Section 5. Nature and Extent of Chemicals in Groundwater

Groundwater data from previous investigations and ongoing monitoring (Section 3) were used to define the nature and extent of groundwater contamination at Parcel E-2. This section evaluates existing groundwater monitoring data (through October 2007) to support the remedial alternative analysis and the risk assessment in this RI/FS Report. This nature and extent evaluation documents that an adequate amount of data, of sufficient quality, exist to support the HHRA and SLERA, to provide the basis for the RAOs, and to evaluate a focused set of remedial alternatives for Parcel E-2. All of the Parcel E-2 groundwater monitoring data collected between 1990 and October 2007 have been compiled, evaluated, and summarized in this report. In addition, groundwater data collected in March 2008 during a focused investigation along the Parcel E-2 shoreline were used to supplement the nature and extent evaluation (CE2-Kleinfelder Joint Venture, 2009a). Due to the large quantity of data collected, the groundwater evaluation discusses only those chemicals with concentrations exceeding laboratory reporting limits, ambient levels, or risk-based criteria developed for the RI. Groundwater monitoring data collected through October 2007 were included in the risk assessments presented in this RI/FS Report. Groundwater data from the March 2008 investigation were used in the SLERA to evaluate the potential threat to aquatic wildlife exposed to potentially contaminated groundwater at Parcel E-2; however, these data were not included in the HHRA because they were not available by January 2008, when the data set was "locked" for the HHRA. As discussed in Section 1.1.4, this RI/FS Report addresses CERCLA hazardous substances except for radionuclides. Radionuclides in soil and groundwater are evaluated in the radiological addendum to this RI/FS Report.

This section is organized as follows:

- Section 5.1: Data Evaluation Methodology
- Section 5.2: Groundwater Beneficial Reuse
- Section 5.3: Identification of Chemicals Detected in Groundwater
- Section 5.4: Hunters Point Groundwater Ambient Levels
- Section 5.5: Chemical Concentration Limits and Standards
- Section 5.6: Selection of Groundwater Evaluation Criteria
- Section 5.7: Focused Evaluation
- Section 5.8: Summary of Findings

5.1. DATA EVALUATION METHODOLOGY

To provide the most accurate evaluation of nature and extent, a thorough analysis was conducted of the existing data, including data collected during past investigations (i.e., the RI, the GDGI, and the ongoing BGMP [see Section 3.5]). The steps involved in the nature and extent evaluation are described below.

Step 1. Compilation of Groundwater Data

All groundwater monitoring data collected at Parcel E-2 between 1990 to October 2007 were compiled and grouped in tabular form, by chemical category (i.e., anions, metals, pesticides and PCBs, SVOCs, VOCs, and petroleum hydrocarbons). The data set was "locked" in October 2007 to provide a consistent data set for the nature and extent evaluation and risk assessments presented in this Draft Final RI/FS Report and that will be presented in the Final RI/FS Report; however, as discussed at the beginning of this section, groundwater data collected in March 2008 during a focused investigation along the Parcel E-2 shoreline were used to supplement the nature and extent evaluation (CE2-Kleinfelder Joint Venture, 2009a). Appendix J contains the tables that list comprehensive analytical results for samples collected between 1990 and October 2007, and the focused data gaps investigation in 2008.

Step 2. Beneficial Reuse Analysis

The groundwater beneficial reuse evaluation, discussed in Section 2.2.6, was performed to evaluate the potential future uses for the aquifers at Parcel E-2. A summary of the beneficial reuse evaluation is presented in Section 5.2.

Step 3. Identification of Chemical Detections

Chemical data were analyzed to establish the extent of detectable concentrations of chemicals in Parcel E-2 groundwater. Section 5.6 summarizes the detections by analytical group. All monitoring well data were evaluated to identify all chemical concentrations exceeding reporting limits at Parcel E-2. Quantitative data, such as the number, location, range of reporting limits, and magnitude and frequency of detections, are presented in the tables in Appendix J. The detection statistics are summarized as part of Section 5.3.

Step 4. Comparison with Hunters Point Groundwater Ambient Levels

Because metals naturally occur in groundwater and site-specific ambient levels for metals are defined for the A-aquifer, concentrations of all metals detected in the A-aquifer were compared with HGALs (PRC, 1996b). Metals that never exceeded HGALs in any Parcel E-2 well were not included in the nature and extent evaluation because they do not constitute a release of metals from the landfill or the adjacent areas (the Panhandle Area, East Adjacent Area, and Shoreline Area). All metals were included in the HHRA (presented in Section 7), regardless of whether their concentrations exceeded HGALs. The ambient metals screening results are presented in Section 5.4.

Step 5. Selection of Remedial Investigation Evaluation Criteria

Based on the results of the groundwater beneficial use evaluation, applicable chemical concentration limits (based on regulatory standards and HPS-specific criteria) were identified for the A- and B-aquifers at Parcel E-2. Because each of these aquifers has different beneficial uses, the applicable chemical concentration limits are distinct per aquifer. Section 5.5 summarizes the regulatory limits and standards that apply to each aquifer. The chemical concentration limits and standards derived from the beneficial use evaluation were used to focus the nature and extent evaluation for Parcel E-2. In parallel with the soil evaluation process, the most conservative (lowest) concentration limit or standard for each chemical was used to determine the RIEC for each chemical in each aquifer. In the case of metals present in the A-aquifer, a different approach was employed to assign RIECs. For each metal, the HGAL (if available) was selected as the RIEC, unless a limit or standard exceeding the HGAL exists. In such a case, the most conservative (lowest) concentration limit or standard above the HGAL was used as the RIEC. The methodology for selecting RIECs is described in Section 5.6, along with a listing of all the selected RIECs.

Step 6. Focused Data Evaluation

To focus the evaluation and data presentation on the target COPCs and COPECs, sampling results were posted to determine the lateral, vertical, and temporal extent of chemicals in groundwater and to identify areas where groundwater chemicals exceed the RIECs. Figures 5-1 through 5-53 show detected concentrations for each chemical that exceeded the RIEC in at least one well. Results of the focused evaluation are included as part of Section 5.7.

Step 7. Lateral, Vertical, and Temporal Extent Assessment

The lateral, vertical, and temporal extent of all chemicals exceeding RIECs was determined to establish the current extent of groundwater contamination at Parcel E-2. This assessment evaluated whether the data adequately delineate the lateral, vertical, and temporal extents of chemicals in groundwater. In areas where the extent of a chemical may not have been delineated at a parcel boundary, data from beyond the boundary were included in the assessment. Those data are provided in tables in Appendix J. A summary of the lateral, vertical, and temporal extent of contamination is provided in Section 5.8.

Step 8. Resolution of Data Quality Objectives, Evaluation of Detection Limits, and Summary of Data Gaps

Section 5.8 presents an evaluation of whether the data satisfy the DQOs outlined in the BGMP, an evaluation of detection limits versus chosen RIECs, and a summary of data gaps to be considered during the remedial alternatives design, selection, and implementation process.

5.2. GROUNDWATER BENEFICIAL USE

As presented in the geologic and hydrogeologic descriptions in Section 2 of this report, the Parcel E-2 hydrostratigraphy is composed of two aquifers, which are almost entirely separated by an aquitard composed of Bay Mud, and an underlying bedrock WBZ. As discussed in Section 2.2.1, groundwater monitoring has not been required in the Parcel E-2 bedrock WBZ because the bedrock is relatively deep (greater than 55 feet bgs in the northern portion of Parcel E-2 to greater than 200 feet bgs in the southeast portion of Parcel E-2). The bedrock WBZ in Parcel E-2 was not evaluated as part of this report.

The A- and B-aquifers were evaluated to determine the potential beneficial uses. Results of these evaluations are presented in Section 2.2.6. Based on the beneficial use evaluation, RIECs were selected for the A- and B-aquifers and used to evaluate the data and identify chemicals that should be the primary focus of the nature and extent evaluation. The selection of RIECs is discussed in Section 5.5.

5.3. IDENTIFICATION OF CHEMICALS DETECTED IN GROUNDWATER

All groundwater data collected from monitoring wells at Parcel E-2 were evaluated to determine which chemicals have been detected in the A- and B-aquifers. More specifically, these data were evaluated to determine which chemicals have been detected at concentrations above analytical reporting limits. The data tables in Appendix J list all groundwater results from monitoring wells sampled, by analytical group (i.e., anions, metals, pesticides and PCBs, SVOCs, VOCs, and petroleum hydrocarbons). Each table summarizes the statistics for each chemical, such as the number of samples collected, the number of results that exceed the reporting limit, and the minimum and maximum concentrations detected. Each table also includes basic descriptive statistics, including the median, mean, and standard deviation of the results for each chemical.

Groundwater monitoring data from 1990 through October 2007, along with data from the March 2008 investigation, were included in the evaluation. These data were screened against RIEC to identify potential COPCs and COPECs that may require additional evaluation, monitoring, or remedial action. The March 2008 data are from temporary wells that were installed along the Parcel E-2 shoreline and the northern portion of the Panhandle Area to address groundwater data gaps. Samples were collected from temporary wells installed in the Metal Slag Area and analyzed for dissolved metals. Samples also were collected from temporary wells installed in the PCB Hot Spot Area and analyzed for PCBs and TPH. Finally, samples were collected from temporary wells installed along the shoreline and within the Panhandle Area and analyzed for ammonia as nitrogen, dissolved metals, PCBs, and TPH (CE-2-Kleinfelder Joint Venture, 2009a). These data were screened against RIECs (which include surface water criteria) to identify potential nearshore areas of concern in groundwater.

Section 5.3.1 summarizes the results of previous groundwater investigations, including a discussion of RI results and GDGI results, and Section 5.3.2 summarizes the extent of dense nonaqueous-phase liquid (DNAPL) and light nonaqueous-phase liquid (LNAPL) in Parcel E-2 groundwater. In addition, a thorough reanalysis of the entire data set included in Appendix J is provided in Section 5.3.3. The goal of this subsection is to identify all chemicals detected in Parcel E-2 groundwater using the data set described above.

5.3.1. Summary of Results from Past Evaluations

Groundwater data were collected in multiple phases beginning in the early 1990s with the Parcel E RI (TtEMI, LFR, and U&A, 1997). As discussed in Section 3.4, additional data gaps investigations were conducted in 2001 (TtEMI, 2001a) and 2002 (TtEMI, 2004c). The RI and GDGI results are summarized in the following subsections.

5.3.1.1. Parcel E RI

The Parcel E RI was the first comprehensive evaluation to present the spatial distribution of chemicals across Parcel E, including Parcel E-2 (TtEMI, LFR, and U&A, 1997). The RI identified the following COPCs:

- Metals (including arsenic, chromium, copper, lead, manganese, and nickel) were detected at concentrations exceeding PRGs, MCLs, and HGALs in either or both of the A- and B-aquifers.
- Elevated concentrations of Aroclor-1260 exceeded evaluation criteria exclusively in A-aquifer wells across Parcel E, including Parcel E-2 wells.
- Petroleum hydrocarbons (as diesel, gasoline, and motor oil) were detected in discrete areas at levels exceeding evaluation criteria across Parcel E-2.

5.3.1.2. Groundwater Data Gaps Investigations

In 2001, the following chemicals exceeded Phase II GDGI evaluation criteria in groundwater samples collected from the Landfill Area (TtEMI, 2001a):

- Metals (including copper, nickel, and zinc)
- VOCs (various)
- Pesticides (including 4,4'-DDT and dieldrin)
- PCBs (including Aroclor-1260)

In 2002, the following chemicals were detected at concentrations exceeding Phase III GDGI evaluation criteria in the Landfill Area (TtEMI, 2004c):

- VOCs (including 1,1-DCA; 1,1-dichloroethene [DCE]; 1,2-DCA; 1,4-DCB; benzene; cis-1,2-DCE; PCE; TCE; and vinyl chloride)
- Iron
- Cyanide
- Ammonia
- PCBs
- Pesticides (including chlordane [alpha and gamma]; dieldrin; 4,4'-DDT; endosulfan II; and heptachlor)
- Radionuclides (including potassium-40, radium-226, and strontium-90)

Benzene (in the A- and B-aquifers) and 1,4-DCB (in the A-aquifer) were the only VOCs that had formed laterally extensive areas of contamination that exceeded the evaluation criteria. The presence of cyanide exceedances in groundwater was generally limited to the Landfill Area within the A-aquifer; ammonia concentrations were detected throughout the A- and B-aquifers in the vicinity of the Landfill Area. Although other metals (arsenic, barium, copper, lead, nickel, silver, sodium, and zinc); SVOCs (benzo[a]pyrene and benzo[a]anthracene); pesticides (chlordane [alpha and gamma], dieldrin, 4,4'-DDT, endosulfan II, heptachlor, and lindane); and PCBs (Aroclor-1254 and Aroclor-1260) were detected at concentrations exceeding evaluation criteria, they did not form widespread areas of contamination (TtEMI, 2004c).

The specific conclusions presented in the Phase III GDGI are summarized below.

Benzene

Concentrations exceeded the MCL for benzene in the B-aquifer in the northwestern corner of the site, where the A-aquifer is not separated from the B-aquifer by the Bay Mud aquitard. Benzene was present in the A-aquifer in 2002 at concentrations less than 7 micrograms per liter (µg/L) (at wells IR01MW02B, IR01MW03A, and IR03MW16A).

Elevated concentrations of benzene were detected in wells in the A- and B-aquifers within an area with approximate lateral dimensions of 2,250 by 1,200 feet, extending south and west from the landfill. Although benzene was present in groundwater in a large lateral area, concentrations were less than 7 µg/L and appeared to be decreasing.

Benzene was detected in B-aquifer wells IR01MW09B, IR01MW47B, IR01MW02B, and IR01MW53B, indicating that benzene contamination had migrated vertically into the B-aquifer. Well IR01MW02B is located in an area where the B-aquifer is in direct contact with waste fill material. Benzene likely migrated vertically into the B-aquifer in this area and then laterally, where it was detected in other B-aquifer wells.

1,4-Dichlorobenzene

1,4-DCB concentrations in 2002 exceeded the MCL at the southern and central portion of the landfill in an area with approximate lateral dimensions of 1,000 by 400 feet. In 2002, 1,4-DCB concentrations also exceeded the MCL in the area southeast of the landfill with approximate lateral dimensions of 450 by 400 feet.

Concentrations of 1,4-DCB at A-aquifer well IR01MW03A in the northwestern portion of the landfill decreased from 7 µg/L in 1991 to 0.15 µg/L in 2002. Although concentrations in downgradient wells IR01MW05A and IR01MW16A increased during that time, they remained below the evaluation criterion of 5 µg/L.

Chlorinated Solvents

Concentrations of the chlorinated solvents PCE, TCE, vinyl chloride, cis-1,2-DCE, 1,2-DCA, 1,1-DCE, and 1,1-DCA exceeded their respective MCLs at the Landfill Area in an area southeast of the landfill in well IR04MW13A. Concentrations of PCE and TCE in downgradient well IR12MW14A indicated that contamination was migrating laterally in the A-aquifer to the southeast.

Iron

The highest concentrations of iron exceeded the evaluation criterion in groundwater samples from within the waste material. Concentrations of iron increased in the southwest corner of the site, including in off-site A-aquifer well, IR01MW401A, which indicated a possible separate source of iron off site. These concentrations may also be related to the metal slag located this area.

Cyanide

Elevated concentrations of cyanide were detected in A-aquifer wells throughout the Landfill Area. The extent of persistent cyanide contamination at the Landfill Area could not be delineated during the Phase III GDGI because of fluctuations in 2002 concentrations and elevated reporting limits exceeded the evaluation criterion of 1 µg/L. The cause of fluctuating cyanide concentrations was not identified and did not appear to correspond to nitrate concentrations, seasonal fluctuations, or analytical uncertainty.

Ammonia

Ammonia was detected at elevated concentrations throughout the A- and B-aquifers in the Landfill Area. These concentrations were indicative of the decomposition of organic waste material in the landfill. Wells located near San Francisco Bay contained elevated concentrations of un-ionized ammonia, based on data from well IR01MW48A (425 µg/L), which is approximately 100 feet from the shoreline. Ammonia levels calculated as un-ionized ammonia exceeded the recommended evaluation criterion and could be harmful to aquatic life.

PCBs and Pesticides

Concentrations of PCBs exceeded the evaluation criteria in A-aquifer wells located near the sheet-pile wall in the Landfill Area in 2002. Historical data indicated that PCB concentrations were generally decreasing across the site. This decrease could be attributed to low-flow sampling techniques used during the GDGI and BGMP, which have reduced the amount of entrained sediment within water samples analyzed for PCBs.

During 2002, detected trace concentrations of the pesticides chlordane (alpha and gamma); dieldrin; 4,4'-DDT; endosulfan II; and heptachlor exceeded evaluation criteria. The presence of these pesticides could be related to facility-wide pest abatement programs and could be indicative of the routine use of these materials or possible disposal as waste materials in the landfill.

Petroleum Hydrocarbons

Petroleum hydrocarbons are not classified as a hazardous substance under CERCLA (Title 42 United States Code § 9601[14]), thus they are excluded from consideration under the CERCLA process unless they are commingled with hazardous substances regulated under the CERCLA program. A screening evaluation was conducted to identify areas where petroleum hydrocarbons were commingled with other organic and inorganic chemicals that are regulated under CERCLA. The aquatic criterion used in this evaluation is based on the HPS-specific methodology established under the petroleum program (TtEMI, 2004b). The methodology sums all TPH categories (gasoline-range, diesel-range, and motor-oil range) and compares it against a total TPH criterion, which ranges from 1,400 to 20,000 µg/L, depending on the distance from the shoreline.

Historical TPH concentrations in groundwater in wells IR01MWI-3, IR01MW43A, and IR01MW44A exceeded TPH criteria in samples collected in 1992 and 1996. The TPH criterion for these wells near the shoreline is 1,400 µg/L, calculated as the sum of TPH fractions. Results were below the TPH criterion during subsequent sampling in 2001 in wells IR01MWI-3 and IR01MW43A. Well IR01MW44A was not sampled for TPH in 2001.

5.3.2. Dense Nonaqueous-Phase Liquid and Light Nonaqueous-Phase Liquid in Parcel E-2 Groundwater

Prior to implementation of the BGMP, Parcel E-2 groundwater had not been systematically surveyed for the presence of LNAPL and DNAPL. Monitoring wells sampled under the BGMP are surveyed for the presence of immiscible phase liquids, as specified in the BGMP Sampling and Analysis Plan (SAP) (TtEMI, 2004e). The following subsections summarize the results of previous evaluations for LNAPL and DNAPL.

5.3.2.1. Previous DNAPL Evaluations

Based on the nature of the historical activities conducted at Parcel E-2, DNAPL contamination may exist in Parcel E-2 groundwater. This subsection describes the findings from past investigations and briefly assesses the possible presence and nature and extent of DNAPL contamination at Parcel E-2.

The Parcel E RI concluded that PAH concentrations detected at Parcel E-2, relative to their aqueous solubility limits, may be indicative of DNAPL in groundwater; however, the report also concluded that this assumption could be false because the types of wastes released at Parcel E-2 do not typically result in DNAPL plumes. The presence of PAHs at Parcel E-2 is due to releases of waste fuels containing mixtures of PAHs and other petroleum hydrocarbons. Because waste fuels are lighter than water, they float on the water table and do not migrate to the bottom of the A-aquifer, as they would if they behaved like DNAPLs (TtEMI, LFR, and U&A, 1997).

Elevated PCB concentrations in Parcel E-2 groundwater also could be indicative of DNAPL in groundwater; however, the characteristics of the wastes released at Parcel E-2 do not typically result in DNAPL plumes. The presence of PCBs at Parcel E-2 is mainly due to releases of waste oils containing PCBs. The fraction of PCBs in these waste oils is insufficient to result in a DNAPL in groundwater. PCB concentrations were probably detected in groundwater samples because the presence of petroleum hydrocarbons in these samples enhances the solubility of the PCBs (TtEMI, LFR, and U&A, 1997).

Another factor that reduces the likelihood that PCB DNAPL is present in groundwater is that past groundwater sampling for PCBs at Parcel E-2 did not employ low-flow sampling techniques to minimize entrained sediments in samples (IT, 2001). PCB concentrations detected in Parcel E-2 groundwater, mostly notably during the RI sampling, were shown to exceed the typical solubility limits of PCB compounds (2.7 µg/L) (IT, 2001). Entrained sediment introduced into samples by turbulent well water pumping may have yielded results that are not representative of dissolved-phase PCB concentrations. Such nonrepresentative results could occur because PCBs very readily adsorb to entrained sediment in an aqueous sample, but also readily desorb during the extraction process associated with analytical testing.

To further ascertain the presence of PCBs as DNAPL, Parcel E-2 wells with possible DNAPL were identified by comparing historic groundwater data against corresponding aqueous solubility limits. Wells with chemical concentrations that exceeded 1 percent of the corresponding aqueous solubility limit were identified for a focused field measurement, conducted during the Phase III GDGI program. An oil-water interface probe was used to assess the potential presence of DNAPL in 15 A-aquifer wells in Parcel E-2 that had PCB concentrations exceeding 1 percent of the corresponding aqueous solubility limit. No DNAPL was observed in these wells during the Phase III GDGI (TtEMI, 2004c). This finding has been confirmed by subsequent oil-water interface measurements collected as part of the ongoing BGMP (CE2-Kleinfelder Joint Venture, 2006, 2007a, 2007b, 2007d through 2007f, 2008a, and 2008d).

5.3.2.2. Previous LNAPL Evaluations

Based on the nature of the historical activities conducted at Parcel E-2, most notably the disposal of waste oils, LNAPL contamination may exist in Parcel E-2 groundwater. This subsection describes the findings from past LNAPL investigations and briefly assesses the possible presence, nature, and extent of LNAPL contamination at Parcel E-2. Past LNAPL investigations were conducted using oil-water interface probes, which are used to identify the presence and measure the depth and thickness of free-phase product (such as LNAPL) in monitoring wells.

The potential presence of LNAPL was investigated during basewide well inspections conducted during the Phase I GDGI (from March to April 2000). These results were subsequently used for focused LNAPL inspections that were conducted as part of the petroleum hydrocarbon program in June to October 2000 (TtEMI, 2002f). These inspections did not identify any measurable LNAPL at Parcel E-2. This finding was confirmed by subsequent measurements collected as part of the ongoing BGMP (CE2-Kleinfelder Joint Venture, 2006, 2007a, 2007b, 2007d through 2007f, 2008a, and 2008d). However, LNAPL consisting of oily waste was encountered and removed during removal activities at the PCB Hot Spot Area within the East Adjacent Area (Navy, 2005e). This hot spot was the likely source of PCBs in groundwater. During removal activities, over 3 million gallons of groundwater and surface water was extracted from the excavation and treated. In addition, free-phase product was collected from the groundwater surface using absorbent booms and pads or skimmed or pumped until all visible LNAPL was removed in areas where excavation was feasible. Soil excavation continued, where free-phase product was observed to depths greater than 10 feet bgs, until conditions were no longer safe or practical to continue. In some areas, the excavation extended beyond 20 feet bgs to remediate the visual free-phase product (TtECI, 2007a). Following excavation, residual LNAPL was observed along the shoreline portion of the PCB Hot Spot Area (the western and southwestern sidewalls of the excavation); however, excavation was not performed in this area because of its proximity to San Francisco Bay. Additional excavation along the western and southwestern sidewalls of the excavation (referred to as the shoreline portion of the PCB Hot Spot Area) was initiated in March 2010 as part of a follow-on removal action that is planned to be completed in 2011 (Navy, 2010).

5.3.3. Comprehensive List of Chemical Detections

The comprehensive data presentation referenced in Section 5.1, and included (in tabular form) in Appendix J, includes all data from all groundwater investigations performed at Parcel E-2. Currently, the presence and distribution of chemicals in Parcel E-2 groundwater is being monitored under the BGMP (TtEMI, 2004e). Analytical data for the first 15 sampling events under the BGMP were added to data collected prior to 2003 and evaluated in this nature and extent assessment. The following subsections present summaries, by analytical group, of all chemicals detected (at or above reporting limits) in Parcel E-2 groundwater.

5.3.3.1. Anions

Since 1990, Parcel E-2 groundwater has been sampled and analyzed for a variety of anions, including:

- Bromide
- Chloride
- Cyanide
- Fluoride
- Nitrate
- Nitrite
- Orthophosphate
- Sulfate
- Sulfide
- Total Kjeldahl Nitrogen (TKN)
- Un-ionized ammonia (calculated)

Each of these chemicals has been detected in groundwater at Parcel E-2. Table 5-1 summarizes the anion data presented in Appendix J, including the detection frequency, range of reporting limits, and range of results for each anion.

5.3.3.2. Metals

The dissolved metals in groundwater, listed below, have been detected in both A-aquifer and B-aquifer groundwater wells at Parcel E-2.

- Aluminum
- Antimony
- Arsenic
- Barium
- Beryllium
- Cadmium
- Calcium
- Chromium (total)
- Chromium VI
- Cobalt
- Copper
- Iron
- Lead
- Magnesium
- Manganese
- Mercury
- Molybdenum
- Nickel
- Potassium
- Selenium
- Silver
- Sodium
- Thallium
- Vanadium
- Zinc

Table 5-2 summarizes the metals data presented in Appendix J, including the detection frequency, range of reporting limits, and range of results for each metal. Table 5-2 also contains information that allows for comparison of metals data to HGALs. This evaluation is presented in Section 5.4.

5.3.3.3. Pesticides and PCBs

Pesticides and PCBs in groundwater have been detected in the A-aquifer, but rarely in the B-aquifer, as listed on the following page.

- 4,4'-DDD
- 4,4'-DDE
- 4,4'- DDT
- alpha-Chlordane
- beta-BHC
- Chloropyrifos
- Diazinon
- Delta-BHC
- Dieldrin
- Endosulfan I
- Endosulfan II
- Endosulfan sulfate
- Endrin
- Endrin aldehyde
- Endrin ketone
- gamma-BHC (lindane)
- Heptachlor
- Heptachlor epoxide
- Heptachlor epoxide A
- Heptachlor epoxide B
- Malathion
- Total PCBs (calculated)
- gamma-Chlordane

Table 5-3 summarizes the pesticide and PCB data presented in Appendix J, including the detection frequency, range of reporting limits, and range of results for each pesticide and PCB.

5.3.3.4. SVOCs

SVOCs in groundwater have been detected in both the A- and B-aquifers. The list below identifies SVOCs that were detected in Parcel E-2 groundwater.

- 1,2,4-DCB
- 1,2-DCB
- 1,3-DCB
- 1,4-DCB
- 2,4-Dichlorophenol
- 2,4-Dimethylphenol
- 2-Chloronapthalene
- 2-Chlorophenol
- 2-Methylnaphthalene
- 2-Methylphenol
- 2-Nitrophenol
- 4-Chloro-3-methylphenol
- 4-Methylphenol
- 4-Nitrophenol
- Acenaphthene
- Acenaphthylene
- Anthracene
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(g,h,i)perylene
- Benzo(k)fluoranthene
- Benzoic acid
- Benzyl alcohol
- Bis(2-ethylhexyl)phthalate
- Butylbenzylphthalate
- Carbazole
- Chrysene
- Dibenz(a,h)anthracene
- Dibenzofuran
- Diethylphthalate
- Di-n-butylphthalate
- Fluoranthene
- Fluorene
- Hexachlorocyclopentadiene
- Indeno(1,2,3-cd)pyrene
- Naphthalene
- N-nitrosodiphenylamine
- Pentachlorophenol
- Phenanthrene
- Phenol
- Pyrene

Table 5-4 summarizes the SVOC data presented in Appendix J, including the detection frequency, range of reporting limits, and range of results for each SVOC. As seen in Table 5-4 and the data presented in Appendix J, a wider range of SVOCs was detected in the A-aquifer than in the B-aquifer.

5.3.3.5. VOCs

VOCs in groundwater have been detected in both the A- and B-aquifers. The list below identifies VOCs that were detected in Parcel E-2 groundwater.

- 1,1,1-TCA
- 1,1,2,2-Tetrachloroethane
- 1,1,2-Trichloro-1,2,2-trifluoroethane
- 1,1-DCA
- 1,1-DCE
- 1,2,3-Trichloropropane
- 1,2,4-Trichlorobenzene
- 1,2,4-Trimethylbenzene
- 1,2-DCB
- 1,2-DCA
- 1,2-DCE (total)
- 1,3,5-Trimethylbenzene
- 1,3-DCB
- 1,4-DCB
- 2-Butanone
- 2-Hexanone
- 4-Methyl-2-pentanone
- Acetone
- Benzene
- Bromomethane
- Carbon disulfide
- Carbon tetrachloride
- Chlorobenzene
- Chloroethane
- Chloroform
- Chloromethane
- cis-1,2-DCE
- Cyclohexane
- Ethylbenzene
- Isopropyl benzene
- Methylcyclohexane
- Methylene chloride
- Naphthalene
- O-xylene
- Secondary-butylbenzene
- Propylbenzene
- Sec-butylbenzene
- Tertiary-butyl methyl ether
- PCE
- Toluene
- trans-1,2-DCE
- Trans-1,3-dichloropropene
- TCE
- Trichlorofluoromethane
- Vinyl chloride
- Xylenes (total)

Table 5-5 summarizes the VOC data presented in Appendix J, including the detection frequency, range of reporting limits, and range of results for each VOC. Similar to SVOCs, Table 5-5 and the data presented in Appendix J show a wider range of VOCs detected in the A-aquifer than in the B-aquifer.

5.3.3.6. Petroleum Hydrocarbons

Petroleum hydrocarbons in groundwater have been detected in both the A- and B-aquifers. The specific ranges of petroleum hydrocarbon compounds detected are listed below.

- TPH-d
- TPH-mo
- TPH (total)
- TPH-g
- TOG

Table 5-6 summarizes the petroleum hydrocarbon data presented in Appendix J, including the detection frequency, range of reporting limits, and range of results for each petroleum hydrocarbon range.

5.4. HUNTERS POINT GROUNDWATER AMBIENT LEVELS

Metals naturally occur in groundwater; thus, they are regularly detected in Parcel E-2 aquifers. Detected metals concentrations were compared against HGALs to distinguish between naturally occurring metals in groundwater and potential contamination caused by site operations. Table 5-2 includes the comparison of detected metals concentration ranges to HGALs. Based on this comparison, it is apparent that some metals detected in Parcel E-2 groundwater are less than their corresponding HGAL, thus they are not included in the nature and extent evaluation. Because HGALs only apply to the A-aquifer, the comparison with B-aquifer concentrations was merely for informational purposes and did not influence the nature and extent evaluation of metals in the B-aquifer.

In the A-aquifer, the following metals were never detected at concentrations exceeding HGALs: magnesium, molybdenum, and potassium. Therefore, these metals were not included in the nature and extent evaluation. Some A-aquifer metals only occasionally exceeded HGALs (in less than 2 percent of all samples collected); these metals included antimony, beryllium, manganese, silver, sodium, and thallium. Although these metals likely are within the ambient range for the site, they were included in the focused analysis, along with any other metals detected in the A-aquifer that exceeded HGALs.

In the B-aquifer, the following metals were never detected at concentrations exceeding HGALs: barium, cobalt, copper, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, silver, sodium, thallium, vanadium, and zinc. Because HGALs are not valid evaluation criteria for the B-aquifer, these metals were included in the nature and extent evaluation.

5.5. CHEMICAL CONCENTRATION LIMITS AND STANDARDS

Chemical concentration limits and standards were considered for groundwater in each aquifer at Parcel E-2 include (if available):

- Federal and state MCLs for drinking water (EPA, 2003b; DPH, 2008)
- Federal and state water quality criteria for the protection of marine life (aquatic criteria) (EPA 2000a, EPA 2006, RWQCB, 2007a and 2007b)
- RWQCB ESLs, for both drinking water and nondrinking water sources, which are based on human health and ecological criteria (RWQCB, 2008)
- HGALs for dissolved metals (PRC, 1996b)

Different evaluation criteria were considered for the A- and B-aquifers at Parcel E-2, consistent with the beneficial use evaluation. The subsections below provide more detail on the limits and standards that were considered for the A- and B-aquifers. The following tables summarizing all of the limits and standards that were considered for the A- and B-aquifers are included in this report:

- Anions (Table 5-7)
- Metals (Table 5-8)
- Pesticides and PCBs (Table 5-9)
- SVOCs (Table 5-10)
- VOCs (Table 5-11)
- Petroleum hydrocarbons (Table 5-12)

These tables also identify the chosen RIECs used in the focused evaluation. The RIEC used to evaluate groundwater data in Section 5 were based primarily on ESLs, which use aquatic criteria (such as California Toxics Rule [CTR] and National Ambient Water Quality Criteria [NAWQC]) and human health-based criteria. In most cases the RIEC selected is based on the most conservative limit or standard. There are two exceptions: (1) ESLs based on an aquatic habitat goals were not considered because they use criteria for freshwater aquatic habitats and are not applicable; and (2) surface water criteria (based on either promulgated or recommended criteria for saltwater aquatic habitats) were developed to evaluate the effects to aquatic life in San Francisco Bay. In the case of metals, if the lowest limit or standard is exceeded by the HGAL, the HGAL is selected as the RIEC (applicable to the A-aquifer only).

The RIEC represent a conservative basis for evaluating the nature and extent of chemical concentrations relative to both human and ecological criteria. The selection of RIECs is further discussed in Section 5.6, and the focused evaluation is presented in Section 5.7. All criteria identified in this section were used solely to support the nature and extent evaluation. Remediation goals for groundwater are identified in Section 9 of this RI/FS Report.

5.5.1. A-Aquifer

Surface water criteria were developed for use as the primary evaluation criteria for the A-aquifer. The surface water criteria are based on promulgated and recommended criteria for saltwater aquatic life, and are comprised of criteria derived from the following sources:

- San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan) (RWQCB, 2007a)
- California Toxics Rule Priority Toxic Pollutants for the State of California (EPA, 2000a)
- National Ambient Water Quality Criteria (RWQCB, 2007b)
- National Recommended Water Quality Criteria (EPA, 2006)

To evaluate the data conservatively, the surface water criteria were applied to all wells screened in the A-aquifer, not just those wells that are along or near the shoreline. This evaluation methodology was performed strictly for the nature and extent evaluation presented in this section. The main issue with this comparison is that it is not reflective of potential exposures when groundwater discharges into the bay. A quantitative method for comparing groundwater data for comparison with aquatic criteria, in a manner that accounts for chemical attenuation and the nearshore mixing process, is required to assess the downgradient effects of shoreline groundwater contamination on San Francisco Bay. Such a method has been agreed to by the Navy and the regulatory agencies, and it is being applied in the aquatic evaluation (Appendix M), in the form of a trigger level evaluation, and when determining cleanup goals.

In some instances, nondrinking water ESLs were used to develop evaluation criteria. Nondrinking water ESLs incorporate aquatic criteria that are primarily applicable in areas where groundwater discharges to surface waters (e.g., the bay or wetlands). Nondrinking water ESLs also address human health risk via the vapor intrusion pathway and were used as evaluation criteria for VOCs detected in the A-aquifer. The A-aquifer is at a relatively shallow depth with no overlying confining layer, so SVOCs and VOCs could potentially migrate to the surface and volatilize into the air. The issue with using nondrinking water ESLs as evaluation criteria is they conservatively use a combination of freshwater and saltwater aquatic criteria and include both promulgated and nonpromulgated criteria. Potential risk to aquatic life in the bay is more accurately evaluated by using only promulgated criteria for saltwater aquatic life, so nondrinking water ESLs were not selected as evaluation criteria in instances where they were based on aquatic habitat goals.

Lastly, in the case of metals, HPS-specific HGALs were considered applicable as evaluation criteria for metals in A-aquifer groundwater, as explained in Section 5.4.

5.5.2. B-Aquifer

Drinking water ESLs were used as the primary evaluation criteria for the B-aquifer because this unit is considered to have a moderate potential for use as a municipal or domestic water supply (Section 2.2.6). The nondrinking water ESLs incorporate aquatic criteria, which are primarily applicable in areas where groundwater discharges to surface waters (e.g., the bay or wetlands). To evaluate the data conservatively, the nondrinking water ESLs were applied to all wells screened in the B-aquifer; however, B-aquifer groundwater discharges into permeable zones underlying the bay and does not result in direct exposures to aquatic life in the bay.

5.6. SELECTION OF GROUNDWATER EVALUATION CRITERIA

As stated in Section 5.1, all detected chemical concentrations were compared with RIECs to define the past and current nature and extent of groundwater contamination. To assign RIECs to each detected

chemical in each aquifer, either the ambient level (if applicable) or the most conservative single limit or standard per chemical per aquifer was selected from the limits and standards identified in Section 5.5. Tables 5-7 through 5-12 contain a comprehensive list of all applicable evaluation criteria for each aquifer, along with the selected RIEC for each chemical analyzed; the chemicals are organized by analytical group. A summary of all RIECs for Parcel E-2 groundwater is included in Table 5-13. This table also lists the number of detections that exceeded the RIECs.

5.7. FOCUSED EVALUATION

The purpose of the focused data evaluation was to identify and describe the groundwater contaminants present at levels requiring a more thorough assessment, so that the lateral, vertical, and temporal extents of contamination in Parcel E-2 groundwater could be characterized. As established in the nature and extent evaluation methodology (Section 5.1), further assessment of the nature and extent of a chemical was conducted if detected concentrations of that chemical ever exceeded the RIEC. To facilitate the focused evaluation, spatial and temporal data maps were created and evaluated for each chemical that exceeded RIECs. The maps were created using all the groundwater data included in Appendix J. These data are associated with groundwater wells located within and adjacent to Parcel E-2, which are hereafter referred to as the Parcel E-2 monitoring wells. The maps, along with the results of the focused evaluation, are presented in this subsection.

5.7.1. Graphical Presentation of Groundwater Data

The focused data evaluation was performed for the following analytical groups: anions, metals, pesticides and PCBs, SVOCs, VOCs, and petroleum hydrocarbons. Each map displays wells with no data, nondetect data, detection data, and data that exceed RIECs. For wells with data that exceed RIECs, a data table is included to display the magnitude and temporal distribution of those exceedances. To further focus the evaluation, selected monitoring wells were informally designated as Parcel E-2 perimeter wells and were evaluated in more detail. The Parcel E-2 perimeter wells include all of the wells along the south, east, and west Parcel E-2 property boundaries (Table 5-14). The Parcel E-2 perimeter wells were selected based on water table mapping included in BGMP reports. Some of the Parcel E-2 perimeter wells are part of the current well network used in the BGMP (TtEMI, 2004e). A focused evaluation of groundwater conditions upgradient (or background) and downgradient (or point of compliance) of a landfill is consistent with 22 CCR § 66264.97, which is the identified ARAR for establishing a groundwater monitoring network.

The maps were used to determine whether chemical concentrations in groundwater exceed RIECs, with the greatest focus on Parcel E-2 perimeter wells. If contamination was identified in groundwater, the maps were further used to determine if the contamination:

- Is short-lived or persistent over time
- Is invariable, increasing, or decreasing over time
- Is present over a contiguous area or is scattered, occurring in single unrelated locations
- Is adequately delineated in its lateral and vertical extents

5.7.2. Graphical Data Analysis Results

The following subsections describe the results of the graphical analysis of each chemical that exceeded its RIEC. Each subsection deals with one analytical group (i.e., anions, metals, pesticides and PCBs, SVOCs, VOCs, or petroleum hydrocarbons).

5.7.2.1. Anions

Because most of the anions occur naturally in areas of high TDS, only those detected at concentrations exceeding promulgated criteria were selected for additional evaluation. These anions include cyanide, fluoride, nitrate, nitrite, sulfide, and un-ionized ammonia. Results of the mapping of the selected anion data are discussed below. Refer to Section 5.8.3.2 for a discussion of laboratory reporting limits that exceed the corresponding RIEC.

Cyanide (Table 5-1 and Figure 5-1)**.** Between 1990 and 2008, 537 samples from 51 Parcel E-2 monitoring wells were analyzed for cyanide, a carbon-nitrogen chemical unit that combines with many organic and inorganic chemicals. Cyanide was detected in 16 A-aquifer and 5 B-aquifer wells. All but one of those wells (IR12MW17A) had detected concentrations that exceeded the RIEC (1 µg/L). The highest concentration of cyanide (80 µg/L) was in a sample collected from well IR01MW31A within the Landfill Area. Cyanide concentrations exceeded the A- and B-aquifer RIEC (1 µg/L) in eight A-aquifer and four B-aquifer perimeter monitoring wells at Parcel E-2. Most of the perimeter wells had concentrations that exceeded the RIEC during the most recent monitoring years (2006 and 2007), including perimeter wells IR01MW47B, IR01MW48A, IR01MW60A, IR01MW63A, IR01W403B, and IR01MWLF2A. In perimeter well IR01MW63A, in the Panhandle Area, recent detections exceeding the RIEC appear to be persistent, with detected concentrations exceeding RIECs five times during the past five sampling events. Exceedances in B-aquifer perimeter wells are not persistent, but they appeared during the most recent sampling events. Due to the persistence of detections exceeding the RIEC in one perimeter A-aquifer well (IR01MW63A) and the widespread presence of recent detections of cyanide exceeding the RIEC in the A- and B-aquifers, the extent of cyanide in groundwater is not adequately delineated by concentrations below RIECs in perimeter wells IR01MW47B, IR01MW48A, IR01MW60A, IR01MW63A, IR01W403B, and IR01MWLF2A. Cyanide may be migrating to San Francisco Bay based on the proximity of the exceedances to the shoreline and the predominant direction of groundwater flow.

Fluoride (Table 5-1 and Figure 5-2). Between 1990 and 2008, 405 samples from 48 wells were analyzed for fluoride. This chemical was detected in 31 A-aquifer and 8 B-aquifer wells at Parcel E-2. A RIEC for the A-aquifer was not assigned because no screening criteria are established for fluoride. The RIEC for fluoride in the B-aquifer was assigned based on the California MCL because the B-aquifer is considered a potential source of drinking water. A sample from only one well (IR01MW366B) exhibited fluoride at a concentration exceeding the B-aquifer RIEC (2,000 µg/L). This exceedance occurred in August 2006 only, and fluoride has not been detected in this well at a concentration exceeding the RIEC during the last five consecutive sampling events. This well is located in the East Adjacent Area and is surrounded by wells (on all sides) that have never had exceedances of the RIEC. Therefore, the extent of fluoride in B-aquifer groundwater is adequately delineated by concentrations below the RIEC.

Nitrate (Table 5-1 and Figure 5-3)**.** Between 1990 and 2008, 617 samples from 63 wells were analyzed for the nutrient nitrate (as nitrogen). Nitrate was detected in 34 A-aquifer and 10 B-aquifer wells at Parcel E-2. A RIEC for the A-aquifer was not assigned because no screening criteria are established for nitrate. The RIEC for nitrate in the B-aquifer was assigned based on the federal MCL because the B-aquifer is considered a potential source of drinking water. Samples from two B-aquifer wells (IR01MW53B and IR01MW403B) exhibited concentrations exceeding the RIEC (10,000 µg/L). Both wells are Parcel E-2 perimeter monitoring wells. Elevated nitrite concentrations have been detected in samples from perimeter well IR01MW53B several times throughout its sampling history. This well is located in the northern portion of the Panhandle Area, approximately 130 feet from the Parcel E-2 shoreline. Perimeter well IR01MW403B had a single detection exceeding the RIEC in December 2004; however, this exceedance did not recur during the following eight consecutive sampling events over a period of 3 years. Concentrations exceeding the RIEC have been consistently detected during the last 10 sampling events, which spanned June 2005 through October 2007. Concentrations detected are approximately two to four times the RIEC and do not appear to be attenuating over time. The extent of nitrate in groundwater is adequately delineated by concentrations below the RIEC, except in the B-aquifer along the northern portion of the shoreline in the Panhandle Area near well IR01MW53B.

Nitrite (Table 5-1 and Figure 5-4)**.** Between 1990 and 2008, 578 samples from 63 wells were analyzed for the nutrient nitrite (as nitrogen). Nitrite was detected in 14 A-aquifer and 5 B-aquifer wells at Parcel E-2. A RIEC for the A-aquifer was not assigned because no screening criteria are established for nitrite. The RIEC for nitrite in the B-aquifer was assigned based on federal and California MCLs because the B-aquifer is considered a potential source of drinking water. Concentrations of nitrite in samples collected from two B-aquifer wells (IR01MW09B and IR01MW403B) exceeded the RIEC (1,000 µg/L). Both wells are Parcel E-2 perimeter monitoring wells. Each well had a single inconsistent, nonrecurring detection exceeding the RIEC. The extent of nitrite in B-aquifer groundwater is adequately delineated by concentrations below the RIEC.

Sulfide (Table 5-1 and Figure 5-5)**.** Between 1990 and 2008, 749 samples from 63 wells were analyzed for sulfide. This chemical was detected at concentrations exceeding the A-aquifer and B-aquifer RIEC (2 µg/L) in 53 A-aquifer wells and 10 B-aquifer wells. Wells with elevated concentrations of sulfide are distributed consistently throughout all of Parcel E-2. Nineteen of these wells are Parcel E-2 perimeter wells. Of the 19 perimeter wells, 6 are A-aquifer wells and 2 are B-aquifer wells with exceedances of the RIEC near the shoreline of Parcel E-2. Because every well at Parcel E-2 has had sulfide concentrations exceeding the RIEC, data tables were only posted on Figure 5-5 for wells located within 250 feet of the Parcel E-2 shoreline. The shoreline has the highest potential for transferring chemicals in groundwater to San Francisco Bay, thus the data presentation was focused on this area. Nearly all wells located along the shoreline have had significant exceedances, with sulfide concentrations ranging from hundreds to hundreds of thousands of times the RIEC. The extent of sulfide in groundwater is not adequately delineated by concentrations below the RIEC in any of the three areas at Parcel E-2 (Panhandle Area, Landfill Area, and East Adjacent Area). In particular, wells near the shoreline display significantly elevated and persistent concentrations of sulfide in groundwater that may migrate to the bay.

Un-ionized Ammonia (Table 5-1 and Figure 5-6)**.** At Parcel E-2, the oxygenation state of groundwater is reducing and most nitrogen present at the site is ionized ammonia (NH_4^+, also referred to as the ammonium ion) or un-ionized ammonia (the gas ammonia, NH_3, which dissolves readily in water and forms ammonium hydroxide, NH_4OH). Ammonification of nitrogen occurs during the decomposition of organic chemicals, including naturally occurring organic matter and organic waste material. Ionized ammonia is generally harmless to aquatic life, whereas un-ionized ammonia is toxic to aquatic life. The relationship between ionized and un-ionized ammonia is governed by the following equilibrium reaction:

$$NH_3 + H_2O \leftrightarrow NH_4OH \leftrightarrow NH_4^+ + OH^- \qquad (5\text{-}1)$$

where

NH_3	=	ammonia gas (un-ionized; dissolves readily in water to form NH_4OH)
H_2O	=	water
NH_4OH	=	ammonium hydroxide (un-ionized)
NH_4^+	=	ammonium ion
OH^-	=	hydroxyl ion

The equilibrium reaction for ammonia is dependent on water quality parameters that are measured in the field, specifically pH, temperature, and salinity. In general, the concentration of un-ionized ammonia (as a percentage of total ammonia concentration) increases with increased pH levels and temperature (Horne and Goldman, 1994).

Between 2002 and 2008, 439 samples from 88 wells were analyzed for total ammonia. Un-ionized ammonia (calculated from total ammonia results and other field parameters [pH, temperature, and specific conductance]) was detected at concentrations exceeding the RIEC (25 µg/L) in 41 A-aquifer wells and 6 B-aquifer wells at Parcel E-2. Because a large number of wells had exceedances, data tables were only posted on Figure 5-6 for wells located within 250 feet of the Parcel E-2 shoreline. Un-ionized ammonia concentrations within Parcel E-2 fluctuate considerably from one sampling round to another. Some results are not consistent with the preceding sampling event, and some results are not consistent with the results from the same season of the preceding year. Because un-ionized ammonia concentrations are calculated using field parameters, the potential exists for error to be introduced into the results.

Detections exceeding the RIEC in Parcel E-2 perimeter wells are focused along the perimeter of the Landfill Area and the northern portion of the Panhandle Area. Un-ionized ammonia concentrations elevated above the RIEC are persistent in well IR01MW38A and perimeter wells IR01MW47B and IR01MW48A. Twenty-four temporary wells also had a detected exceedance of un-ionized ammonia during the March 2008 sampling event. One of the temporary wells (TW003) had a concentration of un-ionized ammonia over 118 times the RIEC. The extent of un-ionized ammonia in groundwater is not adequately delineated by concentrations below the RIEC along the shoreline of Parcel E-2 in wells IR01MW43A, IR01MW47B, IR01MW48A, IR01MWI-3, PZ150D, TW013, TW014, TW016, TW031, TW032, TW039, and TW040 where elevated concentrations of un-ionized ammonia in groundwater may migrate to San Francisco Bay.

