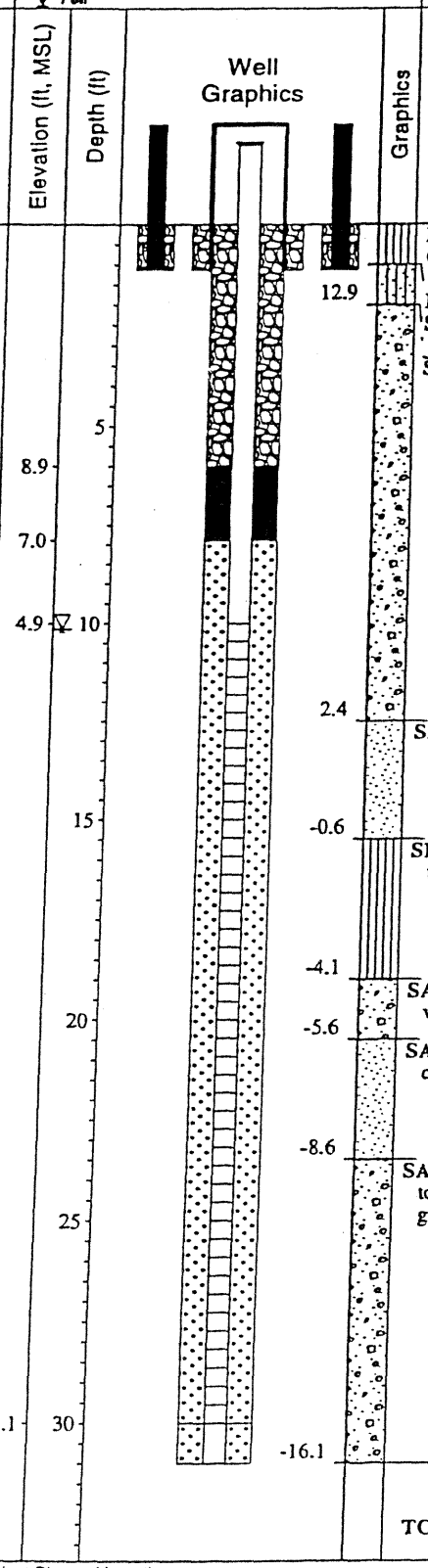
Centralizer (Top of Screen):
Depth: 11 ft BGS

Filter Pack:
Type: RMC Lonestar #1C
Top: 7.9 ft BGS
Bottom: 30 ft BGS

Well Screen:
Type: 4" I.D. Schedule 40 PVC, 0.010 slot
Top: 10 ft BGS
Bottom: 30 ft BGS

Centralizer (Base of Screen):
Depth: 29 ft BGS

Sump:
Type: Bentonite pelletes (1/4")
Top: 30 ft BGS
Bottom: 31 ft BGS



Geologic Description and Classification

FILL
CLAYEY SAND/CLAYEY SILT (ML): black [5YR2.5/1], soft, moist, trace gravel to 1/2"

RECENT DEPOSITS
SILTY SAND (SM): reddish brown [5YR1/3], moist, medium dense, fine grained
SAND (SW): dark yellowish brown [10YR4/4], loose, moist, fine to medium grained, trace silt, trace gravel to 1/4" shell horizon 2-3 feet up to 1" diameter
at 3 ft bgs colo change to strong brown [7.5YR5/6]

SAND (SP) to SILTY SAND (SM): brown [7.5YR4/4], loose, moist to wet

SILT (ML): yellowish brown [10YR5/6], medium stiff, moist to wet, micaceous, grades downward to silty sand (SM)

SAND (SW): light yellowish brown, loose to medium dense, wet, fine to medium grained

SAND (SP): light yellowish brown [10YR6/4], loose, wet, coarse grained, 3 percent subrounded gravel 1/4" diameter

SAND (SW): brownish yellow to yellowish brown [10YR6/6 to 10YR5/6], loose, wet, medium coarse grained, trace fine gravel subrounded

TOTAL DEPTH = 31.0 FEET

SEE EXPLANATION PAGE for GRAPHIC SYMBOLS

Project Site and Location: IRP Site 5 WPNSTA, S.B.

Well No.: MW-05-01

Report form: REVNAVY_WCD Time: 2:57:00 PM

Monitoring Well Log

Project Name	Job Number	Sheet Number	Well Number
IR Site 5	23818 - 002	1 of 1	MW-05-02

Drilling Company	Project Site and Location	Started	Completed
Water Development Corp.	Seal Beach Naval Weapons Station	09-22-03	09-26-02

Ground Water Depth (bgs)	Elevation (amsl)	Coordinates	Logged By	TD of Well (ft)	TD of Hole (ft)
10.62	-2.37	N 2,219,591.2 E 6,003,776.4	J. Stock	29.5	30.5

Top of Casing Elevation (amsl)	Ground Elevation (amsl)	Checked By	Hole Size (in)	Update
10.35	8.25	J. Stock	10	12-04-03

Well Construction Details	Well Graphics (Depth in Feet / Elevation in Feet)	Graphics	Geologic Description and Classification
Above-ground stick up well monument. Concrete backfill 0 to 2 feet bgs.	2.0 / 6.3		SAND (SW): brown (7.5YR, 4/3), moist, fine to coarse grained, with silt and fine grained gravel, appears to be construction fill.
Portland cement with 5% bentonite gel from 2 to 13.6 feet bgs		4.3	SILTY SAND (SM): dark brown, moist, with very fine grained sand.
Riser Casing from 0 to 19 feet bgs. 4-inch PVC, Sch. 40.			shell fragments
Bentonite Seal (medium chips) from 13.6 to 17 feet bgs	13.6 / -5.4	-6.8	SILTY CLAY (CL): very dark gray (2.5Y, 3/1), moist, abundant roots.
Filter pack (#2/16 Monterey) from 17 to 30.5 feet bgs	17.0 / -8.8		
Well Screen from 19 to 29 feet bgs. 4-inch PVC, 0.010-inch slot.	19.0 / -10.8	-11.8	CLAYEY SILT (ML): very dark gray (2.5Y, 3/1), wet, some roots.
PVC endcap from 29 to 29.5 feet bgs.	29.0 / -20.8 29.5 / -21.3 30.5 / -22.3	-22.3	

REGISTERED GEOLOGIST
JEREMIAH STOCK
NO. 6387
STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
Seal Beach Naval Weapons Station	MW-05-02

Report Form: CTO-02A MW LOG Time: 10:19:47 AM

Monitoring Well Log

Project Name	Job Number	Sheet Number	Well Number
IR Site 5	23818 - 002	1 of 1	MW-05-03

Drilling Company	Project Site and Location		Started	Completed
West Hazmat Drilling Corp.	Seal Beach Naval Weapons Station		10-20-03	10-22-03
Ground Water Depth (bgs) Elevation (amsl)	Coordinates	Logged By	TD of Well (ft)	TD of Hole (ft)
	N 2,219,183.7 E 6,003,948.9	S. Barden	30.0	30.5
Top of Casing Elevation (amsl)	Ground Elevation (amsl)	Checked By	Hole Size (in)	Update
4.85	1.75	J. Stock	10	12-04-03

Well Construction Details	Well Graphics (Depth in Feet / Elevation in Feet)	Graphics	Geologic Description and Classification
Above-ground stick up well monument. Concrete backfill 0 to 2 feet bgs.	2.0 / -0.3		SILTY SAND (SM): dark greenish gray (5GY, 4/1), wet, sand is fine to medium grained, little clayey silt, 1- to 2-inch thick organic peat-like material from 0-2 feet bgs.
Portland cement with 5% bentonite gel from 2 to 8 feet bgs	5		At 5 to 10 feet bgs, same as above, no organic layer
Riser Casing from 0 to 19.5 feet bgs. 4-inch PVC, Sch. 40. Bentonite Seal (medium chips) from 8 to 17 feet bgs	8.0 / -6.3		
	10	-8.3	CLAYEY SILT (ML): very dark gray (2.5YR, 3/1), wet, trace fine grained sand.
	15	-13.3	CLAYEY SILT (ML): dark greenish gray (5GY, 4/1), wet, little fine to medium grained sand.
Filter pack (#2/16 Monterey) from 18 to 30.5 feet bgs	18.0 / -16.3		
Well Screen from 19.5 to 29.5 feet bgs. 4-inch PVC, 0.010-inch slot.	19.5 / -17.8		
	20		
	25		CLAYEY SILT (ML): light greenish gray (5GY, 5/1), wet, trace to little fine grained sand.
PVC endcap from 29.5 to 30 feet bgs.	29.5 / -27.8 30.0 / -28.3 30.5 / -28.8	-28.3	
	30	-28.8	SILT (ML): light yellowish brown (10YR, 6/4), trace very fine grained sand.

REGISTERED GEOLOGIST
JEREMIAH STOCK
NO. 6387
STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
Seal Beach Naval Weapons Station	MW-05-03

Report Form: CTO-02A MW LOG Time: 10:19:56 AM

Monitoring Well Log

Project Name	Job Number	Sheet Number	Well Number
IR Site 5	23818 - 002	1 of 1	MW-05-04

Drilling Company	Project Site and Location	Started	Completed
Water Development Corp.	Seal Beach Naval Weapons Station	09-23-03	09-30-03

Ground Water Depth (bgs)	Elevation (amsl)	Coordinates	Logged By	TD of Well (ft)	TD of Hole (ft)
3	-0.03	N 2,218,960.7 E 6,003,792.2	S. Barden	29.5	30.0

Top of Casing Elevation (amsl)	Ground Elevation (amsl)	Checked By	Hole Size (in)	Update
5.49	2.97	J. Stock	10	12-04-03

Well Construction Details	Well Graphics	Geologic Description and Classification
Above-ground stick up well monument. Concrete backfill 0 to 2 feet bgs.	2.0 / 1.0	SILTY SAND (SM): very dark brown (10YR, 2/2), moist, sand is very fine grained, little clay.
Portland cement with 5% bentonite gel from 2 to 14.5 feet bgs	5	
Riser Casing from 0 to 19 feet bgs. 4-inch PVC, Sch. 40.	10	
	-10.0	SANDY SILT (ML): light olive brown (2.5Y, 5/2), wet, sand is very fine grained, trace clay.
Bentonite Seal (medium chips) from 14.5 to 17 feet bgs	14.5 / -11.5; 15	
Filter pack (#2/16 Monterey) from 17 to 30 feet bgs	17.0 / -14.0	
	19.0 / -16.0; -16.0	
Well Screen from 19 to 29 feet bgs. 4-inch PVC, 0.010-inch slot.	20	SAND (SW): brown (7.5YR, 4/3), wet, sand is very fine to medium grained, some silt.
	25	
PVC endcap from 29 to 29.5 feet bgs.	29.0 / -26.0; 29.5 / -26.5; 30.0 / -27.0; 30; -27.0	

REGISTERED GEOLOGIST JEREMIAH STOCK NO. 6387 STATE OF CALIFORNIA

SITE and LOCATION	HOLE NO.
Seal Beach Naval Weapons Station	MW-05-04

Report Form: CTO-02A MW LOG Time: 10:20:04 AM

Monitoring Well Log

Project Name	Job Number	Sheet Number	Well Number
IR Site 5	23818 - 002	1 of 1	MW-05-05