5.7.2.2. Metals

Figures were created for the following metals because their concentrations exceeded HGALs in the A-aquifer and exceeded the RIECs in the A- or B-aquifers: aluminum, antimony, arsenic, barium, beryllium, cadmium, total chromium, chromium VI, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, vanadium, and zinc. Various factors (geochemistry, degradation of organic material, sampling methods, etc.) can result in variable dissolved metals concentrations. These factors include differing soil types; surface topography that may affect chemical redistribution, runoff, or migration; potential tidal influences and groundwater flow patterns; pH, which affects the solubility of metals in water; and some sampling methods, which may tend to be biased high and may not be representative of actual concentrations of chemicals in groundwater (Barajas & Associates, Inc., 2008). Results from the mapping of metals concentrations are discussed below. Refer to Section 5.8.3.2 for a discussion of laboratory reporting limits that exceed the corresponding RIEC.

Aluminum (Table 5-2 and Figure 5-7)**.** Between 1990 and 2008, 733 samples from 125 A-aquifer and B-aquifer wells were analyzed for aluminum. Aluminum was detected in 38 A-aquifer and 10 B-aquifer wells. A RIEC for the A-aquifer was not assigned because no screening criteria are established for

aluminum. The RIEC for aluminum in the B-aquifer was assigned based on the California MCL because the B-aquifer is considered a potential source of drinking water. Of the B-aquifer wells with detections, three wells (IR01MW02B, IR01MW17B, and IR75MW05B) exhibited concentrations in groundwater exceeding the B-aquifer RIEC (1,000 µg/L). Well IR01MW02B is a perimeter monitoring well and well IR75MW05B is located north of the parcel. These wells each had a single aluminum concentration exceeding the RIEC in 1992, and exceedances have not recurred in these wells in over 18 monitoring events conducted over the subsequent 3 years. Well IR01MW17B is located within the landfill waste, and it had a single concentration exceeding the RIEC in 1992. This well is surrounded by wells that have no exceedances. The extent of aluminum in B-aquifer groundwater is adequately delineated by concentrations below RIECs.

Antimony (Table 5-2 and Figure 5-8)**.** Between 1990 and 2008, 726 samples from 128 A-aquifer and B-aquifer wells were analyzed for antimony. Antimony was detected in 55 of the 128 wells. Antimony concentrations exceeded the RIECs (43.3 µg/L and 6 µg/L) in seven A-aquifer wells and in nine B-aquifer wells, respectively. Because a large number of wells had exceedances, data tables were only posted on Figure 5-8 for wells located within 250 feet of the Parcel E-2 shoreline. Overall, detections exceeding the RIECs in most wells are inconsistent and do not persist over time. Four of the A-aquifer wells (IR01MW05A, IR01MW43A, IR01MWI-3, and IR01MWI-7) and four of the B-aquifer wells (IR01MW09B, IR01MW47B, IR01MW53B, and IR01MW403B) are Parcel E-2 perimeter monitoring wells. These perimeter wells have exhibited antimony in groundwater at concentrations exceeding the RIEC in one or two samples throughout their sampling history. Recent groundwater sampling results (from 2007 and 2008) collected from all but two perimeter monitoring wells (IR01MW47B and IR01MWI-3) show that antimony concentrations in groundwater no longer exceed the RIEC. The most recent samples were collected from wells IR01MW47B and IR01MWI-3 in 2005, prior to the abandonment of these wells as part of the removal action at the PCB Hot Spot Area. At that time, these wells had concentrations of antimony that exceeded the RIEC. More recent data in these areas are not available. Thus, the extent of antimony in groundwater is adequately delineated by concentrations below RIECs, except in wells IR01MW47B and IR01MWI-3, where concentrations of antimony exceeding the RIEC may be migrating to San Francisco Bay. Future monitoring in this area could demonstrate that concentrations of antimony are attenuating as a result of the removal action at the PCB Hot Spot Area.

Arsenic (Table 5-2 and Figure 5-9)**.** Between 1990 and 2008, 736 samples from 125 A-aquifer and B-aquifer wells were analyzed for arsenic. Arsenic was detected in 66 of the 125 wells. Arsenic was detected at concentrations that exceeded the RIECs (36 µg/L and 10 µg/L) in nine A-aquifer wells and in four B-aquifer wells, respectively. Three of the A-aquifer wells (IR01MW05A, IR04MW31A, and IR04MW36A) and one of the B-aquifer wells (IR01MW403B) are Parcel E-2 perimeter wells. Samples from wells IR01MW05A, IR01MW403B, and IR04MW31A exhibited single arsenic concentrations exceeding the RIECs. Arsenic concentrations exceeding the RIEC at IR04MW36A; however, have

occurred consistently since late 1991. This persistent contamination is confined to that well and does not appear in any of the surrounding wells. Concentrations of arsenic in this well fluctuate slightly, but are generally approximately four times the RIEC and appear to be increasing since mid 2006. An examination of sampling data from wells outside the eastern edge of Parcel E-2 showed no arsenic detections in wells located off site (immediately downgradient). The extent of arsenic in groundwater is adequately delineated by concentrations below RIECs.

Barium (Table 5-2 and Figure 5-10)**.** Between 1990 and 2008, 740 samples from 125 Parcel E-2 A-aquifer and B-aquifer monitoring wells were analyzed for barium. Barium was detected in all Parcel E-2 monitoring wells. Barium was detected at concentrations that exceeded the RIEC (504 µg/L) in 30 A-aquifer wells. Of these, exceedances were detected in 16 A-aquifer Parcel E-2 perimeter wells. Wells IR01MW05A, IR01MW48A, and IR01MW58A have had persistent detections that exceeded the A-aquifer RIEC (504 µg/L). Also, IR01MWI-3 had eight persistent detections exceeding the RIEC between January 1992 and December 2004; however, the most recent sample collected in March 2005 from this well did not exceed the RIEC. One of the perimeter wells (IR01MW63A), which had many historical RIEC exceedances, has not had an exceedance since 2006.

The presence of barium in groundwater is most prominent in the Panhandle Area and along the Landfill Area shoreline. Cross-gradient data and upgradient data from non-Navy property (adjacent to the Panhandle Area) allows for adequate delineation of the extent of barium along the western edge of the Panhandle Area. Wells located to the west of the Panhandle Area (on non-Navy property) showed no detections exceeding RIECs, except for a single historic exceedance at IR01MW400A that has not recurred. These results suggest that the exceedances in Panhandle Area groundwater are limited in extent.

The extent of barium in groundwater is not adequately delineated by concentrations below the RIEC at shoreline wells IR01MW48A, IR01MWI-3, PZ150D, TW014, TW013, TW042, TW041, TW031, and TW040, where concentrations of barium exceeding the RIEC may be migrating to the Bay.

Beryllium (Table 5-2 and Figure 5-11)**.** Between 1990 and 2008, 726 samples from 125 A-aquifer and B-aquifer wells were analyzed for beryllium. Beryllium was detected in 19 A-aquifer wells and 6 B-aquifer wells. However, detected concentrations that exceeded RIECs were limited to the A-aquifer. Samples from nine A-aquifer wells exhibited concentrations exceeding the RIEC (1.4 µg/L). Four of the wells (IR01MW44A, IR01MW63A, IR01MWI-7, and IR01MWI-8) with detections exceeding the RIEC are Parcel E-2 perimeter wells. Throughout their sampling history, detections exceeding the RIEC only occurred once in each of the nine wells, and most of the exceedances were less than double the RIEC in magnitude. The extent of beryllium in groundwater is adequately delineated by concentrations below RIECs.

Cadmium (Table 5-2 and Figure 5-12)**.** Between 1990 and 2008, 734 samples from 125 A-aquifer and B-aquifer wells were analyzed for cadmium. Cadmium was detected in 22 A-aquifer wells and 4 B-aquifer wells. Cadmium concentrations exceeded the RIECs (8.8 µg/L and 5 µg/L) in five A-aquifer wells and in two B-aquifer wells, respectively. Most of the A-aquifer wells and all of the B-aquifer wells had single RIEC exceedances that occurred in 1991 or 1992. Subsequent samples collected from these wells show no cadmium concentrations exceeding the RIEC. Two Parcel E-2 perimeter wells (IR01MW05A and IR01MW53B) exhibited a single concentration that exceeded the RIECs; however, the exceedances for each of these wells occurred in 1992 and have not recurred since. The extent of cadmium in groundwater is adequately delineated by concentrations below RIECs.

Chromium (Total) (Table 5-2 and Figure 5-13)**.** Between 1990 and 2008, 734 samples from 125 A-aquifer and B-aquifer wells were analyzed for total chromium. Total chromium was detected in 77 A-aquifer wells and 11 B-aquifer wells. Total chromium concentrations exceeded the RIECs (15.7 µg/L and 50 µg/L) in 15 A-aquifer wells and in 1 B-aquifer well, respectively. Nine of these wells were Parcel E-2 perimeter wells. Total chromium concentrations exceeding the RIECs in most perimeter wells were sporadic and inconsistent. Total chromium concentrations in samples from well IR01MW43A exceeded the A-aquifer RIEC during four sampling events in 2004 and 2005. Samples from wells IR01MW03A, IR01MW44A, and IR01MWI-3 also exhibited exceedances during their four most recent sampling events. All other perimeter wells with exceedances have not consistently exhibited concentrations exceeding the RIEC. The extent of total chromium in groundwater is adequately delineated by concentrations below RIECs, except in wells IR01MW43A, IR01MW44A, and IR01MWI-3, where groundwater with elevated total chromium concentrations may be migrating to San Francisco Bay. It should be noted that the removal action at the PCB Hot Spot Area included removal of soil in the area of these wells, thus the elevated concentrations of total chromium detected in these wells may be reduced in the future. This hypothesis is partly confirmed by data collected in 2008 from temporary wells installed along the shoreline and wells IR0MW60A and IR01MW64A. The data from these wells suggest that total chromium concentrations in the A-aquifer near wells IR01MW43A and IR01MWI-3 are attenuating. Additional post-removal action groundwater sampling is required to confirm this hypothesis.

Chromium VI (Table 5-2 and Figure 5-14)**.** Between 1990 and 2008, 207 samples from 43 A-aquifer and B-aquifer wells were analyzed for chromium VI. Chromium VI was only detected at a single well, the B-aquifer perimeter well IR01MW02B. This single detection was more than two times the RIEC (50 µg/L) in January 1992. Since that time, chromium VI has not been detected in this or any other well. The extent of chromium VI in groundwater is adequately delineated by concentrations below RIECs.

Cobalt (Table 5-2 and Figure 5-15)**.** Between 1990 and 2008, 725 samples from 125 A-aquifer and B-aquifer wells were analyzed for cobalt. Cobalt was detected in 65 A-aquifer wells and 10 B-aquifer wells. Cobalt exceeded the RIEC (20.8 µg/L) in nine A-aquifer wells. Two of these wells are perimeter wells (IR01MW05A and IR04MW35A). Exceedances in samples from the two perimeter wells occurred in 1992 and 1991, respectively, and have not recurred since that time. The concentrations of cobalt exceeding the RIEC in A-aquifer wells are inconsistent, nonrecurring, single detections. The most recent data (collected in March 2008 from temporary wells) showed no cobalt concentrations exceeding the RIEC along the shoreline and in the northern Panhandle Area. A RIEC for the B-aquifer was not assigned because no screening criteria are established for cobalt. The extent of cobalt in A-aquifer groundwater is adequately delineated by concentrations below the RIEC.

Copper (Table 5-2 and Figure 5-16)**.** Between 1990 and 2008, 735 samples from 125 A-aquifer and B-aquifer wells were analyzed for copper. Copper was detected in 58 A-aquifer wells and 10 B-aquifer wells. Concentrations exceeding the RIECs (28 µg/L and 3.1 µg/L) occurred in 15 A-aquifer wells and in 10 B-aquifer wells, respectively.

Copper concentrations exceeding the RIEC were widely distributed across the site, but they were infrequent and inconsistent in most wells. One notable exception is well IR01MW366A, which has had consistent copper exceedances since early 1996. This well is bounded by wells in the downgradient direction, in which copper concentrations have never exceeded the RIEC. Recent data (March 2008) collected from A-aquifer temporary wells show that copper concentrations in groundwater located along the shoreline and northern inland areas of the Panhandle Area have exceeded the RIEC. The shoreline of the Panhandle Area also has one B-aquifer perimeter well (IR01MW53B) that had concentrations exceeding the RIEC during four consecutive sampling events in 2007. Concentrations of copper detected in this well ranged from approximately one to three times the B-aquifer RIEC. The extent of copper in groundwater is adequately delineated by concentrations below the RIEC, except in wells TW018, TW019, TW020, and TW029, where concentrations of copper exceeding the RIEC may be migrating to San Francisco Bay, and in well IR01MW53B.

Lead (Table 5-2 and Figure 5-17)**.** Between 1990 and 2008, 739 samples from 125 A-aquifer and B-aquifer wells were analyzed for lead. Lead was detected in 45 A-aquifer wells and 9 B-aquifer wells. Lead concentrations exceeded the RIECs (14.4 µg/L and 8.1 µg/L) in 19 A-aquifer wells and in 4 B-aquifer wells, respectively. Overall, detections exceeding RIECs are inconsistent and nonpersistent and are widely distributed across the site.

Lead concentrations exceeded the RIEC in nine A-aquifer and one B-aquifer perimeter wells. In 1992, detected concentrations exceeded the RIEC in perimeter wells IR01MW03A, IR01MW31A, and IR01MW48A, by approximately two to four times. Exceedances have not recurred in these perimeter

wells since that time. Perimeter wells IR01MW43A and IR01MW44A showed more recent lead concentrations (three in 2004) exceeding the RIEC, which also did not recur (during one and three sampling events performed, respectively, conducted in late 2004 and early 2005). Concentrations exceeding the RIEC in these wells were 2 times the RIEC in IR01MW43A and almost 10 times the RIEC in IR01MW44A. The other perimeter wells have infrequent and inconsistent detections exceeding the RIECs. Of the temporary wells installed along the shoreline, three wells (TW029, TW028B, and TW021) located in the shoreline of the Panhandle Area had recent (2008) detections exceeding the RIEC.

The extent of lead in groundwater is adequately delineated by concentrations below RIECs, except in IR01MW43A, where two detections exceeded the RIEC over the past three sampling events, and in temporary wells TW029, TW028B, and TW021. At these locations, elevated lead concentrations in groundwater may be migrating to San Francisco Bay. It should be noted that the removal action at the PCB Hot Spot Area included removal of soil in the area of IR01MW43A, thus the elevated concentrations of lead detected in this well may be reduced in the future. Post-removal action groundwater sampling is required to confirm this hypothesis.

Manganese (Table 5-2 and Figure 5-18)**.** Between 1990 and 2008, 725 samples from 125 A-aquifer and B-aquifer wells were analyzed for manganese. Manganese was detected in all A-aquifer and B-aquifer wells sampled, including all temporary wells that were recently installed. Concentrations exceeding the A-aquifer RIEC (8,140 µg/L) were detected in three wells (IR01MWI-2, TW012, and TW048), one of which is a Parcel E-2 perimeter well (TW048). The single exceedance in IR01MWI-2 occurred in July 1992, and no detections exceeding the RIEC have recurred since that time in this well (between August 1992 and September 2002). The detected concentration at well TW012 is 1.4 times the RIEC, and this well is surrounded by temporary wells that had detections below the RIEC. Well TW048 is a recently installed temporary perimeter well. The concentration detected in this well is less than two times the RIEC concentration, and several temporary wells located downgradient of this well all exhibited concentrations below the RIEC. The extent of manganese in groundwater is adequately delineated by concentrations below RIECs.

Mercury (Table 5-2 and Figure 5-19)**.** Between 1990 and 2008, 732 samples from 125 A-aquifer and B-aquifer wells were analyzed for mercury. Mercury was detected in 34 A-aquifer and 4 B-aquifer wells. Mercury has exceeded the RIECs (0.6 µg/L and 0.025 µg/L) in samples from 13 A-aquifer wells and four B-aquifer wells, respectively. Most of the wells only had single, nonrecurring exceedance, except for one A-aquifer well (IR01MW366A), which is located in close proximity to the eastern edge of the Landfill Area. Samples from well IR01MW366A exhibited persistent exceedances (between 3 and 542 times the RIEC). Perimeter wells IR01MW02B and IR01MW05A have each had inconsistent exceedances over their sampling history. Mercury was not detected in any samples collected during the five most recent sampling events (between August 2006 and October 2007) from either of these wells. Well

IR01MW44A, located along the shoreline of the East Adjacent Area, had a single exceedance of the RIEC (in June 2004), with no subsequent exceedances during three sampling events since that time. A single temporary well (TW029) located along the shoreline of the Panhandle Area had a recent exceedance (in 2008) of 1.5 times the RIEC, which is not significant in magnitude. Also, this well is adjacent to multiple temporary wells that did not have detections exceeding the RIEC. The extent of mercury in groundwater is adequately delineated by concentrations below the RIECs.

Nickel (Table 5-2 and Figure 5-20)**.** Between 1990 and 2008, 743 samples from 125 wells were analyzed for nickel. Nickel was detected in 94 A-aquifer and 9 B-aquifer wells. Nickel concentrations exceeded the RIECs (96.5 µg/L and 8.2 µg/L) in 12 A-aquifer wells and four B-aquifer wells, respectively.

Nickel concentrations exceeded the RIEC (96.5 µg/L) in A-aquifer perimeter wells IR01MW05A IR01MWI-3, IR04MW35A, and TW040. Samples from three perimeter wells (IR01MW05A, IR01MWI-3, and IR04MW35A) have had single nickel concentrations exceeding the RIEC that occurred prior to 1996. Since that time, exceedances have not recurred in these wells during five or more sampling events. A sample from temporary well TW040, located at the edge of the Landfill Area along the shoreline, had a detection that was 1.2 times the A-aquifer RIEC in 2008. This exceedance was not significant in magnitude, and several adjacent temporary wells had no detections exceeding the RIEC, suggesting that the extent of nickel in the area of TW040 is limited.

Nickel concentrations exceeded the RIEC (8.2 µg/L) in B-aquifer perimeter wells IR01MW02B and IR01MW53B. Well IR01MW02B has only had two exceedances, which occurred in 1991 and 1992. Subsequent samples collected from this well (17 samples over 5 years) had no exceedances. Well IR01MW53B has had several exceedances between 2002 and 2006; however, nickel has not been detected at concentrations above the RIEC during the last five sampling events (between November 2006 and October 2007). The extent of nickel in groundwater is adequately delineated by concentrations below RIECs.

Selenium (Table 5-2 and Figure 5-21)**.** Between 1990 and 2008, 733 samples from 125 A-aquifer and B-aquifer wells were analyzed for selenium. Selenium was detected in 73 A-aquifer and 9 B-aquifer wells sampled at Parcel E-2. Only three wells (IR01MW38A, IR01MW366A, and IR01MWLF4B), two in the A-aquifer and one in the B-aquifer, have shown concentrations that exceeded the RIECs, all of which were detected in early 2007. All three of the wells are located within the estimated extent of the Landfill Area. A sample from well IR01MW366A exhibited a selenium concentration greater than six times the RIEC; however, the selenium concentration in the sample collected 2 months later (during the latest sampling event), was below the RIEC. The single RIEC exceedance in this well may be anomalous. The RIEC exceedances for the other two wells (IR01MW38A and IR01MWLF4B) were less than twice the RIEC concentration, and concentrations in samples collected from both wells during three subsequent

sampling events were below the RIECs. All three wells that exhibited exceedances are bounded by downgradient wells that have not. The extent of selenium in groundwater is adequately delineated by concentrations below the RIECs.

Silver (Table 5-2 and Figure 5-22)**.** Between 1990 and 2008, 727 samples from 125 A-aquifer and B-aquifer wells were analyzed for silver. Silver was detected in 30 A-aquifer and 3 B-aquifer wells at Parcel E-2. Silver concentrations exceeded the RIECs (7.43 µg/L and 0.38 µg/L) in three A-aquifer wells and three B-aquifer wells, respectively. Of these wells, two are A-aquifer perimeter wells (IR01MW05A and IR01MW31A). Detected concentrations exceeding the RIEC in these perimeter wells occurred in 1992 and 2002, respectively, and the exceedances have not recurred in at least 14 subsequent monitoring events. Wells IR01MW26B, IR01MW366B, and IR01MWLF4B exhibited single concentrations exceeding the B-aquifer RIEC (in February 2007). Concentrations of silver in these wells have not exceeded the RIEC during the last three consecutive sampling events, between May and October 2007. The extent of silver in groundwater is adequately delineated by concentrations below RIECs.

Vanadium (Table 5-2 and Figure 5-23)**.** Between 1990 and 2008, 255 samples from 55 A-aquifer and B-aquifer monitoring wells were analyzed for vanadium. Vanadium has been detected in 44 A-aquifer and 5 B-aquifer wells. Vanadium concentrations exceeded the RIECs (26.6 µg/L and 15 µg/L) in nine A-aquifer wells and three B-aquifer wells, respectively. Concentrations exceeding the RIEC in all 10 wells were inconsistent and mainly occurred in 1992. Four of the wells (IR01MW02B, IR01MW05A, IR01MW31A, and IR01MW58A) with exceedances are Parcel E-2 perimeter wells. Only one of these wells (IR01MW05A) exhibited vanadium at concentrations more than 1.4 times the RIEC. Well IR01MW05A had a single exceedance in 1992 that was 2.4 times the RIEC. This exceedance did not recur during four subsequent sampling events over 10 years. The extent of vanadium in groundwater is adequately delineated by concentrations below RIECs.

Zinc (Table 5-2 and Figure 5-24)**.** Between 1990 and 2008, 740 samples from 125 A-aquifer and B-aquifer wells were analyzed for zinc. Zinc has been detected in 52 A-aquifer and 8 B-aquifer wells at Parcel E-2. Zinc was detected in 19 A-aquifer wells at concentrations exceeding the RIEC (81 µg/L). Ten of the wells had historic exceedances (prior to 1997), with no exceedances during three or more subsequent sampling rounds. Zinc was detected more recently (between 2002 and 2005) in two perimeter wells (IR01MW43A and IR01MW44A). A sample from well IR01MW43A exhibited a single zinc concentration exceeding the RIEC in November 2004. This well was abandoned as part of the removal action at the PCB Hot Spot Area and replaced with well IR01MW64A. Zinc was not detected in the replacement well (sampled in 2008). Zinc consistently exceeds the RIEC in IR01MW44A (three concentrations exceeding the RIEC out of the past five sampling events). In early 2008, samples from three temporary wells (TW020, TW021, and TW029) along the shoreline of the Panhandle Area had elevated zinc concentrations. Concentrations detected in these wells were between 1.2 and 15.8 times

higher than the A-aquifer RIEC. The extent of zinc in groundwater is adequately delineated by concentrations below the RIEC, except in IR01MW43A, IR01MW44A, and temporary perimeter well TW020, TW021, and TW029, where elevated zinc concentrations in groundwater may be migrating to San Francisco Bay. It should be noted that the removal action at the PCB Hot Spot Area included removal of soil in the areas of IR01MW43A and IR01MW44A, thus the elevated concentrations of zinc detected in these wells will likely be reduced in the future. This hypothesis is partly confirmed by a nondetected result in a sample collected at well IR01MW64A (replacement for IR01MW43A) in 2008. Additional post-removal action groundwater sampling is required to confirm this hypothesis.

5.7.2.3. Pesticides and PCBs

Maps were created for the following pesticides and PCBs because they exceeded the RIECs: 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-chlordane, total PCBs, dieldrin, endosulfan I, endosulfan II, endrin, gamma-BHC (lindane), gamma-chlordane, heptachlor, and heptachlor epoxide. Results from the mapping of pesticide and PCB concentrations with detections exceeding RIECs are discussed below. Refer to Section 5.8.3.2 for a discussion of laboratory reporting limits that exceed the corresponding RIECs.

4,4'-DDD (Table 5-3 and Figure 5-25)**.** Between 1990 and 2008, 606 samples from 63 A-aquifer and B-aquifer wells were analyzed for 4,4'-DDD. This chemical was only detected in three wells (IR01MW38A, IR01MW403A, and IR12MW17A) at Parcel E-2. Samples from each of these wells exhibited 4,4'-DDD concentrations that exceeded the RIEC (0.001 µg/L). No samples from Parcel E-2 perimeter wells exhibited exceedances. The extent of 4,4'-DDD in groundwater is adequately delineated by concentrations below RIECs.

4,4'-DDE (Table 5-3 and Figure 5-26)**.** Between 1990 and 2008, 606 samples from 63 A-aquifer and B-aquifer wells were analyzed for 4,4'-DDE. This chemical was detected in two wells (IR01MW26B and IR01MW38A) at Parcel E-2, both located within the Landfill Area. Neither well is a Parcel E-2 perimeter well, and no samples from downgradient wells have ever exhibited 4,4'-DDE concentrations exceeding the RIEC. The extent of 4,4'-DDE in groundwater is adequately delineated by concentrations below RIECs.

4,4'-DDT (Table 5-3 and Figure 5-27)**.** Between 1990 and 2008, 606 samples from 63 A-aquifer and B-aquifer wells were analyzed for 4,4'-DDT. This chemical was inconsistently detected in samples from eight A-aquifer wells within the Landfill and East Adjacent Areas at concentrations that exceeded the A-aquifer RIEC (0.001 µg/L). Of the eight wells, five are Parcel E-2 perimeter wells (IR01MW03A, IR01MW31A, IR01MW43A, IR01MW44A, and IR01MWI-3). The three perimeter wells (IR01MW43A, IR01MW44A, and IR01MWI-3) with the highest concentrations are within the PCB Hot Spot Area. Samples from these wells have exhibited concentrations exceeding the RIEC by a factor of up to 100, but these exceedances did not recur after 2002 during three or more subsequent sampling events.

Samples from the other Parcel E-2 perimeter wells (IR01MW03A and IR01MW31A) have not exhibited exceedances during at least 11 subsequent sampling rounds since 2005 and 2002, respectively. The extent of 4,4'-DDT in groundwater is adequately delineated by concentrations below RIECs.

Alpha-chlordane (Table 5-3 and Figure 5-28)**.** Between 1990 and 2008, 606 samples from 63 A-aquifer and B-aquifer wells were analyzed for alpha-chlordane. Alpha-chlordane was detected in two A-aquifer wells: one perimeter well (IR01MW44A) along the eastern side of the shoreline in the PCB Hot Spot Area and one (IR01MW366A) within the Landfill Area. Alpha-chlordane concentrations in both wells exceeded the RIEC (0.004 µg/L) by 2.5 times in 2001 and 2002. Since then, samples from this well have not exceeded the RIEC (during four sampling events). The extent of alpha-chlordane in groundwater is adequately delineated by concentrations below RIECs.

Total PCBs (Table 5-3 and Figure 5-29)**.** Between 1990 and 2008, 682 samples from 123 A-aquifer and B-aquifer wells were collected for PCBs. These data were used to calculate total PCB concentrations. Total PCBs were detected in 29 A-aquifer wells at Parcel E-2, and all detected concentrations exceeded the RIEC (0.03 µg/L). Overall, PCB concentrations in Parcel E-2 groundwater have been sporadic and nonpersistent, except in the PCB Hot Spot Area. Of the 29 A-aquifer wells with detections, 15 are Parcel E-2 perimeter wells. Samples from three of these perimeter wells (IR01MW05A, IR01MW31A, and IR01MW58A) exhibited PCB concentrations exceeding the RIEC in 1992, with no subsequent detections in any of these wells since that time (three or more consecutive sampling events). Exceedances have occurred in wells IR01MW03A and IR01MWI-3; however, during the last three or more sampling events, no PCBs have been detected in samples from these wells. Perimeter wells IR01MW43A and IR01MW44A, located within the PCB Hot Spot Area, exhibited consistent exceedances of the RIEC. Samples were collected from both of these wells prior to the completion of the removal action at the PCB Hot Spot Area. Well IR01MW43A was abandoned as part of the removal action and replaced with well IR01MW64A. In 2008, No PCBs were detected in samples from the replacement well.

In perimeter well IR01MWI-6, one sample collected in August 1992 exceeded the RIEC. Because no samples have been collected since then, it is unclear if elevated PCB concentrations persist in this well. However, a temporary well located downgradient from well IR01MWI-6 (TW047) had a recent (March 2008) PCB concentration exceeding the RIEC. This well is in the vicinity of well IR01MWI-9, which had two PCB concentrations exceeding the RIEC in July and August 1992. A single temporary well located along the panhandle shoreline (TW021) had a recent (March 2008) PCB concentration that was nine times the RIEC. This well is adjacent to several wells that had no detections during the same monitoring event, which suggests that the result in well TW021 may be anomalous, or that the extent of contamination is very limited. Temporary wells TW031, TW039, TW040, and PZ150D located along the shoreline of the Landfill Area also had recent (March 2008) exceedances.

The extent of PCBs in groundwater is adequately delineated by concentrations below RIECs, except in wells IR01MW43A and IR01MW44A, and along the Landfill Area shoreline, where elevated concentrations of PCBs in groundwater (exceeding the RIEC) may migrate to San Francisco Bay, and in well IR01MWI-6, where cross-gradient groundwater movement may allow for PCB migration off site. It should be noted that removal action at the PCB Hot Spot Area included removal of soil in the areas of IR01MW43A and IR01MW44A, thus the elevated concentrations of total PCBs detected in these wells will likely be reduced in the future. This hypothesis is partly confirmed by a sample collected at well IR01MW64A (replacement for IR01MW43A), where PCBs were not detected in 2008. Additional post-removal action groundwater sampling is required to confirm this hypothesis.

Dieldrin (Table 5-3 and Figure 5-30)**.** Between 1990 and 2008, 607 samples from 63 A-aquifer and B-aquifer wells were analyzed for dieldrin. Dieldrin was detected in five A-aquifer wells (IR01MW05A, IR01MW43A, IR01MW44A, IR01MW403A, and IR01MWI-3) at concentrations exceeding the RIEC (0.0019 µg/L). Four of these wells are Parcel E-2 perimeter monitoring wells; three of which are located in the PCB Hot Spot Area (IR01MW43A, IR01MW44A, and IR01MWI-3). The exceedances in these wells are inconsistent and limited to three samples collected in 2001 and 2002. Dieldrin has not been detected in samples from wells IR01MW43A and IR01MW44A during six or more sampling events over four years. Well IR01MWI-3 has only been sampled twice since the last exceedance was detected. Both subsequent samples did not have dieldrin detections. The detection exceeding the RIEC in the fourth perimeter well (IR01MW05A) occurred in May 2006, and no other detections were identified in this well during the following six consecutive sampling events. The extent of dieldrin in groundwater is adequately delineated by concentrations below RIECs.

Endosulfan I (Table 5-3 and Figure 5-31)**.** Between 1990 and 2008, 607 samples from 63 A-aquifer and B-aquifer wells were analyzed for endosulfan I. Endosulfan I was only detected once at Parcel E-2. The detection, in an A-aquifer well (IR01MW366A) located in the eastern portion of the Landfill Area, exceeded the RIEC (0.0087 µg/L) by a factor of 3.4. No endosulfan I was detected in Parcel E-2 perimeter wells since the single detection in 1996. The extent of endosulfan I in groundwater is adequately delineated by concentrations below RIECs.

Endosulfan II (Table 5-3 and Figure 5-32)**.** Between 1990 and 2008, 609 samples from 63 A-aquifer and B-aquifer wells were analyzed for endosulfan II. Endosulfan II was detected a single time in two A-aquifer wells (IR01MW366A and IR01MWI-3) in 2006 and 2002, respectively. Both of the detections exceeded the RIEC (0.0087 µg/L). One of these wells (IR01MWI-3) is a Parcel E-2 perimeter well located along the southeastern shoreline of Parcel E-2, within the PCB Hot Spot Area. No detections of endosulfan II have occurred in either of these wells during three sampling events following the exceedances. The extent of endosulfan II in groundwater is adequately delineated by concentrations below RIECs.

Endrin (Table 5-3 and Figure 5-33)**.** Between 1990 and 2008, 605 samples from 63 A-aquifer and B-aquifer wells were analyzed for endrin. Endrin was detected a single time in each of five A-aquifer wells at Parcel E-2 (IR01MW03A, IR01MW05A, IR01MW44A, IR01MWI-3A, and IR12MW17A). All detections exceeded the A-aquifer RIEC (0.0023 µg/L). Two of these wells (IR01MW44A and IR01MWI-3) are Parcel E-2 perimeter wells, located along the Parcel E-2 shoreline in the PCB Hot Spot Area. The exceedances occurred in March 2001, but detectable concentrations have not recurred in these wells since then (during four sampling events). The extent of endrin in groundwater is adequately delineated by concentrations below RIECs.

Gamma-BHC (lindane) (Table 5-3 and Figure 5-34)**.** Between 1990 and 2008, 607 samples from 63 A-aquifer and B-aquifer wells were analyzed for gamma-BHC (lindane). Gamma-BHC (lindane) was detected in a single A-aquifer well (IR01MW05A) at concentrations that exceeded the RIEC (0.032 µg/L). IR01MW05A is a perimeter well located within the Landfill Area at the northern edge of the parcel, where, based on the prevailing groundwater flow direction, there is little to no risk of migration off site. The extent of gamma-BHC (lindane) in groundwater is adequately delineated by concentrations below RIECs.

Gamma-chlordane (Table 5-3 and Figure 5-35)**.** Between 1990 and 2008, 460 samples from 58 A-aquifer and B-aquifer wells were analyzed for gamma-chlordane. Gamma-chlordane was detected in five A-aquifer wells. All detections exceeded the RIEC (0.004 µg/L). Three of these wells (IR01MW43A, IR01MW44A, and IR01MWI-3) are Parcel E-2 perimeter wells located in the PCB Hot Spot Area. The exceedances in these three wells ranged from 2.4 to 25 times the RIEC, and they occurred inconsistently between 1996 and 2004. No detections have recurred in these wells during recent sampling events (at least three events which took place in late 2004 and early 2005). The extent of gamma-chlordane in groundwater is adequately delineated by concentrations below RIECs.

Heptachlor (Table 5-3 and Figure 5-36)**.** Between 1990 and 2008, 609 samples from 63 A-aquifer and B-aquifer wells were analyzed for heptachlor. Heptachlor was detected in six A-aquifer wells (IR01MW05A, IR01MW43A, IR01MW44A, IR01MWI-2, IR01MWI-3, and IR01MWI-5) at Parcel E-2. All of the detections in these wells exceeded the RIEC (0.0036 µg/L). Four of the six wells are Parcel E-2 perimeter wells (IR01MW05A, IR01MW43A, IR01MW44A, and IR01MWI-3). They are located along the southeastern shoreline of Parcel E-2, within the PCB Hot Spot Area, except for IR01MW05A, which is located at the northern edge of the Landfill Area. The detections exceeding the RIEC in all of the perimeter wells occurred in 2001 and 2002, and they were between 1.5 and 23 times the RIEC. None of the wells have had detections of heptachlor during three or more subsequent events. The extent of heptachlor in groundwater is adequately delineated by concentrations below RIECs.

Heptachlor Epoxide (Table 5-3 and Figure 5-37)**.** Between 1990 and 2008, 610 samples from 63 A-aquifer and B-aquifer wells were analyzed for heptachlor epoxide. Heptachlor epoxide was detected in five A-aquifer wells (IR01MW05A, IR01MW43A, IR01MW44A, IR01MWI-5, and IR12MW17A), three of which are Parcel E-2 perimeter wells. All the detections exceeded the A-aquifer RIEC (0.0036 µg/L). IR01MW05A is a perimeter well located at the northern edge of the Landfill Area, at the northern edge of the parcel where, based on the prevailing groundwater flow direction, there is little to no risk of migration off site. Also, at IR01MW05A, heptachlor epoxide has not been detected during eleven consecutive sampling events following the exceedance measured in March 2001. The other two perimeter wells (IR01MW43A and IR01MW44A) are located along the eastern shoreline of Parcel E-2, at the southern edge of the PCB Hot Spot Area. These wells (IR01MW43A and IR01MW44A) had one and two exceedances, respectively, and heptachlor epoxide has not been detected in either well during two and four sampling events, respectively. The extent of heptachlor epoxide in groundwater is adequately delineated by concentrations below RIECs.

5.7.2.4. SVOCs

SVOCs, more specifically PAHs, are typically present in groundwater at low levels. PAHs are generally biodegradable in soil systems (U.S. Army Environmental Center, 2002). Many of the RIECs for SVOCs are very low; thus, a large number of SVOC were detected in Parcel E-2 aquifers. Many SVOCs detected in A-aquifer and B-aquifer wells were only detected a single time during the nearly 15-year sampling history of the site. Based on the infrequency of these detections, these chemicals are unlikely to be COCs in groundwater; however, because they were detected at concentrations exceeding RIECs, they were included in the focused evaluation. Figures were created for the following SVOCs because they were detected at concentrations exceeding their respective RIECs: 2-chlorophenol, benzo(a)pyrene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, butylbenzylphthalate, dibenz(a,h)anthracene, diethylphthalate, di-n-butylphthalate, hexachlorocyclopentadiene, and naphthalene. Results from the mapping of SVOC concentrations are discussed below. Refer to Section 5.8.3.2 for a discussion of laboratory reporting limits that exceeded their corresponding RIECs.

2-Chlorophenol (Table 5-4 and Figure 5-38)**.** Between 1991 and 2007, 659 samples from 63 A-aquifer and B-aquifer wells were analyzed for 2-chlorophenol. This chemical was detected in two wells, one A-aquifer and one B-aquifer. Only the detection in the B-aquifer well (IR01MW366B) exceeded the B-aquifer RIEC (0.18 µg/L). This exceedance occurred once in September 2005, and was approximately 56 times greater than the RIEC. No other detections have ever been measured in well IR01MW366B during nine subsequent sampling events performed between January 2006 and October 2007. The extent of 2-chlorophenol in groundwater is adequately delineated by concentrations below RIECs.

Benzo(a)pyrene (Table 5-4 and Figure 5-39)**.** Between 1991 and 2007, 669 samples from 117 A-aquifer and B-aquifer wells were analyzed for benzo(a)pyrene. Benzo(a)pyrene was detected in three A-aquifer wells (IR01MW62A, IR01MWI-3, and IR01MWI-9) and one B-aquifer well (IR01MW53B). Detections in the A-aquifer did not exceed the A-aquifer RIEC (60 µg/L). One detection in the B-aquifer well exceeded the B-aquifer RIEC (0.2 µg/L) in September 2002. The exceedance was approximately 4 times the RIEC. No other detections have been measured in that well during the 15 subsequent sampling events performed between June 2004 and October 2007. The extent of benzo(a)pyrene in groundwater is adequately delineated by concentrations below RIECs.

Benzo(k)fluoranthene (Table 5-4 and Figure 5-40)**.** Between 1991 and 2007, 667 samples from 63 A-aquifer and B-aquifer wells were analyzed for benzo(k)fluoranthene. Benzo(k)fluoranthene was detected once in one A-aquifer well (IR01MWI-3) and once in one B-aquifer well (IR01MW53B), at concentrations exceeding their respective REICs (0.4 µg/L and 0.029 µg/L). Both wells are Parcel E-2 perimeter wells located along the Parcel E-2 shoreline. Neither well had persistent benzo(k)fluoranthene detections, nor were there any detections since 2002 (three or more sampling events). The extent of benzo(k)fluoranthene in groundwater is adequately delineated by concentrations below RIECs.

Bis(2-ethylhexyl)phthalate (Table 5-4 and Figure 5-41)**.** Between 1991 and 2007, 669 samples from 63 A-aquifer and B-aquifer wells were analyzed for bis(2-ethylhexyl)phthalate. Bis(2-ethylhexyl)phthalate was detected in two A-aquifer (IR01MW36A and IR01MW366A) and one B-aquifer (IR01MW17B) wells. IR01MW17B is the only Parcel E-2 well with a detection of bis(2-ethylhexyl)phthalate above the RIEC (4 µg/L). The extent of bis(2-ethylhexyl)phthalate in groundwater is adequately delineated by concentrations below RIECs.

Butylbenzylphthalate (Table 5-4 and Figure 5-42)**.** Between 1991 and 2007, 668 samples from 63 A-aquifer and B-aquifer wells were analyzed for butylbenzylphthalate. This chemical was detected once in a sample from A-aquifer well (IR01MW366A) at a concentration exceeding the RIEC (3.4 µg/L). No other detections exceeding the RIEC have ever been measured in this well during seven subsequent sampling events performed between January 2006 and May 2007. No samples from the Parcel E perimeter wells had exceedances. The extent of butylbenzylphthalate in groundwater is adequately delineated by concentrations below RIECs.

Dibenz(a,h)anthracene (Table 5-4 and Figure 5-43)**.** Between 1991 and 2007, 667 samples from 63 A-aquifer and B-aquifer wells were analyzed for dibenz(a,h)anthracene. Dibenz(a,h)anthracene was detected once in a sample from A-aquifer perimeter well (IR01MWI-3) and once in a sample from A-aquifer well (IR01MW403A) outside and upgradient from Parcel E-2; both detections exceeded the A-aquifer RIEC (0.25 µg/L). These isolated exceedances occurred in August 2002 and earlier and have

not recurred during three subsequent sampling events. The extent of dibenz(a,h)anthracene in groundwater is adequately delineated by concentrations below RIECs.

Diethylphthalate (Table 5-4 and Figure 5-44)**.** Between 1991 and 2007, 669 samples from 63 A-aquifer and B-aquifer wells were analyzed for diethylphthalate. This chemical was detected in samples from three A-aquifer wells (IR01MW42A, IR01MW366A, and IR12MW17A) at Parcel E-2. Each well had at least a single detection exceeding the RIEC (3.4 µg/L). Two of the wells (IR01MW42A and IR01MW366A) are located within the Landfill Area and are delineated by downgradient wells with concentrations below the RIEC. IR12MW17A, a downgradient well outside of Parcel E-2, had a single exceedance of diethylphthalate in June 2004, which did not recur during four subsequent sampling rounds. Diethylphthalate has never been detected in any Parcel E-2 perimeter wells. The extent of diethylphthalate in groundwater is adequately delineated by concentrations below RIECs.

Di-n-butylphthalate (Table 5-4 and Figure 5-45)**.** Between 1991 and 2007, 669 samples from 63 A-aquifer and B-aquifer wells were analyzed for di-n-butylphthalate. This chemical was detected twice in sample from A-aquifer well (IR01MW366A) at concentrations exceeding the RIEC (3.4 µg/L). This well is located within the Landfill Area. Di-n-butylphthalate has never been detected at concentrations exceeding the RIEC in any Parcel E-2 perimeter wells. The extent of di-n-butylphthalate in groundwater is adequately delineated by concentrations below RIECs.

Hexachlorocyclopentadiene (Table 5-4 and Figure 5-46)**.** Between 1991 and 2007, 669 samples from 63 A-aquifer and B-aquifer wells were analyzed for hexachlorocyclopentadiene. This chemical was detected once in a sample from A-aquifer well IR01MW03A at a concentration that exceeded the RIEC (1.4 µg/L) during the February 2007 sampling event. IR01MW03A is a perimeter well located at the northern edge of the Landfill Area that has not had a detection of hexachlorocyclopentadiene during the last three consecutive sampling events. The extent of hexachlorocyclopentadiene in groundwater is adequately delineated by concentrations below RIECs.

Naphthalene (Table 5-4 and Figure 5-47)**.** Between 1991 and 2007, 669 samples from 63 A-aquifer and B-aquifer wells were analyzed for naphthalene. Naphthalene was detected in 16 A-aquifer wells and 2 B-aquifer wells spread across Parcel E-2. Of the 16 wells showing past detections, only one (IR01MW02B) has had detections that exceeded the B-aquifer RIEC (17 µg/L). IR01MW02B is a Parcel E-2 perimeter well. Both of the detections in this well that exceeded the RIEC occurred in 1992. During 18 subsequent sampling events, naphthalene concentrations have not exceeded the RIEC in samples from this well. The extent of naphthalene in groundwater is adequately delineated by concentrations below RIECs.

5.7.2.5. VOCs

Similar to SVOCs, many VOCs detected in A-aquifer and B-aquifer wells were only detected a single time during the entire sampling history of the site. Based on the infrequency of these detections, these chemicals are unlikely to be COPCs in groundwater; however, because they have been detected at some point, they were included in the focused evaluation to confirm that the single detections did not represent localized areas of contamination. Figures were created for the following VOCs because they were detected at concentrations exceeding their respective RIECs: 1,2-DCA, benzene, carbon tetrachloride, TCE, and vinyl chloride. Results from the mapping of VOC concentrations are discussed below. Refer to Section 5.8.3.2 for a discussion of laboratory reporting limits that exceeded their corresponding RIEC.

1,2-Dichloroethane (Table 5-5 and Figure 5-48)**.** Between 1991 and 2007, 808 samples from 63 A-aquifer and B-aquifer wells were analyzed for 1,2-DCA. This chemical has been detected in seven A-aquifer and two B-aquifer wells at Parcel E-2. Of these wells, 1,2-DCA exceeded the RIEC (0.5 µg/L) in samples from only one B-aquifer well (IR01MW403B). This well is a Parcel E-2 perimeter well, located along the northwestern edge of Parcel E-2. All of the detections in well IR01MW403B have exceeded the RIEC, and the most recent exceedance occurred in 2007. This well is bounded by downgradient wells to the east with concentrations below the RIEC. The extent of 1,2-DCA in groundwater is adequately delineated by concentrations below RIECs.

Benzene (Table 5-5 and Figure 5-49)**.** Between 1991 and 2007, 809 samples from 63 A-aquifer and B-aquifer wells were analyzed for benzene. Benzene has been detected in 27 A-aquifer and 6 B-aquifer wells across Parcel E-2. Detected concentrations of benzene in the A-aquifer have never exceeded the A-aquifer RIEC (700 µg/L). In five B-aquifer wells, there have been historical single detected concentrations that exceeded the B-aquifer RIEC (1 µg/L). All of the B-aquifer wells with exceedances are Parcel E-2 perimeter wells. One well (IR01MW403B) is located along the western boundary of the parcel, two wells (IR01MW47B and IR01MW53B), one well (IR01MW09B) is located along the eastern parcel boundary, and one well (IR01MW02B) is located along the northern parcel boundary. Benzene has not been detected in any of these wells in at least the past seven sampling events. The extent of benzene in groundwater is adequately delineated by concentrations below RIECs.

Carbon Tetrachloride (Table 5-5 and Figure 5-50)**.** Between 1991 and 2007, 808 samples from 63 A-aquifer and B-aquifer wells were analyzed for carbon tetrachloride. Carbon tetrachloride was detected once in a single B-aquifer well (IR01MW47B). The detection exceeded the RIEC (0.5 µg/L), but has not recurred after 1992 (during nine sampling events performed between August 1992 and June 2005). The extent of carbon tetrachloride in groundwater is adequately delineated by concentrations below RIECs.

Trichloroethene (Table 5-5 and Figure 5-51)**.** Between 1991 and 2007, 809 samples from 63 A-aquifer and B-aquifer wells were analyzed for TCE. TCE has been detected in 16 A-aquifer wells and 5 B-aquifer wells at Parcel E-2. Of these wells, one A-aquifer perimeter well (IR01MW48A) had a single detected concentration that exceeded the RIEC (400 µg/L) in July 2002; however, this exceedance has not recurred over 16 sampling events performed between September 2002 and October 2007. No other perimeter wells have had exceedances. The extent of TCE in groundwater is adequately delineated by concentrations below RIECs.

Vinyl Chloride (Table 5-5 and Figure 5-52)**.** Between 1991 and 2007, 809 samples from 63 A-aquifer and B-aquifer wells were analyzed for vinyl chloride. Vinyl chloride has been detected in five A-aquifer wells at Parcel E-2. Samples from one A-aquifer perimeter well (IR04MW13A) in the East Adjacent Area exhibited concentrations that exceeded the RIEC (3.8 µg/L). Since late 2004, vinyl chloride has been detected sporadically in this well at concentrations exceeding the RIEC (September 2004, March 2005, June 2005, August 2007, and October 2007). These detections have been consistent in magnitude (approximately 1.1 times the RIEC). This well is bounded by downgradient concentrations of vinyl chloride below the RIEC. The extent of vinyl chloride in groundwater is adequately delineated by concentrations below RIECs.

5.7.2.6. Petroleum Hydrocarbons

TPH (Total) (Table 5-6 and Figure 5-53)**.** Between 1991 and 2008, 637 samples from 120 A-aquifer and B-aquifer wells were analyzed for TPH. The sum of TPH fractions was used to evaluate total TPH concentrations in groundwater. Total TPH has been detected in 94 A-aquifer and 7 B-aquifer wells at Parcel E-2. The detection concentrations were compared with RIECs assigned as a function of well distance from the Parcel E-2 shoreline (Shaw, 2007). The concentrations evaluated increased as the distance from the shoreline increased, as shown on Figure 5-53. Total TPH concentrations exceeded their distance-dependent RIECs in 11 A-aquifer wells. All of these wells, except IR12MW21A, are Parcel E-2 perimeter wells located along the shoreline. Well IR12MW21A is located outside of Parcel E-2 to the east. Samples from well IR01MWI-3, located along the shoreline in the PCB Hot Spot Area, exhibited inconsistent exceedances throughout its sampling history, and recent exceedances in December 2004 and March 2005 exceeded the RIEC (1,467 µg/L) for a well between 0 and 50 feet from the shoreline. Samples from well IR01MW43A exhibited persistent and increasing total TPH concentrations exceeding the RIEC (3,216 µg/L) for a well between 50 and 100 feet from the shoreline. Temporary wells located along the Landfill Area shoreline and northern shoreline of the Panhandle Area (adjacent to the Landfill Area) show recent (March 2008) exceedances. The extent of total TPH in groundwater is adequately delineated by concentrations below RIECs, except along the shoreline at the 10 perimeter wells, where elevated concentrations in groundwater (exceeding the RIECs) may be migrating toward San Francisco Bay. More specifically, the shoreline areas where TPH concentration may be migrating to the bay are

limited to the Landfill Area shoreline and the northern shoreline of the Panhandle Area (adjacent to the Landfill Area). It should be noted that the removal action at the PCB Hot Spot Area included removal of soil in the areas of IR01MW43A and IR01MWI-3, thus the elevated concentrations of total TPH detected in these wells may be reduced in the future. This hypothesis is partly confirmed by a sample collected at well IR01MW64A (replacement for IR01MW43A) where total TPH was detected in 2008 at a concentration below the RIEC. Additional post-removal action groundwater sampling is required to confirm this hypothesis. Refer to Section 5.8.3.2 for a discussion of laboratory reporting limits which exceed the corresponding RIEC.

5.8. SUMMARY OF FINDINGS

All groundwater data collected to date (from early 1990 to October 2007) were included to accurately evaluate the nature and extent of groundwater contamination in Parcel E-2. Concentrations of metals in groundwater were compared with ambient concentrations (HGALs) to eliminate those metals not introduced by the landfill or its surrounding source areas. The data were then evaluated by comparing detected chemicals with evaluation criteria (RIECs) to establish whether they are likely to be present at concentrations that could negatively affect human health or the environment. To identify the subset of detected chemicals on which to focus the evaluation, the data were compared with the selected RIECs for each aquifer. The RIECs are composed of regulatory groundwater and drinking water limits and standards and aquatic criteria, as well as background levels (in the case of metals only). To identify and select the criteria that apply to each aquifer at Parcel E-2, a beneficial use evaluation was conducted, followed by a criteria selection process based on the results of that evaluation.

Further evaluation was performed for chemicals found to exceed the selected RIECs. Data maps were created to depict the spatial and temporal distribution and magnitude of the detections and the samples that exceeded the RIEC for each chemical in each aquifer.

The information presented above was used to determine if the problem statements defined for Parcel E-2 groundwater have been answered and if the DQOs have been met. The following subsections summarize the results of the nature and extent evaluation and address the resolution of DQOs and the responses to the problem statements guiding the data collection at Parcel E-2.

5.8.1. Summary of Lateral and Vertical Extent

As stated in Section 5.1, the goal of this section is to present an evaluation of all existing groundwater data to support the risk assessment and remedial alternatives portions of the RI/FS process. This nature and extent evaluation is meant to document that an adequate amount of data, of sufficient quality, exist to support the HHRA and SLERA, to provide a strong basis for the RAOs, and to support the evaluation of a focused set of remedial alternatives for Parcel E-2.

The findings and the areas of concern with respect to groundwater contamination at Parcel E-2 are summarized below.

- Cyanide was detected at elevated concentrations throughout the A- and B-aquifer perimeter wells in Parcel E-2; however, the highest concentrations of cyanide were in samples collected from wells within the Landfill Area. Recent elevated concentrations (exceeding RIEC) and, in some cases, persistent concentrations of cyanide in groundwater wells located along the perimeter of the parcel indicate that the extent of cyanide is not adequately delineated.
- Ammonia was detected at elevated concentrations throughout the A- and B-aquifers in the Landfill Area. These concentrations are indicative of the decomposition of natural organic matter and organic waste material in the landfill. Elevated concentrations (exceeding the RIEC) of un-ionized ammonia are also present in wells located along the bay shoreline and further inland in the northern portion of the Panhandle Area, adjacent to the Landfill Area. Upon contact with bay water, un-ionized ammonia is oxidized to nitrite, then nitrate. The oxidation of ammonia reduces the dissolved oxygen in the bay water and may be harmful to aquatic life.
- Nitrate concentrations exceeding the RIEC are persistent at well IR01MW53B, located along the northern shoreline of the Panhandle Area. The extent of nitrate is not adequately delineated in the B-aquifer at this shoreline location.
- Sulfide was detected at elevated concentrations in monitoring wells throughout Parcel E-2. In particular, wells near the shoreline display elevated and persistent concentrations of sulfide in groundwater that may migrate to San Francisco Bay. The extent of sulfide is not adequately delineated.
- Recently detected concentrations of antimony, chromium, lead, and zinc exceeded their respective RIECs in groundwater where the Landfill Area meets the PCB Hot Spot Area. Concentrations in groundwater may be attenuating as a result of the removal action at the PCB Hot Spot Area, but this hypothesis can only be confirmed through ongoing monitoring in this area. Until this data gap is addressed, the extent of these metals is not considered adequately delineated in the northern portion of the PCB Hot Spot Area, along the shoreline.
- Persistent barium concentrations exceeding the RIEC (504 μg/L) exist in A-aquifer groundwater in the southern portion of the Panhandle Area and along the Landfill Area shoreline. Because the extent of barium beyond the Parcel E-2 shoreline is unknown, groundwater with barium concentrations exceeding the RIEC is potentially migrating toward San Francisco Bay.
- Recently detected concentrations of copper, lead, and zinc exceeded the A-aquifer RIEC in groundwater along the northern shoreline of the Panhandle Area, where these dissolved metals are potentially migrating to San Francisco Bay. Ongoing monitoring in this area may be used to further delineate the extent of metals in groundwater at this location and may be used to make recommendations on future remedial actions.
- For metals in groundwater, ambient concentrations are a contributing factor for the wide variety of detections in the A-aquifer; however, past site activities at Parcel E-2, which include disposal of industrial wastes, also contribute to the metals reported in groundwater. Metals concentrations slightly exceeding HGALs were treated and delineated as RIEC exceedances in this evaluation, but they may be due to natural variations in background concentrations.

- Concentrations of total PCBs consistently exceed the RIEC in A-aquifer wells located near the sheet-pile wall, along the shoreline in the Landfill Area. Historical data indicated that PCB concentrations generally decreased over time at the site. In addition, the removal action that was performed in the PCB Hot Spot Area along the Parcel E-2 shoreline removed the soil source and is likely to result in reduced dissolved concentrations in Parcel E-2 aquifers. The removal action performed at the PCB Hot Spot Area will also probably reduce source concentrations of other chemicals (e.g., SVOCs) detected in the area. Data collected from temporary and replacement wells in the vicinity of the PCB Hot Spot Area, although not extensive, suggest that attenuation is occurring.
- Historical total TPH concentrations in groundwater in wells IR01MW43A and IR01MWI-3 exceeded the TPH criterion in samples collected between 1991 and 2005. Total TPH concentrations in IR01MW43A and IR01MWI-3 continued to exceed their respective RIECs (4,839 µg/L and 2,092 µg/L) through 2005. Total TPH, as well as other chemical concentrations, in soil will likely be reduced as a result of the soil removal action that was conducted in the collocated PCB Hot Spot Area; however additional monitoring is required to confirm whether the removal action has reduced TPH concentrations in groundwater. Concentrations of total TPH in samples collected from temporary monitoring wells within 150 feet of the Parcel E-2 shoreline in the Landfill Area and northern Panhandle Area exceed A-aquifer RIECs. Total TPH is not adequately delineated in these areas.

Table 5-15 includes a list of all the wells from which the extent of certain chemicals could not be adequately delineated based on the available data. Although these are potential areas of concern and may not have all been identified as such in the bulleted list above, the information available is adequate for the evaluation of remedial alternatives for Parcel E-2. Section 5.8.4 provides more information on how the nature and extent analysis presented in this section will be strengthened by future data.

5.8.2. Resolution of Data Quality Objectives

A DQO question was presented in the BGMP SAP (TtEMI, 2004e) that directly addressed the nature and extent of contamination in basewide groundwater, including groundwater affected by the landfill at Parcel E-2. The problem statements, decision question, and answer to the decision question are presented below.

5.8.2.1. Problem Statements

The BGMP SAP (TtEMI, 2004e) lists the following two problem statements for groundwater monitoring at the landfill at Parcel E-2:

Historical groundwater data show that chemicals have been detected in groundwater downgradient of the Parcel E-2 Landfill. Additional monitoring is necessary to determine trends in chemical concentrations and to help evaluate potential remedial alternatives.

27 CCR provides guidance for groundwater monitoring at landfills. Additional monitoring at the Parcel E-2 Landfill is necessary to establish baseline data for chemicals and groundwater parameters that are typical of landfill contaminants.

5.8.2.2. Decision Question

The following decision question was formulated in response to the aforementioned problem statements:

Is the characterization of chemical concentrations and concentration trends, the lateral and vertical distribution of groundwater chemicals, and seasonal fluctuations in concentrations of groundwater chemicals in the Landfill Area adequate for evaluation of remedial alternatives?

To answer the decision question, many types of information and data were collected, graphically mapped, and analyzed (spatially and temporally) to support the groundwater nature and extent evaluation in this RI/FS Report. The information and data sources included:

- Groundwater monitoring data from Parcel E-2 wells, collected as part of the BGMP, including chemical concentrations, field groundwater quality, and hydrogeologic data.
- Existing chemical concentration data and hydrogeologic data from the GDGI (from 2000 to 2002) and from studies conducted before the GDGI (from 1990 to 1996).
- Geologic and hydrogeologic information derived from past potentiometric and hydrogeologic mapping.
- HGALs and other pertinent regulatory evaluation criteria.

5.8.2.3. Answer to the Decision Question

The characterization of chemical concentrations and concentration trends and the understanding of lateral and vertical distribution of groundwater chemicals at the Parcel E-2 Landfill **are** adequate for evaluation of remedial alternatives. Large amounts of defensible data have been analyzed, and the results of those analyses sufficiently characterize the nature and extent of groundwater contamination at Parcel E-2 for the purpose of remedial alternatives evaluation. The groundwater characterization analyses revealed the following:

- The lateral and vertical extent of almost all chemicals tested is adequate to define the overall nature and extent of groundwater contamination at Parcel E-2, for the purposes of performing a risk assessment and remedial alternatives analysis.
- The broad and focused evaluations of the data allowed for a thorough assessment of the lateral and vertical extent of groundwater chemicals at Parcel E-2 and identification of major areas of concern.
- Overall, groundwater at Parcel E-2 contains elevated concentrations (exceeding RIECs) of chemicals from each of the analytical groups evaluated (i.e., anions, metals, pesticides and PCBs,

SVOCs, VOCs, and petroleum hydrocarbons), a number of which may be migrating to San Francisco Bay. A summary of major areas of concern is provided in Section 5.8.1.

5.8.3. Laboratory Reporting Limits Exceeding Remedial Investigation Evaluation Criteria

As part of the data evaluation, the laboratory reporting limits associated with all Parcel E-2 groundwater samples were compared with the selected RIECs for the chemicals analyzed. More specifically, the purpose of this comparison was to identify any chemicals for which the available data may not have been analyzed at reporting limits below RIECs. Because RIECs are the primary evaluation criteria used in this nature and extent evaluation, it is important to report instances where detecting concentrations at or below the RIEC may not be possible or may not have been achievable for particular samples. The following subsections identify the major reasons why reporting limits may not be (or may not have been) at or below RIECs. They also identify the chemicals, by analytical group, that may have sample results that were analyzed using reporting limits that may have exceeded the selected RIECs. Lastly, an assessment of the usability of the data for the purpose of evaluating the extent of chemicals is included.

5.8.3.1. Causes for Elevated Reporting Limits

The data used for this nature and extent evaluation were generated under a number of separate investigations and monitoring programs over a period of nearly 15 years. Over that period of time, many factors have influenced the laboratory reporting limits applied to Parcel E-2 groundwater analyses, including increased accuracy and diversity of analytical methods due to improvements in processes and technologies and changes in data quality goals and objectives, based on varying anticipated beneficial use scenarios, monitoring goals, and remedial objectives. A complete summary of data quality and data validation results is not provided in the form of a quality control summary report (QCSR) because the data were derived from multiple investigations, each having their own QCSR based on different data quality objectives, which may not apply to the evaluation criteria (RIECs) used in this data evaluation.

A general evaluation of the data indicates that for most chemicals the elevated reporting limits do not affect the usability of the data for the purpose of evaluating the extent of chemicals in groundwater, because there are usually multiple analyses for each chemical in each well that have reporting limits less than the RIECs. In some cases, reporting limits are achievable but not met due to chemical interferences in samples. To allow for proper analysis, samples may have been diluted to alleviate the effects of these interferences. Sample dilution results in an elevation of the reporting limit, possibly greater than RIECs. Again, if the need for dilution is occasional within each well, the usability of the data for the purpose of evaluating the extent of chemicals is probably not diminished.

In other cases, when RIECs are based on nonpromulgated, risk-based criteria (e.g., ESLs), and where these criteria are more stringent than the promulgated criteria (e.g., MCLs or HGALs), the specified reporting limit may not be less than the selected RIEC. This is because the RIEC selected is always based

on the most stringent (lowest) of all evaluation criteria; however, the DQOs selected for the BGMP (TtEMI, 2004e) (the source of the more recent groundwater data) specify reporting limits should be selected based on promulgated criteria. Design of the monitoring program and selection of remedial objectives are primarily based on data collection and evaluation based on promulgated criteria, which may not necessarily correspond with evaluations using more stringent, nonpromulgated criteria. Therefore, the conservative nature of the RIEC selection process produces situations where reporting limits are higher than evaluation criteria. The effect on data usability for the purpose of the extent evaluation is usually directly related to the magnitude of the difference between the reporting limit and the chosen RIEC.

Throughout this evaluation, in cases where most samples (80 to 100 percent) have reporting limits that exceed the RIEC and estimated detections are reported, the available estimated data were treated as sufficiently accurate for the purpose of evaluating chemical extent.

5.8.3.2. Assessment of Reporting Limits Exceeding RIECs by Analytical Group

Each analytical group included chemicals whose laboratory reporting limits exceeded RIECs. Table 5-13 includes summary statistics related to the frequency that reporting limits exceeded RIECs for each chemical included in the nature and extent evaluation. Figures 5-1 through 5-53 indicate the well locations where, at some point during the sampling history of a well, a reporting limit exceeded the specified RIEC. For those chemicals that were not mapped, the data summary statistics incorporated in the comprehensive data tables in Appendix J include information on reporting limits as compared with RIECs.

In the subsections below related to each analytical group, an analysis was performed to provide brief explanations of the probable causes of the elevated reporting limits and the magnitude of the effects on the chemical extent evaluation. This analysis was based on an evaluation of the frequency values in Table 5-13 (number of samples with reporting limits greater than RIECs divided by the total number of samples analyzed) and the spatial distribution of the occurrences of samples with reporting limits exceeding criteria (represented on Figures 5-1 through 5-53).

Anions

Reporting limits were found to exceed RIECs for three anions (Table 5-13). The results of the evaluation are presented below.

- Fluoride and Cyanide had reporting limits exceeding RIECs in 10 percent (or less) of all samples (see Table 5-13). For these anions, a low number (10 percent or less) of the analyses had reporting limits greater than RIECs, because reporting limits are typically less than RIECs, except in a small number of instances where dilution may have been required to adjust for chemical

interferences in samples. The small number of samples with reporting limits exceeding RIECs does not diminish the usability of the data in the nature and extent evaluation.

- A single anion (sulfide) had reporting limits exceeding RIECs in 10 to 80 percent of all samples (see Table 5-13). The reporting limit originally specified for sulfide in the BGMP SAP (TtEMI, 2004e) was the laboratory standard for EPA method 376.1 (40 µg/l). During the BGMP implementation (in 2004), it was determined that the practical quantitation limit specified in the SAP for sulfide was not achievable using EPA method 376.1. A BGMP SAP variance was prepared to replace the reporting limit for sulfide with the laboratory reporting limit of 1,000 µg/l. For this nature and extent evaluation, the usability of these data for chemical extent evaluation is not diminished because most samples have detected concentrations that exceed the significantly elevated reporting limits resulting from the sample dilutions.

Metals

Reporting limits were found to exceed RIECs for 11 metals (Table 5-13). The results of the evaluation are presented below.

- Table 5-13 lists the metals with reporting limits exceeding RIECs in 10 percent (or less) of all samples. For these metals, the occurrence of elevated reporting limits is, for the most part, due to occasional sample dilutions and does not diminish the usability of the data used in the extent evaluation.
- A single metal (copper) had reporting limits exceeding RIECs in more than 10 percent of all samples (see Table 5-13). The occurrence of elevated reporting limits is mainly due, in this case, to samples requiring occasional dilutions to minimize chemical interferences. Generally, the usability of these data for chemical extent evaluation is not diminished because samples exist for most wells that have reporting limits less than RIECs.

Pesticides and PCBs

Reporting limits were found to exceed RIECs for 13 pesticides and PCBs (Table 5-13).

- Table 5-13 lists the pesticides with reporting limits exceeding RIECs in 10 percent (or less) of all samples For these chemicals, the occurrence of elevated reporting limits is due, for the most part, to occasional sample dilutions and does not diminish the usability of the data used in the extent evaluation.
- All PCBs had analyses with reporting limits exceeding RIECs. For these chemicals, the RIECs are less than achievable laboratory reporting limits. The RIECs for PCBs are based on risk-based, nonpromulgated criteria (mainly ESLs) and are typically one or two orders of magnitude less than the lowest achievable laboratory reporting limit. EPA-approved analytical methods with the lowest commercially achievable reporting limits are being used, thus the most stringent evaluation of chemical extent possible was conducted.

SVOCs and VOCs

Reporting limits were found to exceed RIECs for 14 SVOCs and 1 VOC (Table 5-13). For all SVOCs and VOCs with reporting limits exceeding RIECs, the frequency of occurrence was less than 1 percent. Table 5-13 lists SVOCs and VOCs with reporting limits exceeding RIECs in less than 1 percent of samples. For these chemicals, the occurrence of elevated reporting limits is mainly due to occasional sample dilutions and does not diminish the usability of the data for the purpose of evaluating chemical extent.

Petroleum Hydrocarbons

Reporting limits were found to exceed RIECs for three groups of petroleum hydrocarbons (Table 5-13). The results of the evaluation are presented below.

- Table 5-13 lists the petroleum hydrocarbons with reporting limits exceeding RIECs in 10 percent (or less) of samples. Although these chemicals are evaluated in the nature and extent evaluation as total TPH, the individual components were evaluated for this assessment. For these petroleum hydrocarbon groups, the occurrence of elevated reporting limits is mainly due to occasional sample dilutions and does not diminish the usability of the data for the purpose of evaluating chemical extent.
- A single petroleum hydrocarbon group (total oil and grease) had reporting limits exceeding RIECs in between 10 and 20 percent of all samples (Table 5-13). The elevated number of reporting limits greater than the RIEC is mainly due to sample dilutions due to interferences, which is not uncommon when analyzing for total oil and grease in groundwater. Therefore, the most stringent evaluation of chemical extent possible was conducted for total oil and grease, and the occurrence of elevated reporting limits in less than 20 percent of samples does not diminish the usability of the data for the purpose of evaluating chemical extent.

5.8.3.3. Summary of Assessment of Reporting Limits Exceeding RIECs

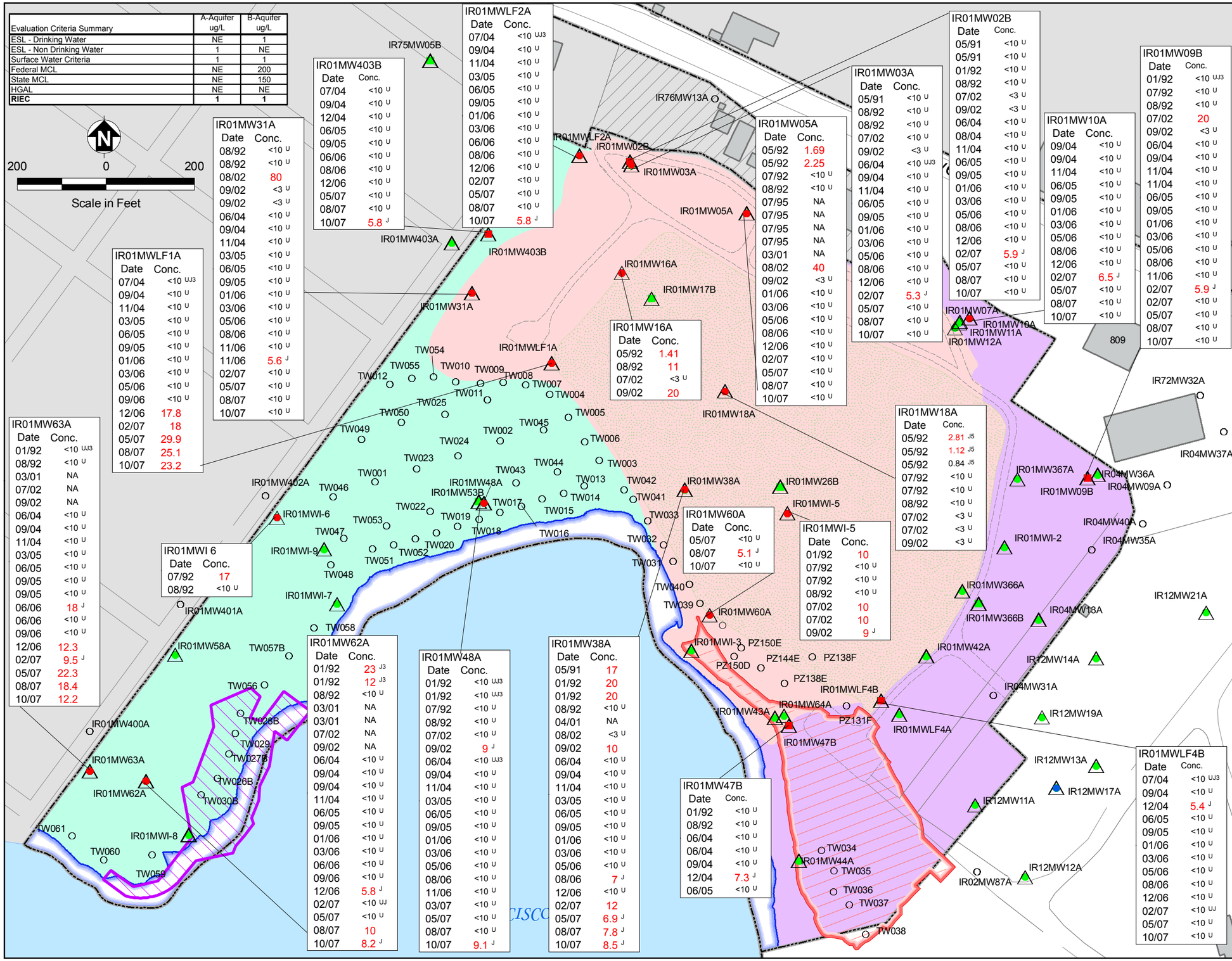
The assessment of reporting limits exceeding RIECs was generalized by evaluating individual analytical groups using spatial representations of the locations where reporting limits exceed RIECs (Figures 5-1 through 5-53) and frequencies of reporting limit exceeding RIECs (Table 5-13 and Appendix J). The summaries presented above are meant to bring to light the most predominant reasons that a reporting limit for a given analytical group might exceed RIECs.

5.8.4. Data Gaps

Although the overall nature and extent of groundwater contamination at Parcel E-2 can be adequately defined by the data evaluated in this analysis, some data gaps are present and should be addressed. The following areas in which further data may help the nature and extent evaluation process were revealed through this analysis:

- Data gaps exist for certain chemicals (Table 5-15) along the Parcel E-2 shoreline, where chemical concentrations exceeded RIECs. A method for comparing groundwater data with aquatic criteria to account for chemical attenuation and the nearshore mixing process has been adopted and used in Appendix M to assess the downgradient effect of shoreline groundwater contamination on the San Francisco Bay. However, this method is extremely conservative and may require future refinement to provide more accurate extent information for use during the RD.
- Data gaps exist in areas where the potentially beneficial effects on chemicals concentrations in groundwater by recent soil removal actions or planned construction activities have yet to be evaluated (e.g., removal actions at the PCB Hot Spot Area and Metal Slag Area, and removal of the sanitary sewer line). As confirmation sampling data and future groundwater monitoring data become available, the extent evaluations could be amended to incorporate that information. To date, a single monitoring event was conducted to sample groundwater from temporary wells drilled in the post-removal action areas in question. Results from this event were incorporated into the current nature and extent evaluation, presented herein.
- The possibility exists that some chemicals may have not been identified as part of this nature and extent evaluation because some sample reporting limits exceeded the RIECs selected for this evaluation. After evaluating the data, it appears that generally, this issue does not diminish the usability of the data for the purpose of identifying the extent of the most prevalent, risk-driving chemicals in groundwater.
- An additional 2 years of recent data collected as part of the BGMP were incorporated into the nature and extent evaluation between the draft and draft final versions of this report. The incorporation of these data addressed several data gaps and further strengthened the nature and extent evaluation. However, data gaps still remain in areas where the amount of additional data was not adequate to completely delineate the extent of a chemical.

Figures



Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	1
ESL - Non Drinking Water	1	NE
Surface Water Criteria	1	1
Federal MCL	NE	200
State MCL	NE	150
HGAL	NE	NE
RIEC	**1**	**1**

IR01MW403B

Date	Conc.
07/04	<10 U
09/04	<10 U
12/04	<10 U
06/05	<10 U
09/05	<10 U
06/06	<10 U
08/06	<10 U
12/06	<10 U
05/07	<10 U
08/07	<10 U
10/07	5.8 J

IR01MW31A

Date	Conc.
08/92	<10 U
08/92	<10 U
08/02	80
09/02	<3 U
09/02	<3 U
06/04	<10 U
09/04	<10 U
11/04	<10 U
03/05	<10 U
06/05	<10 U
09/05	<10 U
01/06	<10 U
03/06	<10 U
05/06	<10 U
08/06	<10 U
11/06	<10 U
11/06	5.6 J
02/07	<10 U
05/07	<10 U
08/07	<10 U
10/07	<10 U

IR01MWLF1A

Date	Conc.
07/04	<10 UJ3
09/04	<10 U
11/04	<10 U
03/05	<10 U
06/05	<10 U
09/05	<10 U
01/06	<10 U
03/06	<10 U
05/06	<10 U
09/06	<10 U
12/06	17.8
02/07	18
05/07	29.9
08/07	25.1
10/07	23.2

IR01MW63A

Date	Conc.
01/92	<10 UJ3
08/92	<10 U
03/01	NA
07/02	NA
09/02	NA
06/04	<10 U
09/04	<10 U
11/04	<10 U
03/05	<10 U
06/05	<10 U
09/05	<10 U
09/05	<10 U
06/06	18 J
06/06	<10 U
09/06	<10 U
12/06	12.3
02/07	9.5 J
05/07	22.3
08/07	18.4
10/07	12.2

IR01MWI 6

Date	Conc.
07/92	17
08/92	<10 U

IR01MW62A

Date	Conc.
01/92	23 J3
01/92	12 J3
08/92	<10 U
03/01	NA
03/01	NA
07/02	NA
09/02	NA
06/04	<10 U
09/04	<10 U
09/04	<10 U
11/04	<10 U
06/05	<10 U
09/05	<10 U
01/06	<10 U
03/06	<10 U
06/06	<10 U
09/06	<10 U
12/06	5.8 J
02/07	<10 UJ
05/07	<10 U
08/07	10
10/07	8.2 J

IR01MW48A

Date	Conc.
01/92	<10 UJ3
01/92	<10 UJ3
07/92	<10 U
08/92	<10 U
07/02	<10 U
09/02	9 J
06/04	<10 UJ3
09/04	<10 U
11/04	<10 U
03/05	<10 U
06/05	<10 U
09/05	<10 U
01/06	<10 U
03/06	<10 U
05/06	<10 U
08/06	<10 U
11/06	<10 U
03/07	<10 U
05/07	<10 U
08/07	<10 U
10/07	9.1 J

IR01MW38A

Date	Conc.
05/91	17
01/92	20
01/92	20
08/92	<10 U
04/01	NA
08/02	<3 U
09/02	10
06/04	<10 U
09/04	<10 U
11/04	<10 U
03/05	<10 U
06/05	<10 U
09/05	<10 U
01/06	<10 U
03/06	<10 U
05/06	<10 U
08/06	7 J
12/06	<10 U
02/07	12
05/07	6.9 J
08/07	7.8 J
10/07	8.5 J

IR01MW47B

Date	Conc.
01/92	<10 U
08/92	<10 U
06/04	<10 U
06/04	<10 U
09/04	<10 U
12/04	7.3 J
06/05	<10 U

IR01MW60A

Date	Conc.
05/07	<10 U
08/07	5.1 J
10/07	<10 U

IR01MWI-5

Date	Conc.
01/92	10
07/92	<10 U
07/92	<10 U
08/92	<10 U
07/02	10
07/02	10
09/02	9 J

IR01MW16A

Date	Conc.
05/92	1.41
08/92	11
07/02	<3 U
09/02	20

IR01MW05A

Date	Conc.
05/92	1.69
05/92	2.25
07/92	<10 U
08/92	<10 U
07/95	NA
07/95	NA
07/95	NA
07/95	NA
03/01	NA
08/02	40
09/02	<3 U
01/06	<10 U
03/06	<10 U
05/06	<10 U
08/06	<10 U
12/06	<10 U
02/07	<10 U
05/07	<10 U
08/07	<10 U
10/07	<10 U

IR01MW03A

Date	Conc.
05/91	<10 U
08/92	<10 U
08/92	<10 U
07/02	<10 U
09/02	<3 U
06/04	<10 UJ3
09/04	<10 U
11/04	<10 U
06/05	<10 U
09/05	<10 U
01/06	<10 U
03/06	<10 U
05/06	<10 U
08/06	<10 U
12/06	<10 U
02/07	5.3 J
05/07	<10 U
08/07	<10 U
10/07	<10 U

IR01MW18A

Date	Conc.
05/92	2.81 J5
05/92	1.12 J5
05/92	0.84 J5
07/92	<10 U
07/92	<10 U
08/92	<10 U
07/02	<3 U
07/02	<3 U
09/02	<3 U

IR01MW02B

Date	Conc.
05/91	<10 U
05/91	<10 U
01/92	<10 U
08/92	<10 U
07/02	<3 U
09/02	<3 U
06/04	<10 U
08/04	<10 U
11/04	<10 U
06/05	<10 U
09/05	<10 U
01/06	<10 U
03/06	<10 U
05/06	<10 U
08/06	<10 U
12/06	<10 U
02/07	5.9 J
05/07	<10 U
08/07	<10 U
10/07	<10 U

IR01MW10A

Date	Conc.
09/04	<10 U
09/04	<10 U
11/04	<10 U
06/05	<10 U
09/05	<10 U
01/06	<10 U
03/06	<10 U
05/06	<10 U
08/06	<10 U
12/06	<10 U
02/07	6.5 J
05/07	<10 U
08/07	<10 U
10/07	<10 U

IR01MW09B

Date	Conc.
01/92	<10 UJ3
07/92	<10 U
08/92	<10 U
07/02	20
09/02	<3 U
06/04	<10 U
09/04	<10 U
11/04	<10 U
11/04	<10 U
06/05	<10 U
09/05	<10 U
01/06	<10 U
03/06	<10 U
05/06	<10 U
08/06	<10 U
11/06	<10 U
02/07	5.9 J
02/07	<10 U
05/07	<10 U
08/07	<10 U
10/07	<10 U

IR01MWLF4B

Date	Conc.
07/04	<10 UJ3
09/04	<10 U
12/04	5.4 J
06/05	<10 U
09/05	<10 U
01/06	<10 U
03/06	<10 U
05/06	<10 U
08/06	<10 U
12/06	<10 U
02/07	<10 UJ
05/07	<10 U
10/07	<10 U

- Reporting Limit Exceeds RIEC (for at least one sample)
- A-aquifer Well
- B-aquifer Well
- Not Analyzed for Analyte
- Analyte Not Detected
- Analyte Exceeds Reporting Limit
- Analyte Exceeds Criterion
- Road
- Gravel Road
- Metal Slag Area (2007 excavation limit)[a]
- PCB Hot Spot Area (2007 excavation limit)[a]
- Limit of Landfill Cap
- Parcel Boundary
- Building
- UCSF Compound
- Landfill Area
- Adjacent Area
- Panhandle Area
- Shoreline Area
- San Francisco Bay
- Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Sample Date (mm/yy) → 05/07 527; 08/07 646; 10/07 633 J ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

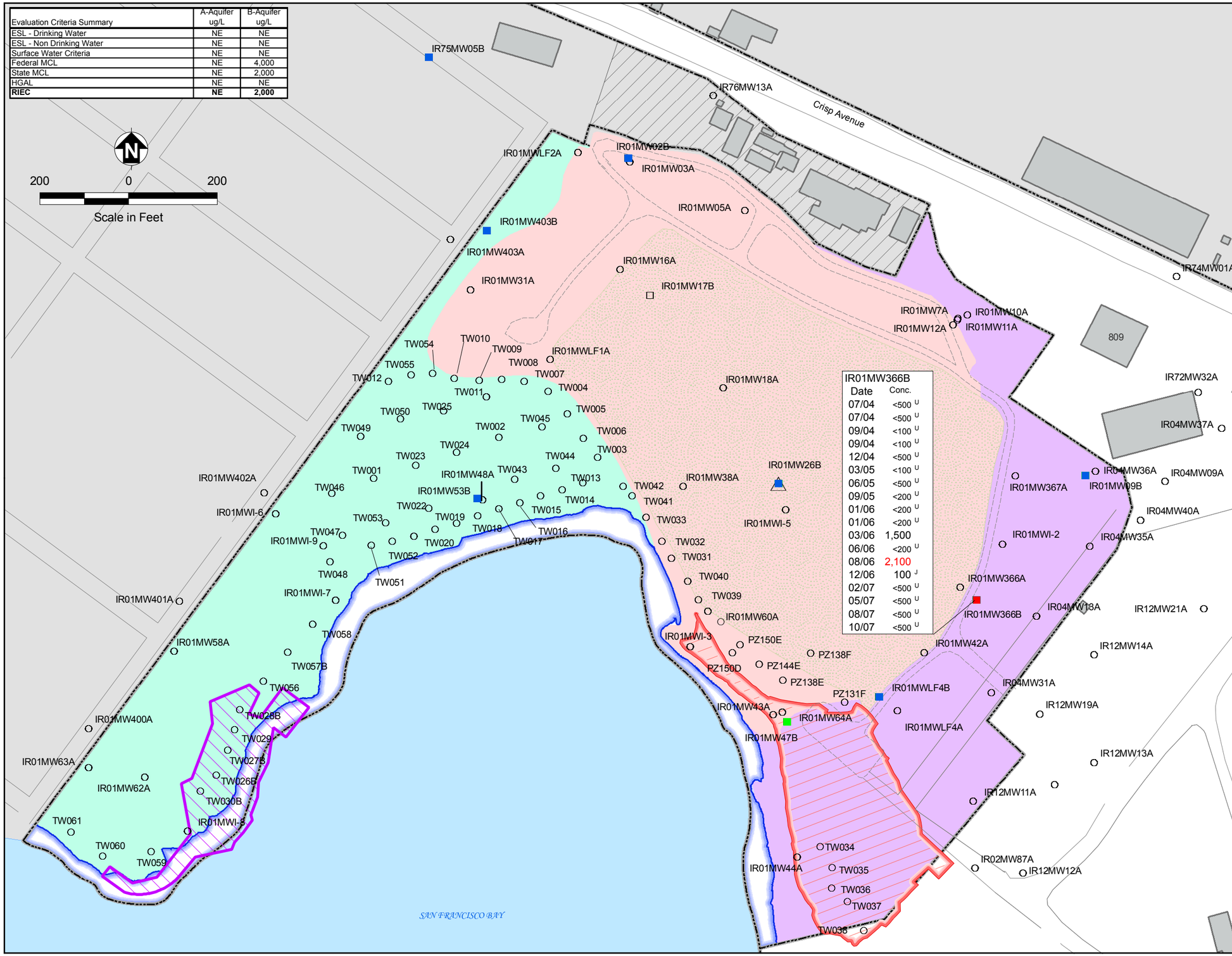
Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 5-1

CYANIDE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	NE
ESL - Non Drinking Water	NE	NE
Surface Water Criteria	NE	NE
Federal MCL	NE	4,000
State MCL	NE	2,000
HGAL	NE	NE
RIEC	**NE**	**2,000**



Reporting Limit Exceeds RIEC (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
µg/L = microgram per liter

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J
Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

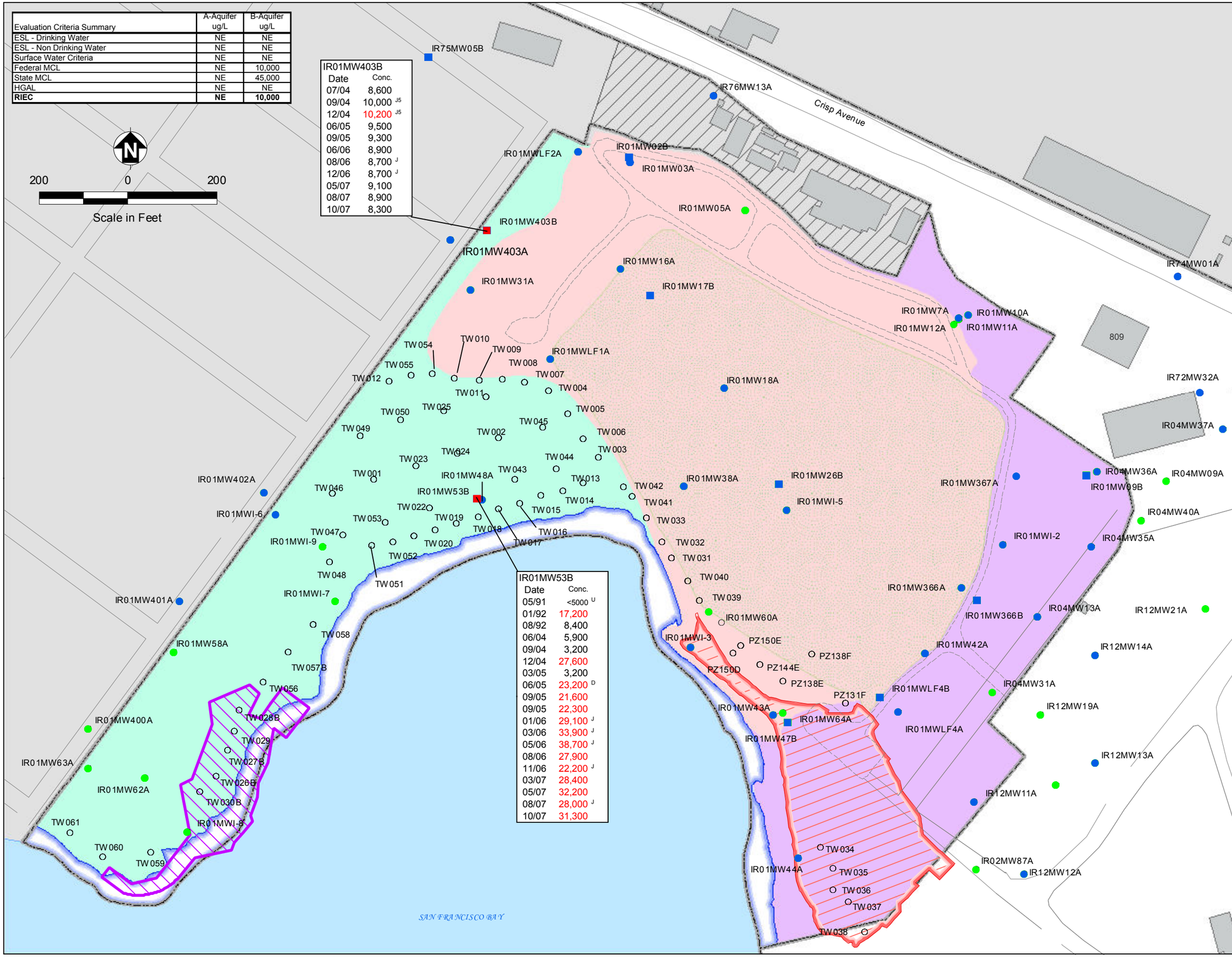
FIGURE 5-2

FLUORIDE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Anions\Fluoride-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	NE
ESL - Non Drinking Water	NE	NE
Surface Water Criteria	NE	NE
Federal MCL	NE	10,000
State MCL	NE	45,000
HGAL	NE	NE
RIEC	**NE**	**10,000**



IR01MW403B Date	Conc.
07/04	8,600
09/04	10,000 J5
12/04	10,200 J5
06/05	9,500
09/05	9,300
06/06	8,900
08/06	8,700 J
12/06	8,700 J
05/07	9,100
08/07	8,900
10/07	8,300

IR01MW53B Date	Conc.
05/91	<5000 U
01/92	17,200
08/92	8,400
06/04	5,900
09/04	3,200
12/04	27,600
03/05	3,200
06/05	23,200 D
09/05	21,600
09/05	22,300
01/06	29,100 J
03/06	33,900 J
05/06	38,700 J
08/06	27,900
11/06	22,200 J
03/07	28,400
05/07	32,200
08/07	28,000 J
10/07	31,300

- Reporting Limit Exceeds RIEC (for at least one sample)
- A-aquifer Well
- B-aquifer Well
- Not Analyzed for Analyte
- Analyte Not Detected
- Analyte Exceeds Reporting Limit
- Analyte Exceeds Criterion
- Road
- Gravel Road
- Metal Slag Area (2007 excavation limit)[a]
- PCB Hot Spot Area (2007 excavation limit)[a]
- Limit of Landfill Cap
- Parcel Boundary
- Building
- UCSF Compound
- Landfill Area
- Adjacent Area
- Panhandle Area
- Shoreline Area
- San Francisco Bay
- Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
D = pattern resembles diesel
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J

Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

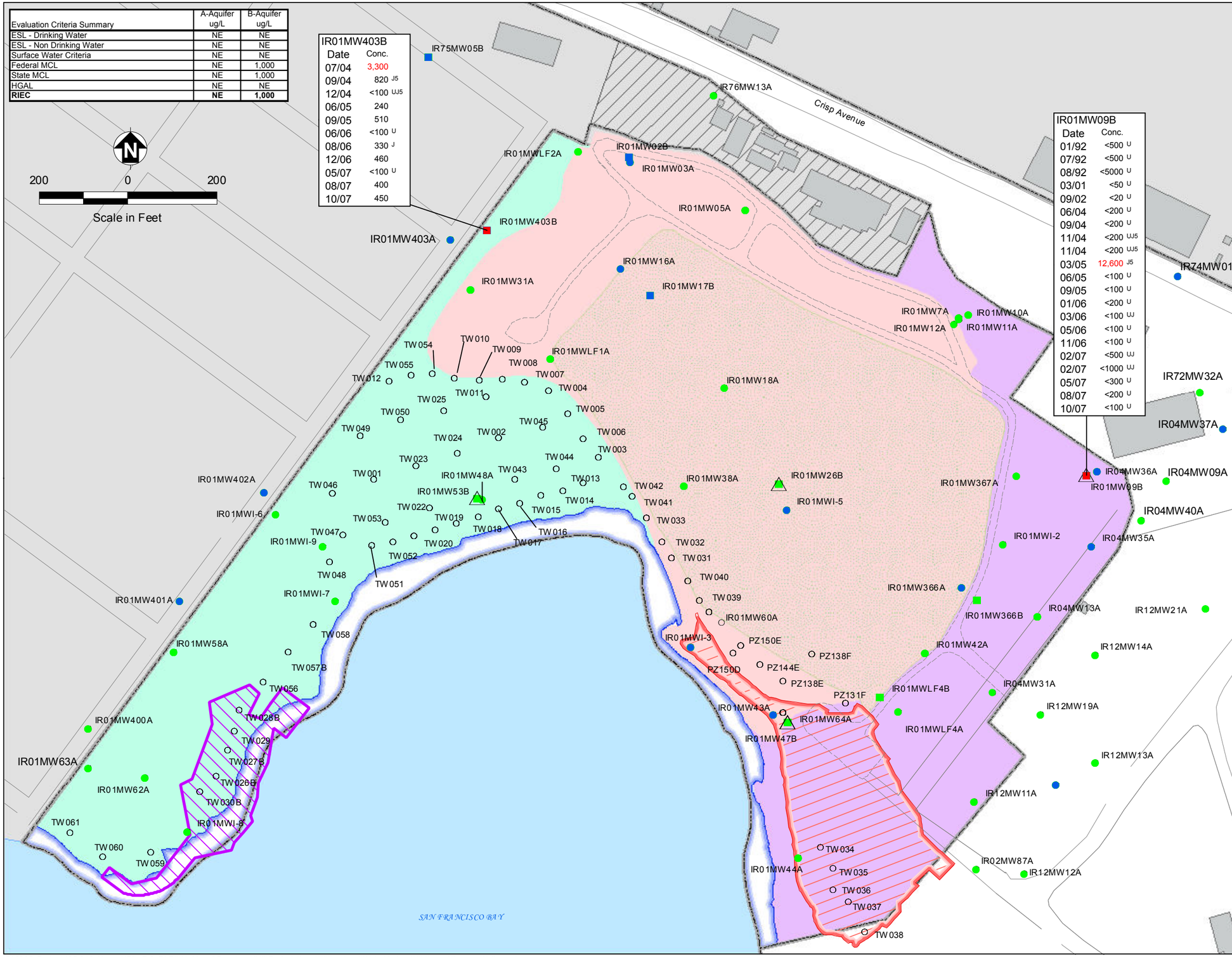
FIGURE 5-3

NITRATE AS NITROGEN IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Anions\Nitrate as Nitrogen-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	NE
ESL - Non Drinking Water	NE	NE
Surface Water Criteria	NE	NE
Federal MCL	NE	1,000
State MCL	NE	1,000
HGAL	NE	NE
RIEC	**NE**	**1,000**



- Reporting Limit Exceeds RIEC (for at least one sample)
- A-aquifer Well
- B-aquifer Well
- Not Analyzed for Analyte
- Analyte Not Detected
- Analyte Exceeds Reporting Limit
- Analyte Exceeds Criterion
- Road
- Gravel Road
- Metal Slag Area (2007 excavation limit)[a]
- PCB Hot Spot Area (2007 excavation limit)[a]
- Limit of Landfill Cap
- Parcel Boundary
- Building
- UCSF Compound
- Landfill Area
- Adjacent Area
- Panhandle Area
- Shoreline Area
- San Francisco Bay
- Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J
Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