Drilling Company	Project Site and Location	Started	Completed
Water Development Corp.	Seal Beach Naval Weapons Station	09-22-03	09-26-03

Ground Water Depth (bgs)	Elevation (amsl)	Coordinates	Logged By	TD of Well (ft)	TD of Hole (ft)
3.5	-0.57	N 2,218,903.8 E 6,003,574.4	J. Stock	29.5	30.5

Top of Casing Elevation (amsl)	Ground Elevation (amsl)	Checked By	Hole Size (in)	Update
5.81	2.93	J. Stock	10	12-04-03

Well Construction Details	Well Graphics	Geologic Description and Classification
Above-ground stick up well monument. Concrete backfill 0 to 1 feet bgs.	2.0 / 0.9	SILTY SAND (SM): strong brown (7.5YR, 4/6), moist, sand is fine grained, trace clay, appears to be compacted fill.
Portland cement with 5% bentonite gel from 1 to 15 feet bgs		wet soil cuttings
Riser Casing from 0 to 19 feet bgs. 4-inch PVC, Sch. 40.	-7.1	SILT (ML): strong brown (7.5YR, 4/6), moist, some clay, trace fine grained sand.
Bentonite Seal (medium chips) from 15 to 17 feet bgs	15.0 / -12.1	
Filter pack (#2/16 Monterey) from 17 to 30.5 feet bgs	17.0 / -14.1	
Well Screen from 19 to 29 feet bgs. 4-inch PVC, 0.010-inch slot.	19.0 / -16.1	
	-17.1	SAND (SW): brown (7.5YR, 4/3), wet, fine to coarse grained.
PVC endcap from 29 to 29.5 feet bgs.	29.0 / -26.1 29.5 / -26.6 30.5 / -27.6	
	-27.1	

Depth in Feet: 5, 10, 15, 20, 25, 30

REGISTERED GEOLOGIST
JEREMIAH STOCK
NO. 6387
STATE OF CALIFORNIA

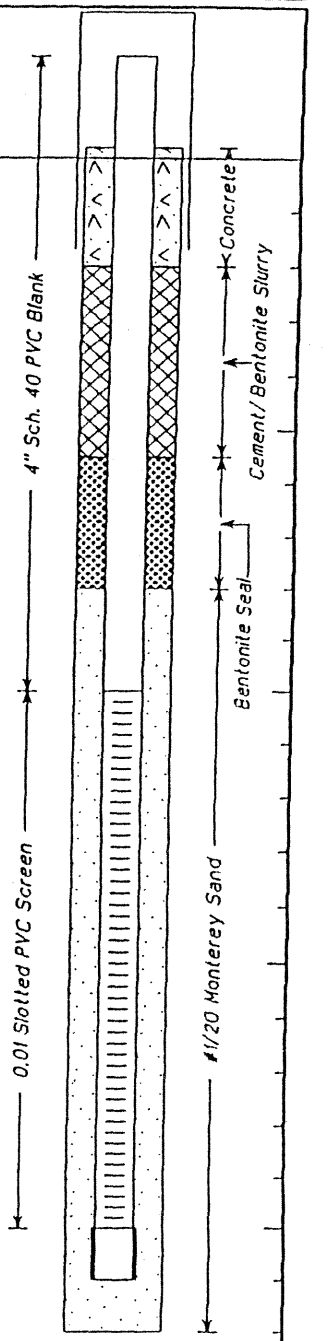
SITE and LOCATION	HOLE NO.
Seal Beach Naval Weapons Station	MW-05-05

Report Form: CTO-02A MW LOG Time: 10:20:13 AM

VISUAL SOIL CLASSIFICATION AND WELL DIAGRAM

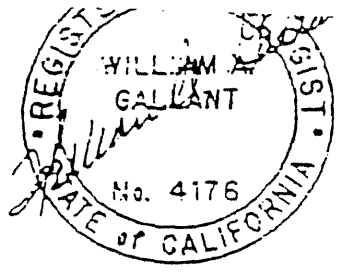
BORING NUMBER 07M01 | CLIENT U. S. NAVY
DATE DRILLED 12/22/93 | PROJECT NWS SEAL BEACH OU1 and 2 R.I.
CASING ELEVATION (PVC) 5.16 Feet MSLD | GEOLOGIST P. Toelkes
NORTHING 573945.931875 | EASTING 1449700.048897

DEPTH feet	SAMPLE	SAMP. NO.	PID (ppm)	GRAPHIC LOG	SOIL CLASS	DESCRIPTION AND REMARKS
		07M01SA0-1			ml	Stiff, gray brown, SILT, dry, some clay
		07M01SA0-2			cl	Stiff, gray brown, CLAY, moist, some very fine sand trace organic material some platey minerals.
		07M01SA0-3			ml	Loose, gray brown, silty SAND, wet abundant platey minerals.
15		07M01SA0-4				Soft, gray brown, SILT, very moist some fine sand.
25						Boring terminated at 22 feet BGS Notes: 1. Boring drilled with CME-75 rig using 10-inch diameter hollow-stem augers. 2. Samples from 0-48" were collected on 12/20/93, samples from 16'-19.5' were collected on 12/22/93. 3. Groundwater measured on 1/4/94.