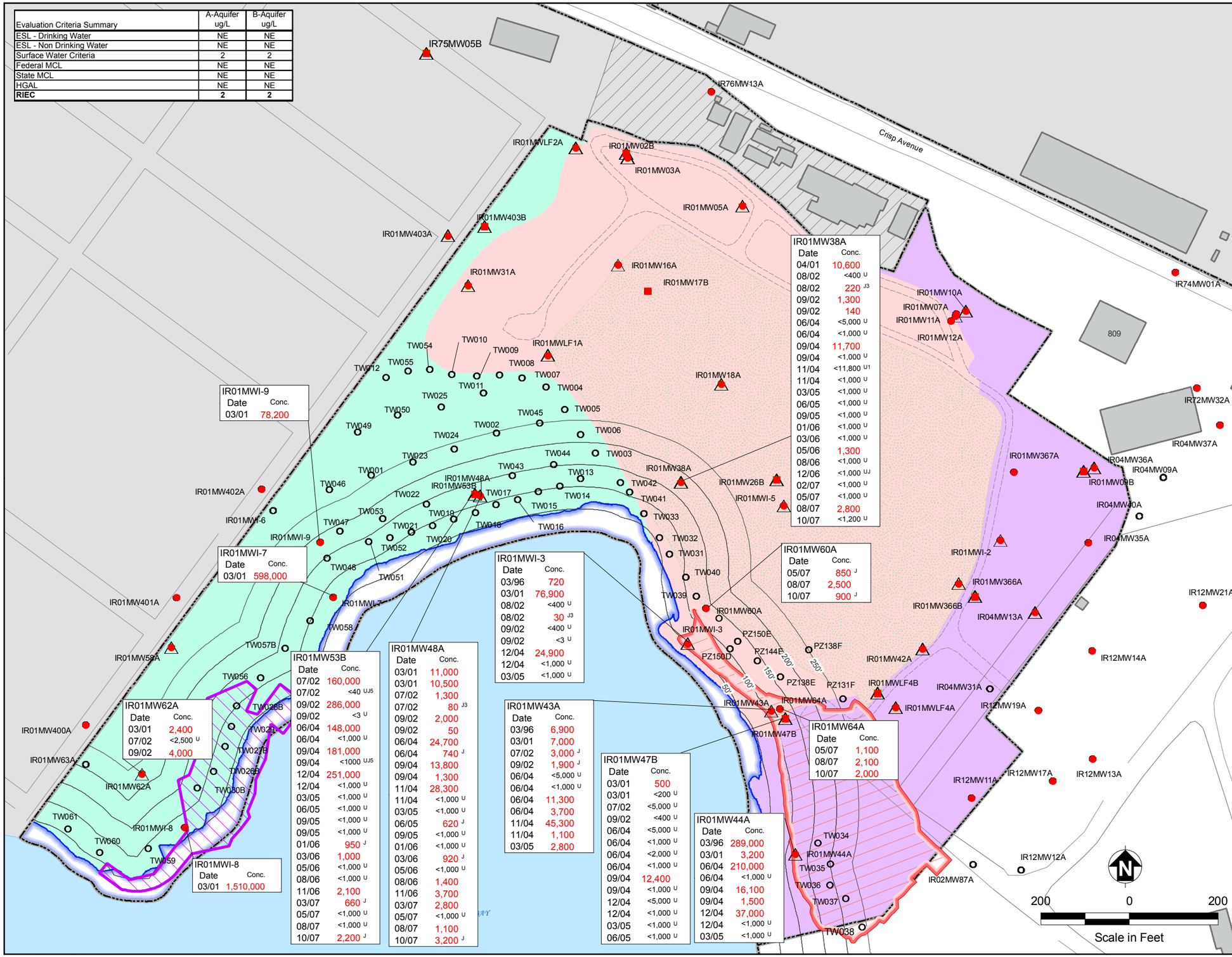
FIGURE 5-4

NITRITE AS NITROGEN IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Anions\Nitrite as Nitrogen-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	NE
ESL - Non Drinking Water	NE	NE
Surface Water Criteria	2	2
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	NE	NE
RIEC	**2**	**2**



Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property
Distance from Shoreline (in feet)

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J

Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

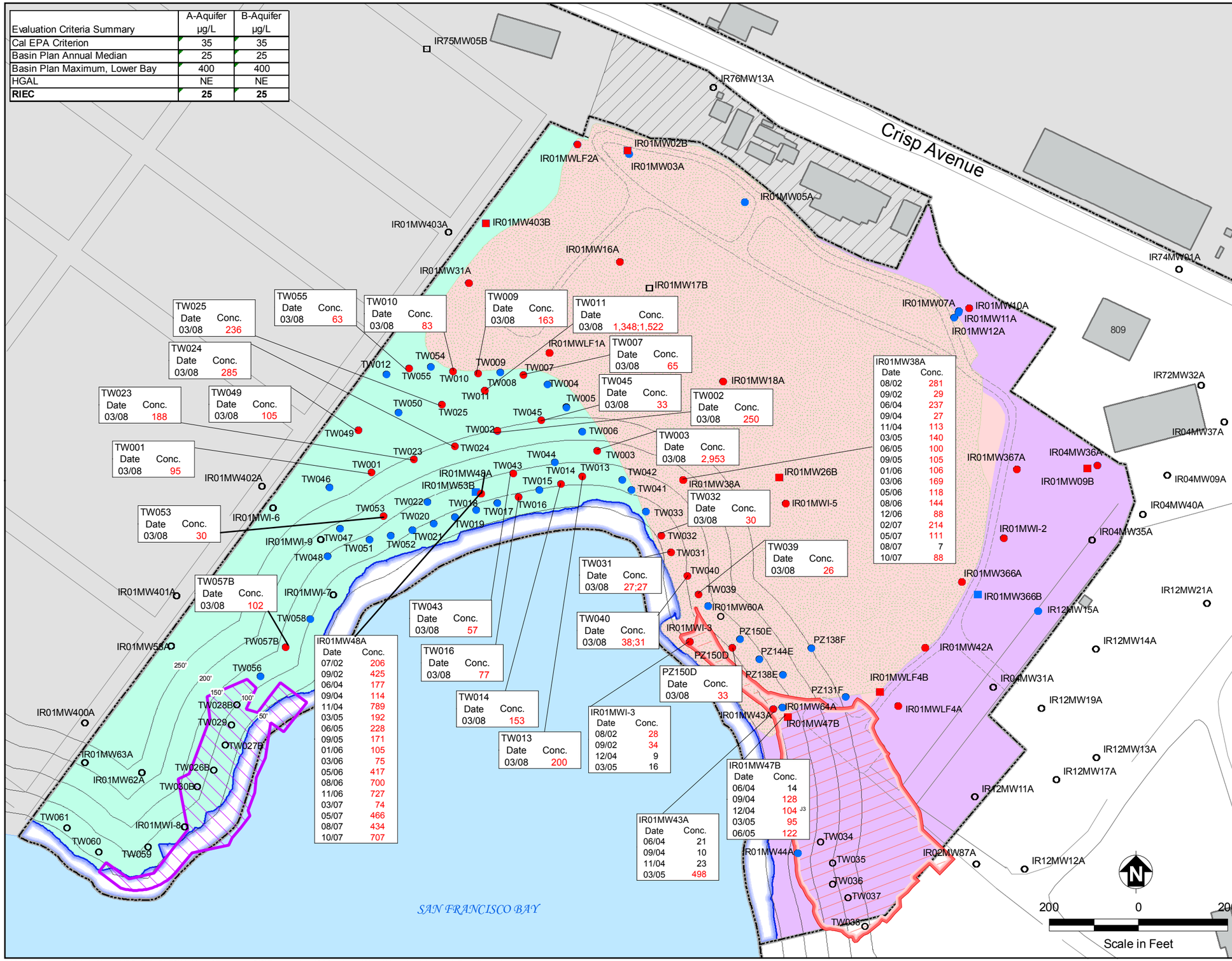
FIGURE 5-5

SULFIDE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Anions\Sulfide_Wells.mxd

Evaluation Criteria Summary	A-Aquifer µg/L	B-Aquifer µg/L
Cal EPA Criterion	35	35
Basin Plan Annual Median	25	25
Basin Plan Maximum, Lower Bay	400	400
HGAL	NE	NE
RIEC	**25**	**25**



Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property
-50'- Distance from Shoreline (in feet)

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
EPA = Environmental Protection Agency
HGAL = Hunters Point groundwater ambient level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
UCSF = University of California, San Francisco
µg/L = microgram per liter

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J
Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

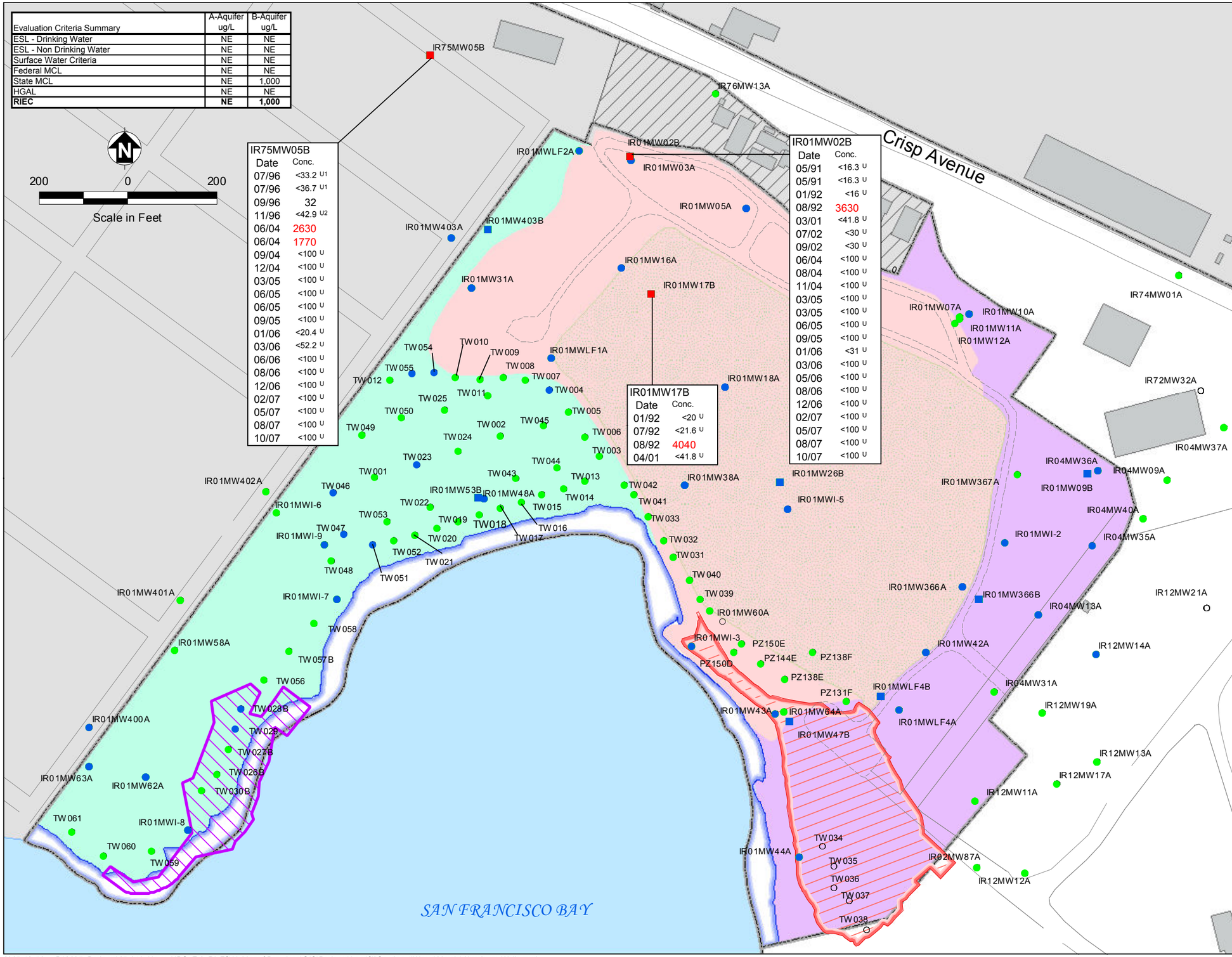
FIGURE 5-6

UN-IONIZED AMMONIA IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Unionized AmmoniaTI-wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	NE
ESL - Non Drinking Water	NE	NE
Surface Water Criteria	NE	NE
Federal MCL	NE	NE
State MCL	NE	1,000
HGAL	NE	NE
RIEC	**NE**	**1,000**



IR75MW05B Date	Conc.
07/96	<33.2 U1
07/96	<36.7 U1
09/96	32
11/96	<42.9 U2
06/04	2630
06/04	1770
09/04	<100 U
12/04	<100 U
03/05	<100 U
06/05	<100 U
06/05	<100 U
09/05	<100 U
01/06	<20.4 U
03/06	<52.2 U
06/06	<100 U
08/06	<100 U
12/06	<100 U
02/07	<100 U
05/07	<100 U
08/07	<100 U
10/07	<100 U

IR01MW17B Date	Conc.
01/92	<20 U
07/92	<21.6 U
08/92	4040
04/01	<41.8 U

IR01MW02B Date	Conc.
05/91	<16.3 U
05/91	<16.3 U
01/92	<16 U
08/92	3630
03/01	<41.8 U
07/02	<30 U
09/02	<30 U
06/04	<100 U
08/04	<100 U
11/04	<100 U
03/05	<100 U
03/05	<100 U
06/05	<100 U
09/05	<100 U
01/06	<31 U
03/06	<100 U
05/06	<100 U
08/06	<100 U
12/06	<100 U
02/07	<100 U
05/07	<100 U
08/07	<100 U
10/07	<100 U

- Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
- A-aquifer Well
- B-aquifer Well
- Not Analyzed for Analyte
- Analyte Not Detected
- Analyte Exceeds Reporting Limit
- Analyte Exceeds Criterion
- Road
- Gravel Road
- Metal Slag Area (2007 excavation limit)[a]
- PCB Hot Spot Area (2007 excavation limit)[a]
- Limit of Landfill Cap
- Parcel Boundary
- Building
- UCSF Compound
- Landfill Area
- East Adjacent Area
- Panhandle Area
- Shoreline Area
- San Francisco Bay
- Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Sample Date (mm/yy) → Date / Conc.
05/07 527
08/07 646
10/07 633 J
← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California

U.S. Department of the Navy, BRAC PMO West, San Diego, California

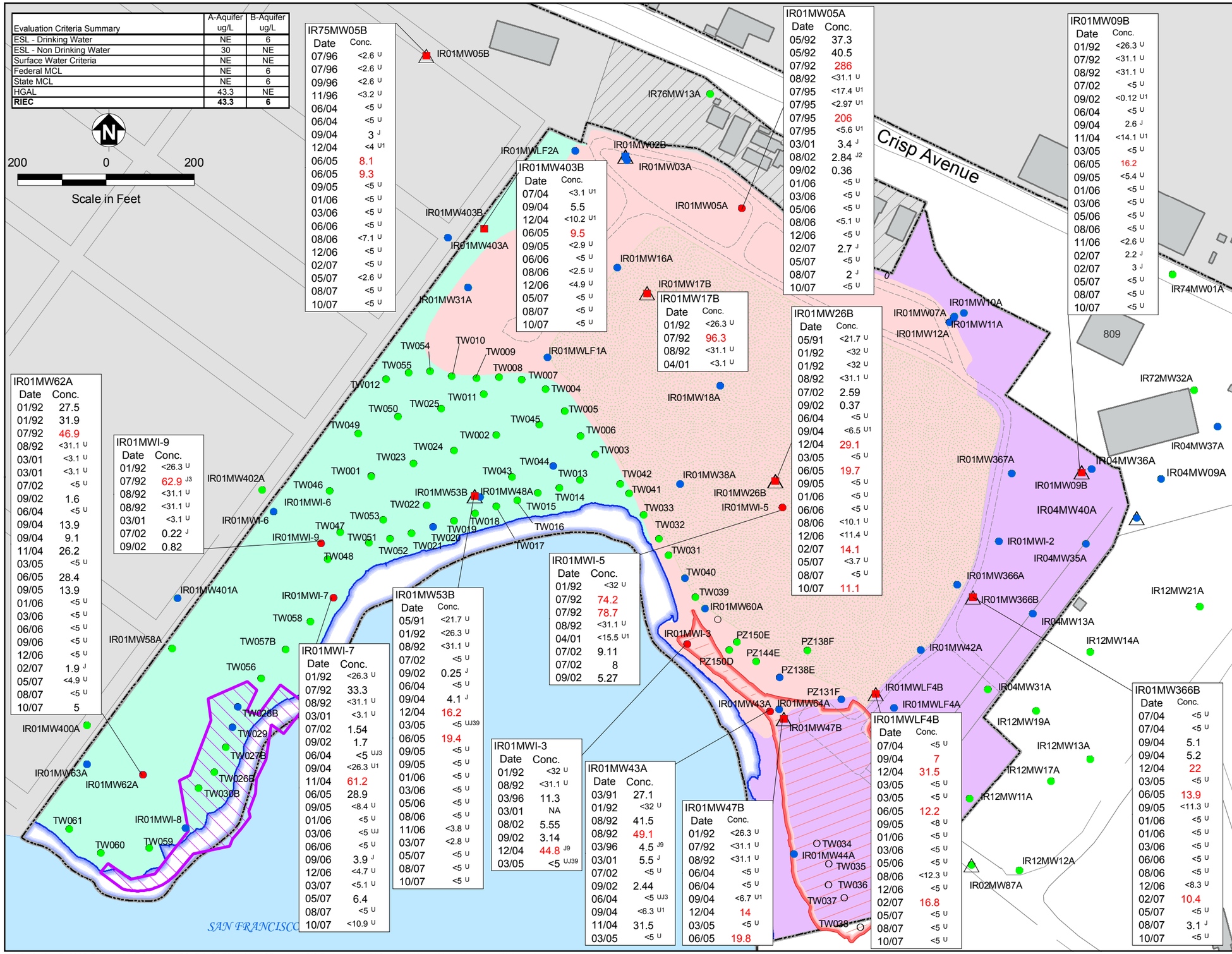
FIGURE 5-7

ALUMINUM IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

2005-12-16 P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Metals\Aluminum-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	6
ESL - Non Drinking Water	30	NE
Surface Water Criteria	NE	NE
Federal MCL	NE	6
State MCL	NE	6
HGAL	43.3	NE
RIEC	**43.3**	**6**



IR01MW05A

Date	Conc.
05/92	37.3
05/92	40.5
07/92	286
08/92	<31.1 U
07/95	<17.4 U1
07/95	<2.97 U1
07/95	206
07/95	<5.6 U1
03/01	3.4 J
08/02	2.84 J2
09/02	0.36
01/06	<5 U
03/06	<5 U
05/06	<5 U
08/06	<5.1 U
12/06	<5 U
02/07	2.7 J
05/07	<5 U
08/07	2 J
10/07	<5 U

IR01MW09B

Date	Conc.
01/92	<26.3 U
07/92	<31.1 U
08/92	<31.1 U
07/02	<5 U
09/02	<0.12 U1
06/04	<5 U
09/04	2.6 J
11/04	<14.1 U1
03/05	<5 U
06/05	16.2
09/05	<5.4 U
01/06	<5 U
03/06	<5 U
05/06	<5 U
08/06	<5 U
11/06	<2.6 U
02/07	2.2 J
02/07	3 J
05/07	<5 U
08/07	<5 U
10/07	<5 U

IR75MW05B

Date	Conc.
07/96	<2.6 U
07/96	<2.6 U
09/96	<2.6 U
11/96	<3.2 U
06/04	<5 U
06/04	<5 U
09/04	3 J
12/04	<4 U1
06/05	8.1
06/05	9.3
09/05	<5 U
01/06	<5 U
03/06	<5 U
06/06	<5 U
08/06	<7.1 U
12/06	<5 U
02/07	<5 U
05/07	<2.6 U
08/07	<5 U
10/07	<5 U

IR01MW403B

Date	Conc.
07/04	<3.1 U1
09/04	5.5
12/04	<10.2 U1
06/05	9.5
09/05	<2.9 U
06/06	<5 U
08/06	<2.5 U
12/06	<4.9 U
05/07	<5 U
08/07	<5 U
10/07	<5 U

IR01MW17B

Date	Conc.
01/92	<26.3 U
07/92	96.3
08/92	<31.1 U
04/01	<3.1 U

IR01MW26B

Date	Conc.
05/91	<21.7 U
01/92	<32 U
01/92	<32 U
08/92	<31.1 U
07/02	2.59
09/02	0.37
06/04	<5 U
09/04	<6.5 U1
12/04	29.1
03/05	<5 U
06/05	19.7
09/05	<5 U
01/06	<5 U
06/06	<5 U
08/06	<10.1 U
12/06	<11.4 U
02/07	14.1
05/07	<3.7 U
08/07	<5 U
10/07	11.1

IR01MW62A

Date	Conc.
01/92	27.5
01/92	31.9
07/92	46.9
08/92	<31.1 U
03/01	<3.1 U
03/01	<3.1 U
07/02	<5 U
09/02	1.6
06/04	<5 U
09/04	13.9
09/04	9.1
11/04	26.2
03/05	<5 U
06/05	28.4
09/05	13.9
01/06	<5 U
03/06	<5 U
06/06	<5 U
09/06	<5 U
12/06	<5 U
02/07	1.9 J
05/07	<4.9 U
08/07	<5 U
10/07	5

IR01MWI-9

Date	Conc.
01/92	<26.3 U
07/92	62.9 J3
08/92	<31.1 U
08/92	<31.1 U
03/01	<3.1 U
07/02	0.22 J
09/02	0.82

IR01MWI-5

Date	Conc.
01/92	<32 U
07/92	74.2
07/92	78.7
08/92	<31.1 U
04/01	<15.5 U1
07/02	9.11
07/02	8
09/02	5.27

IR01MW53B

Date	Conc.
05/91	<21.7 U
01/92	<26.3 U
08/92	<31.1 U
07/02	<5 U
09/02	0.25 J
06/04	<5 U
09/04	4.1 J
12/04	16.2
03/05	<5 UJ39
06/05	19.4
09/05	<5 U
09/05	<5 U
01/06	<5 U
03/06	<5 U
05/06	<5 U
08/06	<5 U
11/06	<3.8 U
03/07	<2.8 U
05/07	<5 U
08/07	<5 U
10/07	<5 U

IR01MWI-7

Date	Conc.
01/92	<26.3 U
07/92	33.3
08/92	<31.1 U
03/01	<3.1 U
07/02	1.54
09/02	1.7
06/04	<5 UJ3
09/04	<26.3 U1
11/04	61.2
06/05	28.9
09/05	<8.4 U
01/06	<5 U
03/06	<5 UJ
06/06	<5 U
09/06	3.9 J
12/06	<4.7 U
03/07	<5.1 U
05/07	6.4
08/07	<5 U
10/07	<10.9 U

IR01MWI-3

Date	Conc.
01/92	<32 U
08/92	<31.1 U
03/96	11.3
03/01	NA
08/02	5.55
09/02	3.14
12/04	44.8 J9
03/05	<5 UJ39

IR01MW43A

Date	Conc.
03/91	27.1
01/92	<32 U
08/92	41.5
08/92	49.1
03/96	4.5 J9
03/01	5.5 J
07/02	<5 U
09/02	2.44
06/04	<5 UJ3
09/04	<6.3 U1
11/04	31.5
03/05	<5 U

IR01MW47B

Date	Conc.
01/92	<26.3 U
07/92	<31.1 U
08/92	<31.1 U
06/04	<5 U
06/04	<5 U
09/04	<6.7 U1
12/04	14
03/05	<5 U
06/05	19.8

IR01MWLF4B

Date	Conc.
07/04	<5 U
09/04	7
12/04	31.5
03/05	<5 U
03/05	<5 U
06/05	12.2
09/05	<8 U
01/06	<5 U
03/06	<5 U
05/06	<5 U
08/06	<12.3 U
12/06	<5 U
02/07	16.8
05/07	<5 U
08/07	<5 U
10/07	<5 U

IR01MW366B

Date	Conc.
07/04	<5 U
07/04	<5 U
09/04	5.1
09/04	5.2
12/04	22
03/05	<5 U
06/05	13.9
09/05	<11.3 U
01/06	<5 U
01/06	<5 U
03/06	<5 U
06/06	<5 U
08/06	<5 U
12/06	<8.3 U
02/07	10.4
05/07	<5 U
08/07	3.1 J
10/07	<5 U

Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A

Date	Conc.
05/07	527
08/07	646
10/07	633 J

Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California

U.S. Department of the Navy, BRAC PMO West, San Diego, California

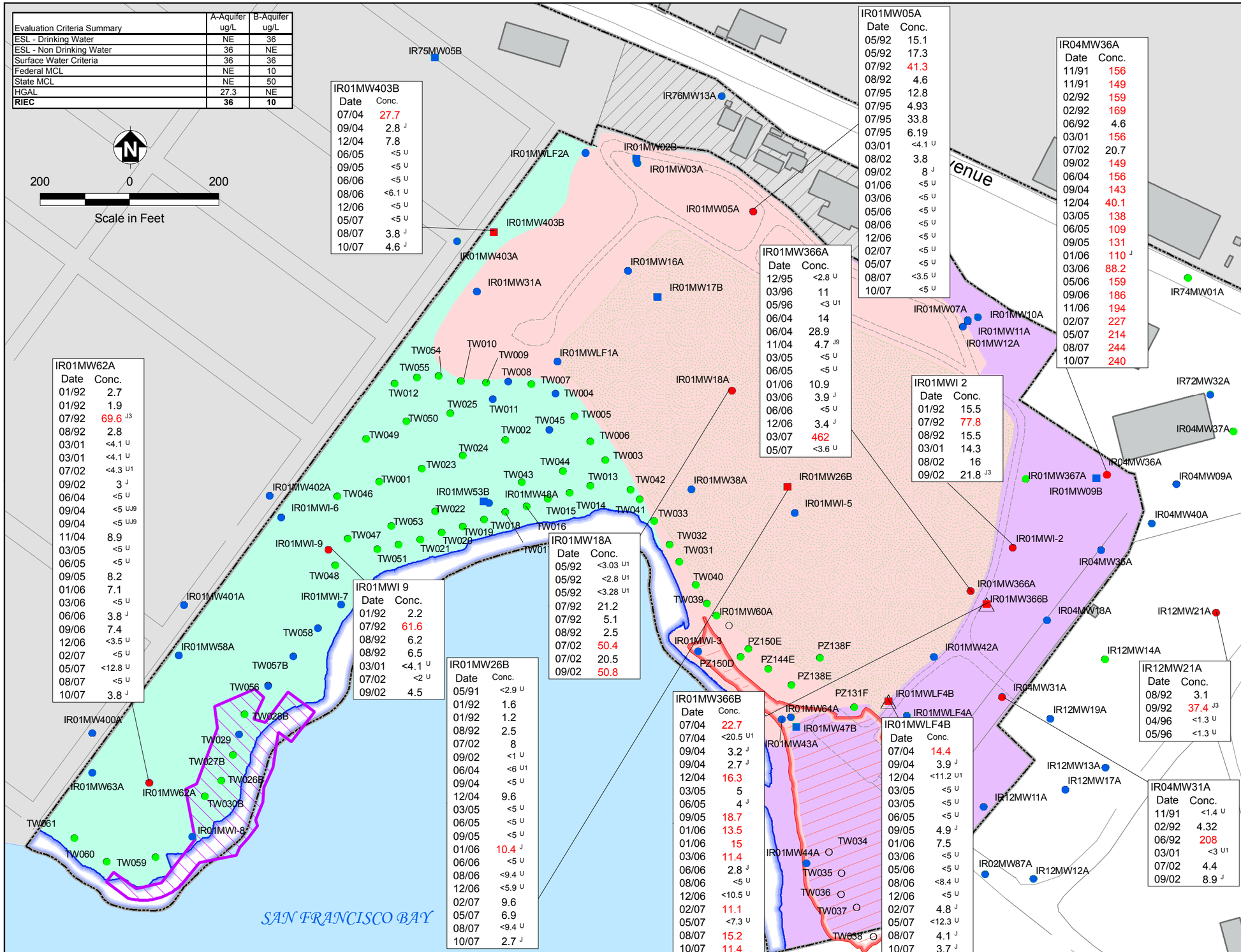
FIGURE 5-8

ANTIMONY IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

2005-12-16 P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Metals\Antimony-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	36
ESL - Non Drinking Water	36	NE
Surface Water Criteria	36	36
Federal MCL	NE	10
State MCL	NE	50
HGAL	27.3	NE
RIEC	**36**	**10**



IR01MW403B Date	Conc.
07/04	27.7
09/04	2.8 J
12/04	7.8
06/05	<5 U
09/05	<5 U
06/06	<5 U
08/06	<6.1 U
12/06	<5 U
05/07	<5 U
08/07	3.8 J
10/07	4.6 J

IR01MW05A Date	Conc.
05/92	15.1
05/92	17.3
07/92	41.3
08/92	4.6
07/95	12.8
07/95	4.93
07/95	33.8
07/95	6.19
03/01	<4.1 U
08/02	3.8
09/02	8 J
01/06	<5 U
03/06	<5 U
05/06	<5 U
08/06	<5 U
12/06	<5 U
02/07	<5 U
05/07	<5 U
08/07	<3.5 U
10/07	<5 U

IR04MW36A Date	Conc.
11/91	156
11/91	149
02/92	159
02/92	169
06/92	4.6
03/01	156
07/02	20.7
09/02	149
06/04	156
09/04	143
12/04	40.1
03/05	138
06/05	109
09/05	131
01/06	110 J
03/06	88.2
05/06	159
09/06	186
11/06	194
02/07	227
05/07	214
08/07	244
10/07	240

IR01MW366A Date	Conc.
12/95	<2.8 U
03/96	11
05/96	<3 U1
06/04	14
06/04	28.9
11/04	4.7 J9
03/05	<5 U
06/05	<5 U
01/06	10.9
03/06	3.9 J
06/06	<5 U
12/06	3.4 J
03/07	462
05/07	<3.6 U

IR01MW62A Date	Conc.
01/92	2.7
01/92	1.9
07/92	69.6 J3
08/92	2.8
03/01	<4.1 U
03/01	<4.1 U
07/02	<4.3 U1
09/02	3 J
06/04	<5 U
09/04	<5 UJ9
09/04	<5 UJ9
11/04	8.9
03/05	<5 U
06/05	<5 U
09/05	8.2
01/06	7.1
03/06	<5 U
06/06	3.8 J
09/06	7.4
12/06	<3.5 U
02/07	<5 U
05/07	<12.8 U
08/07	<5 U
10/07	3.8 J

IR01MWI 2 Date	Conc.
01/92	15.5
07/92	77.8
08/92	15.5
03/01	14.3
08/02	16
09/02	21.8 J3

IR01MWI 9 Date	Conc.
01/92	2.2
07/92	61.6
08/92	6.2
08/92	6.5
03/01	<4.1 U
07/02	<2 U
09/02	4.5

IR01MW18A Date	Conc.
05/92	<3.03 U1
05/92	<2.8 U1
05/92	<3.28 U1
07/92	21.2
07/92	5.1
08/92	2.5
07/02	50.4
07/02	20.5
09/02	50.8

IR01MW26B Date	Conc.
05/91	<2.9 U
01/92	1.6
01/92	1.2
08/92	2.5
07/02	8
09/02	<1 U
06/04	<6 U1
09/04	<5 U
12/04	9.6
03/05	<5 U
06/05	<5 U
09/05	<5 U
01/06	10.4 J
06/06	<5 U
08/06	<9.4 U
12/06	<5.9 U
02/07	9.6
05/07	6.9
08/07	<9.4 U
10/07	2.7 J

IR01MW366B Date	Conc.
07/04	22.7
07/04	<20.5 U1
09/04	3.2 J
09/04	2.7 J
12/04	16.3
03/05	5
06/05	4 J
09/05	18.7
01/06	13.5
01/06	15
03/06	11.4
06/06	2.8 J
08/06	<5 U
12/06	<10.5 U
02/07	11.1
05/07	<7.3 U
08/07	15.2
10/07	11.4

IR01MWLF4B Date	Conc.
07/04	14.4
09/04	3.9 J
12/04	<11.2 U1
03/05	<5 U
03/05	<5 U
06/05	<5 U
09/05	4.9 J
01/06	7.5
03/06	<5 U
05/06	<5 U
08/06	<8.4 U
12/06	<5 U
02/07	4.8 J
05/07	<12.3 U
08/07	4.1 J
10/07	3.7 J

IR12MW21A Date	Conc.
08/92	3.1
09/92	37.4 J3
04/96	<1.3 U
05/96	<1.3 U

IR04MW31A Date	Conc.
11/91	<1.4 U
02/92	4.32
06/92	208
03/01	<3 U1
07/02	4.4
09/02	8.9 J

Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Sample Date (mm/yy) → Chemical Concentration (µg/L) and Qualifier

Date	Conc.
05/07	527
08/07	646
10/07	633 J

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

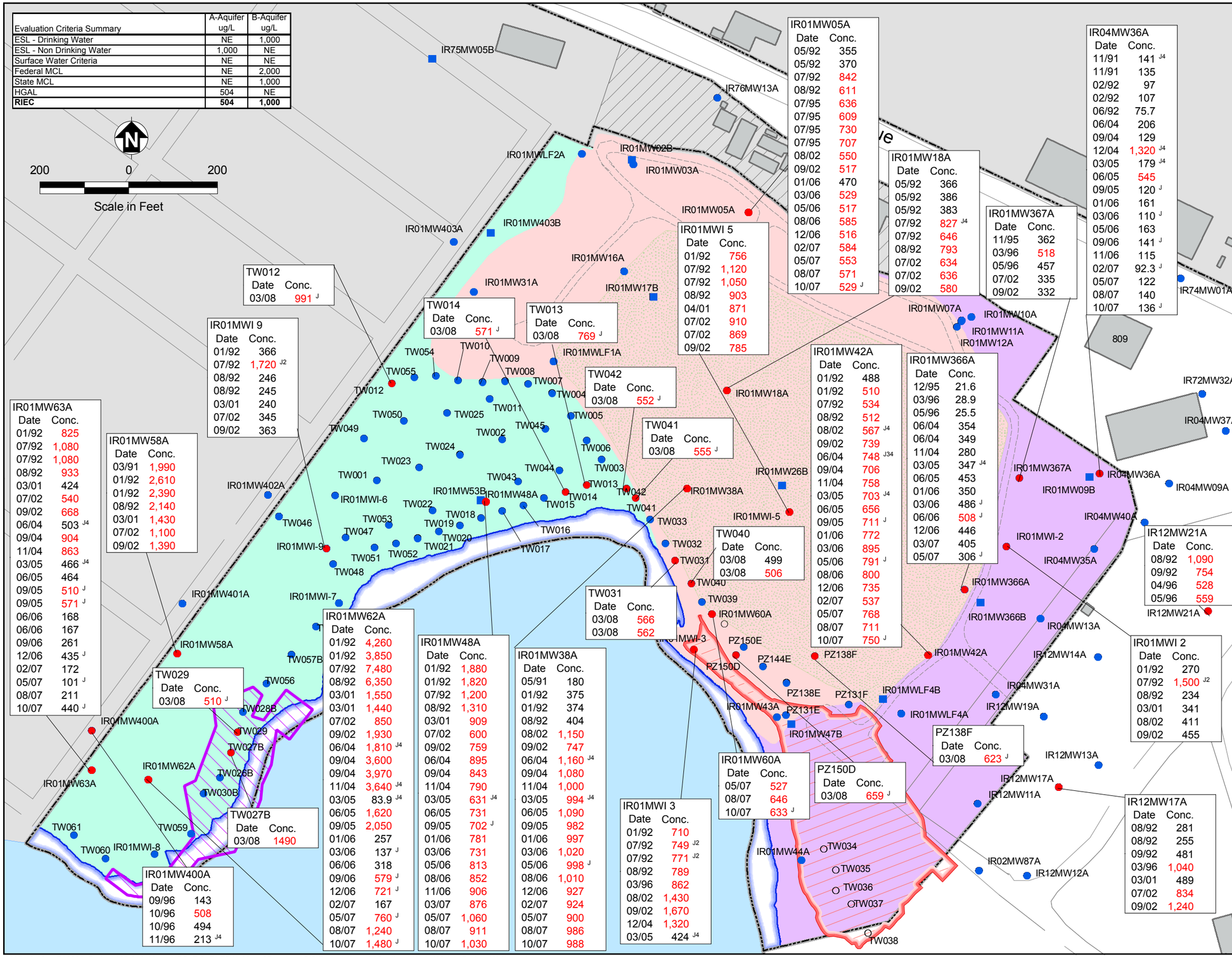
FIGURE 5-9

ARSENIC IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

2005-12-16 P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Metals\Arsenic-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	1,000
ESL - Non Drinking Water	1,000	NE
Surface Water Criteria	NE	NE
Federal MCL	NE	2,000
State MCL	NE	1,000
HGAL	504	NE
RIEC	**504**	**1,000**



IR01MW05A Date	Conc.
05/92	355
05/92	370
07/92	842
08/92	611
07/95	636
07/95	609
07/95	730
07/95	707
08/02	550
09/02	517
01/06	470
03/06	529
05/06	517
08/06	585
12/06	516
02/07	584
05/07	553
08/07	571
10/07	529 J

IR01MWI 5 Date	Conc.
01/92	756
07/92	1,120
07/92	1,050
08/92	903
04/01	871
07/02	910
07/02	869
09/02	785

IR01MW18A Date	Conc.
05/92	366
05/92	386
05/92	383
07/92	827 J4
07/92	646
08/92	793
07/02	634
07/02	636
09/02	580

IR01MW367A Date	Conc.
11/95	362
03/96	518
05/96	457
07/02	335
09/02	332

IR04MW36A Date	Conc.
11/91	141 J4
11/91	135
02/92	97
02/92	107
06/92	75.7
06/04	206
09/04	129
12/04	1,320 J4
03/05	179 J4
06/05	545
09/05	120 J
01/06	161
03/06	110 J
05/06	163
09/06	141 J
11/06	115
02/07	92.3 J
05/07	122
08/07	140
10/07	136 J

TW012 Date	Conc.
03/08	991 J

TW014 Date	Conc.
03/08	571 J

TW013 Date	Conc.
03/08	769 J

IR01MWI 9 Date	Conc.
01/92	366
07/92	1,720 J2
08/92	246
08/92	245
03/01	240
07/02	345
09/02	363

TW042 Date	Conc.
03/08	552 J

TW041 Date	Conc.
03/08	555 J

IR01MW42A Date	Conc.
01/92	488
01/92	510
07/92	534
08/92	512
08/02	567 J4
09/02	739
06/04	748 J34
09/04	706
11/04	758
03/05	703 J4
06/05	656
09/05	711 J
01/06	772
03/06	895
05/06	791 J
08/06	800
12/06	735
02/07	537
05/07	768
08/07	711
10/07	750 J

IR01MW366A Date	Conc.
12/95	21.6
03/96	28.9
05/96	25.5
06/04	354
06/04	349
11/04	280
03/05	347 J4
06/05	453
01/06	350
03/06	486 J
06/06	508 J
12/06	446
03/07	405
05/07	306 J

IR01MW63A Date	Conc.
01/92	825
07/92	1,080
07/92	1,080
08/92	933
03/01	424
07/02	540
09/02	668
06/04	503 J4
09/04	904
11/04	863
03/05	466 J4
06/05	464
09/05	510 J
09/05	571 J
06/06	168
06/06	167
09/06	261
12/06	435 J
02/07	172
05/07	101 J
08/07	211
10/07	440 J

IR01MW58A Date	Conc.
03/91	1,990
01/92	2,610
01/92	2,390
08/92	2,140
03/01	1,430
07/02	1,100
09/02	1,390

TW031 Date	Conc.
03/08	566
03/08	562

TW040 Date	Conc.
03/08	499
03/08	506

TW029 Date	Conc.
03/08	510 J

IR01MW62A Date	Conc.
01/92	4,260
01/92	3,850
07/92	7,480
08/92	6,350
03/01	1,550
03/01	1,440
07/02	850
09/02	1,930
06/04	1,810 J4
09/04	3,600
09/04	3,970
11/04	3,640 J4
03/05	83.9 J4
06/05	1,620
09/05	2,050
01/06	257
03/06	137 J
06/06	318
09/06	579 J
12/06	721 J
02/07	167
05/07	760 J
08/07	1,240
10/07	1,480 J

IR01MW48A Date	Conc.
01/92	1,880
01/92	1,820
07/92	1,200
08/92	1,310
03/01	909
07/02	600
09/02	759
06/04	895
09/04	843
11/04	790
03/05	631 J4
06/05	731
09/05	702 J
01/06	781
03/06	731
05/06	813
08/06	852
11/06	906
03/07	876
05/07	1,060
08/07	911
10/07	1,030

IR01MW38A Date	Conc.
05/91	180
01/92	375
01/92	374
08/92	404
08/02	1,150
09/02	747
06/04	1,160 J4
09/04	1,080
11/04	1,000
03/05	994 J4
06/05	1,090
09/05	982
01/06	997
03/06	1,020
05/06	998 J
08/06	1,010
12/06	927
02/07	924
05/07	900
08/07	986
10/07	988

IR01MW60A Date	Conc.
05/07	527
08/07	646
10/07	633 J

PZ150D Date	Conc.
03/08	659 J

PZ138F Date	Conc.
03/08	623 J

IR01MWI 3 Date	Conc.
01/92	710
07/92	749 J2
07/92	771 J2
08/92	789
03/96	862
08/02	1,430
09/02	1,670
12/04	1,320
03/05	424 J4

IR01MW400A Date	Conc.
09/96	143
10/96	508
10/96	494
11/96	213 J4

IR12MW21A Date	Conc.
08/92	1,090
09/92	754
04/96	528
05/96	559

IR01MWI 2 Date	Conc.
01/92	270
07/92	1,500 J2
08/92	234
03/01	341
08/02	411
09/02	455

IR12MW17A Date	Conc.
08/92	281
08/92	255
09/92	481
03/96	1,040
03/01	489
07/02	834
09/02	1,240

- Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
- A-aquifer Well
- B-aquifer Well
- Not Analyzed for Analyte
- Analyte Not Detected
- Analyte Exceeds Reporting Limit
- Analyte Exceeds Criterion
- Road
- Gravel Road
- Metal Slag Area (2007 excavation limit)[a]
- PCB Hot Spot Area (2007 excavation limit)[a]
- Limit of Landfill Cap
- Parcel Boundary
- Building
- UCSF Compound
- Landfill Area
- East Adjacent Area
- Panhandle Area
- Shoreline Area
- San Francisco Bay
- Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
UCSF = University of California, San Francisco
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Sample Date (mm/yy) → Date / Conc.
05/07 527
08/07 646
10/07 633 J ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

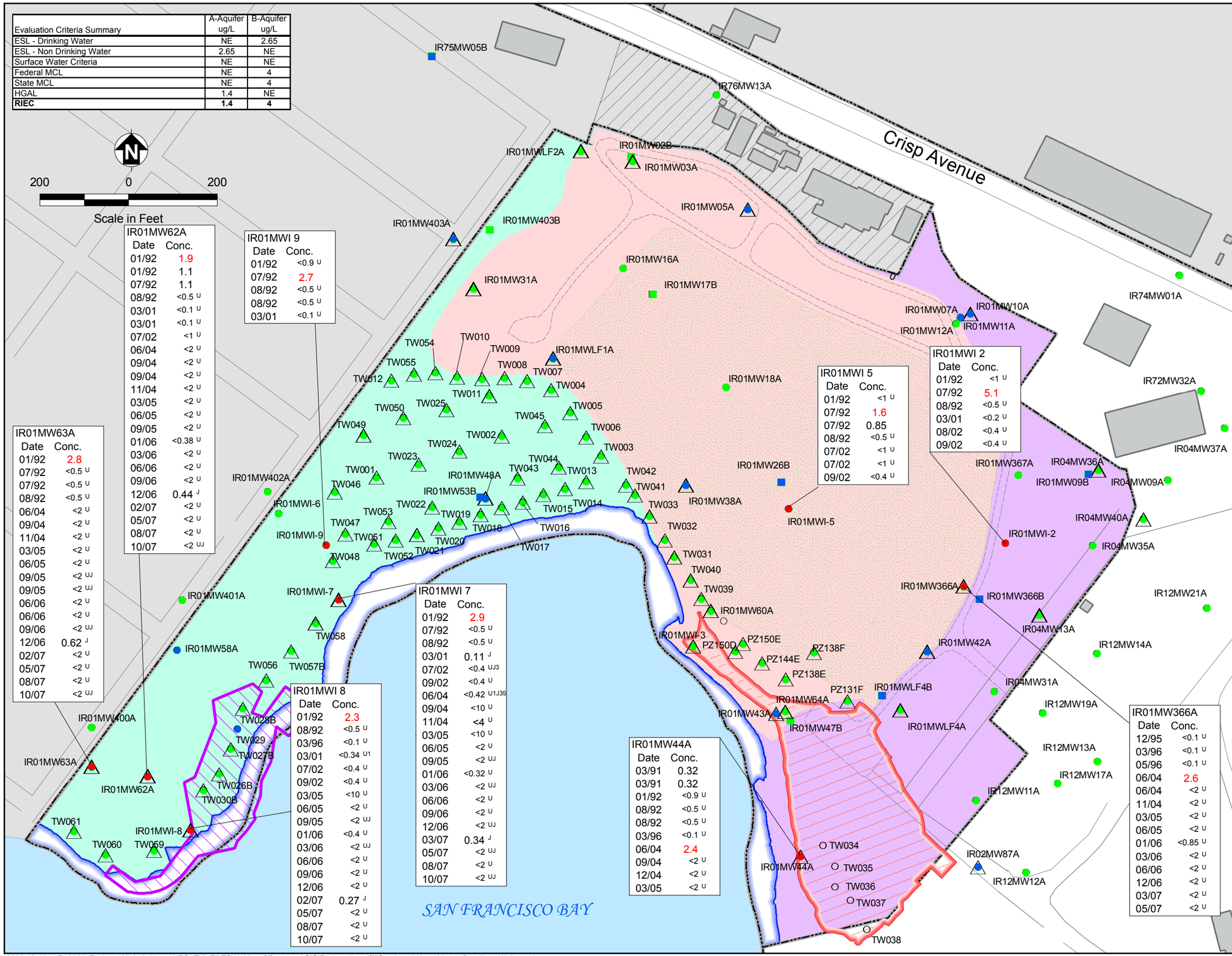
FIGURE 5-10

BARIUM IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

2005-12-16 P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Metals\Barium-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	2.65
ESL - Non Drinking Water	2.65	NE
Surface Water Criteria	NE	NE
Federal MCL	NE	4
State MCL	NE	4
HGAL	1.4	NE
RIEC	**1.4**	**4**



- Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
- A-aquifer Well
- B-aquifer Well
- Not Analyzed for Analyte
- Analyte Not Detected
- Analyte Exceeds Reporting Limit
- Analyte Exceeds Criterion
- Road
- Gravel Road
- Metal Slag Area (2007 excavation limit)[a]
- PCB Hot Spot Area (2007 excavation limit)[a]
- Limit of Landfill Cap
- Parcel Boundary
- Building
- UCSF Compound
- Landfill Area
- East Adjacent Area
- Panhandle Area
- Shoreline Area
- San Francisco Bay
- Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Sample Date (mm/yy) → Date Conc.
05/07 527
08/07 646
10/07 633 J ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 5-11

BERYLLIUM IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

2005-12-16 P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Metals\Beryllium-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	1.1
ESL - Non Drinking Water	1.1	NE
Surface Water Criteria	8.8	8.8
Federal MCL	NE	5
State MCL	NE	5
HGAL	5.08	NE
RIEC	**8.8**	**5**

200 0 200
Scale in Feet

IR01MW62A

Date	Conc.
01/92	<2.8 U
01/92	<2.8 U
07/92	11.1
08/92	<2.7 U
03/01	<0.2 U
03/01	<0.2 U
07/02	<2 U
09/02	<1.22 U1
06/04	<5 U
09/04	<5 U
09/04	<5 U
11/04	<5 U
03/05	<5 UJ3
06/05	<5 U
09/05	<5 U
01/06	<5 U
03/06	<5 U
06/06	<5 U
09/06	<5 U
12/06	<5 U
02/07	<5 U
05/07	<5 U
08/07	<5 U
10/07	<5 UJ

IR01MW17B

Date	Conc.
01/92	<2.8 U
07/92	7.6
08/92	<2.7 U
04/01	<0.2 U

IR01MW05A

Date	Conc.
05/92	<1.7 U
05/92	<1.7 U
07/92	20.2
08/92	<2.7 U
07/95	<0.2 U
07/95	<0.2 U
07/95	6.07
07/95	<0.2 U
03/01	<0.74 U1
08/02	1.2 J
09/02	0.6 J
01/06	<5 U
03/06	<5 U
05/06	<5 U
08/06	<5 U
12/06	<5 U
02/07	<5 U
05/07	<5 U
08/07	<5 U
10/07	<5 U

IR04MW40A

Date	Conc.
11/91	<11.6 U
11/91	13
02/92	<1.8 U
06/92	<2.7 U
03/01	<0.36 U1
07/02	2.57
09/02	<0.5 U

IR01MW366A

Date	Conc.
12/95	<0.2 U
03/96	6.3
05/96	<4.1 U1
03/01	48.4
06/04	11.4
06/04	9.6
11/04	<5 U
03/05	<5 U
06/05	<5 U
01/06	<5 U
03/06	<5 U
06/06	<5 UJ
12/06	<5 U
03/07	1.4 J
05/07	<5 U

IR01MW53B

Date	Conc.
05/91	<2.7 U
01/92	<2.8 U
08/92	8
03/01	<0.2 U
07/02	<2 U
09/02	0.4 J1
06/04	<5 U
09/04	<5 U
12/04	<5 U
03/05	<5 UJ9
06/05	<5 U
09/05	<5 U
09/05	<5 U
01/06	<5 U
03/06	<5 U
05/06	<5 U
08/06	<5 U
11/06	<5 U
03/07	<5 U
05/07	<5 U
08/07	<5 U
10/07	<5 U

PZ131F

Date	Conc.
03/08	11.7

Crisp Avenue

SAN FRANCISCO BAY

Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J
Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

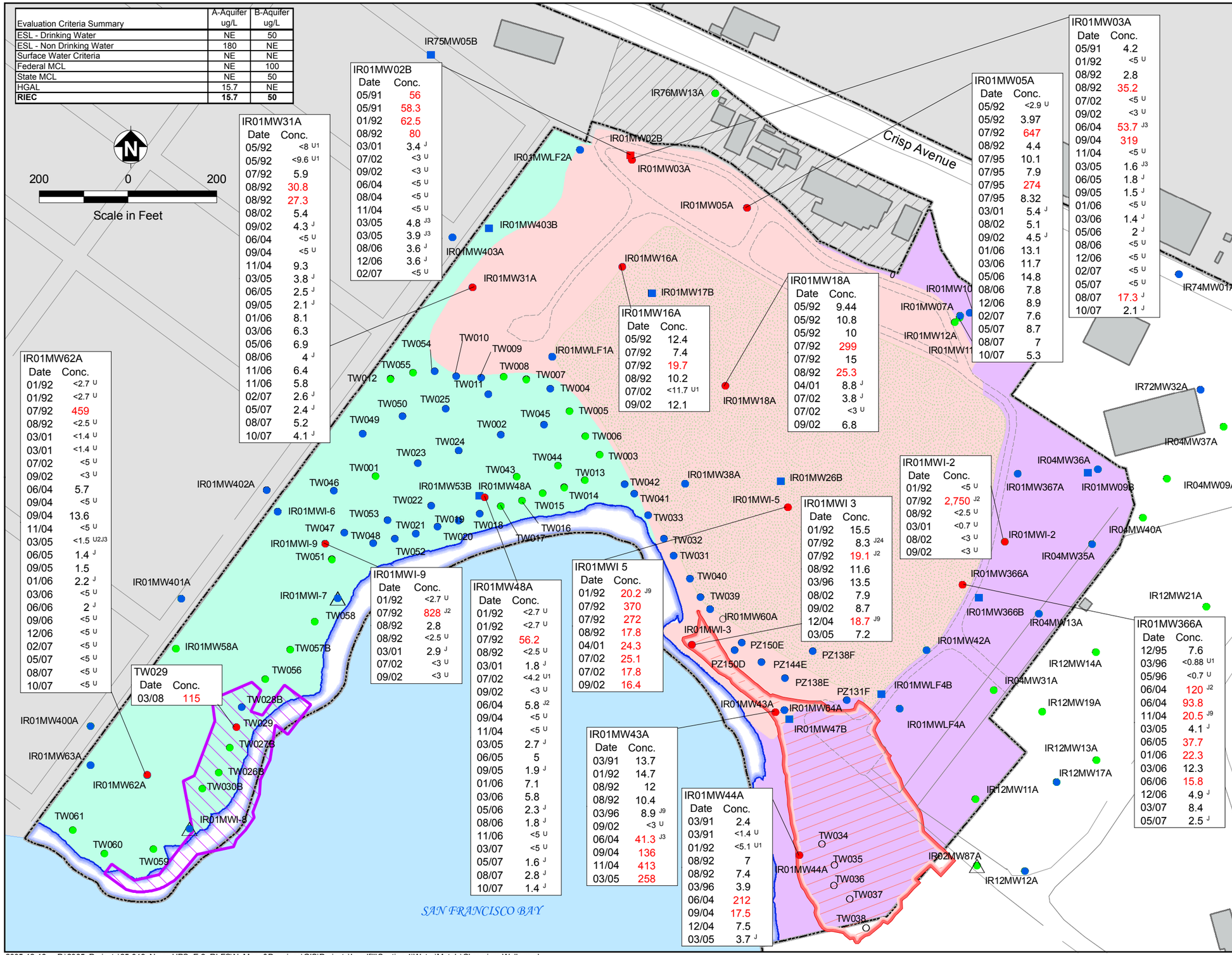
FIGURE 5-12

CADMIUM IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

2005-12-16 P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Metals\Cadmium-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	50
ESL - Non Drinking Water	180	NE
Surface Water Criteria	NE	NE
Federal MCL	NE	100
State MCL	NE	50
HGAL	15.7	NE
RIEC	**15.7**	**50**



Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J ← Chemical Concentration (µg/L) and Qualifier
Sample Date (mm/yy) →

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

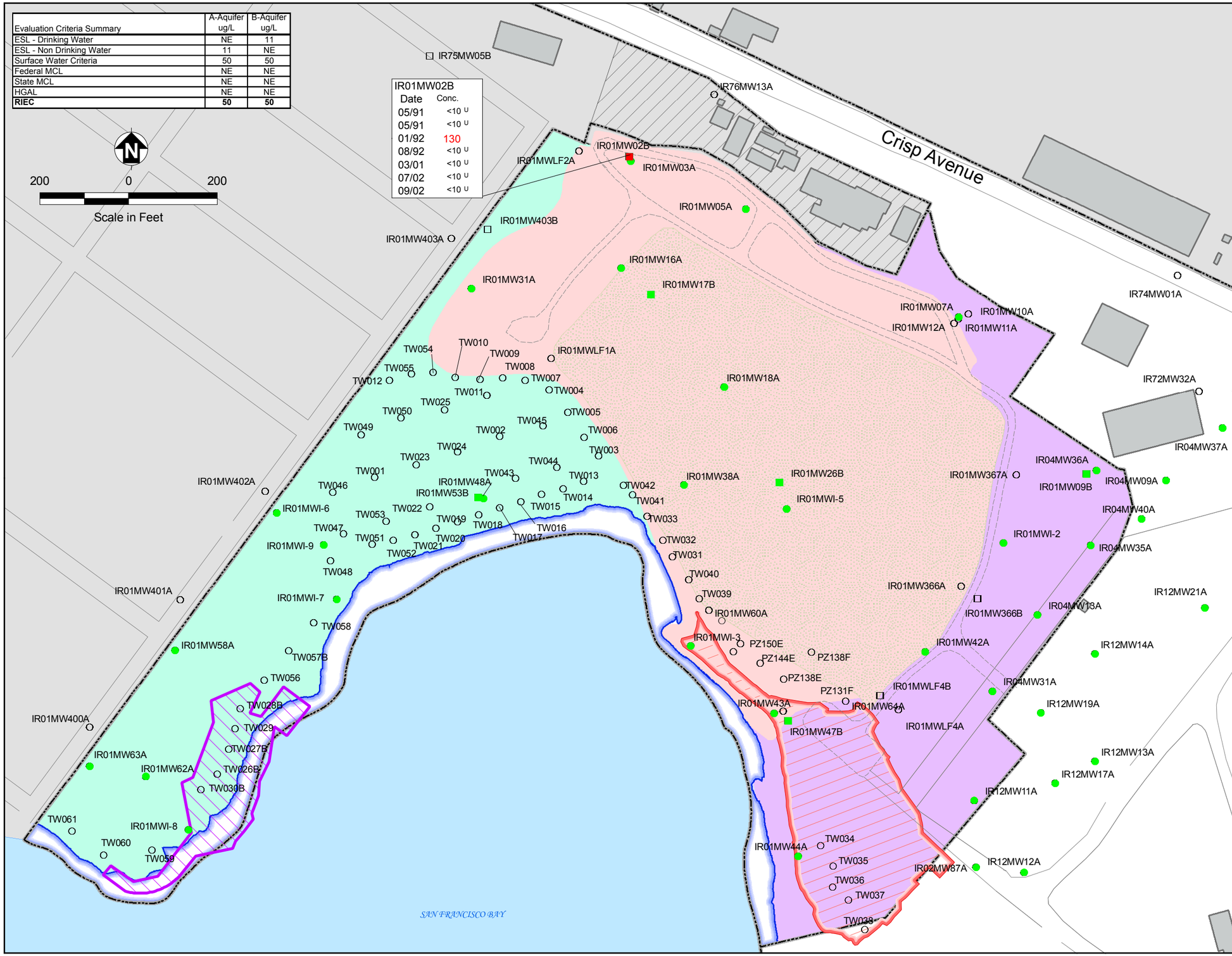
FIGURE 5-13

CHROMIUM (TOTAL) IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

2005-12-16 P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Metals\Chromium-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	11
ESL - Non Drinking Water	11	NE
Surface Water Criteria	50	50
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	NE	NE
RIEC	**50**	**50**



Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
µg/L = microgram per liter

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J

Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

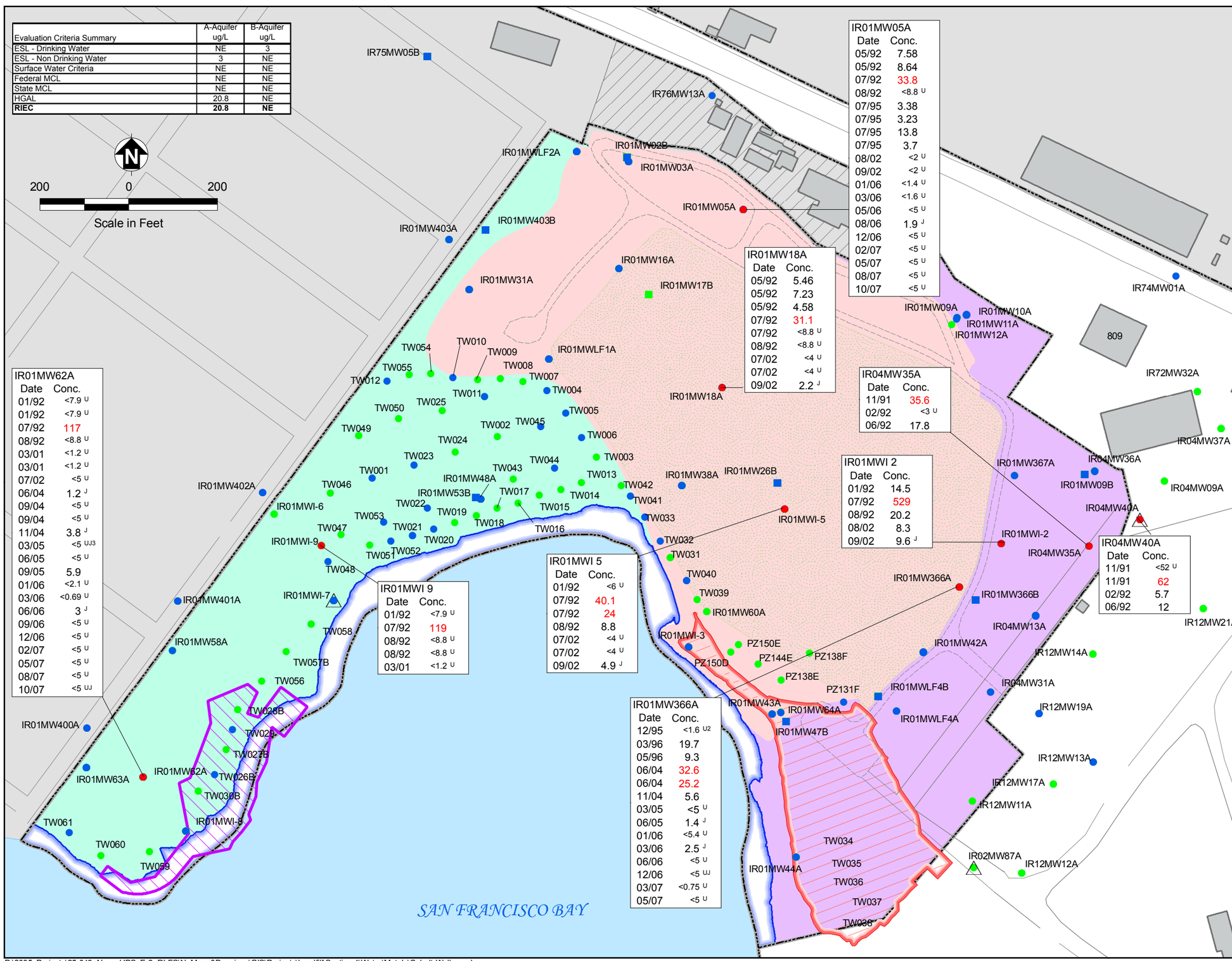
FIGURE 5-14

CHROMIUM VI IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Metals\Chromium VI-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	3
ESL - Non Drinking Water	3	NE
Surface Water Criteria	NE	NE
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	20.8	NE
RIEC	**20.8**	**NE**



IR01MW05A

Date	Conc.
05/92	7.58
05/92	8.64
07/92	33.8
08/92	<8.8 U
07/95	3.38
07/95	3.23
07/95	13.8
07/95	3.7
08/02	<2 U
09/02	<2 U
01/06	<1.4 U
03/06	<1.6 U
05/06	<5 U
08/06	1.9 J
12/06	<5 U
02/07	<5 U
05/07	<5 U
08/07	<5 U
10/07	<5 U

IR01MW18A

Date	Conc.
05/92	5.46
05/92	7.23
05/92	4.58
07/92	31.1
07/92	<8.8 U
08/92	<8.8 U
07/02	<4 U
07/02	<4 U
09/02	2.2 J

IR04MW35A

Date	Conc.
11/91	35.6
02/92	<3 U
06/92	17.8

IR01MWI 2

Date	Conc.
01/92	14.5
07/92	529
08/92	20.2
08/02	8.3
09/02	9.6 J

IR04MW40A

Date	Conc.
11/91	<52 U
11/91	62
02/92	5.7
06/92	12

IR01MW62A

Date	Conc.
01/92	<7.9 U
01/92	<7.9 U
07/92	117
08/92	<8.8 U
03/01	<1.2 U
03/01	<1.2 U
07/02	<5 U
06/04	1.2 J
09/04	<5 U
09/04	<5 U
11/04	3.8 J
03/05	<5 UJ3
06/05	<5 U
09/05	5.9
01/06	<2.1 U
03/06	<0.69 U
06/06	3 J
09/06	<5 U
12/06	<5 U
02/07	<5 U
05/07	<5 U
08/07	<5 U
10/07	<5 UJ

IR01MWI 9

Date	Conc.
01/92	<7.9 U
07/92	119
08/92	<8.8 U
08/92	<8.8 U
03/01	<1.2 U

IR01MWI 5

Date	Conc.
01/92	<6 U
07/92	40.1
07/92	24
08/92	8.8
07/02	<4 U
07/02	<4 U
09/02	4.9 J

IR01MW366A

Date	Conc.
12/95	<1.6 U2
03/96	19.7
05/96	9.3
06/04	32.6
06/04	25.2
11/04	5.6
03/05	<5 U
06/05	1.4 J
01/06	<5.4 U
03/06	2.5 J
06/06	<5 U
12/06	<5 UJ
03/07	<0.75 U
05/07	<5 U

- Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
- A-aquifer Well
- B-aquifer Well
- Not Analyzed for Analyte
- Analyte Not Detected
- Analyte Exceeds Reporting Limit
- Analyte Exceeds Criterion
- Road
- Gravel Road
- Metal Slag Area (2007 excavation limit)[a]
- PCB Hot Spot Area (2007 excavation limit)[a]
- Limit of Landfill Cap
- Parcel Boundary
- Building
- UCSF Compound
- Landfill Area
- East Adjacent Area
- Panhandle Area
- Shoreline Area
- San Francisco Bay
- Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Sample Date (mm/yy) → Chemical Concentration (µg/L) and Qualifier

Date	Conc.
05/07	527
08/07	646
10/07	633 J

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

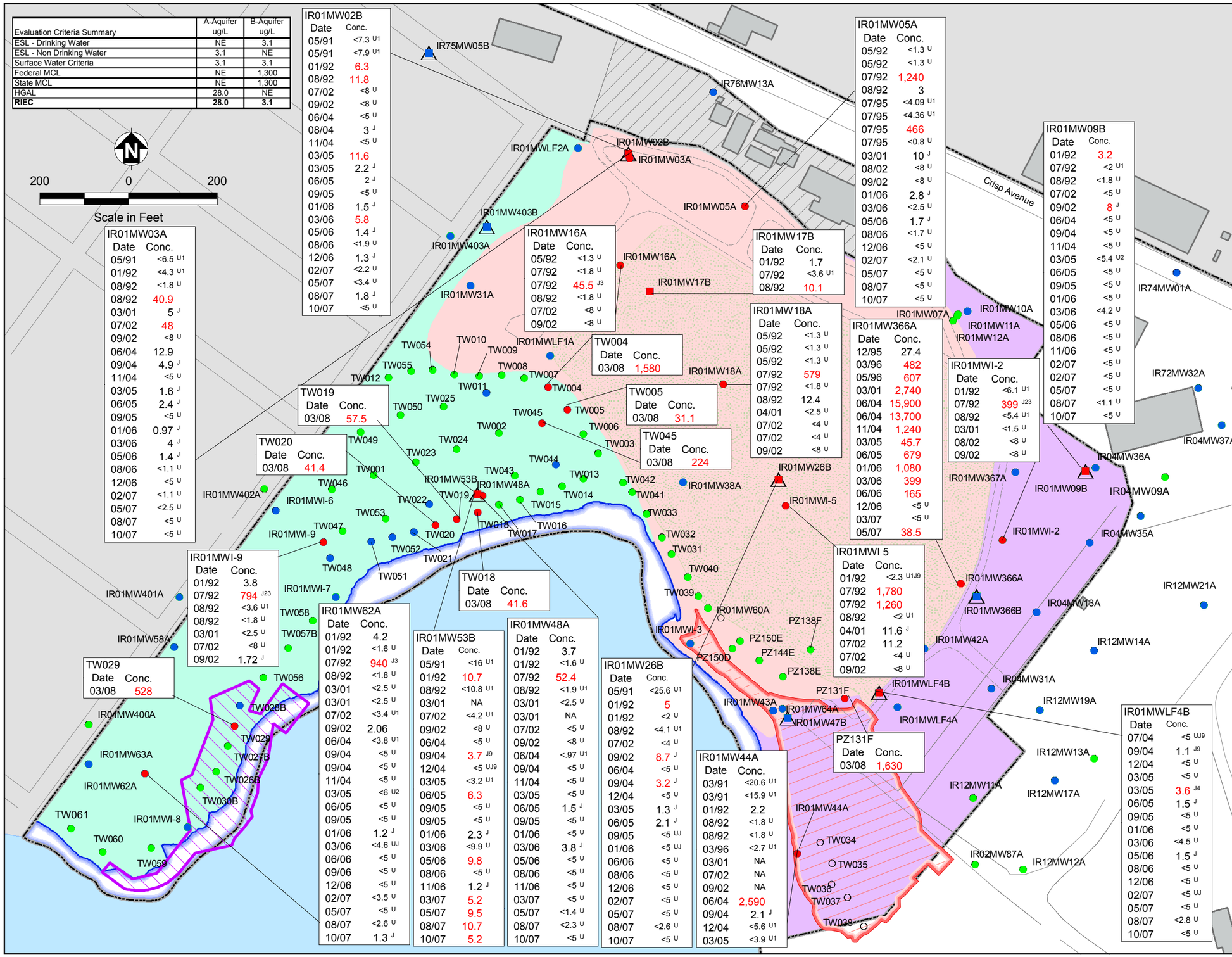
FIGURE 5-15

COBALT IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Metals\Cobalt-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	3.1
ESL - Non Drinking Water	3.1	NE
Surface Water Criteria	3.1	3.1
Federal MCL	NE	1,300
State MCL	NE	1,300
HGAL	28.0	NE
RIEC	**28.0**	**3.1**



IR01MW02B

Date	Conc.
05/91	<7.3 U1
05/91	<7.9 U1
01/92	6.3
08/92	11.8
07/02	<8 U
09/02	<8 U
06/04	<5 U
08/04	3 J
11/04	<5 U
03/05	11.6
03/05	2.2 J
06/05	2 J
09/05	<5 U
01/06	1.5 J
03/06	5.8
05/06	1.4 J
08/06	<1.9 U
12/06	1.3 J
02/07	<2.2 U
05/07	<3.4 U
08/07	1.8 J
10/07	<5 U

IR01MW03A

Date	Conc.
05/91	<6.5 U1
01/92	<4.3 U1
08/92	<1.8 U
08/92	40.9
03/01	5 J
07/02	48
09/02	<8 U
06/04	12.9
09/04	4.9 J
11/04	<5 U
03/05	1.6 J
06/05	2.4 J
09/05	<5 U
01/06	0.97 J
03/06	4 J
05/06	1.4 J
08/06	<1.1 U
12/06	<5 U
02/07	<1.1 U
05/07	<2.5 U
08/07	<5 U
10/07	<5 U

IR01MW16A

Date	Conc.
05/92	<1.3 U
07/92	<1.8 U
07/92	45.5 J3
08/92	<1.8 U
07/02	<8 U
09/02	<8 U

IR01MW17B

Date	Conc.
01/92	1.7
07/92	<3.6 U1
08/92	10.1

IR01MW05A

Date	Conc.
05/92	<1.3 U
05/92	<1.3 U
07/92	1,240
08/92	3
07/95	<4.09 U1
07/95	<4.36 U1
07/95	466
07/95	<0.8 U
03/01	10 J
08/02	<8 U
09/02	<8 U
01/06	2.8 J
03/06	<2.5 U
05/06	1.7 J
08/06	<1.7 U
12/06	<5 U
02/07	<2.1 U
05/07	<5 U
08/07	<5 U
10/07	<5 U

IR01MW09B

Date	Conc.
01/92	3.2
07/92	<2 U1
08/92	<1.8 U
07/02	<5 U
09/02	8 J
06/04	<5 U
09/04	<5 U
11/04	<5 U
03/05	<5.4 U2
06/05	<5 U
09/05	<5 U
01/06	<5 U
03/06	<4.2 U
05/06	<5 U
08/06	<5 U
11/06	<5 U
02/07	<5 U
02/07	<5 U
05/07	<5 U
08/07	<1.1 U
10/07	<5 U

IR01MW18A

Date	Conc.
05/92	<1.3 U
05/92	<1.3 U
05/92	<1.3 U
07/92	579
07/92	<1.8 U
08/92	12.4
04/01	<2.5 U
07/02	<4 U
07/02	<4 U
09/02	<8 U

IR01MW366A

Date	Conc.
12/95	27.4
03/96	482
05/96	607
03/01	2,740
06/04	15,900
06/04	13,700
11/04	1,240
03/05	45.7
06/05	679
01/06	1,080
03/06	399
06/06	165
12/06	<5 U
03/07	<5 U
05/07	38.5

IR01MWI-2

Date	Conc.
01/92	<6.1 U1
07/92	399 J23
08/92	<5.4 U1
03/01	<1.5 U
08/02	<8 U
09/02	<8 U

TW004

Date	Conc.
03/08	1,580

TW005

Date	Conc.
03/08	31.1

TW019

Date	Conc.
03/08	57.5

TW020

Date	Conc.
03/08	41.4

TW045

Date	Conc.
03/08	224

TW018

Date	Conc.
03/08	41.6

TW029

Date	Conc.
03/08	528

PZ131F

Date	Conc.
03/08	1,630

IR01MWI-9

Date	Conc.
01/92	3.8
07/92	794 J23
08/92	<3.6 U1
08/92	<1.8 U
03/01	<2.5 U
07/02	<8 U
09/02	1.72 J

IR01MW62A

Date	Conc.
01/92	4.2
01/92	<1.6 U
07/92	940 J3
08/92	<1.8 U
03/01	<2.5 U
03/01	<2.5 U
07/02	<3.4 U1
09/02	2.06
06/04	<3.8 U1
09/04	<5 U
09/04	<5 U
11/04	<5 U
03/05	<6 U2
06/05	<5 U
09/05	<5 U
01/06	1.2 J
03/06	<4.6 UJ
06/06	<5 U
09/06	<5 U
12/06	<5 U
02/07	<3.5 U
05/07	<5 U
08/07	<2.6 U
10/07	1.3 J

IR01MW53B

Date	Conc.
05/91	<16 U1
01/92	10.7
08/92	<10.8 U1
03/01	NA
07/02	<4.2 U1
09/02	<8 U
06/04	<5 U
09/04	3.7 J9
12/04	<5 UJ9
03/05	<3.2 U1
06/05	6.3
09/05	<5 U
09/05	<5 U
01/06	2.3 J
03/06	<9.9 U
05/06	9.8
08/06	<5 U
11/06	1.2 J
03/07	5.2
05/07	9.5
08/07	10.7
10/07	5.2

IR01MW48A

Date	Conc.
01/92	3.7
01/92	<1.6 U
07/92	52.4
08/92	<1.9 U1
03/01	<2.5 U
03/01	NA
07/02	<5 U
09/02	<8 U
06/04	<.97 U1
09/04	<5 U
11/04	<5 U
03/05	<5 U
06/05	1.5 J
09/05	<5 U
01/06	<5 U
03/06	3.8 J
05/06	<5 U
08/06	<5 U
11/06	<5 U
03/07	<5 U
05/07	<1.4 U
08/07	<2.3 U
10/07	<5 U

IR01MW26B

Date	Conc.
05/91	<25.6 U1
01/92	5
01/92	<2 U
08/92	<4.1 U1
07/02	<4 U
09/02	8.7 J
06/04	<5 U
09/04	3.2 J
12/04	<5 U
03/05	1.3 J
06/05	2.1 J
09/05	<5 UJ
01/06	<5 UJ
06/06	<5 U
08/06	<5 U
12/06	<5 U
02/07	<5 U
05/07	<5 U
08/07	<2.6 U
10/07	<5 U

IR01MW44A

Date	Conc.
03/91	<20.6 U1
03/91	<15.9 U1
01/92	2.2
08/92	<1.8 U
08/92	<1.8 U
03/96	<2.7 U1
03/01	NA
07/02	NA
09/02	NA
06/04	2,590
09/04	2.1 J
12/04	<5.6 U1
03/05	<3.9 U1

IR01MWI 5

Date	Conc.
01/92	<2.3 U1J9
07/92	1,780
07/92	1,260
08/92	<2 U1
04/01	11.6 J
07/02	11.2
07/02	<4 U
09/02	<8 U

IR01MWLF4B

Date	Conc.
07/04	<5 UJ9
09/04	1.1 J9
12/04	<5 U
03/05	<5 U
03/05	3.6 J4
06/05	1.5 J
09/05	<5 U
01/06	<5 U
03/06	<4.5 U
05/06	1.5 J
08/06	<5 U
12/06	<5 U
02/07	<5 UJ
05/07	<5 U
08/07	<2.8 U
10/07	<5 U

- Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
- A-aquifer Well
- B-aquifer Well
- Not Analyzed for Analyte
- Analyte Not Detected
- Analyte Exceeds Reporting Limit
- Analyte Exceeds Criterion
- Road
- Gravel Road
- Metal Slag Area (2007 excavation limit)[a]
- PCB Hot Spot Area (2007 excavation limit)[a]
- Limit of Landfill Cap
- Parcel Boundary
- Building
- UCSF Compound
- Landfill Area
- East Adjacent Area
- Panhandle Area
- Shoreline Area
- San Francisco Bay
- Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A

Date	Conc.
05/07	527
08/07	646
10/07	633 J

Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California

U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 5-16

COPPER IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	2.5
ESL - Non Drinking Water	2.5	NE
Surface Water Criteria	8.1	8.1
Federal MCL	NE	15
State MCL	NE	15
HGAL	14.4	NE
RIEC	**14.4**	**8.1**

N

200 0 200

Scale in Feet

IR01MW05A

Date	Conc.
05/92	<2.61 U1
05/92	<2.9 U1
07/92	1,960
08/92	<1.6 U
07/95	72.2
07/95	1.71
07/95	1,280
07/95	2.49
03/01	<1.3 UJ3
08/02	<0.06 U2J2
09/02	<0.14 U2J2
01/06	3.1 J
03/06	<5 U
05/06	<5 U
08/06	<4 U
12/06	<5 U
02/07	<5 U
05/07	<5 U
08/07	<5 U
10/07	<5 U

IR01MW31A

Date	Conc.
05/92	<0.8 U
05/92	<0.9 U1
07/92	<1.6 U
08/92	27.1
08/92	22.5
03/01	<1.5 U1
08/02	0.1 J
09/02	<0.07 U1
06/04	<5 U
09/04	9
11/04	<5 U
03/05	<5 U
06/05	<5 U
09/05	8.2
01/06	<5 U
03/06	<5 U
05/06	<5 U
08/06	<4.5 U
11/06	<5 U
11/06	<5 U
02/07	<5 U
05/07	<5 U
08/07	<5 U
10/07	<5 U

IR01MW62A

Date	Conc.
01/92	0.9
01/92	0.9
07/92	3,740
08/92	<1.6 U
03/01	<1.3 U
03/01	<1.3 U
07/02	<1 U
09/02	<0.14 U2J2
06/04	35.1
09/04	<3.7 U1J9
09/04	<2.3 U1J9
11/04	<5 U
03/05	<5 UJ3
06/05	<5 U
09/05	<5 U
01/06	<5 U
03/06	<5 U
06/06	<5 U
09/06	<5 U
12/06	<5 U
02/07	<5 U
05/07	<5 U
08/07	<5 U
10/07	<5 UJ

IR01MW16A

Date	Conc.
05/92	<8.31 U1
07/92	<1.6 U
07/92	358
08/92	<1.6 U
07/02	0.08 J
09/02	<0.05 U2

TW004

Date	Conc.
03/08	15.2 J

IR01MW18A

Date	Conc.
05/92	<1.93 U1
05/92	<1.54 U1
05/92	<1.23 U1
07/92	666
07/92	<1.6 U
08/92	10.6
04/01	<1.3 U
04/01	NA
07/02	0.18 J
07/02	0.18 J
09/02	0.14 J

IR01MWI 5

Date	Conc.
01/92	<1 U
07/92	1,430
07/92	994
08/92	<1.6 U
04/01	25.6
07/02	27.6
07/02	17.9
09/02	0.84

IR01MW42A

Date	Conc.
01/92	91.8
01/92	100
07/92	<3.4 U1
08/92	13.8
03/01	<1.6 U
08/02	0.69
09/02	0.34 J
06/04	2 J3
09/04	<5 U
11/04	<5 U
03/05	<5 UJ3
06/05	<5 U
09/05	3.7 J
01/06	<5 U
03/06	<5 U
05/06	2.9 J
08/06	<2.8 U
12/06	<5 U
02/07	<5 U
05/07	<5 U
08/07	<5 U
10/07	<5 U

IR01MW03A

Date	Conc.
05/91	<2.1 U
01/92	1.2
08/92	<1.6 U
08/92	24.4
03/01	<1.3 UJ3
07/02	<1 U
09/02	0.09 J
06/04	8 J3
09/04	<7.2 U1
11/04	<5 U
03/05	<5 UJ3
06/05	<5 U
09/05	4.3 J
01/06	<5 U
03/06	<5 U
05/06	<5 U
08/06	<3.6 U
12/06	<5 U
02/07	<5 U
05/07	<5 U
08/07	<5 UJ
10/07	<5 U

IR01MW02B

Date	Conc.
05/91	<2.1 U
05/91	<2.1 U
01/92	<1 U
08/92	4.1
07/02	0.07 J
09/02	<0.12 U2
06/04	<5 U
08/04	4.4 J
11/04	<5 U
03/05	<5 UJ3
03/05	<5 UJ3
06/05	<5 U
09/05	3.2 J
01/06	<5 U
03/06	14.2
05/06	<5 U
08/06	<3.1 U
12/06	<5 U
02/07	<5 U
05/07	<5 U
08/07	<5 UJ
10/07	<5 U

IR04MW40A

Date	Conc.
11/91	<2 U
11/91	<2 U
02/92	15.4
06/92	<1.6 U
03/01	<1.3 UJ3
07/02	0.142 J
09/02	<0.162 U2

IR01MWLF4B

Date	Conc.
07/04	<5 UJ9
09/04	<5 U
12/04	<5 U
03/05	<5 U
03/05	<5 U
06/05	<5 U
09/05	<5 U
01/06	<5 U
03/06	<5 U
05/06	<5 U
08/06	<5 U
12/06	<5 U
02/07	10
05/07	<5 U
08/07	<5 U
10/07	<5 U

IR01MWI 2

Date	Conc.
01/92	<1 U
07/92	128
08/92	<1.6 U
03/01	<1.6 U
08/02	0.16 J2
09/02	0.13

TW021

Date	Conc.
03/08	25.5
03/08	23.1

TW028B

Date	Conc.
03/08	27.2

TW029

Date	Conc.
03/08	1,110

IR01MW48A

Date	Conc.
01/92	1
01/92	1
07/92	61.2
08/92	<1.6 U
03/01	<1.3 U
07/02	<1 U
09/02	<0.1 U2
06/04	<5 U
09/04	<5 U
11/04	<5 U
03/05	<5 U
06/05	<5 U
09/05	<5 U
01/06	<5 U
03/06	<5 U
05/06	<5 U
08/06	<5 U
11/06	<5 U
03/07	<5 U
05/07	<5 U
08/07	<5 U
10/07	<5 U

IR01MW38A

Date	Conc.
05/91	<2.1 U
01/92	<1 U
01/92	<1 U
08/92	<1.6 U
08/02	0.14
09/02	0.04 J
06/04	<5 U
09/04	15.2
11/04	<5 U
03/05	<5 UJ3
06/05	<5 U
09/05	12.4
01/06	<5 U
03/06	<5 U
05/06	1.9 J
08/06	<6.6 U
12/06	<5 U
02/07	9.2
05/07	<5 U
08/07	<5 U
10/07	<5 U

IR01MW26B

Date	Conc.
05/91	<2.1 U
01/92	<1 U
01/92	<1 U
08/92	<1.6 U
07/02	0.13
09/02	1.02
06/04	<5 U
09/04	13.6
12/04	<5 UJ3
03/05	<5 U
06/05	<5 U
09/05	2.2 J
01/06	<5 U
06/06	<5 U
08/06	<2 U
12/06	<5 U
02/07	9.1
05/07	<5 U
08/07	<5 U
10/07	<5 U

IR01MWI 9

Date	Conc.
01/92	1.2
07/92	6,520
08/92	<1.6 U
08/92	<1.6 U
03/01	<1.3 U
07/02	0.11
09/02	<0.13 U2

IR01MW43A

Date	Conc.
03/91	<2.1 U
01/92	<1 U
08/92	<1.6 U
08/92	<1.6 U
03/96	<0.8 UJ9
09/02	0.08 J
06/04	6.7 J3
09/04	14.8
11/04	26.6
03/05	<5 U

IR01MW44A

Date	Conc.
03/91	<2.1 U
03/91	<2.1 U
01/92	<2 U
08/92	<1.6 U
08/92	<1.6 U
03/96	<0.8 U
06/04	154
09/04	9.3
12/04	<5 U
03/05	<5 U

IR01MW366A

Date	Conc.
12/95	<1.2 U
03/96	<4.1 U1J3
05/96	1.4
06/04	587
06/04	429
11/04	6.7 J9
03/05	<5 U
06/05	25.1
01/06	22.8
03/06	12.3
06/06	4.2 J
12/06	<5 U
03/07	10
05/07	<2.2 U

IR01MW366B

Date	Conc.
07/04	<5 U
07/04	<5 U
09/04	11.5 J9
09/04	11.2 J9
12/04	<5 U
03/05	<5 U
06/05	<5 U
09/05	7.9
01/06	<5 U
01/06	<5 U
03/06	<5 U
06/06	<5 U
08/06	<4.1 U
12/06	<5 U
02/07	6.1
05/07	<5 U
08/07	<5 U
10/07	<5 U

Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Sample Date (mm/yy) → Date / Conc.: 05/07 527; 08/07 646; 10/07 633 J ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

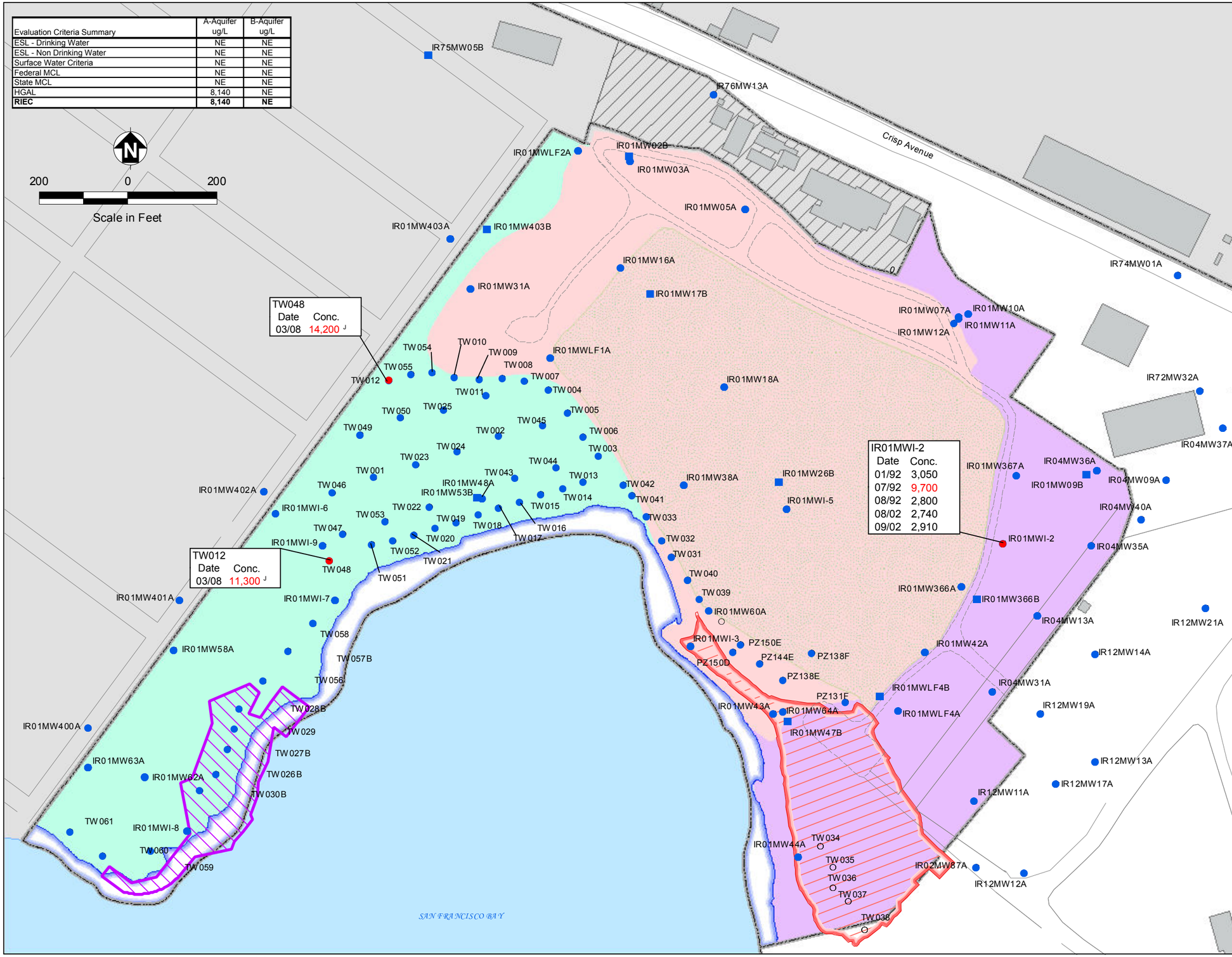
Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 5-17

LEAD IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	NE
ESL - Non Drinking Water	NE	NE
Surface Water Criteria	NE	NE
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	8,140	NE
RIEC	**8,140**	**NE**



Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
UCSF = University of California, San Francisco
µg/L = microgram per liter

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J
← Chemical Concentration (µg/L) and Qualifier
Sample Date (mm/yy)

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

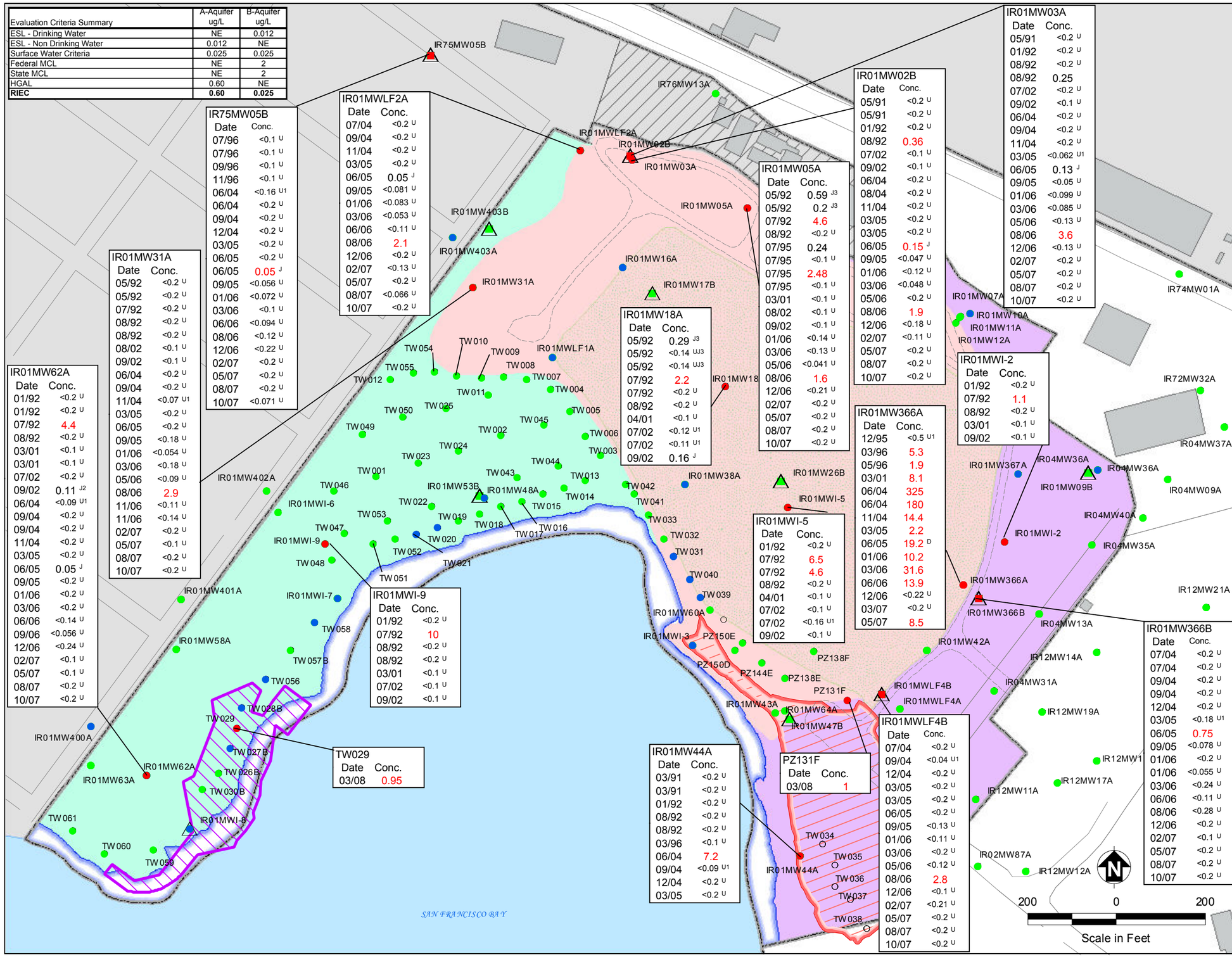
FIGURE 5-18

MANGANESE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Metalss\Manganese-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	0.012
ESL - Non Drinking Water	0.012	NE
Surface Water Criteria	0.025	0.025
Federal MCL	NE	2
State MCL	NE	2
HGAL	0.60	NE
RIEC	**0.60**	**0.025**



IR75MW05B

Date	Conc.
07/96	<0.1 U
07/96	<0.1 U
09/96	<0.1 U
11/96	<0.1 U
06/04	<0.16 U1
06/04	<0.2 U
09/04	<0.2 U
12/04	<0.2 U
03/05	<0.2 U
06/05	<0.2 U
06/05	0.05 J
09/05	<0.056 U
01/06	<0.072 U
03/06	<0.1 U
06/06	<0.094 U
08/06	<0.12 U
12/06	<0.22 U
02/07	<0.2 U
05/07	<0.2 U
08/07	<0.2 U
10/07	<0.071 U

IR01MWLF2A

Date	Conc.
07/04	<0.2 U
09/04	<0.2 U
11/04	<0.2 U
03/05	<0.2 U
06/05	0.05 J
09/05	<0.081 U
01/06	<0.083 U
03/06	<0.053 U
06/06	<0.11 U
08/06	2.1
12/06	<0.2 U
02/07	<0.13 U
05/07	<0.2 U
08/07	<0.066 U
10/07	<0.2 U

IR01MW31A

Date	Conc.
05/92	<0.2 U
05/92	<0.2 U
07/92	<0.2 U
08/92	<0.2 U
08/92	<0.2 U
08/02	<0.1 U
09/02	<0.1 U
06/04	<0.2 U
09/04	<0.2 U
11/04	<0.07 U1
03/05	<0.2 U
06/05	<0.2 U
09/05	<0.18 U
01/06	<0.054 U
03/06	<0.18 U
05/06	<0.09 U
08/06	2.9
11/06	<0.11 U
11/06	<0.14 U
02/07	<0.2 U
05/07	<0.1 U
08/07	<0.2 U
10/07	<0.2 U

IR01MW62A

Date	Conc.
01/92	<0.2 U
01/92	<0.2 U
07/92	4.4
08/92	<0.2 U
03/01	<0.1 U
03/01	<0.1 U
07/02	<0.2 U
09/02	0.11 J2
06/04	<0.09 U1
09/04	<0.2 U
09/04	<0.2 U
11/04	<0.2 U
03/05	<0.2 U
06/05	0.05 J
09/05	<0.2 U
01/06	<0.2 U
03/06	<0.2 U
06/06	<0.14 U
09/06	<0.056 U
12/06	<0.24 U
02/07	<0.1 U
05/07	<0.1 U
08/07	<0.2 U
10/07	<0.2 U

IR01MW02B

Date	Conc.
05/91	<0.2 U
05/91	<0.2 U
01/92	<0.2 U
08/92	0.36
07/02	<0.1 U
09/02	<0.1 U
06/04	<0.2 U
08/04	<0.2 U
11/04	<0.2 U
03/05	<0.2 U
03/05	<0.2 U
06/05	0.15 J
09/05	<0.047 U
01/06	<0.12 U
03/06	<0.048 U
05/06	<0.2 U
08/06	1.9
12/06	<0.18 U
02/07	<0.11 U
05/07	<0.2 U
08/07	<0.2 U
10/07	<0.2 U

IR01MW03A

Date	Conc.
05/91	<0.2 U
01/92	<0.2 U
08/92	<0.2 U
08/92	0.25
07/02	<0.2 U
09/02	<0.1 U
06/04	<0.2 U
09/04	<0.2 U
11/04	<0.2 U
03/05	<0.062 U1
06/05	0.13 J
09/05	<0.05 U
01/06	<0.099 U
03/06	<0.085 U
05/06	<0.13 U
08/06	3.6
12/06	<0.13 U
02/07	<0.2 U
05/07	<0.2 U
08/07	<0.2 U
10/07	<0.2 U

IR01MW05A

Date	Conc.
05/92	0.59 J3
05/92	0.2 J3
07/92	4.6
08/92	<0.2 U
07/95	0.24
07/95	<0.1 U
07/95	2.48
07/95	<0.1 U
03/01	<0.1 U
08/02	<0.1 U
09/02	<0.1 U
01/06	<0.14 U
03/06	<0.13 U
05/06	<0.041 U
08/06	1.6
12/06	<0.21 U
02/07	<0.2 U
05/07	<0.2 U
08/07	<0.2 U
10/07	<0.2 U

IR01MW18A

Date	Conc.
05/92	0.29 J3
05/92	<0.14 UJ3
05/92	<0.14 UJ3
07/92	2.2
07/92	<0.2 U
08/92	<0.2 U
04/01	<0.1 U
07/02	<0.12 U1
07/02	<0.11 U1
09/02	0.16 J

IR01MWI-2

Date	Conc.
01/92	<0.2 U
07/92	1.1
08/92	<0.2 U
03/01	<0.1 U
09/02	<0.1 U

IR01MW366A

Date	Conc.
12/95	<0.5 U1
03/96	5.3
05/96	1.9
03/01	8.1
06/04	325
06/04	180
11/04	14.4
03/05	2.2
06/05	19.2 D
01/06	10.2
03/06	31.6
06/06	13.9
12/06	<0.22 U
03/07	<0.2 U
05/07	8.5