JOB NUMBER: CTO 258

Well Design Diagram

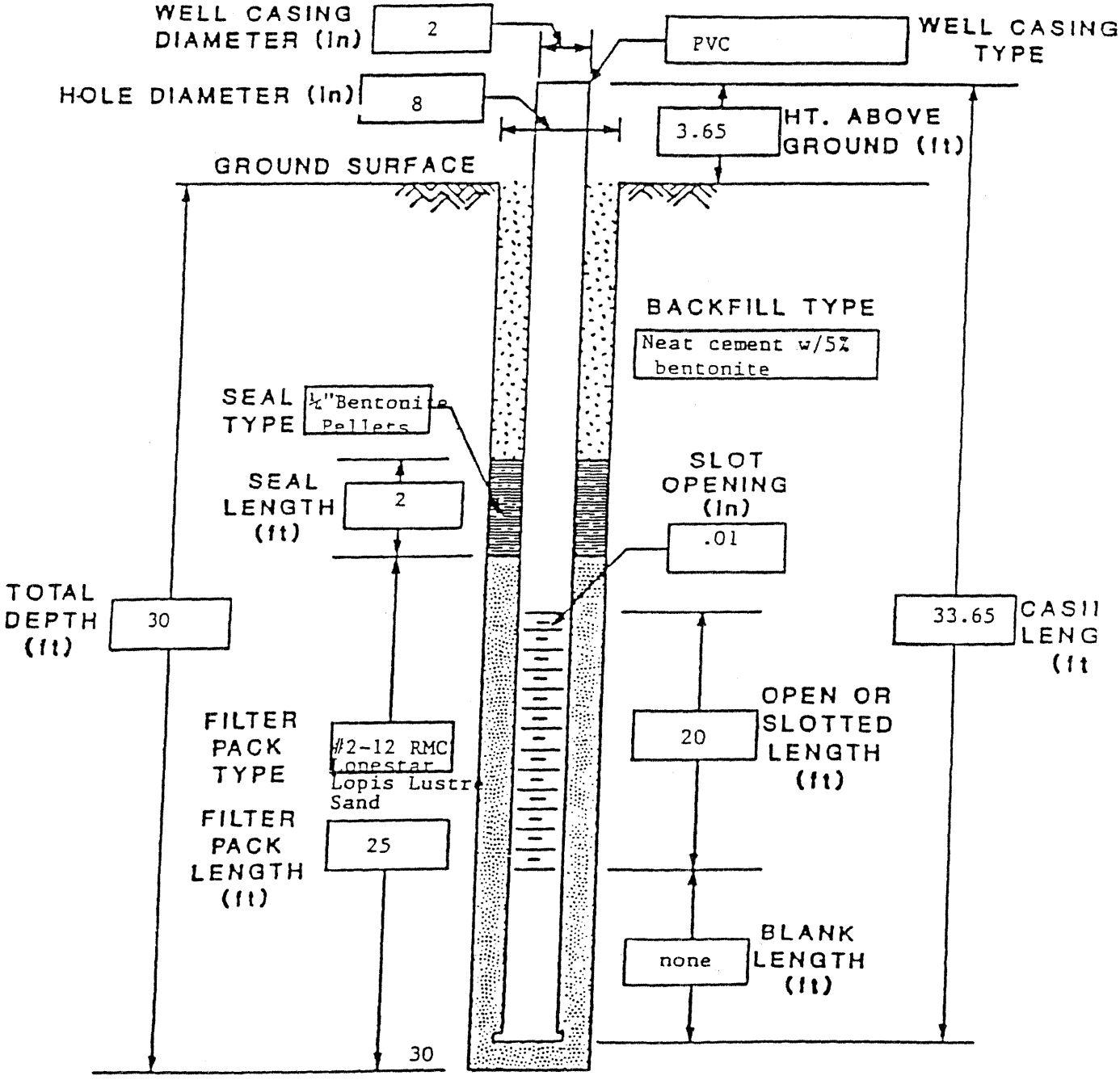


Well W-41

Project Seal Beach

Location Site 7

Personnel J.Montgomery,K.Bate,N.Elvena, W. Gallant



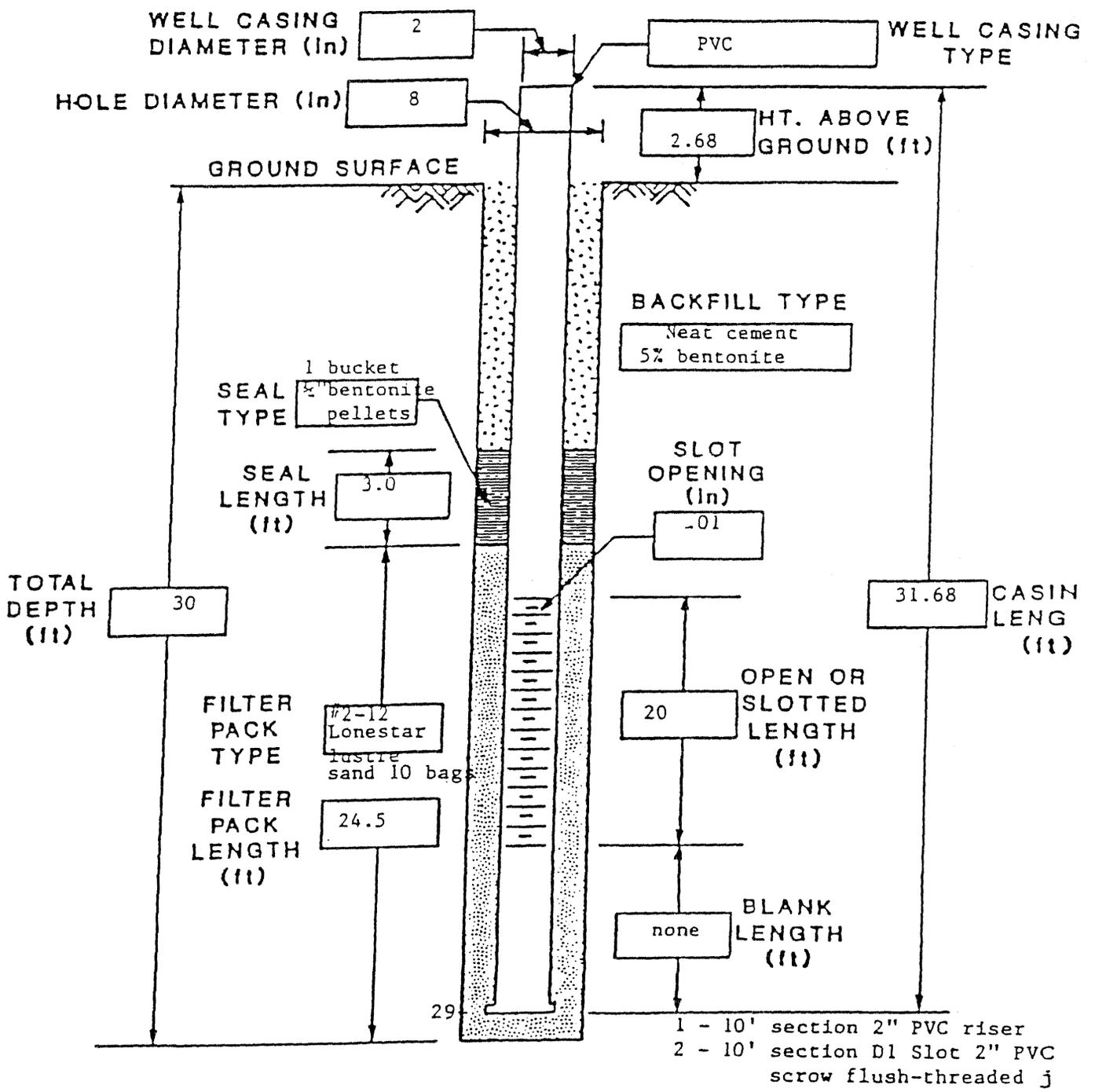
Well Design Diagram

Well W-42

Project Seal Beach

Location Site 7

Personnel J. Montgomery, N. Elvena, B. Muelle
J. Bannon, K. Bate



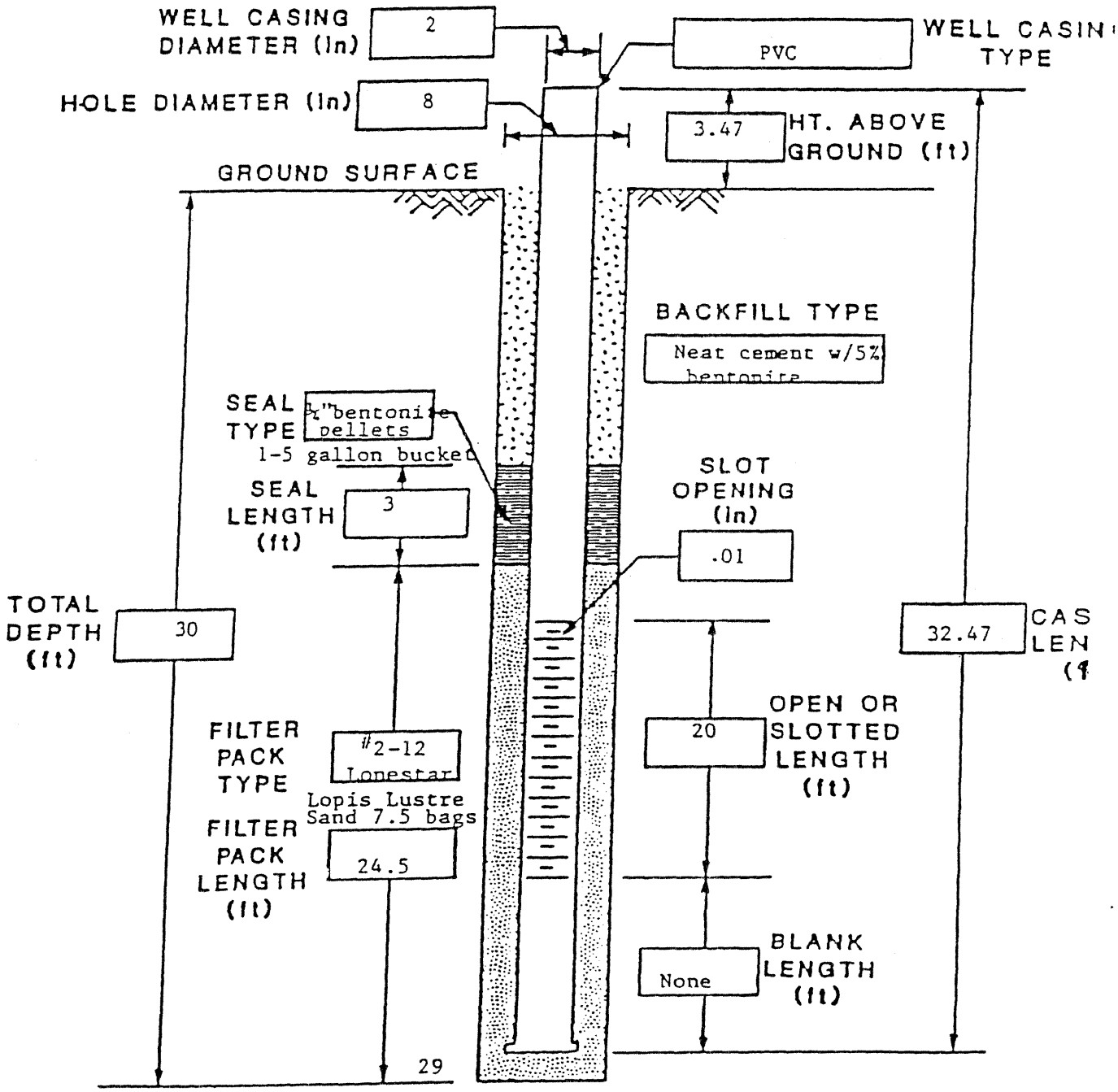
Well Design Diagram

Well W-43

Project Site 7

Location Seal Beach

Personnel J.Montgomery, J.Bannon, K.Bate, N.Elvena, B.Mueller



Well Design Diagram

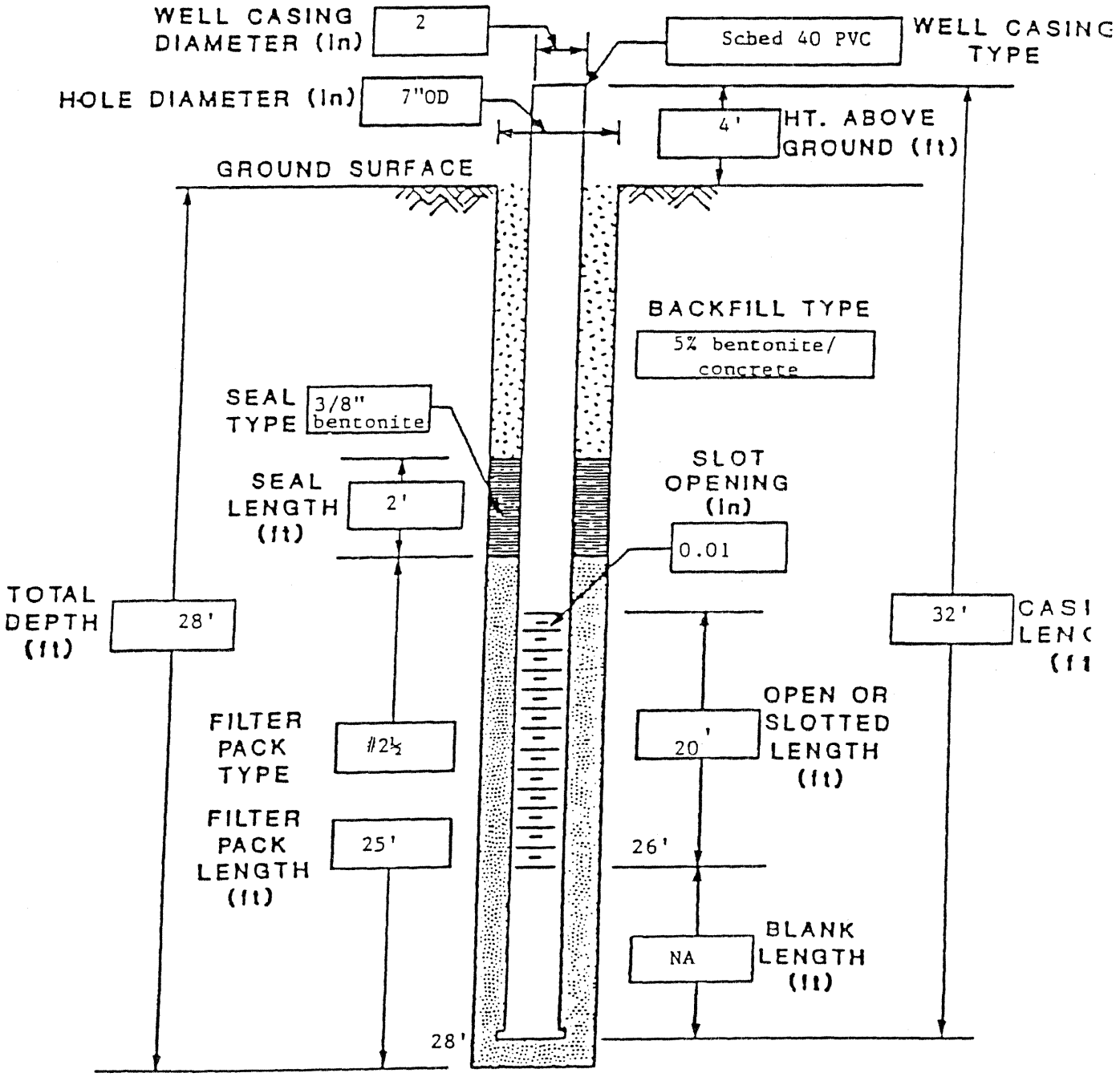
REGISTERED GEOLOGIST
WILLIAM L. GALLANT
No. 4176
STATE of CALIFORNIA

Well W-45

Project Seal Beach

Location Site 7

Personnel Roy Thun/Nadine Elvena



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APPENDIX J

DEVIATIONS FROM THE WORK PLAN

Appendix J
DEVIATIONS FROM THE WORK PLAN

This appendix describes variations from procedures outlined in the Work Plan and the Sampling and Analysis Plan (SAP) (BEI 2003) that were made during execution of the groundwater monitoring program. Field changes were documented in field change notices as required by the Comprehensive Long-Term Environmental Action Navy Program Standard Operating Procedure (SOP) 28, Field Change Request, and are summarized below.

GRAB SAMPLES AND WELL SOUNDING

The requirement in SOP 7, Water and Free Product Level Measurement in Wells, for the collection of a grab sample prior to measuring water levels in a given well was waived. Also, the requirement for total depth sounding of the well each time level measurements are taken was modified to the first round of measurements and any time pumps are removed for maintenance or repair. The original requirements were deemed unnecessary on the basis of historical information. The presence of permanent sampling pumps in each well precludes full-depth sounding. Wells without dedicated pumps will be sounded annually.