IR01MWI-5

Date	Conc.
01/92	<0.2 U
07/92	6.5
07/92	4.6
08/92	<0.2 U
04/01	<0.1 U
07/02	<0.1 U
07/02	<0.16 U1
09/02	<0.1 U

IR01MWI-9

Date	Conc.
01/92	<0.2 U
07/92	10
08/92	<0.2 U
08/92	<0.2 U
03/01	<0.1 U
07/02	<0.1 U
09/02	<0.1 U

TW029

Date	Conc.
03/08	0.95

IR01MW44A

Date	Conc.
03/91	<0.2 U
03/91	<0.2 U
01/92	<0.2 U
08/92	<0.2 U
08/92	<0.2 U
03/96	<0.1 U
06/04	7.2
09/04	<0.09 U1
12/04	<0.2 U
03/05	<0.2 U

PZ131F

Date	Conc.
03/08	1

IR01MWLF4B

Date	Conc.
07/04	<0.2 U
09/04	<0.04 U1
12/04	<0.2 U
03/05	<0.2 U
03/05	<0.2 U
06/05	<0.2 U
09/05	<0.13 U
01/06	<0.11 U
03/06	<0.2 U
05/06	<0.12 U
08/06	2.8
12/06	<0.1 U
02/07	<0.21 U
05/07	<0.2 U
08/07	<0.2 U
10/07	<0.2 U

IR01MW366B

Date	Conc.
07/04	<0.2 U
07/04	<0.2 U
09/04	<0.2 U
09/04	<0.2 U
12/04	<0.2 U
03/05	<0.18 U1
06/05	0.75
09/05	<0.078 U
01/06	<0.2 U
01/06	<0.055 U
03/06	<0.24 U
06/06	<0.11 U
08/06	<0.28 U
12/06	<0.2 U
02/07	<0.1 U
05/07	<0.2 U
08/07	<0.2 U
10/07	<0.2 U

Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Sample Date (mm/yy) → 05/07 527; 08/07 646; 10/07 633 J ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

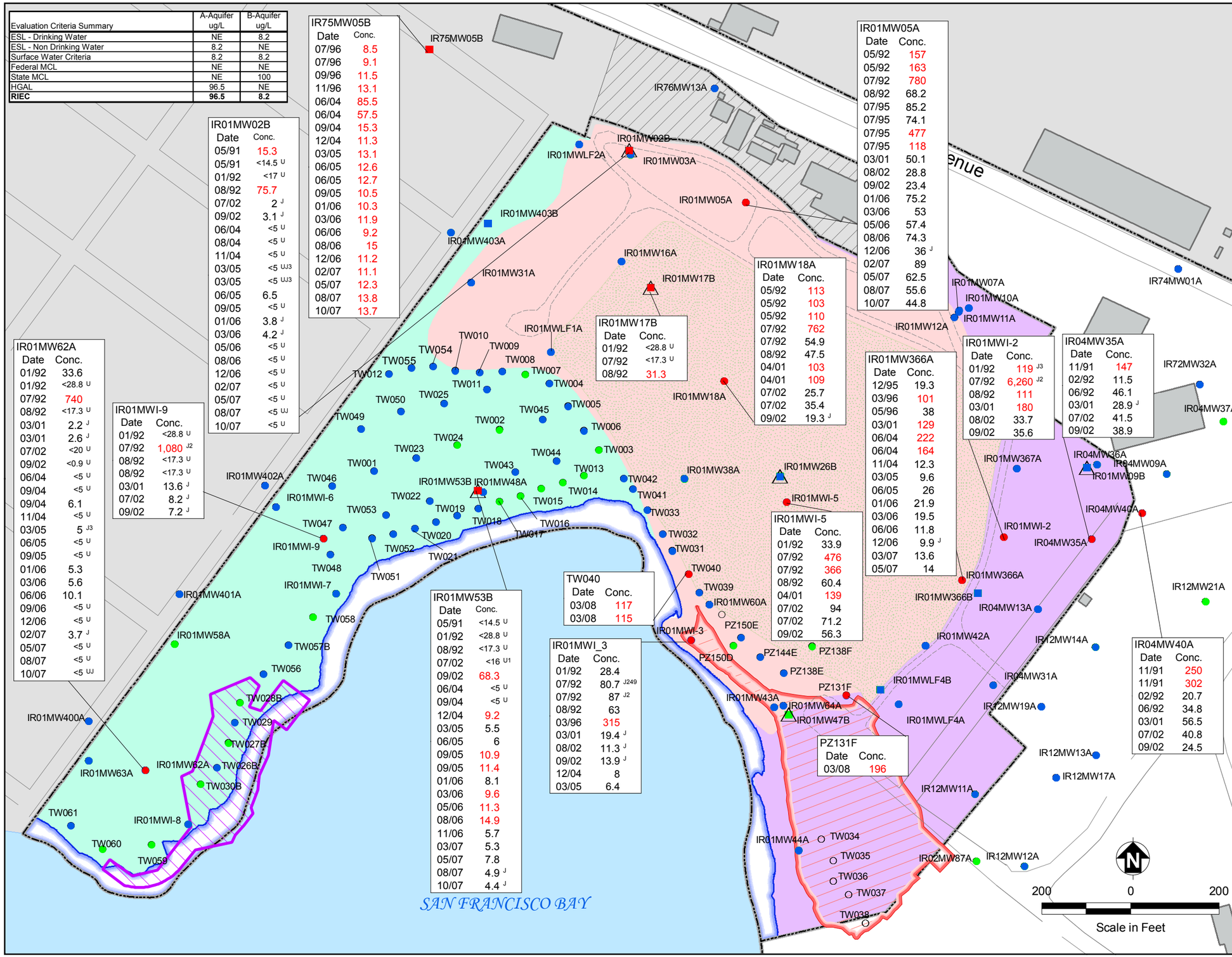
Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 5-19

MERCURY IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Metals\Mercury-Wells.mxd



Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	8.2
ESL - Non Drinking Water	8.2	NE
Surface Water Criteria	8.2	8.2
Federal MCL	NE	NE
State MCL	NE	100
HGAL	96.5	NE
RIEC	**96.5**	**8.2**

IR75MW05B

Date	Conc.
07/96	8.5
07/96	9.1
09/96	11.5
11/96	13.1
06/04	85.5
06/04	57.5
09/04	15.3
12/04	11.3
03/05	13.1
06/05	12.6
06/05	12.7
09/05	10.5
01/06	10.3
03/06	11.9
06/06	9.2
08/06	15
12/06	11.2
02/07	11.1
05/07	12.3
08/07	13.8
10/07	13.7

IR01MW02B

Date	Conc.
05/91	15.3
05/91	<14.5 U
01/92	<17 U
08/92	75.7
07/02	2 J
09/02	3.1 J
06/04	<5 U
08/04	<5 U
11/04	<5 U
03/05	<5 UJ3
03/05	<5 UJ3
06/05	6.5
09/05	<5 U
01/06	3.8 J
03/06	4.2 J
05/06	<5 U
08/06	<5 U
12/06	<5 U
02/07	<5 U
05/07	<5 U
08/07	<5 UJ
10/07	<5 U

IR01MW05A

Date	Conc.
05/92	157
05/92	163
07/92	780
08/92	68.2
07/95	85.2
07/95	74.1
07/95	477
07/95	118
03/01	50.1
08/02	28.8
09/02	23.4
01/06	75.2
03/06	53
05/06	57.4
08/06	74.3
12/06	36 J
02/07	89
05/07	62.5
08/07	55.6
10/07	44.8

IR01MW62A

Date	Conc.
01/92	33.6
01/92	<28.8 U
07/92	740
08/92	<17.3 U
03/01	2.2 J
03/01	2.6 J
07/02	<20 U
09/02	<0.9 U
06/04	<5 U
09/04	<5 U
09/04	6.1
11/04	<5 U
03/05	5 J3
06/05	<5 U
09/05	<5 U
01/06	5.3
03/06	5.6
06/06	10.1
09/06	<5 U
12/06	<5 U
02/07	3.7 J
05/07	<5 U
08/07	<5 U
10/07	<5 UJ

IR01MWI-9

Date	Conc.
01/92	<28.8 U
07/92	1,080 J2
08/92	<17.3 U
08/92	<17.3 U
03/01	13.6 J
07/02	8.2 J
09/02	7.2 J

IR01MW17B

Date	Conc.
01/92	<28.8 U
07/92	<17.3 U
08/92	31.3

IR01MW18A

Date	Conc.
05/92	113
05/92	103
05/92	110
07/92	762
07/92	54.9
08/92	47.5
04/01	103
04/01	109
07/02	25.7
07/02	35.4
09/02	19.3 J

IR01MW366A

Date	Conc.
12/95	19.3
03/96	101
05/96	38
03/01	129
06/04	222
06/04	164
11/04	12.3
03/05	9.6
06/05	26
01/06	21.9
03/06	19.5
06/06	11.8
12/06	9.9 J
03/07	13.6
05/07	14

IR01MWI-2

Date	Conc.
01/92	119 J3
07/92	6,260 J2
08/92	111
03/01	180
08/02	33.7
09/02	35.6

IR04MW35A

Date	Conc.
11/91	147
02/92	11.5
06/92	46.1
03/01	28.9 J
07/02	41.5
09/02	38.9

IR01MWI-5

Date	Conc.
01/92	33.9
07/92	476
07/92	366
08/92	60.4
04/01	139
07/02	94
07/02	71.2
09/02	56.3

IR01MW53B

Date	Conc.
05/91	<14.5 U
01/92	<28.8 U
08/92	<17.3 U
07/02	<16 U1
09/02	68.3
06/04	<5 U
09/04	<5 U
12/04	9.2
03/05	5.5
06/05	6
09/05	10.9
09/05	11.4
01/06	8.1
03/06	9.6
05/06	11.3
08/06	14.9
11/06	5.7
03/07	5.3
05/07	7.8
08/07	4.9 J
10/07	4.4 J

TW040

Date	Conc.
03/08	117
03/08	115

IR01MWI_3

Date	Conc.
01/92	28.4
07/92	80.7 J249
07/92	87 J2
08/92	63
03/96	315
03/01	19.4 J
08/02	11.3 J
09/02	13.9 J
12/04	8
03/05	6.4

PZ131F

Date	Conc.
03/08	196

IR04MW40A

Date	Conc.
11/91	250
11/91	302
02/92	20.7
06/92	34.8
03/01	56.5
07/02	40.8
09/02	24.5

Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Sample Date (mm/yy) → 05/07 527; 08/07 646; 10/07 633 J ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

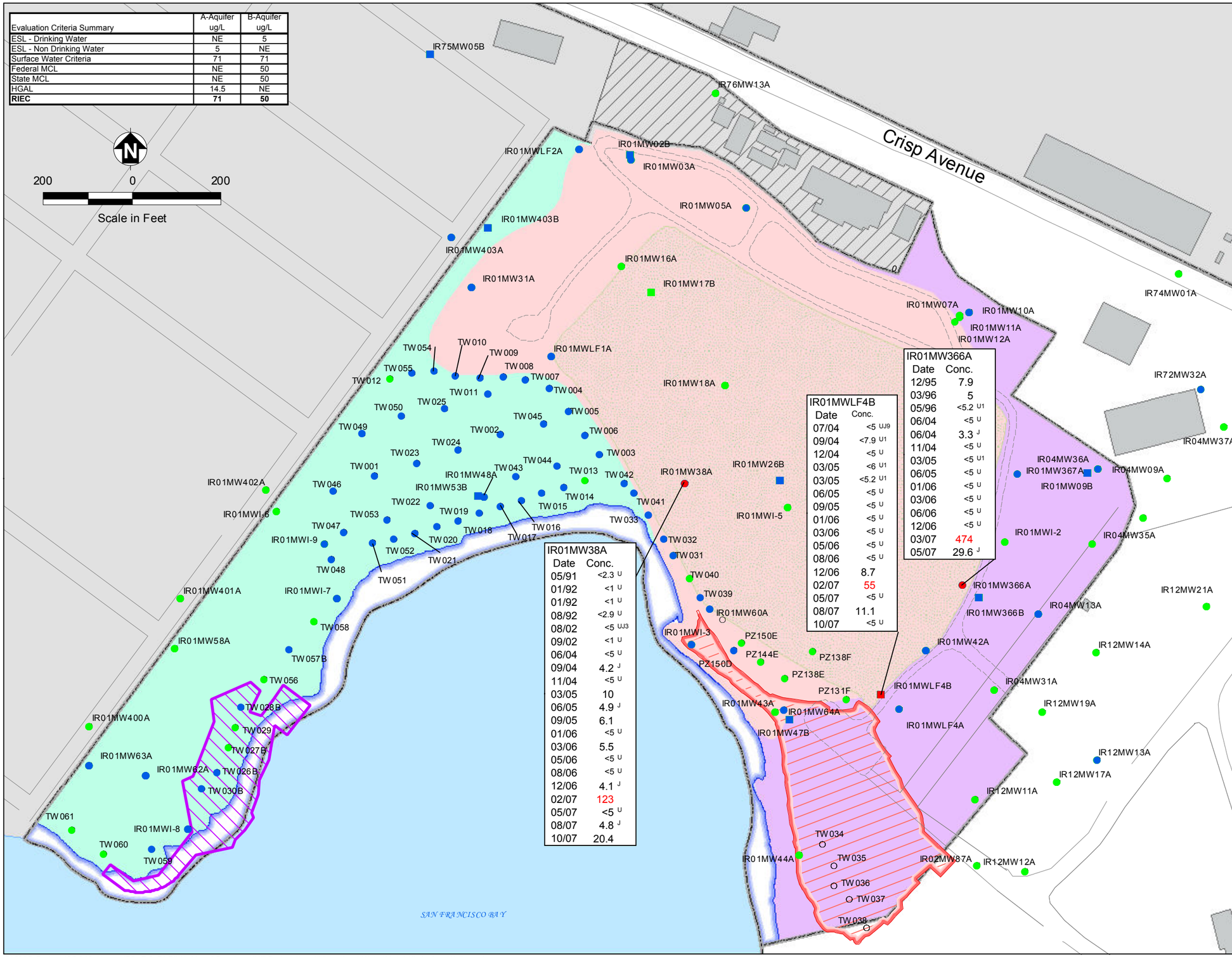
FIGURE 5-20

NICKEL IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Metals\Nickel-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	5
ESL - Non Drinking Water	5	NE
Surface Water Criteria	71	71
Federal MCL	NE	50
State MCL	NE	50
HGAL	14.5	NE
RIEC	**71**	**50**



Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J

Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

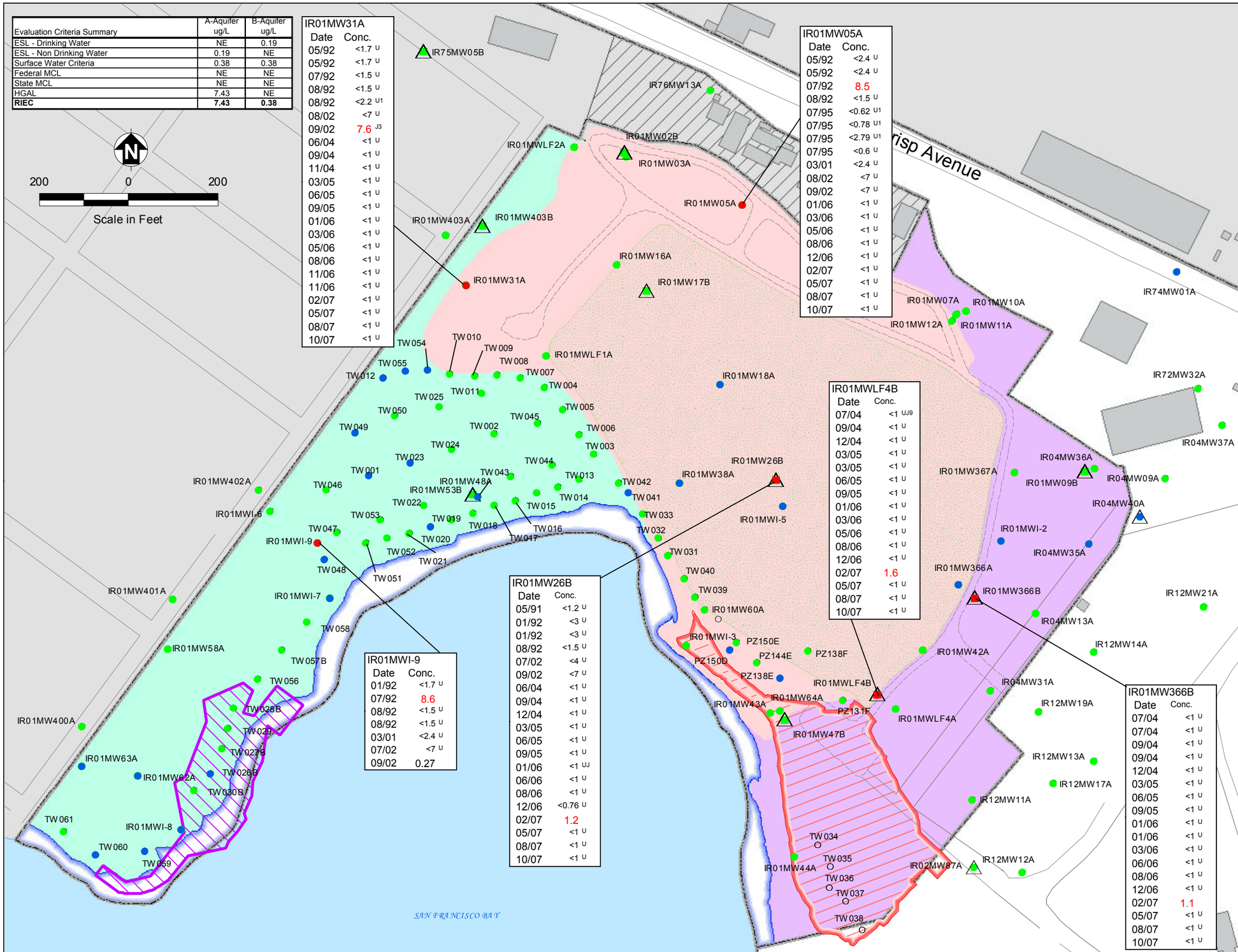
FIGURE 5-21

SELENIUM IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Metals\Selenium-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	0.19
ESL - Non Drinking Water	0.19	NE
Surface Water Criteria	0.38	0.38
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	7.43	NE
RIEC	**7.43**	**0.38**



Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Sample Date (mm/yy) →

Date	Conc.
05/07	527
08/07	646
10/07	633 J

← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

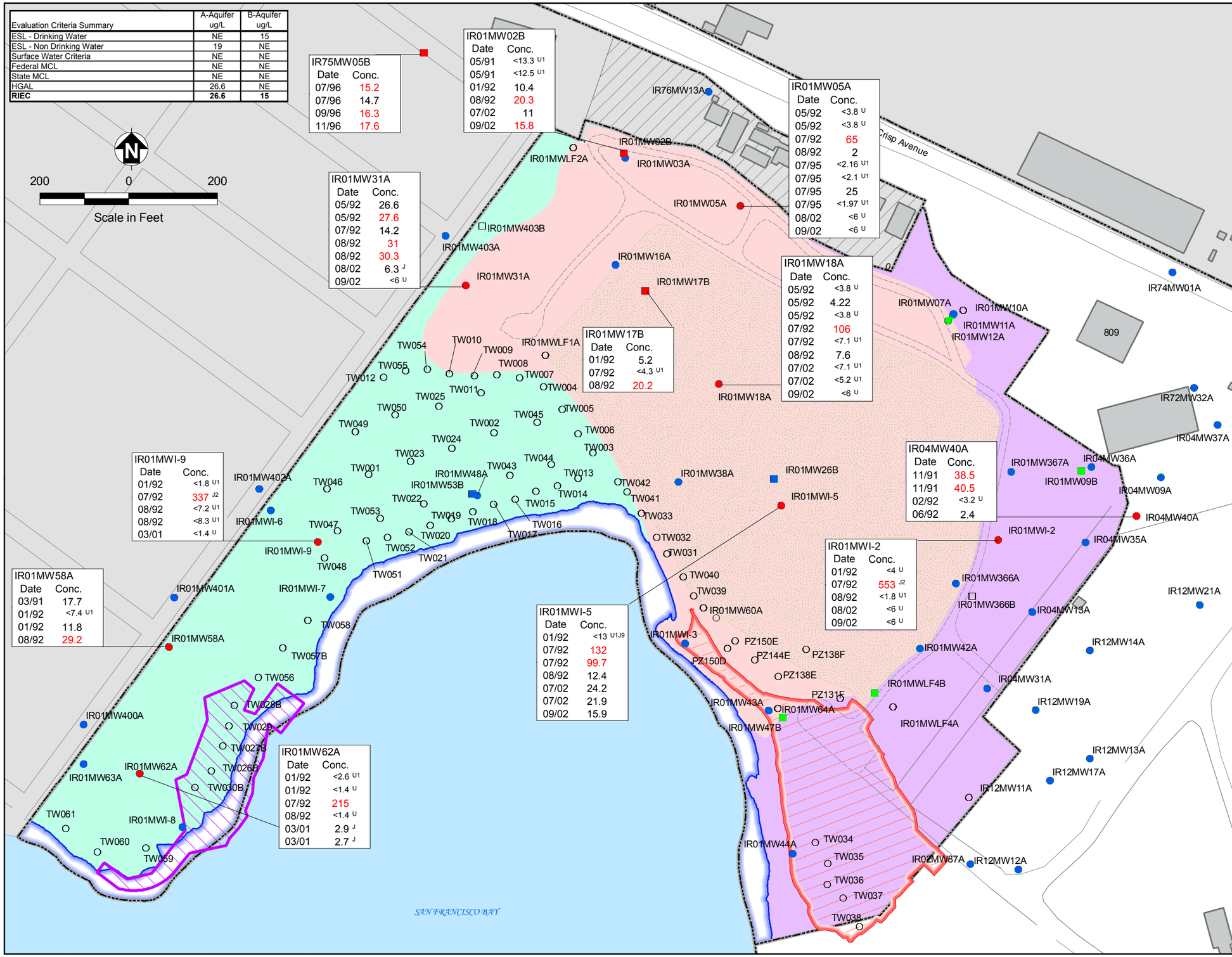
FIGURE 5-22

SILVER IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

2005-12-16 P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Metals\Silver-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	15
ESL - Non Drinking Water	19	NE
Surface Water Criteria	NE	NE
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	26.6	NE
RIEC	**26.6**	**15**



- Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
- A-aquifer Well
- B-aquifer Well
- Not Analyzed for Analyte
- Analyte Not Detected
- Analyte Exceeds Reporting Limit
- Analyte Exceeds Criterion
- Road
- Gravel Road
- Metal Slag Area (2007 excavation limit)[a]
- PCB Hot Spot Area (2007 excavation limit)[a]
- Limit of Landfill Cap
- Parcel Boundary
- Building
- UCSF Compound
- Landfill Area
- East Adjacent Area
- Panhandle Area
- Shoreline Area
- San Francisco Bay
- Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J

Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 5-23

VANADIUM IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

2005-12-16 P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Metals\Vanadium-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	81
ESL - Non Drinking Water	81	NE
Surface Water Criteria	81	81
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	75.7	NE
RIEC	**81**	**81**

N

200 0 200

Scale in Feet

IR01MW03A

Date	Conc.
05/91	16.6
01/92	<30.8 U1
08/92	<16.5 U
08/92	152
03/01	16.5 J
07/02	97
09/02	<8 U1
06/04	<50 UJ3
09/04	<50 U
11/04	<50 U
03/05	<50 UJ3
06/05	<50 U
09/05	<50 U
01/06	<50 UJ
03/06	<50 U
05/06	<50 U
08/06	<50 U
12/06	<4.5 U
02/07	<50 U
05/07	<50 U
08/07	<50 UJ
10/07	<13.3 U

IR01MW05A

Date	Conc.
05/92	114
05/92	108
07/92	3920
08/92	128
07/95	551 J4
07/95	61.7 J4
07/95	2480 J4
07/95	71.7 J4
03/01	45.5
08/02	9.6 J
09/02	<5.5 U2
01/06	<50 U
03/06	<50 U
05/06	<50 U
08/06	<50 U
12/06	<50 UJ
02/07	<50 U
05/07	<50 U
08/07	<50 U
10/07	<50 U

IR01MW18A

Date	Conc.
05/92	28.5
05/92	20.3
05/92	27.2
07/92	1,060
07/92	<16.5 U
08/92	52.6
04/01	<4.8 U
07/02	<2 U
07/02	2.7 J
09/02	<3.3 U1

IR01MW16A

Date	Conc.
05/92	22.9
07/92	<16.5 U
07/92	255
08/92	<16.5 U
07/02	<3.7 U2
09/02	<2.3 U2

IR01MW62A

Date	Conc.
01/92	<1.9 U
01/92	<3 U1
07/92	5,050
08/92	<16.5 U
03/01	<4.8 U
03/01	<4.8 U
07/02	<10 U
09/02	<2 U
06/04	<50 UJ3
09/04	<50 U
09/04	<50 U
11/04	<50 U
03/05	<50 UJ3
06/05	<50 U
09/05	<50 U
01/06	<50 U
03/06	<50 UJ
06/06	<50 U
09/06	285 J
12/06	<50 U
02/07	30.4 J
05/07	4.4 J
08/07	<50 U
10/07	<50 UJ

IR01MWI-9

Date	Conc.
01/92	<2.6 U1
07/92	2,560 J2
08/92	<16.5 U
08/92	<16.5 U
03/01	<4.8 U
07/02	<2.6 U2
09/02	<3.3 U2

TW006

Date	Conc.
03/08	105

TW020

Date	Conc.
03/08	98.6

TW021

Date	Conc.
03/08	105
03/08	30.5 J

TW029

Date	Conc.
03/08	1,280

IR01MW48A

Date	Conc.
01/92	<3.8 U1
01/92	<2.6 U1
07/92	164
08/92	<16.5 U
03/01	<4.8 U
07/02	<10 U
09/02	<2 U
06/04	<50 U
09/04	<50 U
11/04	<50 U
03/05	<50 U
06/05	<50 U
09/05	<50 U
01/06	<50 U
03/06	<50 U
05/06	<50 U
08/06	<50 U
11/06	<50 U
03/07	<50 U
05/07	<50 U
08/07	<50 U
10/07	27.8 J

IR01MWI-5

Date	Conc.
01/92	<11.2 U1J9
07/92	3,540
07/92	2,510
08/92	<16.5 U
04/01	5.1 J
07/02	28.8
07/02	12.8
09/02	<7.3 U1

IR01MWI_3

Date	Conc.
01/92	19
07/92	<16.5 U
07/92	<16.5 U
08/92	<16.5 U
03/96	323
03/01	<4.8 U
08/02	12.2
09/02	13.9
12/04	<50 U
03/05	<50 U

IR01MW43A

Date	Conc.
03/91	66.3
01/92	36.1
08/92	<16.5 U
08/92	18.7
03/96	<8.4 U1J9
09/02	2.7 J
06/04	<50 UJ3
09/04	<50 U
11/04	136
03/05	<50 U

IR01MW366A

Date	Conc.
12/95	<34.2 U2
03/96	682
05/96	537
03/01	6840
06/04	3870
06/04	2740
11/04	243
03/05	<50 U
06/05	175
01/06	152
03/06	49.2 J
06/06	<50 U
12/06	<50 U
03/07	<50 U
05/07	48.2 J

IR01MW367A

Date	Conc.
11/95	111
03/96	<14.7 U1
05/96	<7.3 U1
03/01	5.8 J
07/02	<6.5 U2
09/02	<2.2 U1

IR01MWI-2

Date	Conc.
01/92	<4.7 U1
07/92	632 J2
08/92	<16.5 U
03/01	9.3 J
08/02	<2 U
09/02	9.6 J

PZ131F

Date	Conc.
03/08	5,530

IR01MW44A

Date	Conc.
03/91	235
03/91	226
01/92	<8.4 U1
08/92	22.8
08/92	20.5
03/96	<19 U1
03/01	34.4
07/02	44.5
09/02	136
06/04	1,980
09/04	<50 U
12/04	143
03/05	<50 U

IR75MW05B, IR76MW13A, IR01MWLF2A, IR01MW02B, IR01MW03A, IR01MW05A, IR01MW403B, IR01MW403A, IR01MW16A, IR01MW17B, IR01MW31A, IR01MW18A, IR01MWLF1A, IR01MW07A, IR01MW10A, IR01MW11A, IR01MW12A, IR74MW01A, IR72MW32A, IR04MW37A, IR04MW36A, IR04MW09A, IR01MW09B, IR01MW367A, IR04MW40A, IR01MWI-2, IR04MW35A, IR12MW21A, IR01MW402A, IR01MW366A, IR01MW366B, IR01MW26B, IR01MW38A, IR01MWI-5, IR01MWI-6, IR01MWI-9, IR01MW48A, IR01MW53B, IR01MW401A, IR01MWI-7, IR01MW60A, IR01MWI-3, IR04MW13A, IR01MW58A, PZ150E, PZ150D, PZ144E, PZ138F, PZ138E, IR01MW42A, IR01MW43A, IR01MWLF4B, IR04MW31A, PZ131F, IR01MW64A, IR01MW47B, IR01MWLF4A, IR12MW19A, IR12MW13A, IR12MW17A, IR12MW11A, IR01MW400A, IR01MW63A, IR01MW62A, IR01MW44A, IR02MW87A, IR12MW12A, IR12MW14A, IR01MWI-8, SAN FRANCISCO BAY

Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Sample Date (mm/yy) → Date / Conc.: 05/07 527; 08/07 646; 10/07 633 J ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

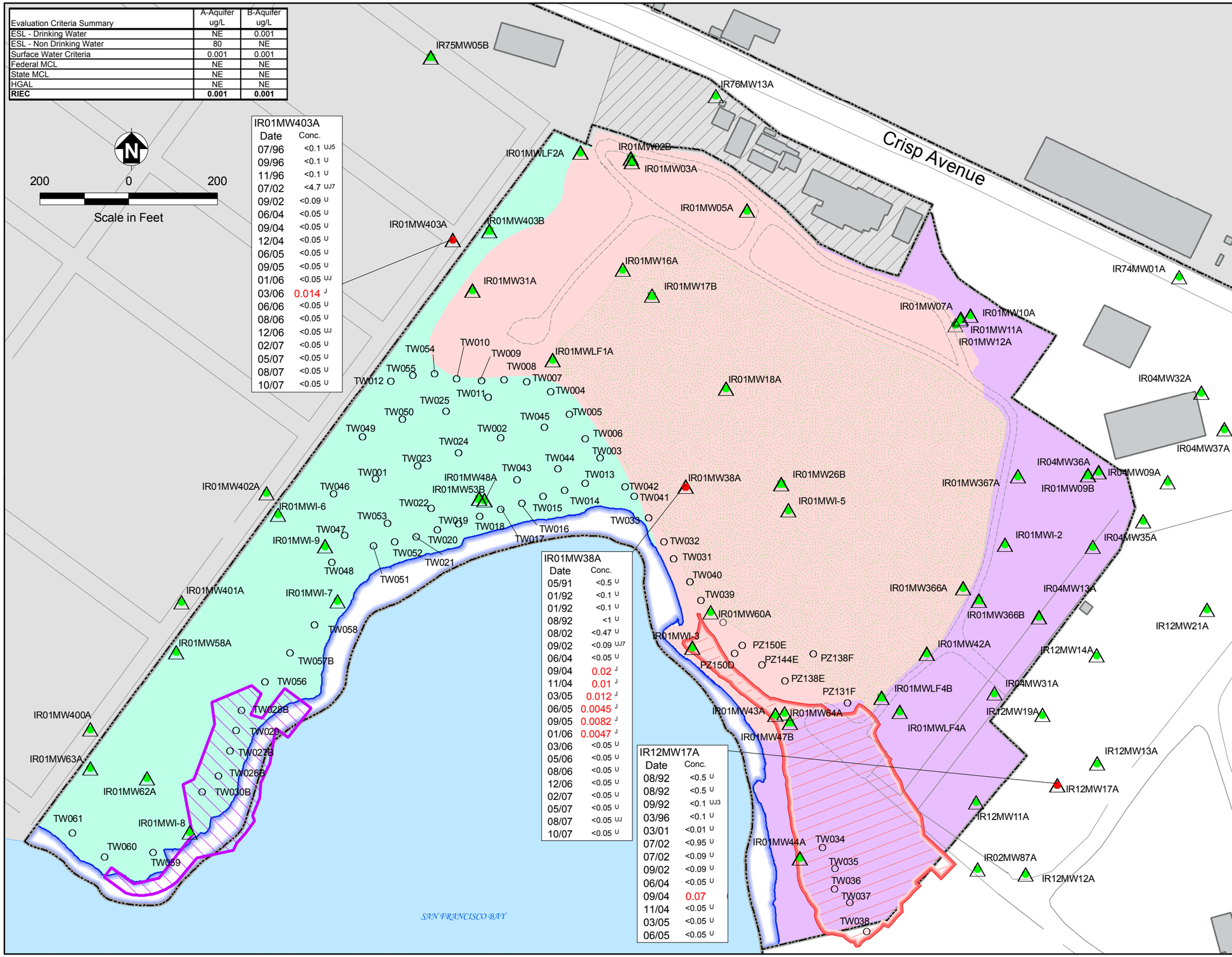
FIGURE 5-24

ZINC IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Metals\Zinc-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	0.001
ESL - Non Drinking Water	80	NE
Surface Water Criteria	0.001	0.001
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	NE	NE
RIEC	**0.001**	**0.001**



Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J

Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

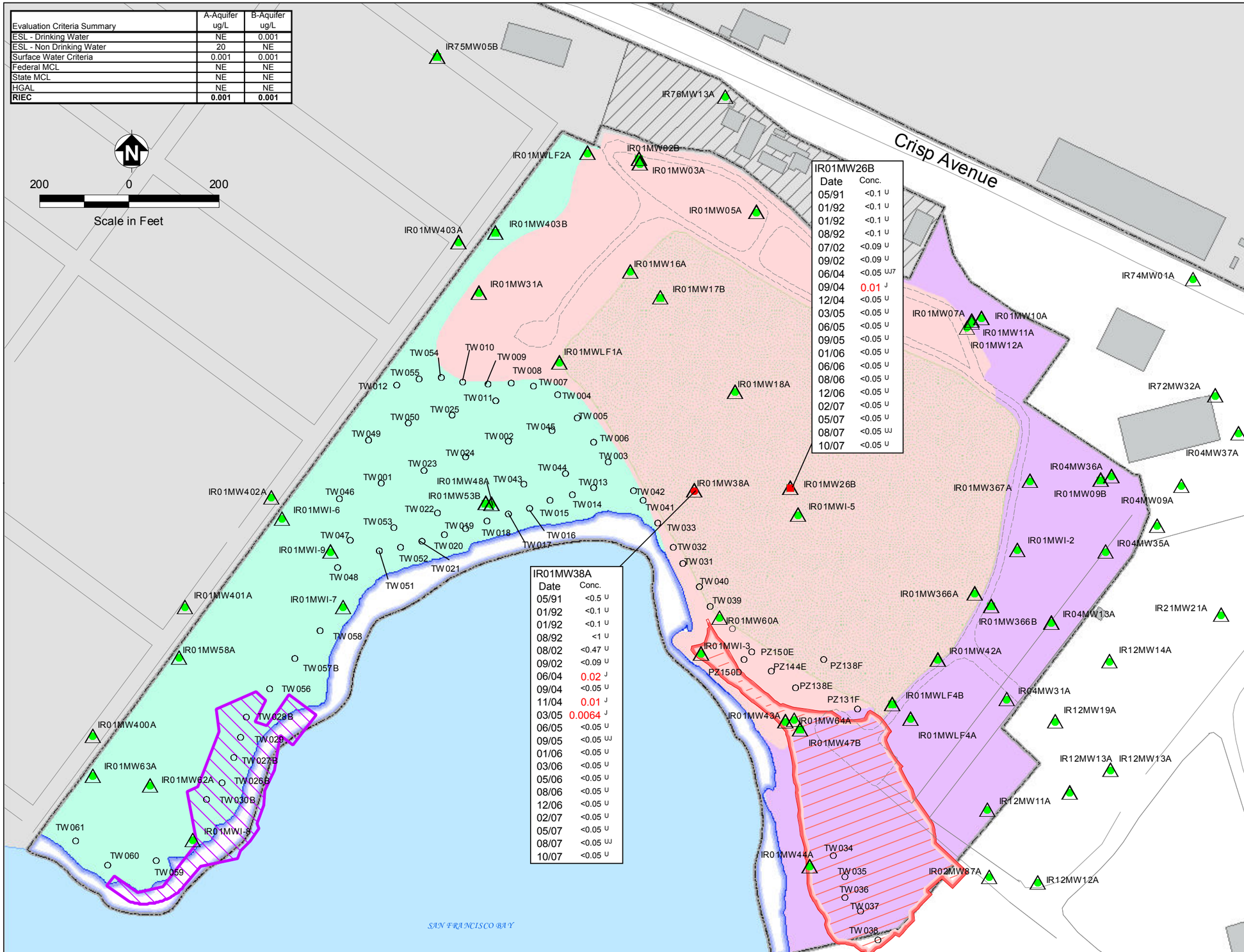
FIGURE 5-25

4,4'-DDD IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

2005-12-16 P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\4-4-DDD-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	0.001
ESL - Non Drinking Water	20	NE
Surface Water Criteria	0.001	0.001
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	NE	NE
RIEC	**0.001**	**0.001**



Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Sample Date (mm/yy) → Date / Conc.
05/07 527
08/07 646
10/07 633 J
← Chemical Concentration (µg/L) and Qualifier

ENGINEERING/REMEDIATION RESOURCES GROUP, INC.
ERRG

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

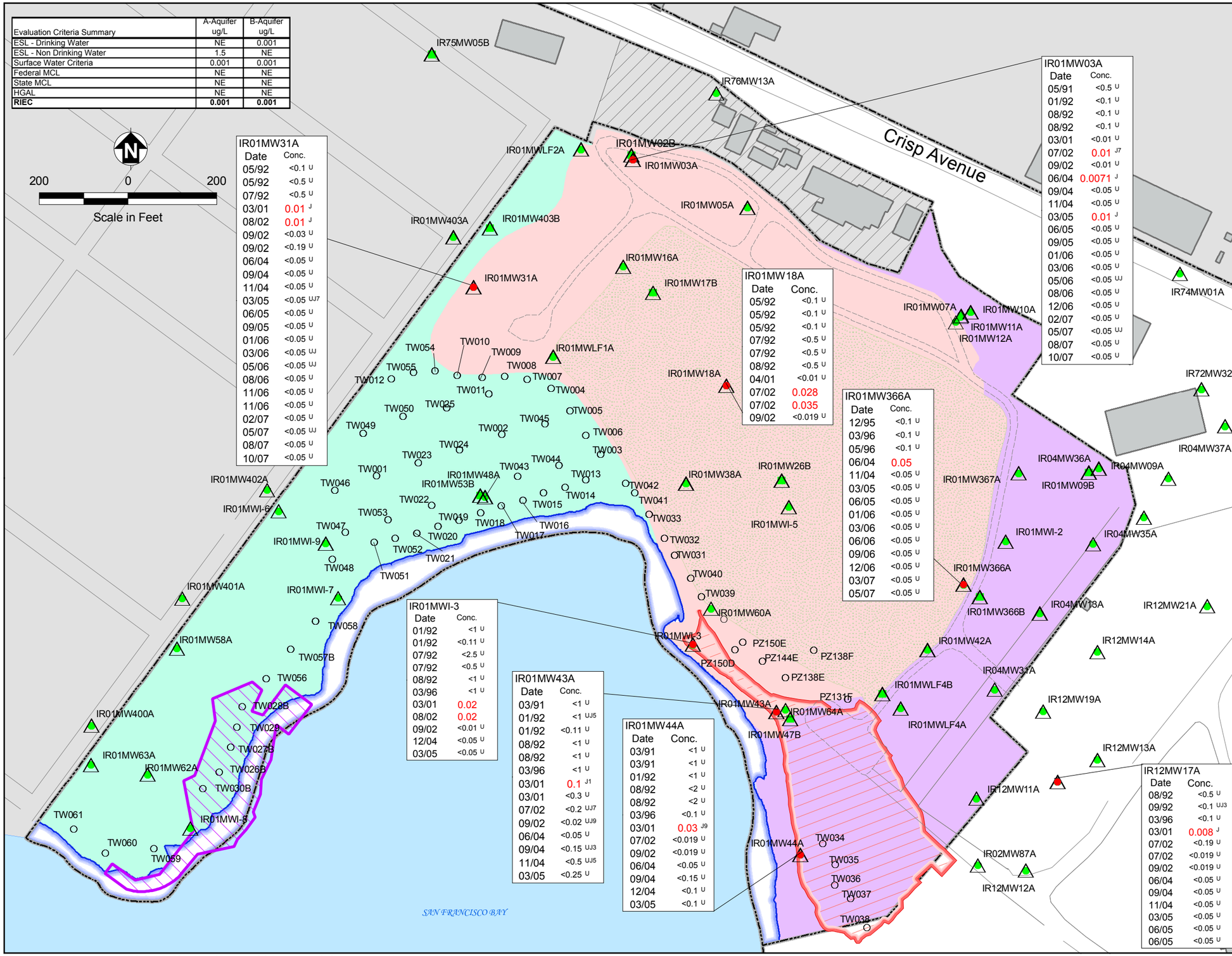
FIGURE 5-26

4,4'-DDE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Metals\4-4-DDE-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	0.001
ESL - Non Drinking Water	1.5	NE
Surface Water Criteria	0.001	0.001
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	NE	NE
RIEC	**0.001**	**0.001**



Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J
← Chemical Concentration (µg/L) and Qualifier
Sample Date (mm/yy) →

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

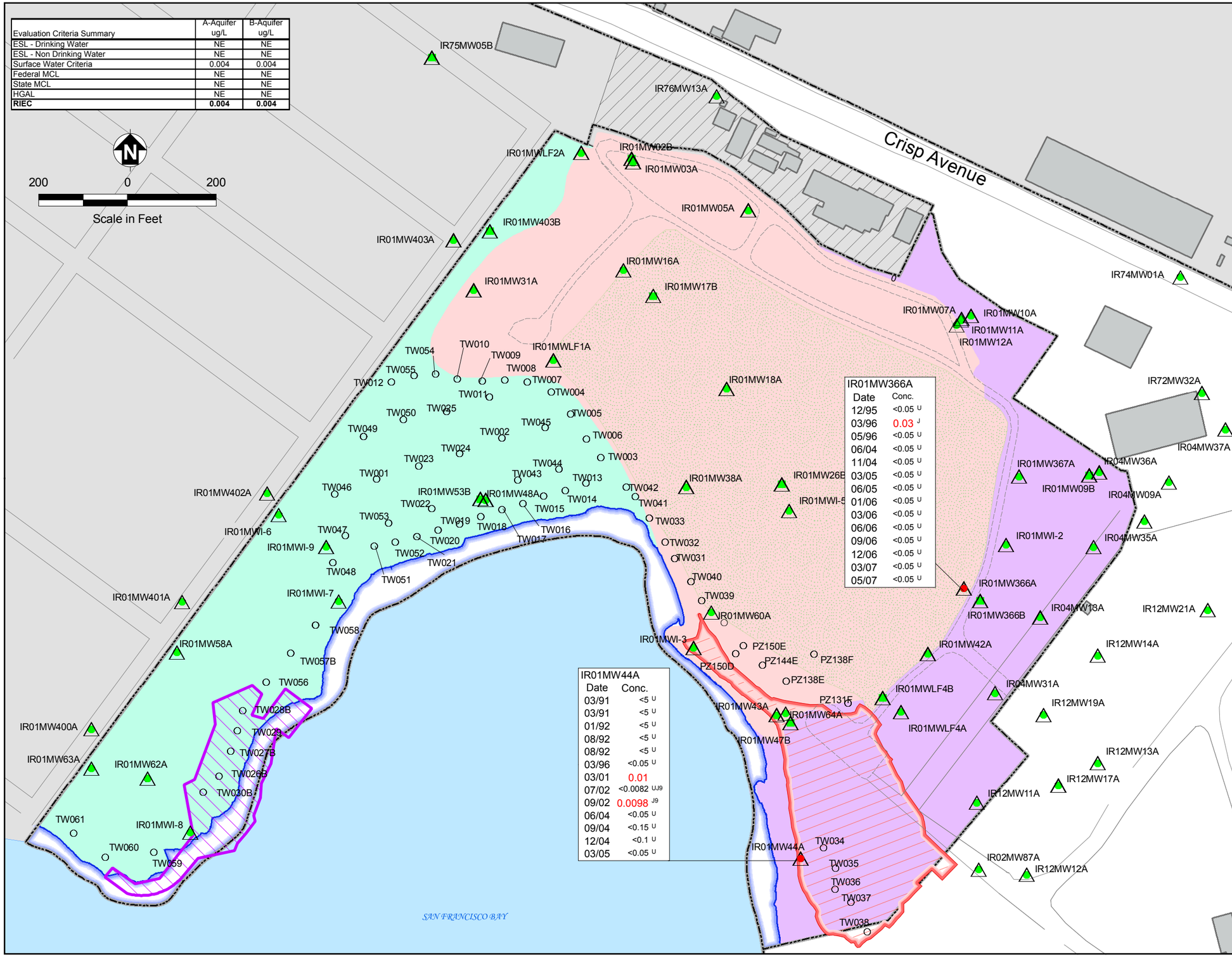
FIGURE 5-27

4,4'-DDT IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Metals\4-4-DDT-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	NE
ESL - Non Drinking Water	NE	NE
Surface Water Criteria	0.004	0.004
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	NE	NE
RIEC	**0.004**	**0.004**



Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J
Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

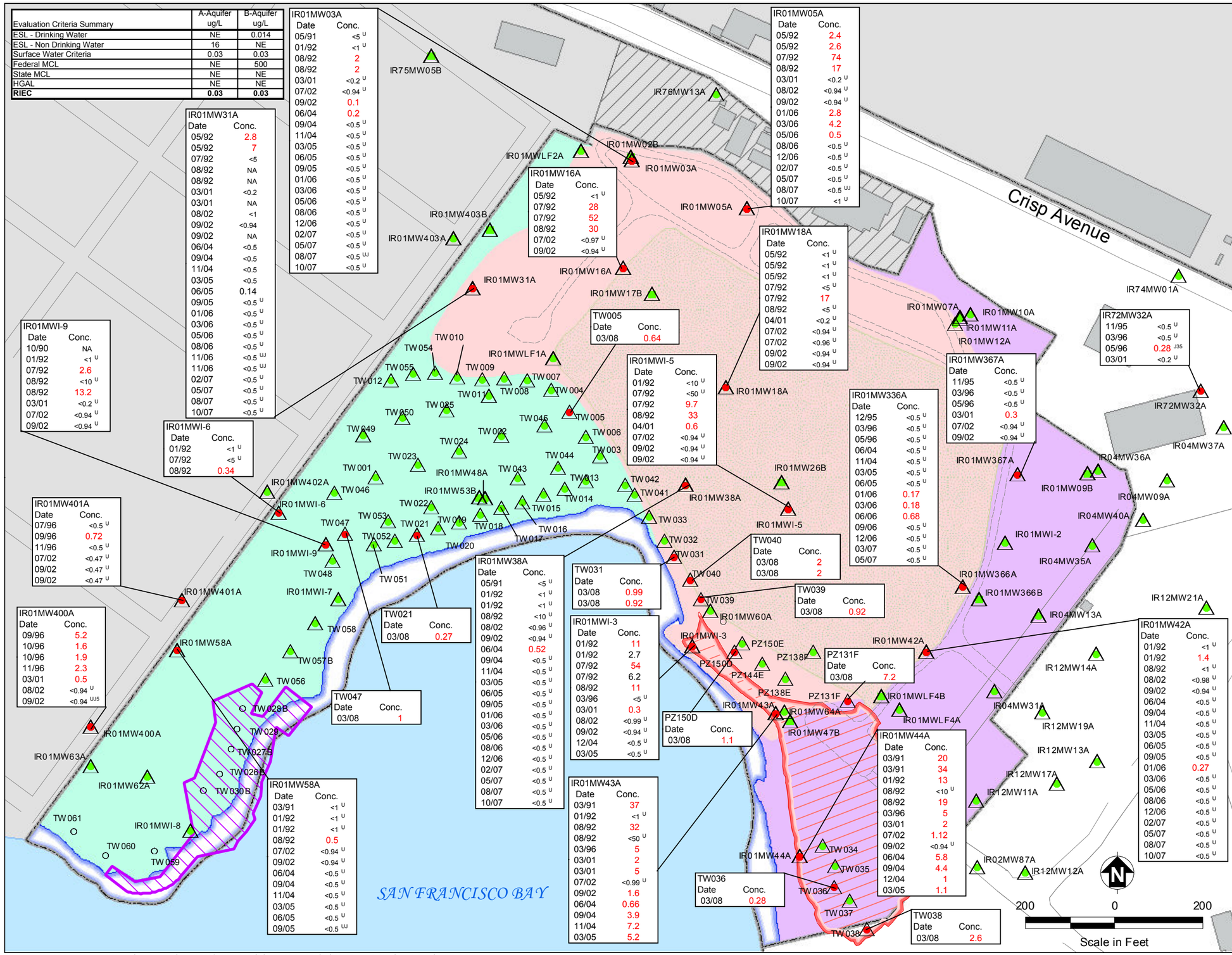
Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 5-28

ALPHA-CHLORDANE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Alpha-Chlordane-Wells.mxd



Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	0.014
ESL - Non Drinking Water	16	NE
Surface Water Criteria	0.03	0.03
Federal MCL	NE	500
State MCL	NE	NE
HGAL	NE	NE
RIEC	**0.03**	**0.03**

IR01MW03A

Date	Conc.
05/91	<5 U
01/92	<1 U
08/92	2
08/92	2
03/01	<0.2 U
07/02	<0.94 U
09/02	0.1
06/04	0.2
09/04	<0.5 U
11/04	<0.5 U
03/05	<0.5 U
06/05	<0.5 U
09/05	<0.5 U
01/06	<0.5 U
03/06	<0.5 U
05/06	<0.5 U
08/06	<0.5 U
12/06	<0.5 U
02/07	<0.5 U
05/07	<0.5 U
08/07	<0.5 UJ
10/07	<0.5 U

IR01MW05A

Date	Conc.
05/92	2.4
05/92	2.6
07/92	74
08/92	17
03/01	<0.2 U
08/02	<0.94 U
09/02	<0.94 U
01/06	2.8
03/06	4.2
05/06	0.5
08/06	<0.5 U
12/06	<0.5 U
02/07	<0.5 U
05/07	<0.5 U
08/07	<0.5 UJ
10/07	<1 U

IR01MW31A

Date	Conc.
05/92	2.8
05/92	7
07/92	<5
08/92	NA
08/92	NA
03/01	<0.2
03/01	NA
08/02	<1
09/02	<0.94
09/02	NA
06/04	<0.5
09/04	<0.5
11/04	<0.5
03/05	<0.5
06/05	0.14
09/05	<0.5 U
01/06	<0.5 U
03/06	<0.5 U
05/06	<0.5 U
08/06	<0.5 U
11/06	<0.5 UJ
11/06	<0.5 UJ
02/07	<0.5 U
05/07	<0.5 U
08/07	<0.5 U
10/07	<0.5 U

IR01MW16A

Date	Conc.
05/92	<1 U
07/92	28
07/92	52
08/92	30
07/02	<0.97 U
09/02	<0.94 U

IR01MW18A

Date	Conc.
05/92	<1 U
05/92	<1 U
05/92	<1 U
07/92	<5 U
07/92	17
08/92	<5 U
04/01	<0.2 U
07/02	<0.94 U
07/02	<0.96 U
09/02	<0.94 U
09/02	<0.94 U

IR01MWI-9

Date	Conc.
10/90	NA
01/92	<1 U
07/92	2.6
08/92	<10 U
08/92	13.2
03/01	<0.2 U
07/02	<0.94 U
09/02	<0.94 U

TW005

Date	Conc.
03/08	0.64

IR72MW32A

11/95	<0.5 U
03/96	<0.5 U
05/96	0.28 J35
03/01	<0.2 U

IR01MWI-5

Date	Conc.
01/92	<10 U
07/92	<50 U
07/92	9.7
08/92	33
04/01	0.6
07/02	<0.94 U
09/02	<0.94 U
09/02	<0.94 U

IR01MW367A

Date	Conc.
11/95	<0.5 U
03/96	<0.5 U
05/96	<0.5 U
03/01	0.3
07/02	<0.94 U
09/02	<0.94 U

IR01MW336A

Date	Conc.
12/95	<0.5 U
03/96	<0.5 U
05/96	<0.5 U
06/04	<0.5 U
11/04	<0.5 U
03/05	<0.5 U
06/05	<0.5 U
01/06	0.17
03/06	0.18
06/06	0.68
09/06	<0.5 U
12/06	<0.5 U
03/07	<0.5 U
05/07	<0.5 U

IR01MWI-6

Date	Conc.
01/92	<1 U
07/92	<5 U
08/92	0.34

IR01MW401A

Date	Conc.
07/96	<0.5 U
09/96	0.72
11/96	<0.5 U
07/02	<0.47 U
09/02	<0.47 U
09/02	<0.47 U

IR01MW38A

Date	Conc.
05/91	<5 U
01/92	<1 U
01/92	<1 U
08/92	<10 U
08/02	<0.96 U
09/02	<0.94 U
06/04	0.52
09/04	<0.5 U
11/04	<0.5 U
03/05	<0.5 U
06/05	<0.5 U
09/05	<0.5 U
01/06	<0.5 U
03/06	<0.5 U
05/06	<0.5 U
08/06	<0.5 U
12/06	<0.5 U
02/07	<0.5 U
05/07	<0.5 U
08/07	<0.5 U
10/07	<0.5 U

TW031

Date	Conc.
03/08	0.99
03/08	0.92

TW040

Date	Conc.
03/08	2
03/08	2

TW039

Date	Conc.
03/08	0.92

TW021

Date	Conc.
03/08	0.27

IR01MW400A

Date	Conc.
09/96	5.2
10/96	1.6
10/96	1.9
11/96	2.3
03/01	0.5
08/02	<0.94 U
09/02	<0.94 UJ5

IR01MWI-3

Date	Conc.
01/92	11
01/92	2.7
07/92	54
07/92	6.2
08/92	11
03/96	<5 U
03/01	0.3
08/02	<0.99 U
09/02	<0.94 U
12/04	<0.5 U
03/05	<0.5 U

PZ131F

Date	Conc.
03/08	7.2

IR01MW42A

Date	Conc.
01/92	<1 U
01/92	1.4
08/92	<1 U
08/02	<0.98 U
09/02	<0.94 U
06/04	<0.5 U
09/04	<0.5 U
11/04	<0.5 U
03/05	<0.5 U
06/05	<0.5 U
09/05	<0.5 U
01/06	0.27
03/06	<0.5 U
05/06	<0.5 U
08/06	<0.5 U
12/06	<0.5 U
02/07	<0.5 U
05/07	<0.5 U
08/07	<0.5 U
10/07	<0.5 U

TW047

Date	Conc.
03/08	1

PZ150D

Date	Conc.
03/08	1.1

IR01MW58A

Date	Conc.
03/91	<1 U
01/92	<1 U
01/92	<1 U
08/92	0.5
07/02	<0.94 U
09/02	<0.94 U
06/04	<0.5 U
09/04	<0.5 U
11/04	<0.5 U
03/05	<0.5 U
06/05	<0.5 U
09/05	<0.5 UJ

IR01MW43A

Date	Conc.
03/91	37
01/92	<1 U
08/92	32
08/92	<50 U
03/96	5
03/01	2
03/01	5
07/02	<0.99 U
09/02	1.6
06/04	0.66
09/04	3.9
11/04	7.2
03/05	5.2

IR01MW44A

Date	Conc.
03/91	20
03/91	34
01/92	13
08/92	<10 U
08/92	19
03/96	5
03/01	2
07/02	1.12
09/02	<0.94 U
06/04	5.8
09/04	4.4
12/04	1
03/05	1.1

TW036

Date	Conc.
03/08	0.28

TW038

Date	Conc.
03/08	2.6

Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
µg/L = microgram per liter

Well ID → IR01MW60A

Date	Conc.
05/07	527
08/07	646
10/07	633 J

Sample Date (mm/yy) → Date; Chemical Concentration (µg/L) and Qualifier → Conc.

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California

U.S. Department of the Navy, BRAC PMO West, San Diego, California

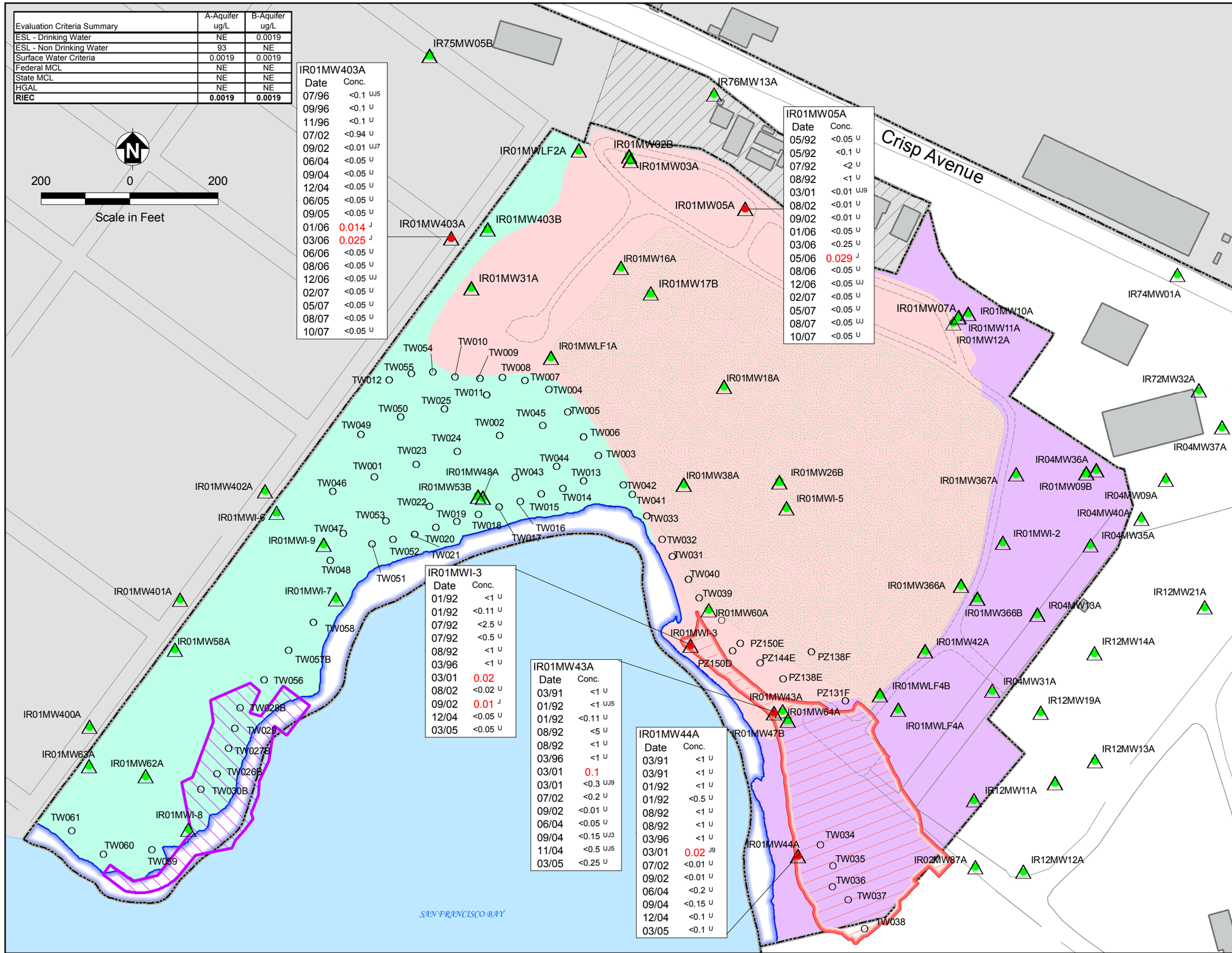
FIGURE 5-29

TOTAL PCBs IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\PCB\Total PCB-wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	0.0019
ESL - Non Drinking Water	93	NE
Surface Water Criteria	0.0019	0.0019
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	NE	NE
RIEC	**0.0019**	**0.0019**



Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J

Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

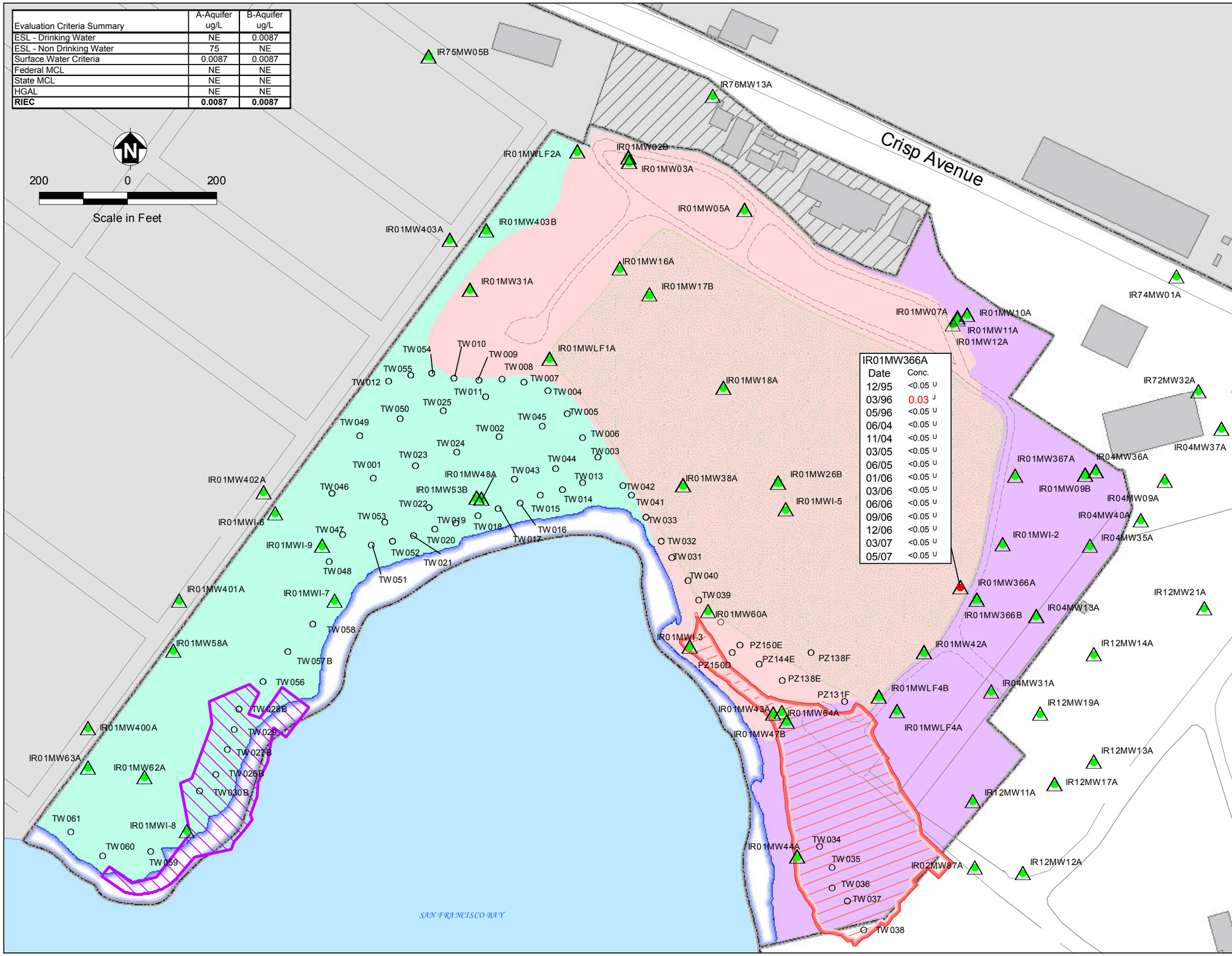
FIGURE 5-30

DIELDRIN IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

2005-12-16 P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Dieldrin-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	0.0087
ESL - Non Drinking Water	75	NE
Surface Water Criteria	0.0087	0.0087
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	NE	NE
RIEC	**0.0087**	**0.0087**



Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
µg/L = microgram per liter

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J

Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

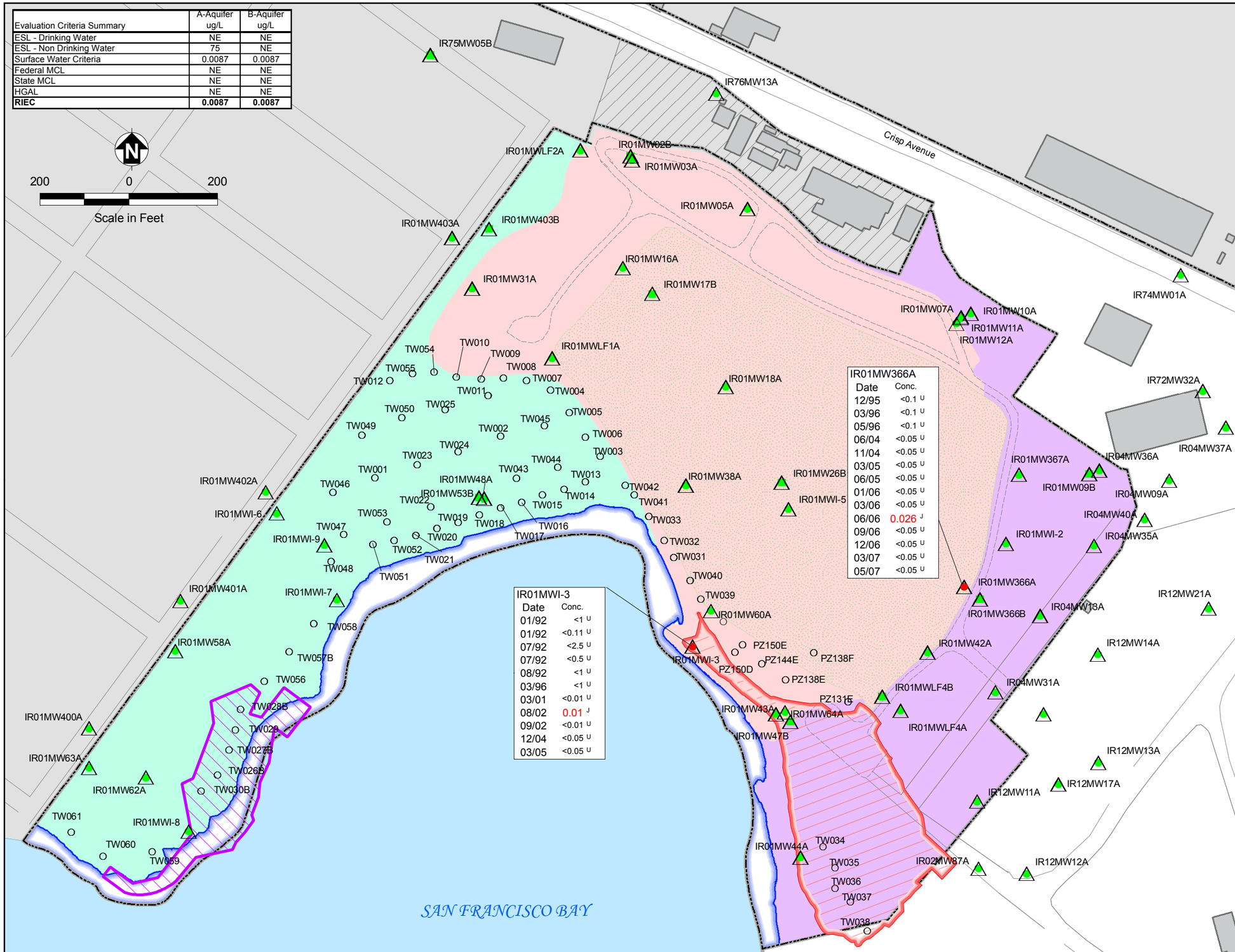
FIGURE 5-31

ENDOSULFAN I IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Endosulfan-I-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	NE
ESL - Non Drinking Water	75	NE
Surface Water Criteria	0.0087	0.0087
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	NE	NE
RIEC	**0.0087**	**0.0087**



Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
µg/L = microgram per liter

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J

Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 5-32

ENDOSULFAN II IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

2005-12-16 P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Endosulfan-II-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	0.0023
ESL - Non Drinking Water	130	NE
Surface Water Criteria	0.0023	0.0023
Federal MCL	NE	2
State MCL	NE	2
HGAL	NE	NE
RIEC	**0.0023**	**0.0023**

Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J

Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

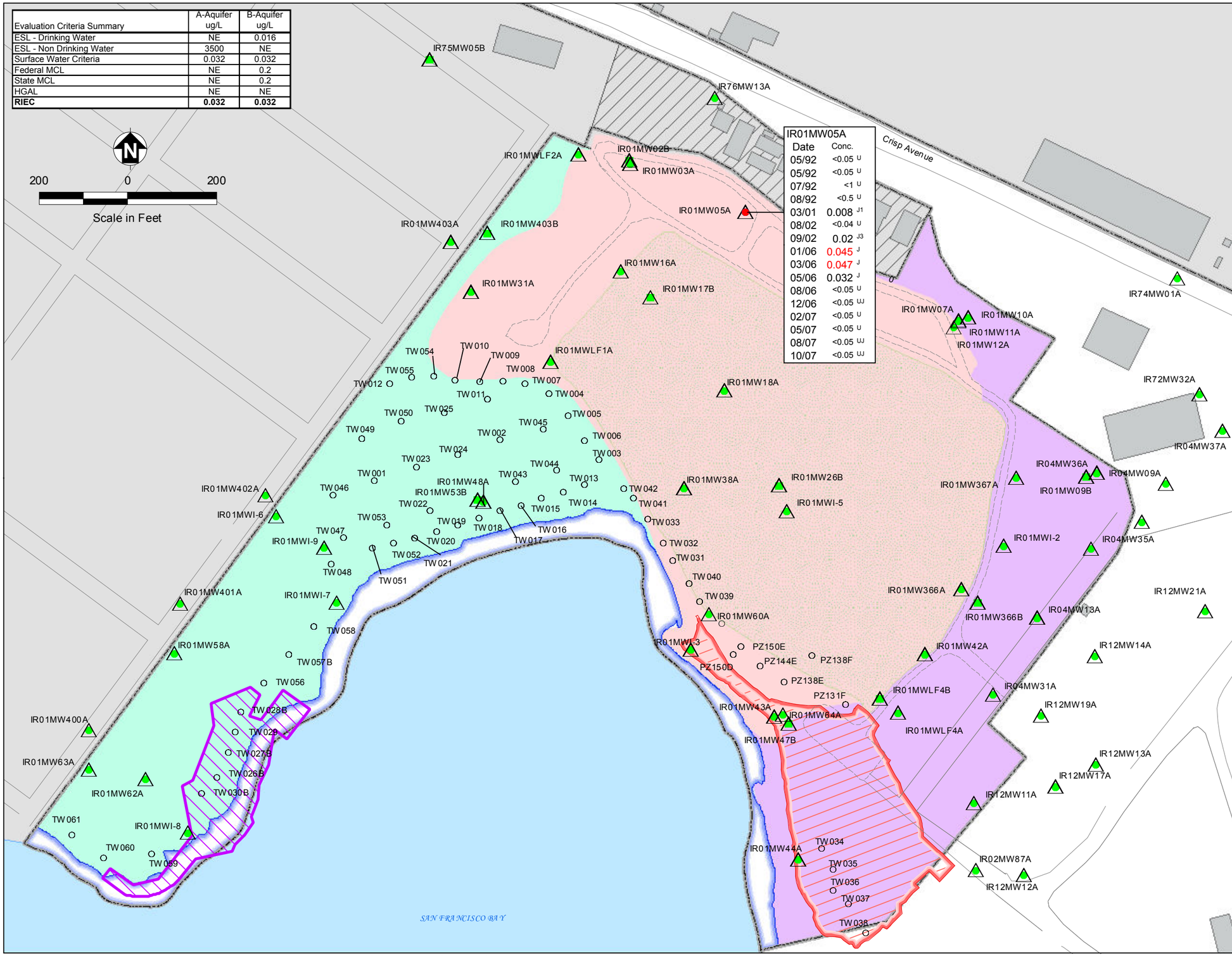
FIGURE 5-33

ENDRIN IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

2005-12-16 P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Endrin-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	0.016
ESL - Non Drinking Water	3500	NE
Surface Water Criteria	0.032	0.032
Federal MCL	NE	0.2
State MCL	NE	0.2
HGAL	NE	NE
RIEC	**0.032**	**0.032**



IR01MW05A		
Date	Conc.	
05/92	<0.05	U
05/92	<0.05	U
07/92	<1	U
08/92	<0.5	U
03/01	0.008	J1
08/02	<0.04	U
09/02	0.02	J3
01/06	0.045	J
03/06	0.047	J
05/06	0.032	J
08/06	<0.05	U
12/06	<0.05	UJ
02/07	<0.05	U
05/07	<0.05	U
08/07	<0.05	UJ
10/07	<0.05	UJ

Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Sample Date (mm/yy) → Date / Conc.
05/07 527
08/07 646
10/07 633 J
← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

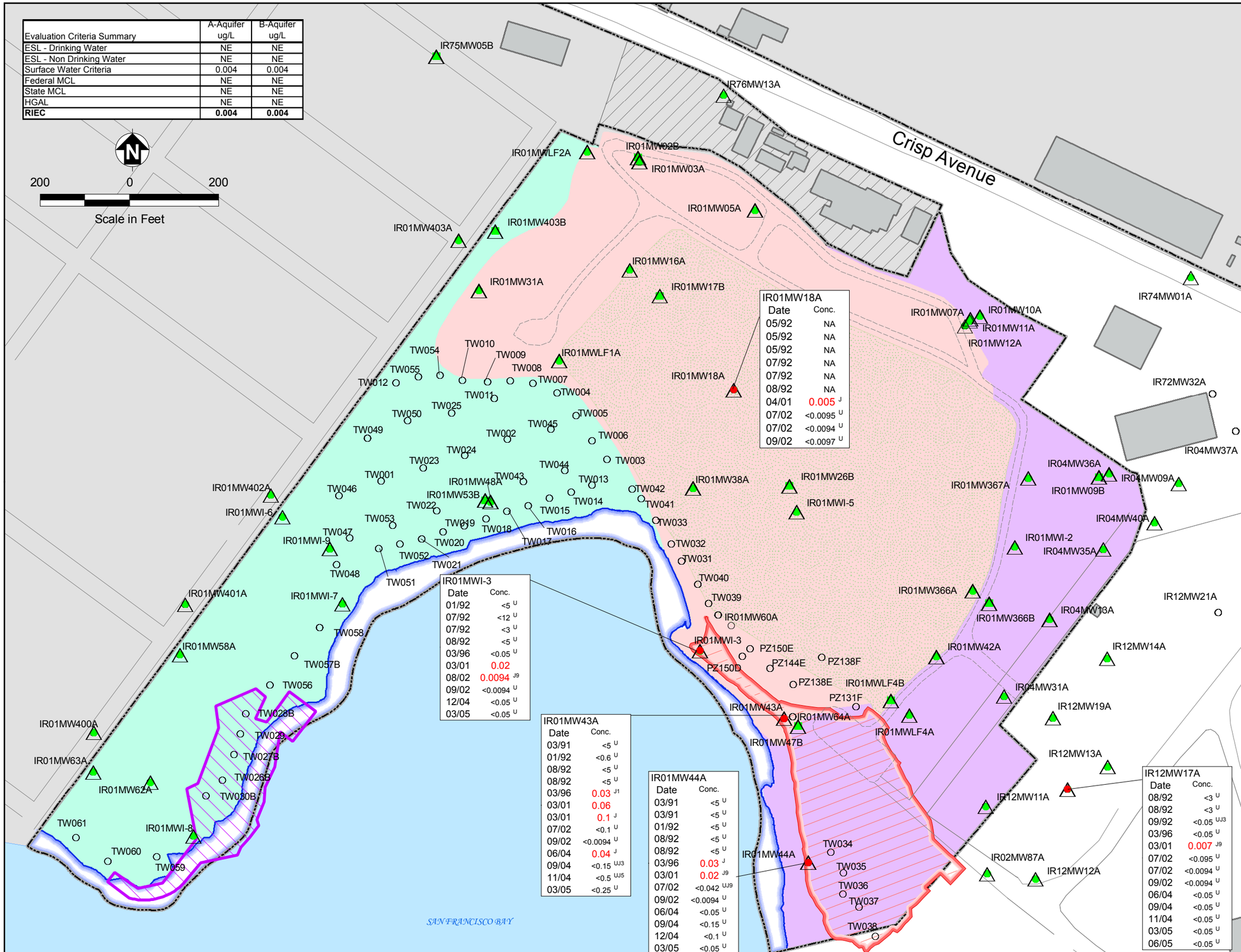
FIGURE 5-34

GAMMA-BHC (LINDANE) IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

2005-12-16 P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\GAMMA-BHC-LINDANE-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	NE
ESL - Non Drinking Water	NE	NE
Surface Water Criteria	0.004	0.004
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	NE	NE
RIEC	**0.004**	**0.004**



Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J
← Chemical Concentration (µg/L) and Qualifier
Sample Date (mm/yy) →

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

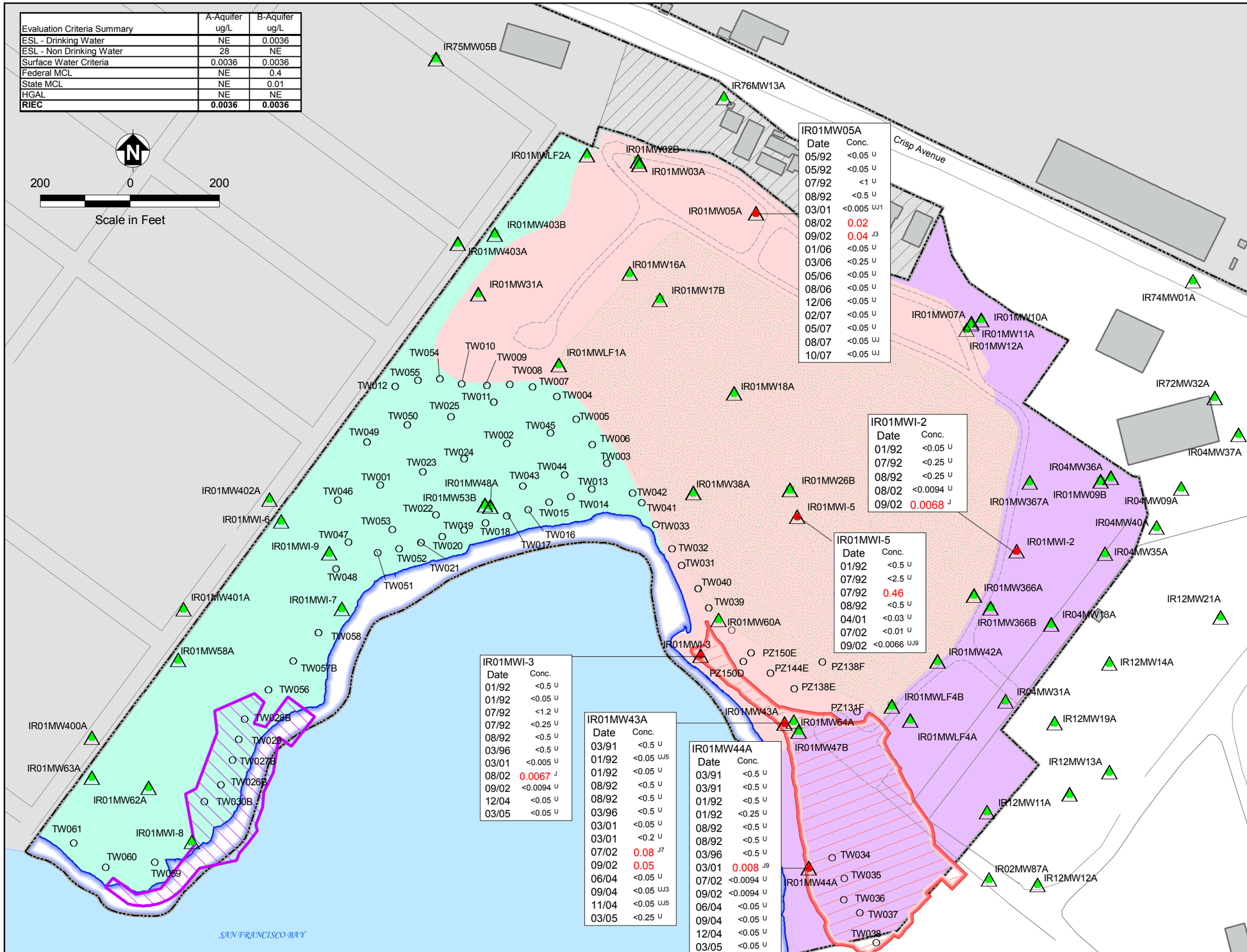
FIGURE 5-35

GAMMA-CHLORDANE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

2005-12-16 P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Gamma-Chlordane-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	0.0036
ESL - Non Drinking Water	28	NE
Surface Water Criteria	0.0036	0.0036
Federal MCL	NE	0.4
State MCL	NE	0.01
HGAL	NE	NE
RIEC	**0.0036**	**0.0036**



IR01MW05A

Date	Conc.
05/92	<0.05 U
05/92	<0.05 U
07/92	<1 U
08/92	<0.5 U
03/01	<0.005 UJ1
08/02	0.02
09/02	0.04 J3
01/06	<0.05 U
03/06	<0.25 U
05/06	<0.05 U
08/06	<0.05 U
12/06	<0.05 U
02/07	<0.05 U
05/07	<0.05 U
08/07	<0.05 UJ
10/07	<0.05 UJ

IR01MWI-2

Date	Conc.
01/92	<0.05 U
07/92	<0.25 U
08/92	<0.25 U
08/02	<0.0094 U
09/02	0.0068 J

IR01MWI-5

Date	Conc.
01/92	<0.5 U
07/92	<2.5 U
07/92	0.46
08/92	<0.5 U
04/01	<0.03 U
07/02	<0.01 U
09/02	<0.0066 UJ9

IR01MWI-3

Date	Conc.
01/92	<0.5 U
01/92	<0.05 U
07/92	<1.2 U
07/92	<0.25 U
08/92	<0.5 U
03/96	<0.5 U
03/01	<0.005 U
08/02	0.0067 J
09/02	<0.0094 U
12/04	<0.05 U
03/05	<0.05 U

IR01MW43A

Date	Conc.
03/91	<0.5 U
01/92	<0.05 UJ5
01/92	<0.05 U
08/92	<0.5 U
08/92	<0.5 U
03/96	<0.5 U
03/01	<0.05 U
03/01	<0.2 U
07/02	0.08 J7
09/02	0.05
06/04	<0.05 U
09/04	<0.05 UJ3
11/04	<0.05 UJ5
03/05	<0.25 U

IR01MW44A

Date	Conc.
03/91	<0.5 U
03/91	<0.5 U
01/92	<0.5 U
01/92	<0.25 U
08/92	<0.5 U
08/92	<0.5 U
03/96	<0.5 U
03/01	0.008 J9
07/02	<0.0094 U
09/02	<0.0094 U
06/04	<0.05 U
09/04	<0.05 U
12/04	<0.05 U
03/05	<0.05 U

- Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
- A-aquifer Well
- B-aquifer Well
- Not Analyzed for Analyte
- Analyte Not Detected
- Analyte Exceeds Reporting Limit
- Analyte Exceeds Criterion
- Road
- Gravel Road
- Metal Slag Area (2007 excavation limit)[a]
- PCB Hot Spot Area (2007 excavation limit)[a]
- Limit of Landfill Cap
- Parcel Boundary
- Building
- UCSF Compound
- Landfill Area
- East Adjacent Area
- Panhandle Area
- Shoreline Area
- San Francisco Bay
- Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A

Date	Conc.
05/07	527
08/07	646
10/07	633 J

Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California

U.S. Department of the Navy, BRAC PMO West, San Diego, California

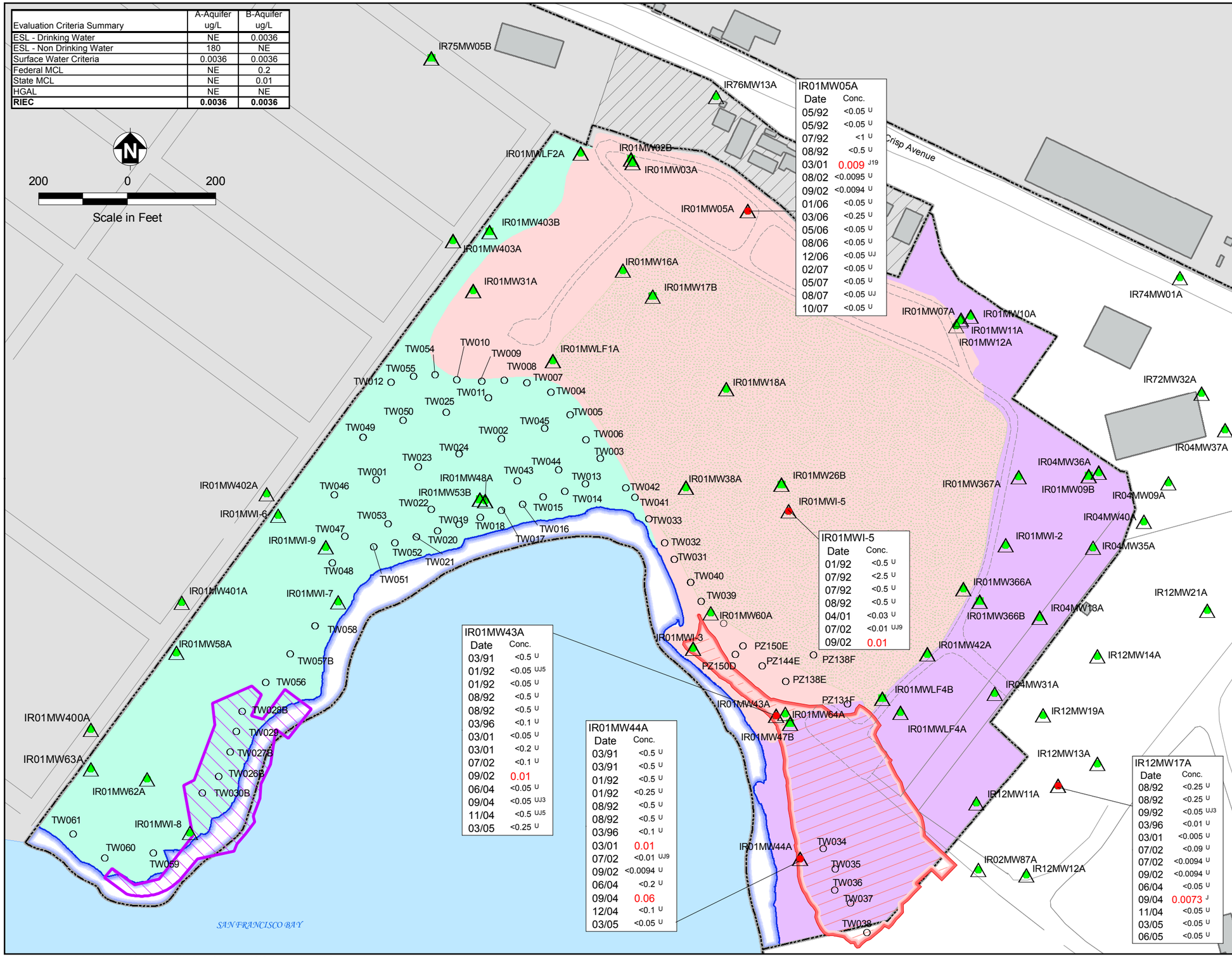
FIGURE 5-36

HEPTACHLOR IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Heptachlor-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	0.0036
ESL - Non Drinking Water	180	NE
Surface Water Criteria	0.0036	0.0036
Federal MCL	NE	0.2
State MCL	NE	0.01
HGAL	NE	NE
RIEC	**0.0036**	**0.0036**



IR01MW05A Date	Conc.
05/92	<0.05 U
05/92	<0.05 U
07/92	<1 U
08/92	<0.5 U
03/01	0.009 J19
08/02	<0.0095 U
09/02	<0.0094 U
01/06	<0.05 U
03/06	<0.25 U
05/06	<0.05 U
08/06	<0.05 U
12/06	<0.05 UJ
02/07	<0.05 U
05/07	<0.05 U
08/07	<0.05 UJ
10/07	<0.05 U

IR01MWI-5 Date	Conc.
01/92	<0.5 U
07/92	<2.5 U
07/92	<0.5 U
08/92	<0.5 U
04/01	<0.03 U
07/02	<0.01 UJ9
09/02	0.01

IR01MW43A Date	Conc.
03/91	<0.5 U
01/92	<0.05 UJ5
01/92	<0.05 U
08/92	<0.5 U
08/92	<0.5 U
03/96	<0.1 U
03/01	<0.05 U
03/01	<0.2 U
07/02	<0.1 U
09/02	0.01
06/04	<0.05 U
09/04	<0.05 UJ3
11/04	<0.5 UJ5
03/05	<0.25 U

IR01MW44A Date	Conc.
03/91	<0.5 U
03/91	<0.5 U
01/92	<0.5 U
01/92	<0.25 U
08/92	<0.5 U
08/92	<0.5 U
03/96	<0.1 U
03/01	0.01
07/02	<0.01 UJ9
09/02	<0.0094 U
06/04	<0.2 U
09/04	0.06
12/04	<0.1 U
03/05	<0.05 U

IR12MW17A Date	Conc.
08/92	<0.25 U
08/92	<0.25 U
09/92	<0.05 UJ3
03/96	<0.01 U
03/01	<0.005 U
07/02	<0.09 U
07/02	<0.0094 U
09/02	<0.0094 U
06/04	<0.05 U
09/04	0.0073 J
11/04	<0.05 U
03/05	<0.05 U
06/05	<0.05 U

- Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
- A-aquifer Well
- B-aquifer Well
- Not Analyzed for Analyte
- Analyte Not Detected
- Analyte Exceeds Reporting Limit
- Analyte Exceeds Criterion
- Road
- Gravel Road
- Metal Slag Area (2007 excavation limit)[a]
- PCB Hot Spot Area (2007 excavation limit)[a]
- Limit of Landfill Cap
- Parcel Boundary
- Building
- UCSF Compound
- Landfill Area
- East Adjacent Area
- Panhandle Area
- Shoreline Area
- San Francisco Bay
- Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Sample Date (mm/yy) → Date / Conc.
05/07 527
08/07 646
10/07 633 J ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

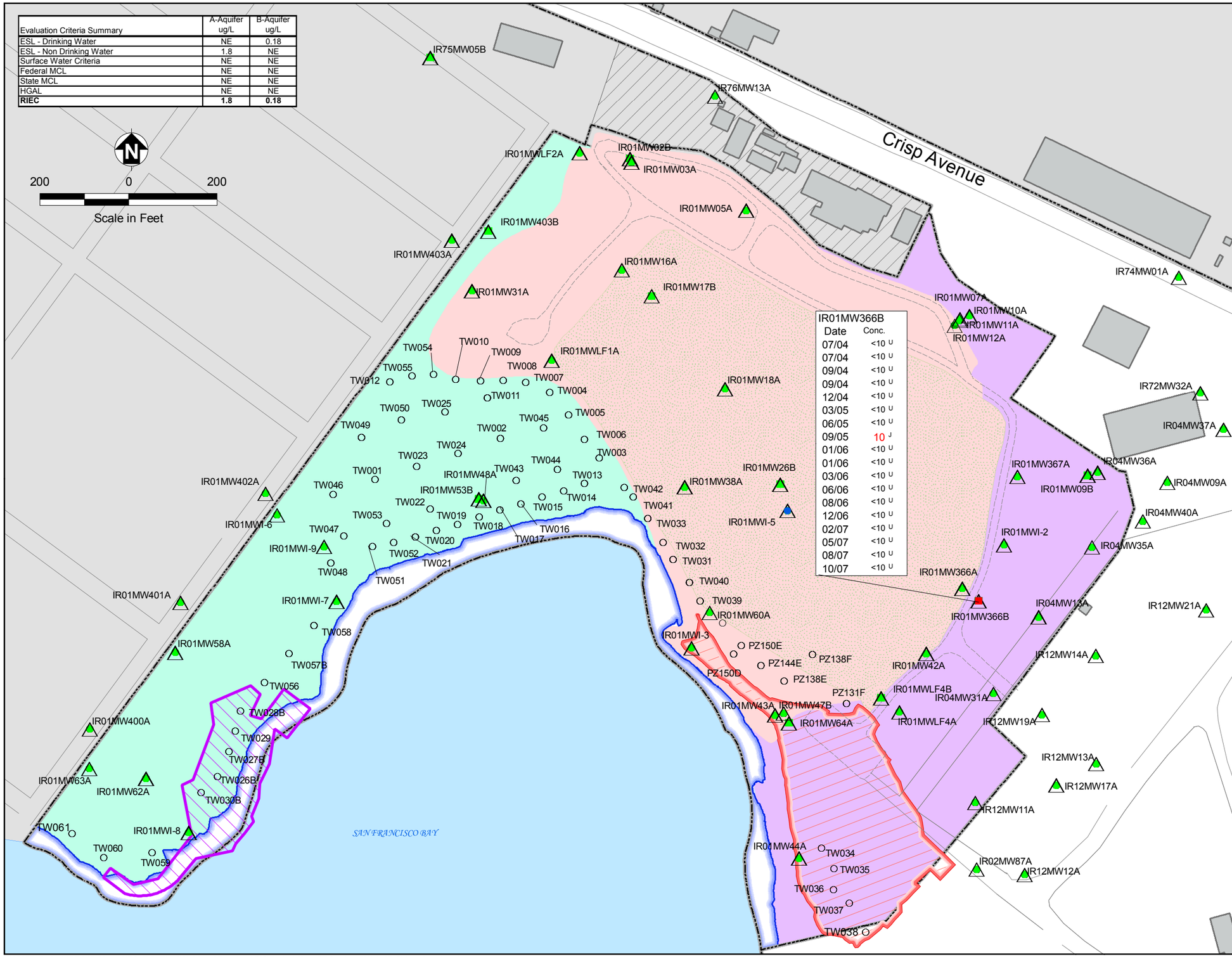
FIGURE 5-37

HEPTACHLOR EPOXIDE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Heptachlor-Epoxide-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	0.18
ESL - Non Drinking Water	1.8	NE
Surface Water Criteria	NE	NE
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	NE	NE
RIEC	**1.8**	**0.18**



IR01MW366B

Date	Conc.
07/04	<10 U
07/04	<10 U
09/04	<10 U
09/04	<10 U
12/04	<10 U
03/05	<10 U
06/05	<10 U
09/05	10 J
01/06	<10 U
01/06	<10 U
03/06	<10 U
06/06	<10 U
08/06	<10 U
12/06	<10 U
02/07	<10 U
05/07	<10 U
08/07	<10 U
10/07	<10 U

- Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
- A-aquifer Well
- B-aquifer Well
- Not Analyzed for Analyte
- Analyte Not Detected
- Analyte Exceeds Reporting Limit
- Analyte Exceeds Criterion
- Road
- Gravel Road
- Metal Slag Area (2007 excavation limit)[a]
- PCB Hot Spot Area (2007 excavation limit)[a]
- Limit of Landfill Cap
- Parcel Boundary
- Building
- UCSF Compound
- Landfill Area
- East Adjacent Area
- Panhandle Area
- Shoreline Area
- San Francisco Bay
- Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A