SAMPLING FLOW RATE AND COLLECTION OF PURGEWATER

The requirement in the SAP that the pumping rate should be reduced to 100 milliliters per minute (mL/min) was revised. The modified procedure states that the sampling flow rate may remain at the established purge rate of between 100 and 500 mL/min, and should be adjusted as necessary to minimize aeration, bubble formation, turbulent filling of sample bottles, or loss of volatiles due to extended residence time in tubing.

RELATIVE WELL LOCATIONS

Tables S-1, 3-5, 3-6, and 3-8 of the Work Plan and Tables 3-5, 3-6, and 3-7 of the SAP identify monitoring well locations relative to the geometry of the site and/or area of potential concern (AOPC), and the presumed groundwater flow direction (i.e., upgradient, downgradient, crossgradient, or in AOPC). The physical locations of the existing and new wells installed and monitored during the first year of the groundwater monitoring program are consistent with those proposed in the Work Plan and SAP. However, the well locations relative to the hydraulic gradient were revised consistent with groundwater level measurements collected during the first year of the monitoring program.

SCREENING VALUES

Table 3-7 of the Work Plan identifies screening values to be used for selected analytes in groundwater and surface water based on previous investigations conducted at IR Sites 4, 5, 6, and 7. Table E-1 in Appendix E of this annual report updates the screening values to include the specific analytes reported in groundwater during the first two years of monitoring at IR Sites 5 and 7. Supplemental criteria developed in the final First Annual Groundwater Monitoring Report (BEI 2005) are also included in Table E-1.

REFERENCES

Bechtel Environmental, Inc. 2003. Final Work Plan for Groundwater Monitoring at Installation Restoration Sites 4, 5, 6, and 7, Naval Weapons Station Seal Beach, Seal Beach, California (including Attachment A – Sampling and Analysis Plan). August.

———. 2005. Final First Annual Groundwater Monitoring Report, IR Sites 4, 5, 6, and 7, Naval Weapons Station Seal Beach, Seal Beach, California. June.

BEI. *See* Bechtel Environmental, Inc.

APPENDIX K

RESPONSES TO COMMENTS

RESPONSES TO COMMENTS *
DRAFT THIRD ANNUAL GROUNDWATER MONITORING REPORT, IR SITES 5 AND 7
NAVAL WEAPONS STATION SEAL BEACH, SEAL BEACH, CA
CTO-0002

Comments by:	**Katherine Leibel, Department of Toxic Substances Control, Remedial Project Manager**	
Dated:	**March 28, 2007**	
Response by:	**Bob Schilling, Bechtel Environmental, Inc.**	
Date:	**June 13, 2007**	
	Comment	**Response**
1	For IR Site 5, Clean Fill Disposal Area, the Report recommends discontinuation of monitoring, but retention of the wells as an aid in evaluation of MTBE migration from the nearby IR Site 14 hydrocarbon release. DTSC concurs with these recommendations.	Comment acknowledged.
2	For IR Site 7, Station Landfill, the Report recommends discontinuation monitoring of all IR Site 7 wells (sic). DTSC has the following comments:	See responses to comments 2A through 2C.
2A	DTSC does not concur with the recommendation to end monitoring of well W-42 (sic) at IR Site 7. This well still demonstrates increasing dissolved cobalt concentrations above the agreed screening level concentration. DTSC recommends continued monitoring of this well.	It is assumed that the reviewer is referring to well W-41, not well W-42. As discussed in Section 5.2.1, while there is a statistically significant increasing trend for cobalt in well W-41 for the period of April 1994 to October 2006, no trend was exhibited over the course of the groundwater monitoring program (from October 2003 to October 2006), suggesting that cobalt concentrations have stabilized. Given that the most likely source of cobalt was removed from Areas 3 and 4 during the 2003/2004 non-time-critical removal action, resumption of a long-term upward trend is unlikely. In the unlikely event that cobalt reported in well W-41 continued to trend upward, the potential for cobalt to reach nearby surface waters and pose a threat to salt water aquatic life is considered extremely low. There is a significant body of evidence to support this conclusion. As discussed in Section 5.2.1, the chemistry of cobalt, geochemistry of the groundwater and surface water, inorganic composition of the soil matrix, dissolved organic content of the groundwater and organic material in the matrix, the hydraulic gradient and flow direction, and the effects of tidal mixing support the conclusion that migration of cobalt to surface water at concentrations that could pose a threat to the marine environment is highly unlikely. Further monitoring of well W-41 for cobalt is therefore not necessary.
2B	DTSC does not concur with the removal of all wells at IR Sites 4 and 7. The Navy should propose to retain sufficient wells to determine	It is assumed that the reviewer is referring to well W-41, not well W-42. The groundwater gradient and flow direction in the vicinity of well W-41

RESPONSES TO COMMENTS *
DRAFT THIRD ANNUAL GROUNDWATER MONITORING REPORT, IR SITES 5 AND 7
NAVAL WEAPONS STATION SEAL BEACH, SEAL BEACH, CA
CTO-0002

Comments by:	**Katherine Leibel, Department of Toxic Substances Control, Remedial Project Manager**	
Dated:	**March 28, 2007**	
Response by:	**Bob Schilling, Bechtel Environmental, Inc.**	
Date:	**June 13, 2007**	
	Comment	**Response**
	groundwater gradient at well W-42 (sic).	is sufficiently well defined to preclude further groundwater-level monitoring. Groundwater elevation contour maps from 11 of 13 monitoring events conducted between November 1988 and October 2006 (summarized in Table B-2) indicate groundwater flow directions in the vicinity of well W-41 from east to northeast and away from the nearest surface water body (i.e., the interconnecting channel between Perimeter Pond and East Pond approximately 375 feet southwest and upgradient of the well). One event (July 1998) indicated a groundwater flow direction in the vicinity of this well to the southeast and toward the drainage ditch located approximately 900 feet downgradient. In only one event (February/March 1998) was the flow direction estimated to be in a southwesterly direction and toward the nearest surface water body. The hydraulic gradient calculated over these 13 monitoring events ranged from 0.0003 to 0.008 foot per foot. No further groundwater-level monitoring is therefore required.

RESPONSES TO COMMENTS *
DRAFT THIRD ANNUAL GROUNDWATER MONITORING REPORT, IR SITES 5 AND 7
NAVAL WEAPONS STATION SEAL BEACH, SEAL BEACH, CA
CTO-0002

Comments by:	**Katherine Leibel, Department of Toxic Substances Control, Remedial Project Manager**	
Dated:	**March 28, 2007**	
Response by:	**Bob Schilling, Bechtel Environmental, Inc.**	
Date:	**June 13, 2007**	
	Comment	**Response**
2C	Appendix J, Deviations from the Work Plan, Page J-1. DTSC does not concur with the modified sampling flow rate of 100 to 500 mL/min. While the sampling at these sites is essentially complete, except as noted above, DTSC finds that the proposed deviation is likely to result in degraded sample quality. The Navy should return to the original requirements stated in the original Workplan (sic).	The sampling flow rate of 100 to 500 mL/min is consistent with United States Environmental Protection Agency (U.S. EPA) low-flow (minimal drawdown) groundwater sampling procedures (U.S. EPA 1996), and CLEAN Program standard operating procedure (SOP) for groundwater sampling, SOP 8 (BEI 2000), which is referenced in the sampling and analysis plan (Attachment A of the approved Work Plan). A 100 mL/min flow rate limitation is appropriate for wells screened in low-permeability formations, however, the wells at IR Site 7 (and other sites subject to the Work Plan) are not screened in zones of low-permeability. The sampling flow rate of 100 to 500 mL/min shall remain as defined in Appendix J. References: Bechtel Environmental, Inc. (BEI). 2000. Bechtel (Navy CLEAN) Standard Operating Procedure (SOP) 8, Groundwater Sampling, Revision 4. October. United States Environmental Protection Agency (U.S. EPA). 1996. Ground Water Issue. Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures. (Robert W. Puls and Michael J. Barcelona, authors). EPA/540/S-95/504. April.

Note:

* These responses may identify proposed changes to the subject document text, tables, and/or figures. The changes, as presented herein, have not undergone formal technical editing. The specific wording that appears in the next release of the document may differ slightly from that presented in these responses to comments, since the proposed changes will be technically edited as part of the overall document revision process. The edited version of the document will be reviewed by BEI to ensure that there are no substantive differences that would warrant further Navy and/or agency review and concurrence.

RESPONSES TO COMMENTS*
DRAFT THIRD ANNUAL GROUNDWATER MONITORING REPORT, IR SITES 5 AND 7
NAVAL WEAPONS STATION SEAL BEACH, SEAL BEACH, CA
CTO-0002

Comments by:	**Patricia Hannon, California Regional Water Quality Control Board, Santa Ana Region**
Dated:	**June 13, 2007**
Response by:	**Bob Schilling, Bechtel Environmental, Inc.**
Date:	**June 13, 2007**

	Comment	Response
1	**IR Site 5 Clean Fill Disposal Area** A water sample was collected from MW-05-02 and analyzed for hexavalent chromium, nickel and zinc. These metals were not detected above their respective detection limits. The water sample from well MW-05-04 was analyzed for methyl tert-butyl ether (MTBE). The analytical results reported a concentration of 50 micrograms/liter (µg/l) which is less than the screening level concentration of 440 µg/l. Water samples from wells MW-05-02, MW-05-03 and MW-05-04 were also analyzed for perchlorate by two methods. Perchlorate was not detected above the detection limits of either method. We concur with the report's recommendations for discontinuing groundwater monitoring at IR Site 5..	Comment acknowledged.
2	**IR Site 7 Station Landfill** Please show the outline of the landfill cover on all figures regarding Site 7.	The landfill cover outline will be added to Figures 3, 5, and 7 in the final report.
3	**IR Site 7 Station Landfill** Groundwater samples showed that cyanide was detected above the detection limit and above the screening level (1 µg/l) at wells 07M01, W42, MW-04-03, and MW-04-02. The concentrations ranged from 3 to 20 µg/l. According to the report, a fate and transport evaluation of the cyanide in groundwater concluded that cyanide did not pose a significant risk to aquatic receptors due to the low concentrations of the chemical, its chemical properties and the geochemical conditions in the groundwater at the site. We concur with the conclusions of the report and concur with the recommendation to discontinue groundwater monitoring at IR Site 7.	Comment acknowledged.

RESPONSES TO COMMENTS*
DRAFT THIRD ANNUAL GROUNDWATER MONITORING REPORT, IR SITES 5 AND 7
NAVAL WEAPONS STATION SEAL BEACH, SEAL BEACH, CA
CTO-0002

Note:

* These responses may identify proposed changes to the subject document text, tables, and/or figures. The changes, as presented herein, have not undergone formal technical editing. The specific wording that appears in the next release of the document may differ slightly from that presented in these responses to comments, since the proposed changes will be technically edited as part of the overall document revision process. The edited version of the document will be reviewed by BEI to ensure that there are no substantive differences that would warrant further Navy and/or agency review and concurrence.