Date	Conc.
05/07	527
08/07	646
10/07	633 J

Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

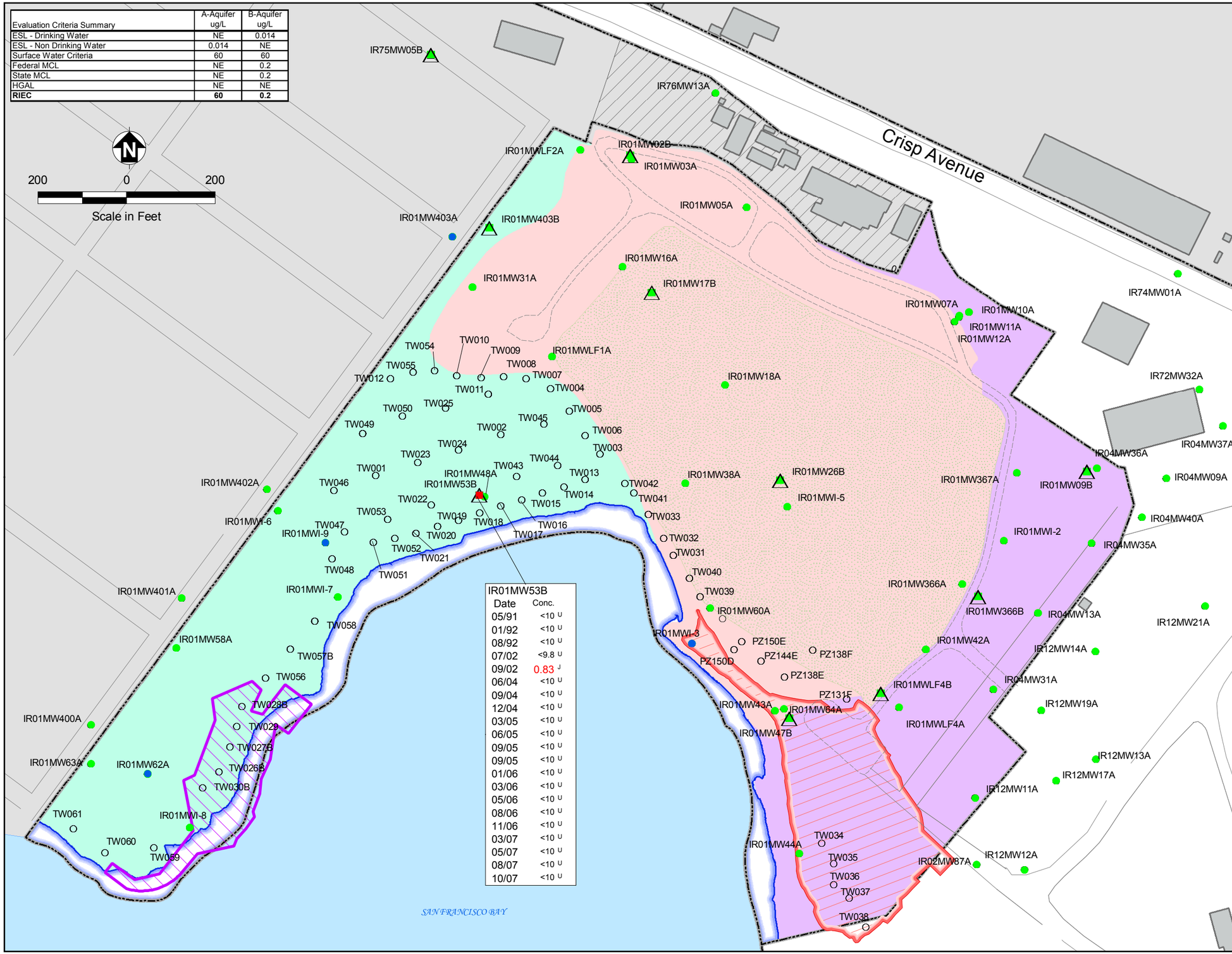
FIGURE 5-38

2-CHLOROPHENOL IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\2-Chlorophenol.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	0.014
ESL - Non Drinking Water	0.014	NE
Surface Water Criteria	60	60
Federal MCL	NE	0.2
State MCL	NE	0.2
HGAL	NE	NE
RIEC	**60**	**0.2**



IR01MW53B Date	Conc.
05/91	<10 U
01/92	<10 U
08/92	<10 U
07/02	<9.8 U
09/02	0.83 J
06/04	<10 U
09/04	<10 U
12/04	<10 U
03/05	<10 U
06/05	<10 U
09/05	<10 U
09/05	<10 U
01/06	<10 U
03/06	<10 U
05/06	<10 U
08/06	<10 U
11/06	<10 U
03/07	<10 U
05/07	<10 U
08/07	<10 U
10/07	<10 U

Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
µg/L = microgram per liter

Well ID → IR01MW60A

Date	Conc.
05/07	527
08/07	646
10/07	633 J

Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

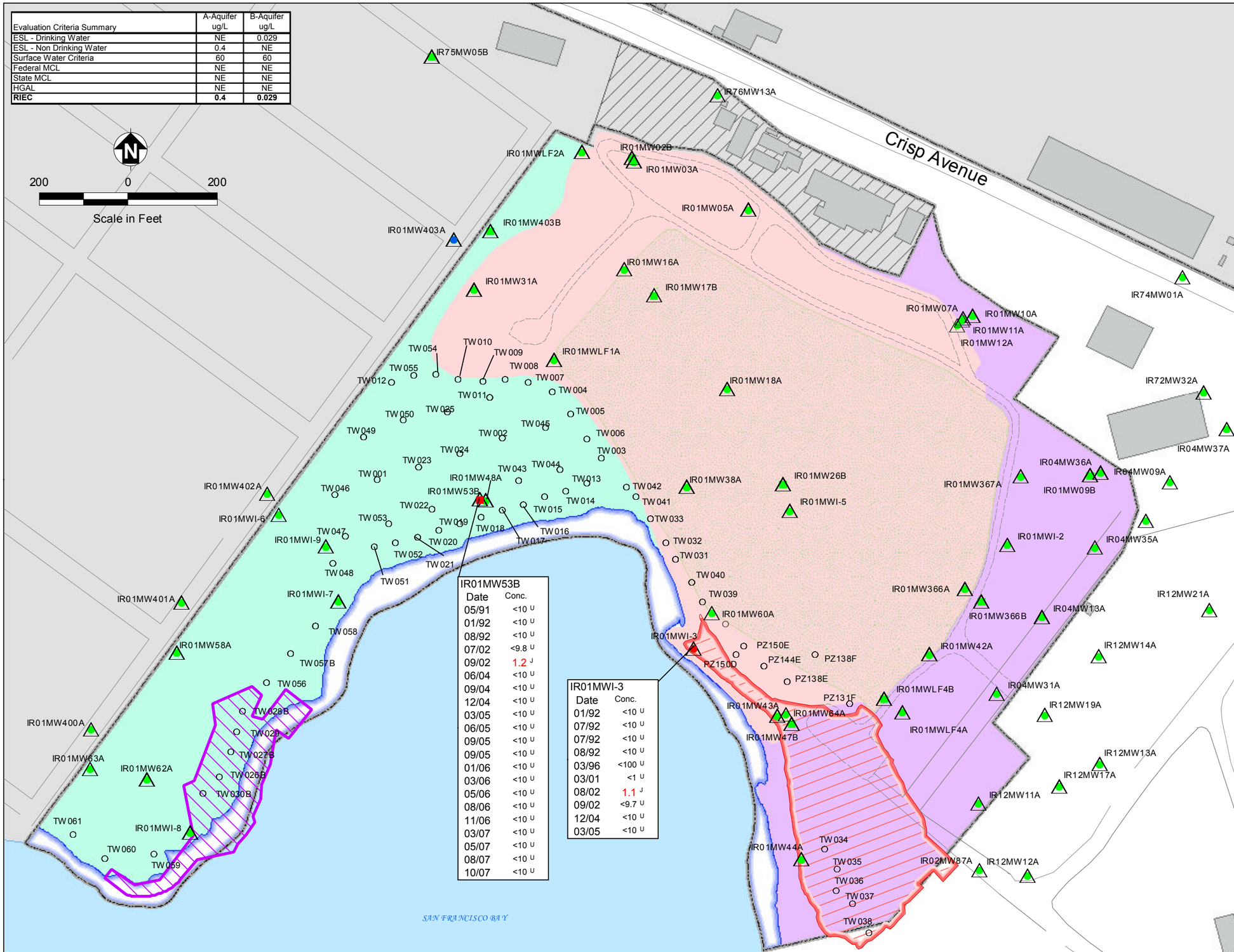
FIGURE 5-39

BENZO (A) PYRENE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Benzo-a-pyrene-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	0.029
ESL - Non Drinking Water	0.4	NE
Surface Water Criteria	60	60
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	NE	NE
RIEC	**0.4**	**0.029**



Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
µg/L = microgram per liter

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J
Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

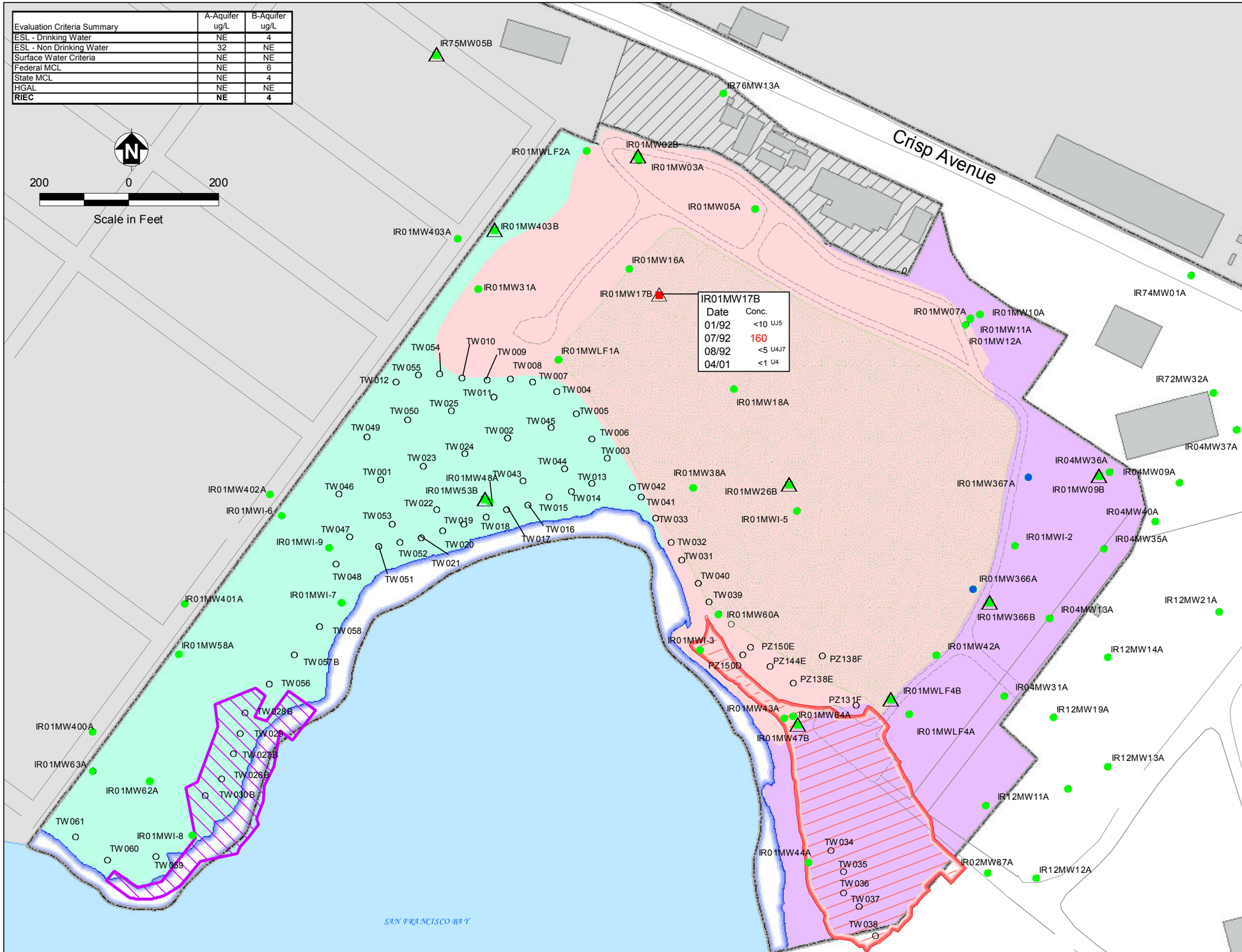
FIGURE 5-40

BENZO (K) FLUORANTHENE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Benzo-k-Fluoranthene-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	4
ESL - Non Drinking Water	32	NE
Surface Water Criteria	NE	NE
Federal MCL	NE	6
State MCL	NE	4
HGAL	NE	NE
RIEC	**NE**	**4**



- Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
- A-aquifer Well
- B-aquifer Well
- Not Analyzed for Analyte
- Analyte Not Detected
- Analyte Exceeds Reporting Limit
- Analyte Exceeds Criterion
- Road
- Gravel Road
- Metal Slag Area (2007 excavation limit)[a]
- PCB Hot Spot Area (2007 excavation limit)[a]
- Limit of Landfill Cap
- Parcel Boundary
- Building
- UCSF Compound
- Landfill Area
- East Adjacent Area
- Panhandle Area
- Shoreline Area
- San Francisco Bay
- Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J

Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ENGINEERING/REMEDIATION RESOURCES GROUP, INC.
ERRG

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

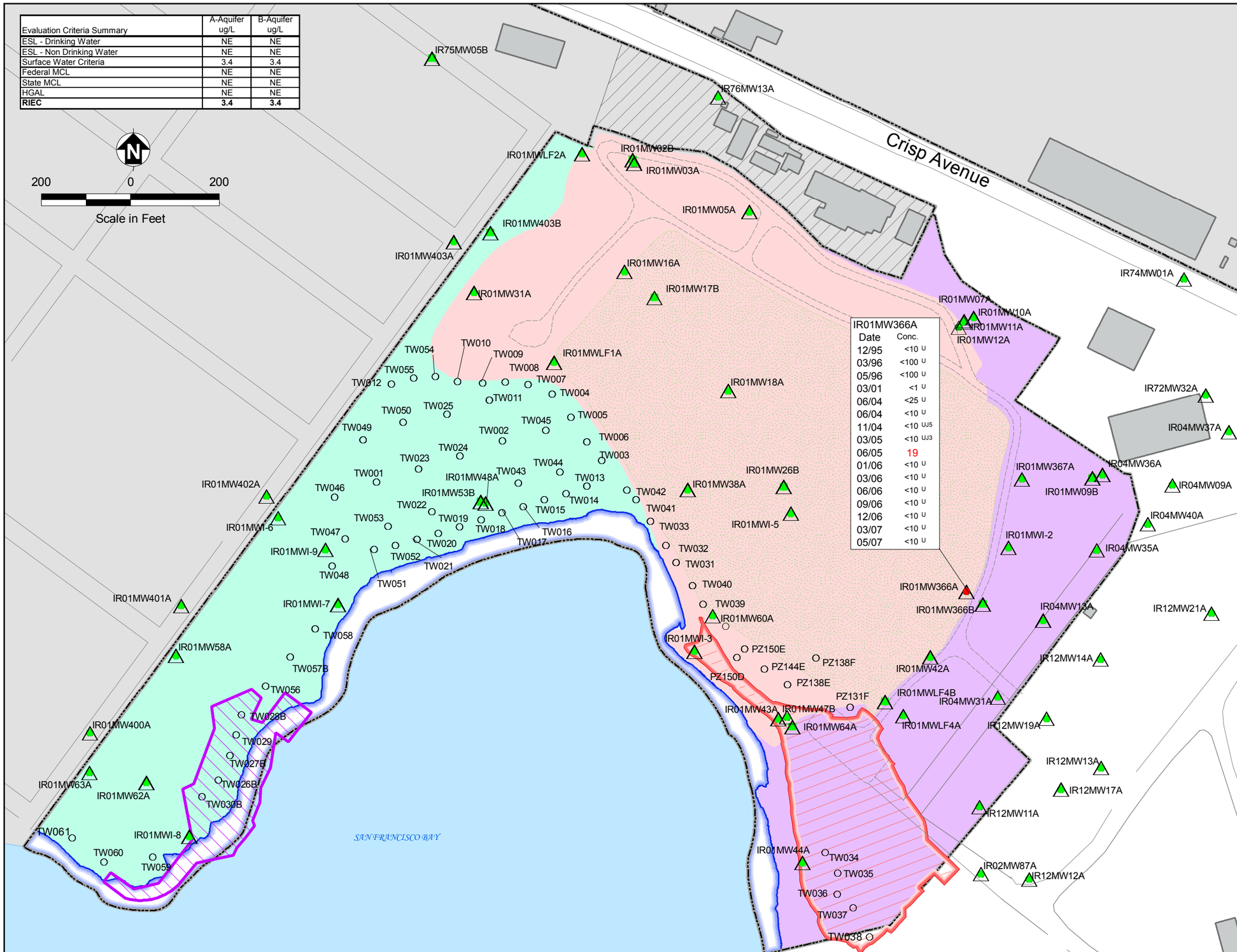
FIGURE 5-41

BIS (2-ETHYLHEXYL) PHTHALATE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\bis-2-Ethylhexyl-Phthalate-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	NE
ESL - Non Drinking Water	NE	NE
Surface Water Criteria	3.4	3.4
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	NE	NE
RIEC	**3.4**	**3.4**



Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J

Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

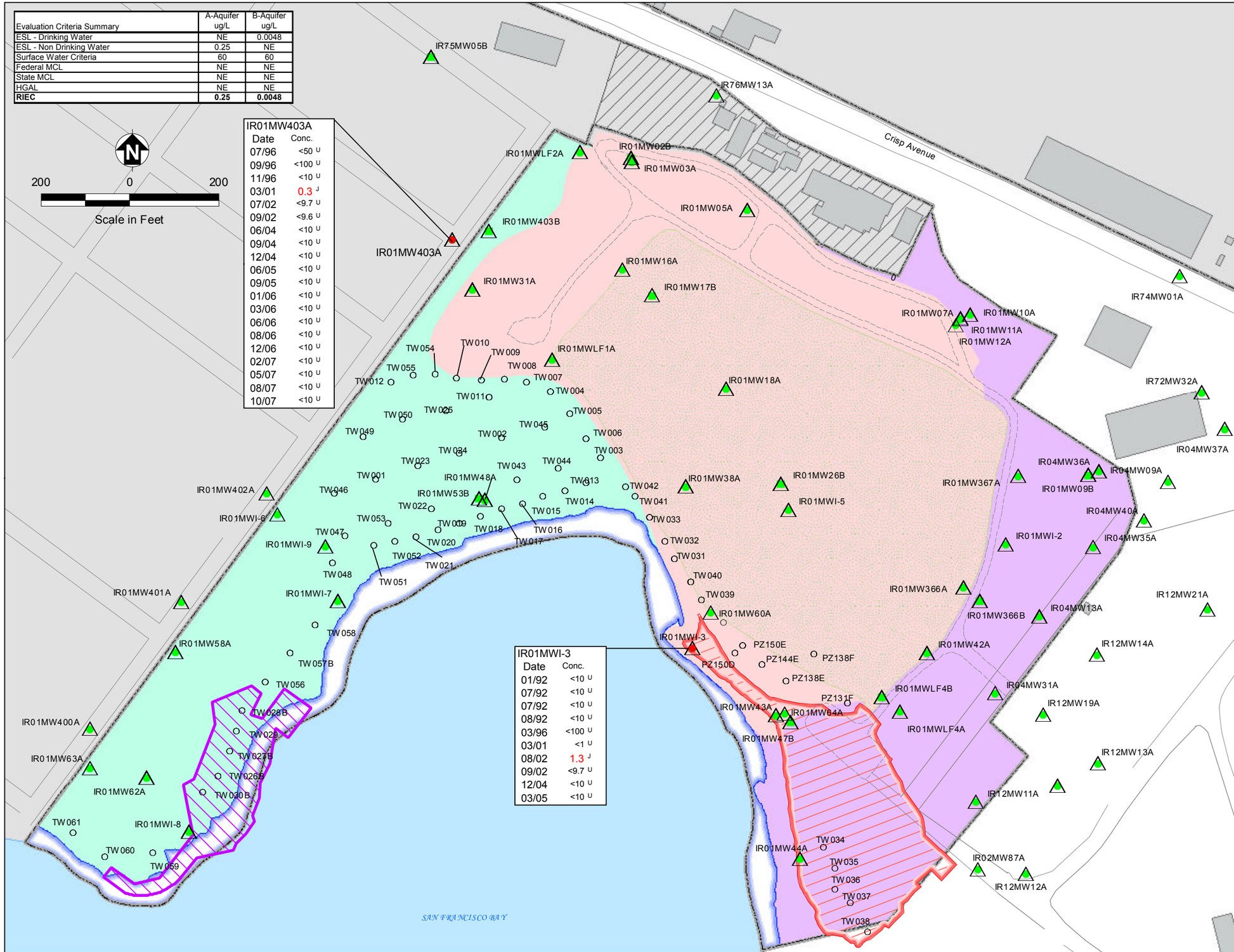
FIGURE 5-42

BUTYLBENZYLPHTHALATE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Butylbenzylphthalate.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	0.0048
ESL - Non Drinking Water	0.25	NE
Surface Water Criteria	60	60
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	NE	NE
RIEC	**0.25**	**0.0048**



Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
µg/L = microgram per liter

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J
← Chemical Concentration (µg/L) and Qualifier
Sample Date (mm/yy)

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 5-43

DIBENZ (A,H) ANTHRACENE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Dibenz-a_h-Anthracene-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	1.5
ESL - Non Drinking Water	1.5	NE
Surface Water Criteria	3.4	3.4
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	NE	NE
RIEC	**3.4**	**3.4**

200 0 200
Scale in Feet

Crisp Avenue

SAN FRANCISCO BAY

IR01MW42A

Date	Conc.
01/92	<10 U
01/92	<10 U
07/92	<10 UJ5
08/92	<10 U
08/02	<9.6 U
09/02	<9.6 U
06/04	10 J
09/04	<10 U
11/04	<10 U
03/05	<10 U
06/05	<10 U
09/05	<10 UJ
01/06	<10 U
03/06	<10 U
05/06	<10 U
08/06	<10 U
12/06	<10 U
02/07	<10 U
05/07	<10 U
08/07	<10 U
10/07	<10 U

IR01MW366A

Date	Conc.
12/95	<10 U
03/96	<100 U
05/96	<100 U
03/01	<1 U
06/04	25 J
06/04	<10 U
11/04	<4.5 U4J5
03/05	<10 UJ3
06/05	5.6 J
01/06	<10 U
03/06	<10 U
06/06	<10 U
09/06	<10 U
12/06	<10 U
03/07	<10 U
05/07	<10 U

IR12MW17A

Date	Conc.
08/92	<29 U4
08/92	<30 U4
09/92	<41 U4
03/96	<16 U4
06/04	10 J
09/04	<10 U
11/04	<10 U4
03/05	<10 U4
06/05	3 J

Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A

Date	Conc.
05/07	527
08/07	646
10/07	633 J

Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

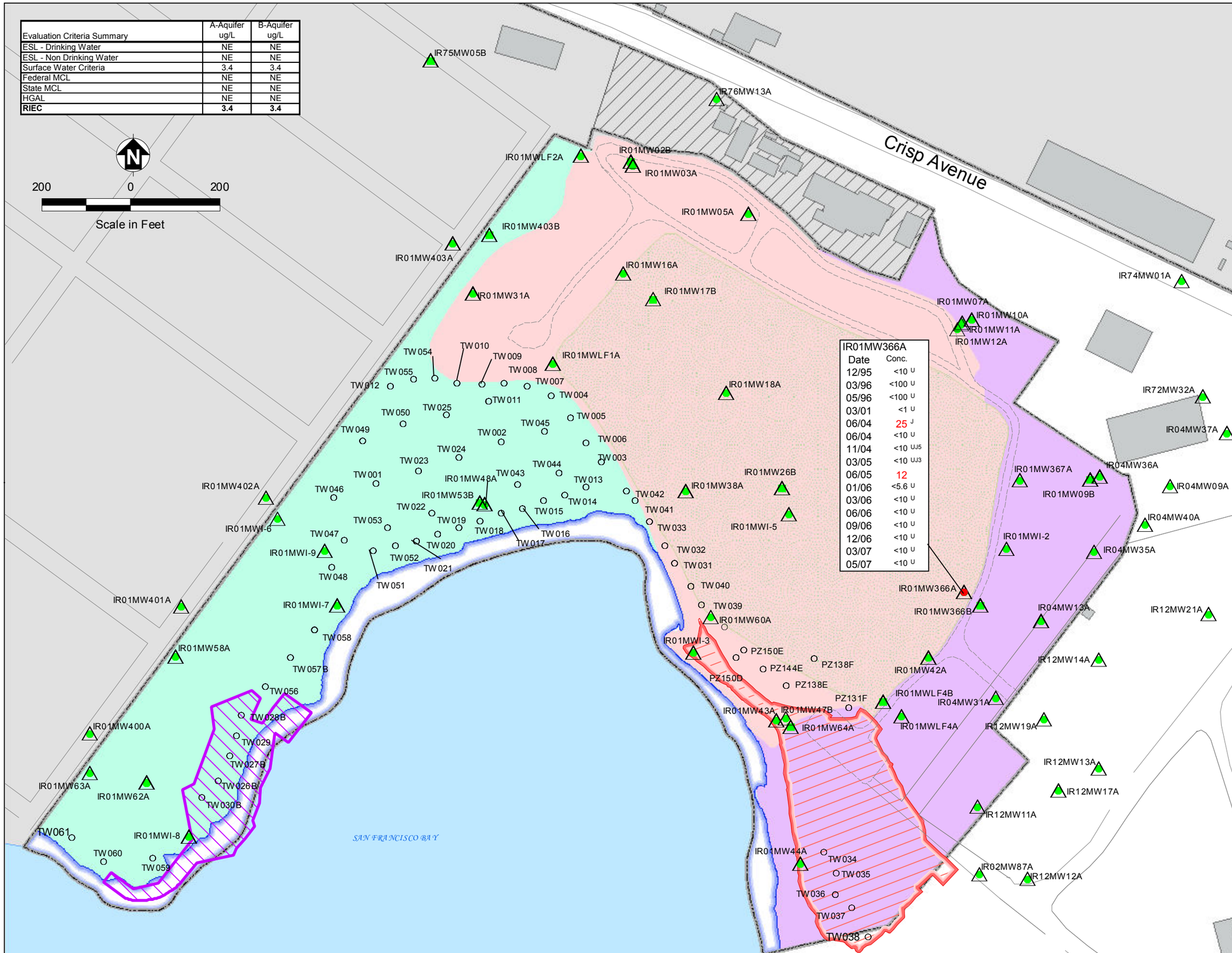
FIGURE 5-44

DIETHYLPHTHALATE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Diethylphalate.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	NE
ESL - Non Drinking Water	NE	NE
Surface Water Criteria	3.4	3.4
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	NE	NE
RIEC	**3.4**	**3.4**



Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Sample Date (mm/yy) →

Date	Conc.
05/07	527
08/07	646
10/07	633 J

← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

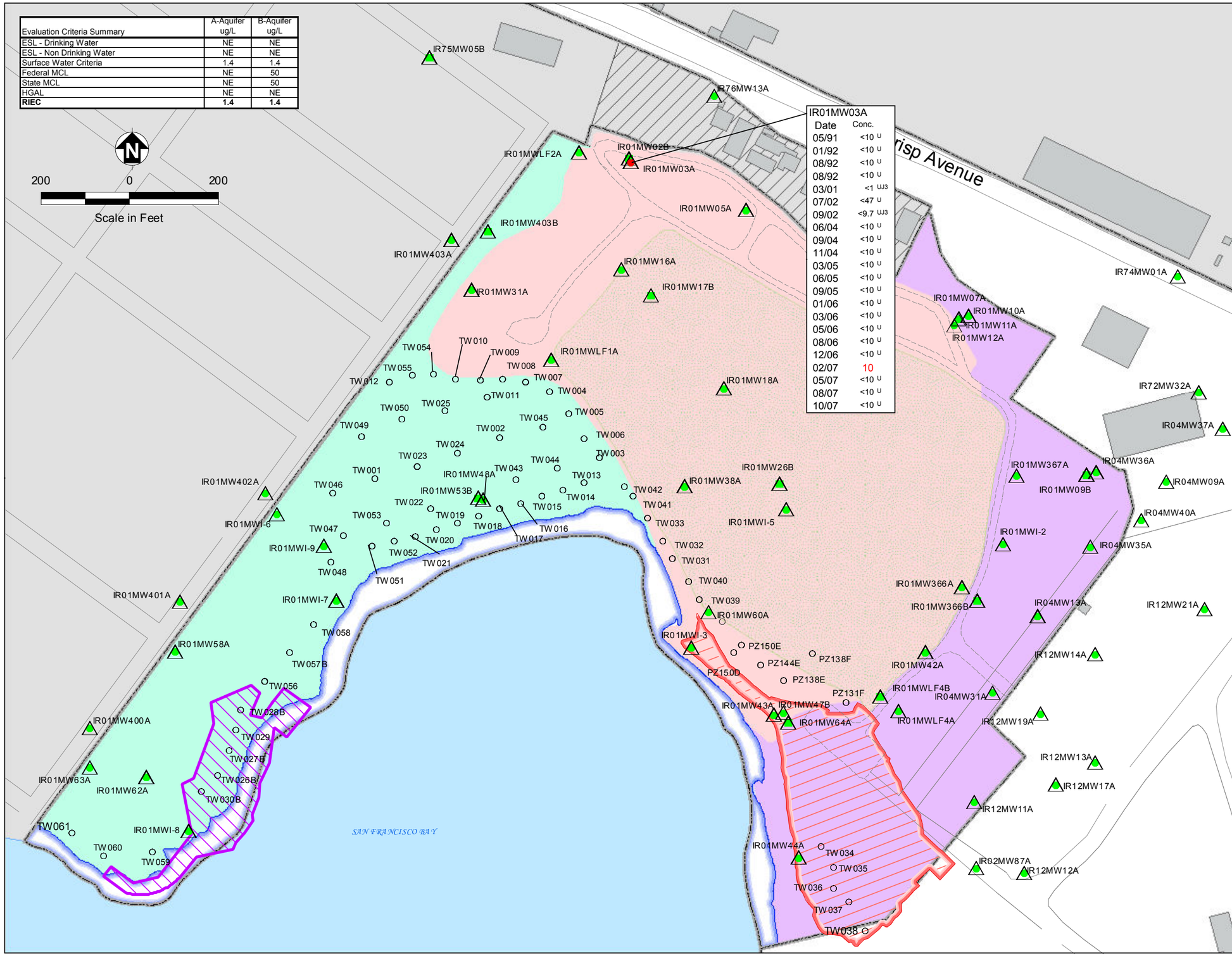
FIGURE 5-45

DI-N-BUTYLPHTHALATE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Di-N-Butylphthalate.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	NE
ESL - Non Drinking Water	NE	NE
Surface Water Criteria	1.4	1.4
Federal MCL	NE	50
State MCL	NE	50
HGAL	NE	NE
RIEC	**1.4**	**1.4**



IR01MW03A	
Date	Conc.
05/91	<10 U
01/92	<10 U
08/92	<10 U
08/92	<10 U
03/01	<1 UJ3
07/02	<47 U
09/02	<9.7 UJ3
06/04	<10 U
09/04	<10 U
11/04	<10 U
03/05	<10 U
06/05	<10 U
09/05	<10 U
01/06	<10 U
03/06	<10 U
05/06	<10 U
08/06	<10 U
12/06	<10 U
02/07	10
05/07	<10 U
08/07	<10 U
10/07	<10 U

Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Sample Date (mm/yy) → Date / Conc.: 05/07 527; 08/07 646; 10/07 633 J ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

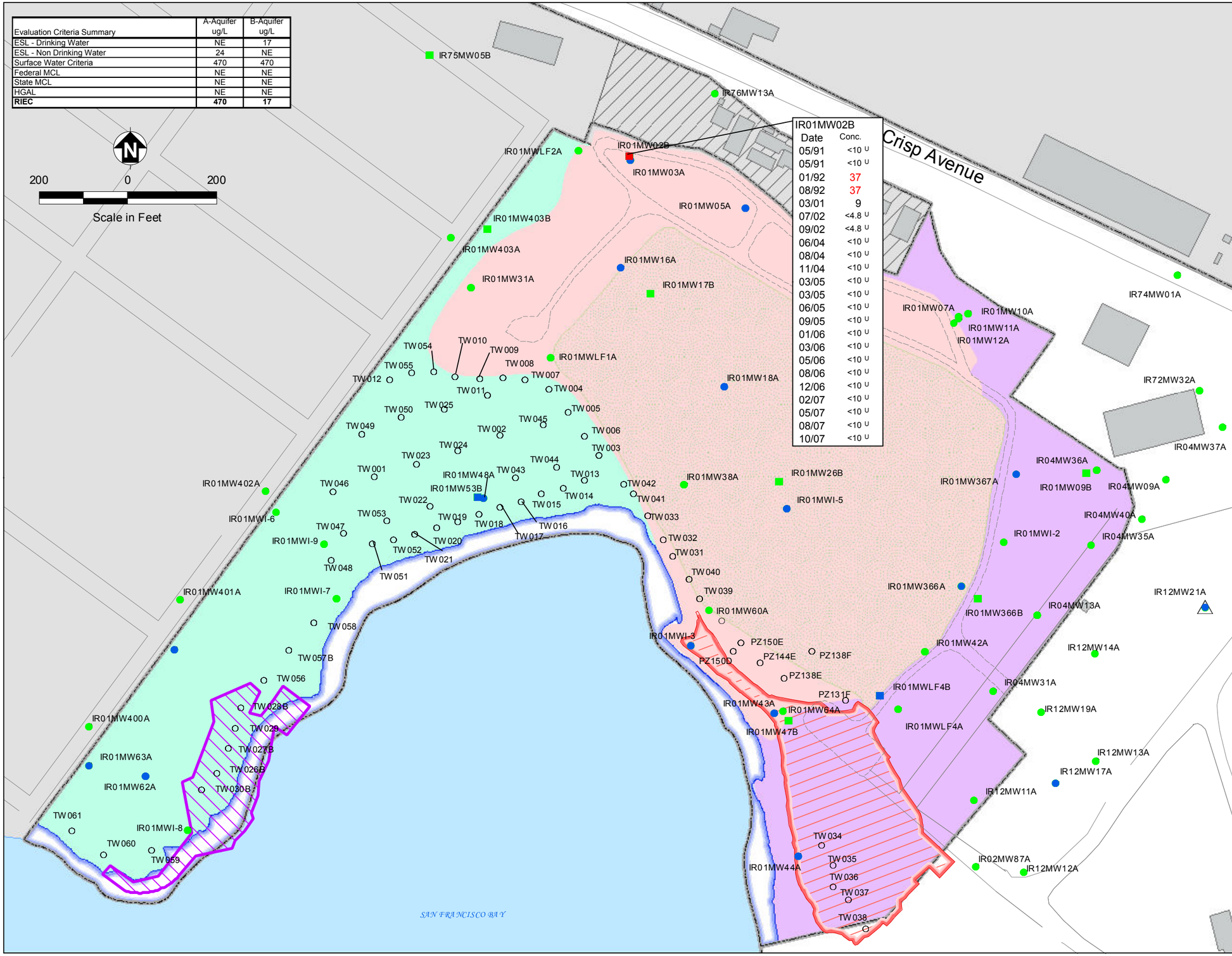
FIGURE 5-46

HEXACHLOROCYCLOPENTADIENE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Hexachlorocyclopentadiene.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	17
ESL - Non Drinking Water	24	NE
Surface Water Criteria	470	470
Federal MCL	NE	NE
State MCL	NE	NE
HGAL	NE	NE
RIEC	**470**	**17**



IR01MW02B

Date	Conc.
05/91	<10 U
05/91	<10 U
01/92	37
08/92	37
03/01	9
07/02	<4.8 U
09/02	<4.8 U
06/04	<10 U
08/04	<10 U
11/04	<10 U
03/05	<10 U
03/05	<10 U
06/05	<10 U
09/05	<10 U
01/06	<10 U
03/06	<10 U
05/06	<10 U
08/06	<10 U
12/06	<10 U
02/07	<10 U
05/07	<10 U
08/07	<10 U
10/07	<10 U

Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
µg/L = microgram per liter

Well ID → IR01MW60A

Date	Conc.
05/07	527
08/07	646
10/07	633 J

Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California

U.S. Department of the Navy, BRAC PMO West, San Diego, California

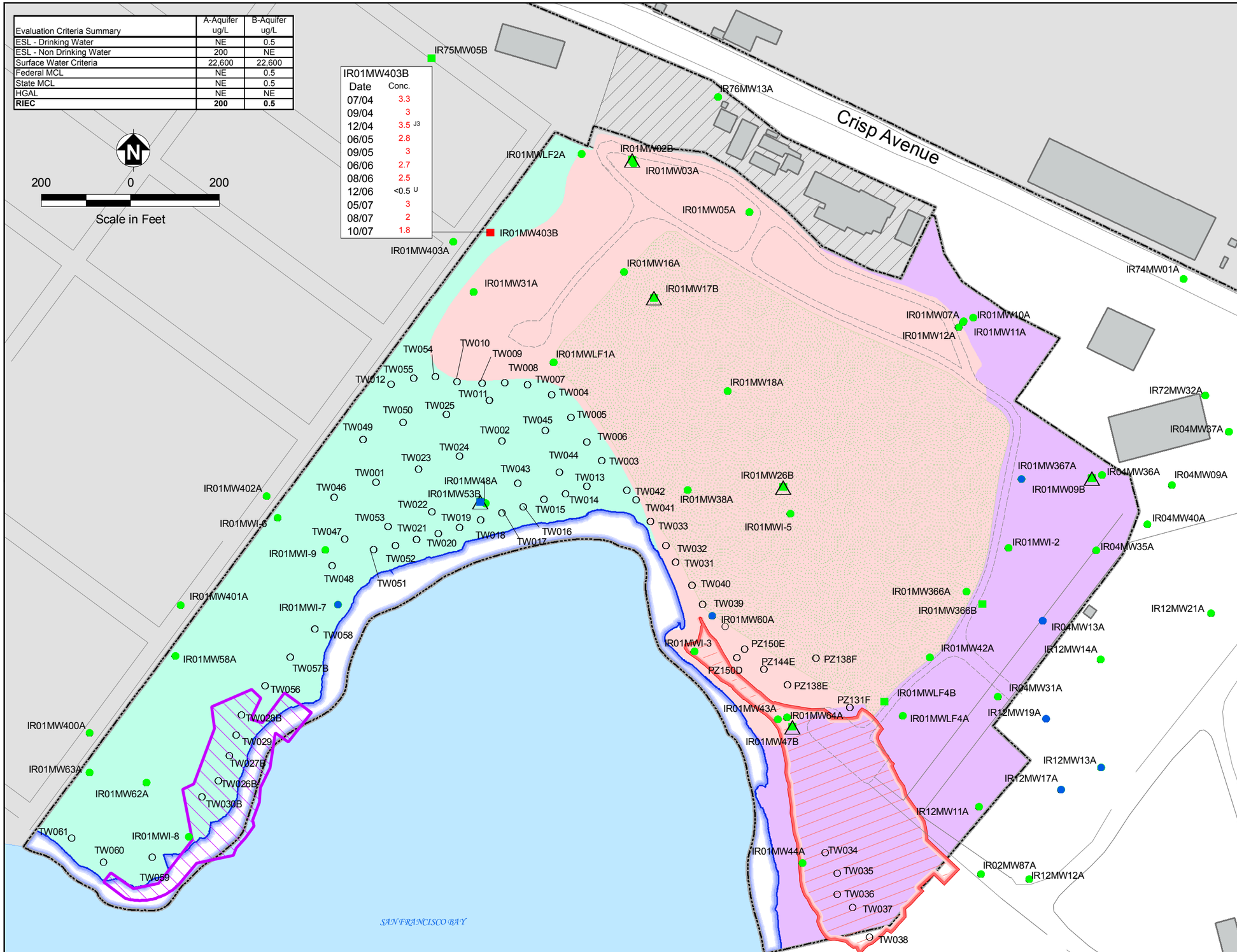
FIGURE 5-47

NAPHTHALENE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Naphthalene-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	0.5
ESL - Non Drinking Water	200	NE
Surface Water Criteria	22,600	22,600
Federal MCL	NE	0.5
State MCL	NE	0.5
HGAL	NE	NE
RIEC	**200**	**0.5**



Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Sample Date (mm/yy) → Date Conc.
05/07 527
08/07 646
10/07 633 J
← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

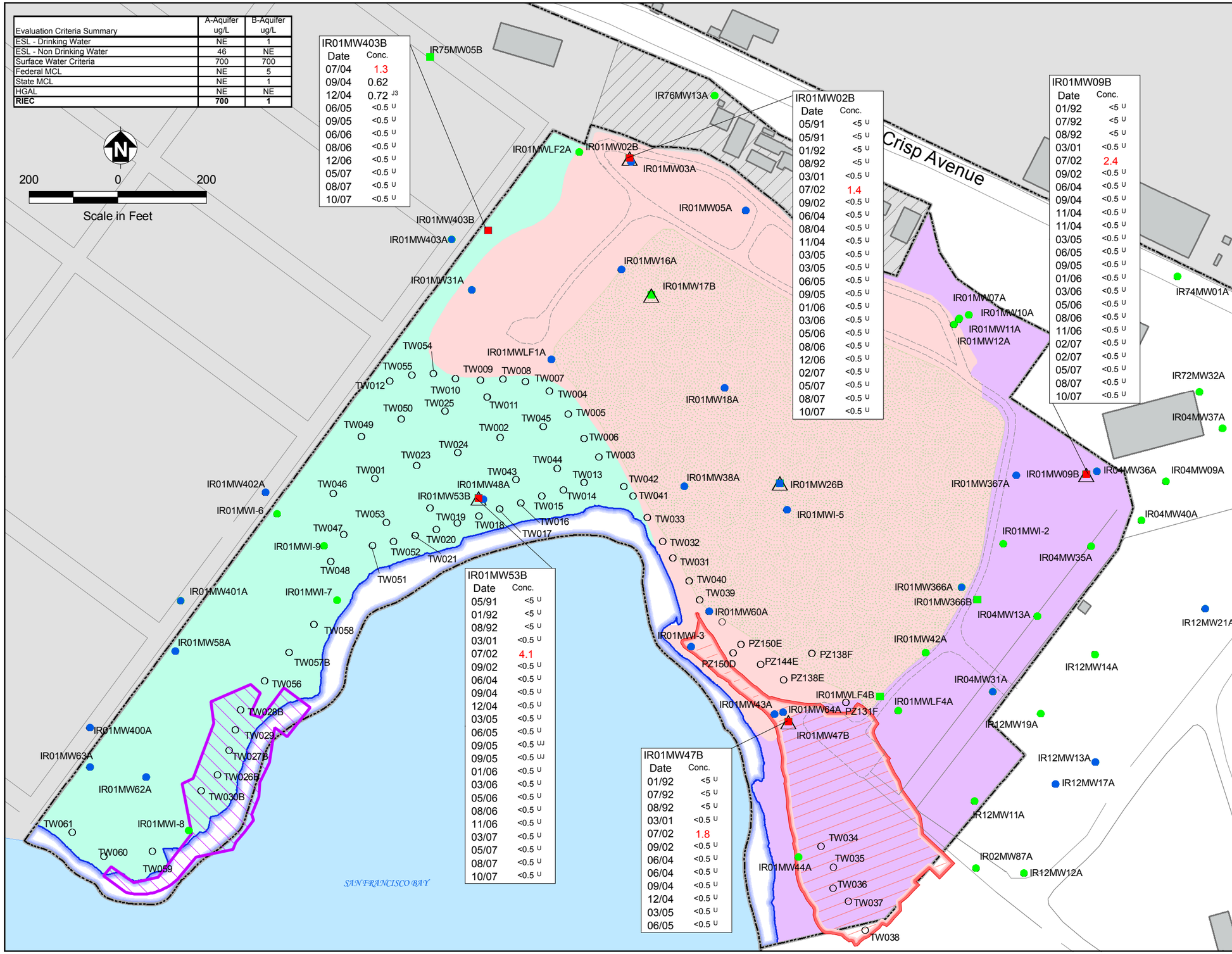
FIGURE 5-48

1,2-DICHLOROETHANE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\1_2-Dichloroethane.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	1
ESL - Non Drinking Water	46	NE
Surface Water Criteria	700	700
Federal MCL	NE	5
State MCL	NE	1
HGAL	NE	NE
RIEC	**700**	**1**



- Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
- A-aquifer Well
- B-aquifer Well
- Not Analyzed for Analyte
- Analyte Not Detected
- Analyte Exceeds Reporting Limit
- Analyte Exceeds Criterion
- Road
- Gravel Road
- Metal Slag Area (2007 excavation limit)[a]
- PCB Hot Spot Area (2007 excavation limit)[a]
- Limit of Landfill Cap
- Parcel Boundary
- Building
- UCSF Compound
- Landfill Area
- East Adjacent Area
- Panhandle Area
- Shoreline Area
- San Francisco Bay
- Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
µg/L = microgram per liter

Numbers associated with qualifiers are further defined in Appendix J.

Well ID → IR01MW60A
Date Conc.
05/07 527
08/07 646
10/07 633 J

Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California

U.S. Department of the Navy, BRAC PMO West, San Diego, California

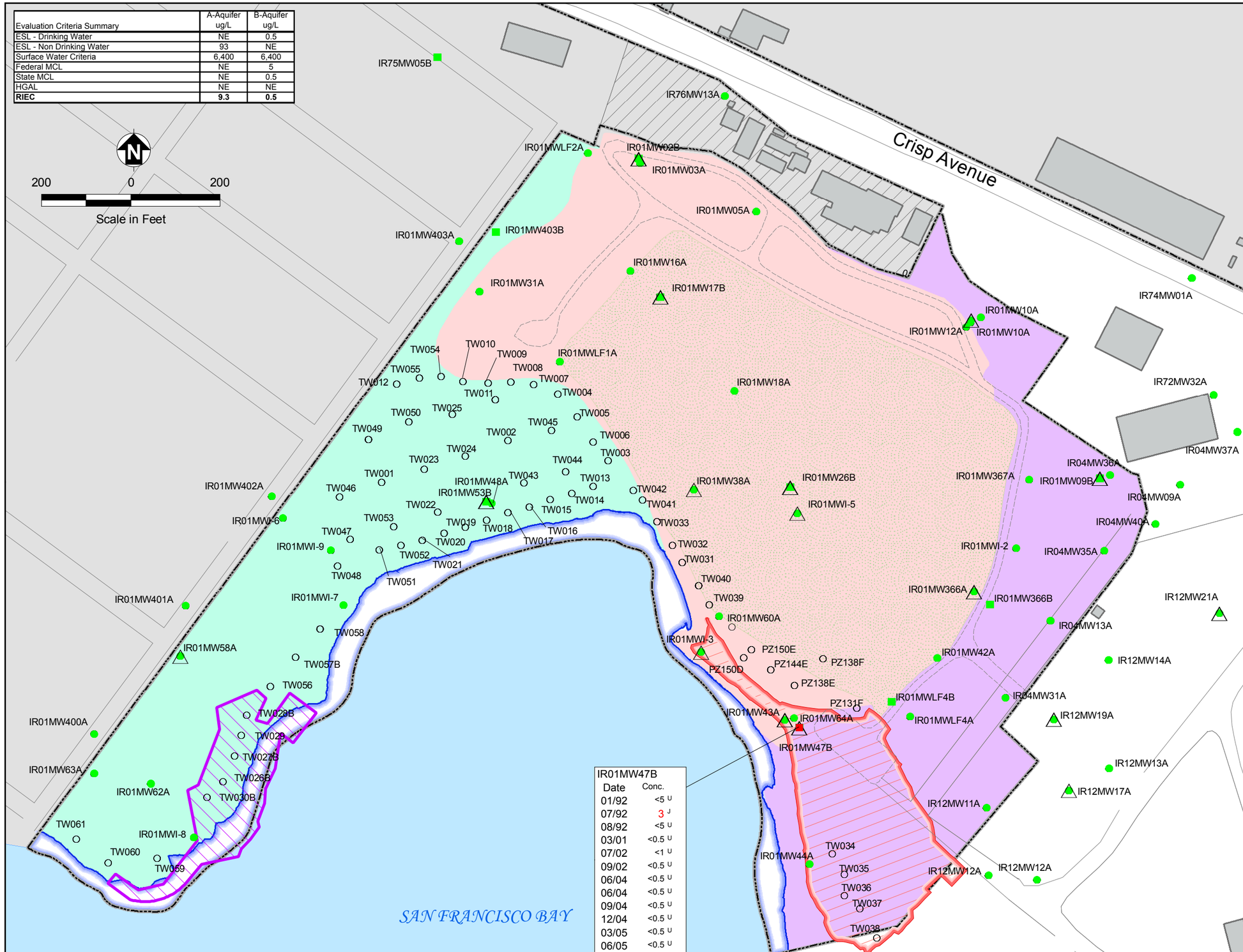
FIGURE 5-49

BENZENE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Benzene-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	0.5
ESL - Non Drinking Water	93	NE
Surface Water Criteria	6,400	6,400
Federal MCL	NE	5
State MCL	NE	0.5
HGAL	NE	NE
RIEC	**9.3**	**0.5**



IR01MW47B	
Date	Conc.
01/92	<5 U
07/92	3 J
08/92	<5 U
03/01	<0.5 U
07/02	<1 U
09/02	<0.5 U
06/04	<0.5 U
06/04	<0.5 U
09/04	<0.5 U
12/04	<0.5 U
03/05	<0.5 U
06/05	<0.5 U

Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
µg/L = microgram per liter

Well ID → IR01MW60A
Sample Date (mm/yy) → Date; ← Chemical Concentration (µg/L) and Qualifier Conc.

Date	Conc.
05/07	527
08/07	646
10/07	633 J

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

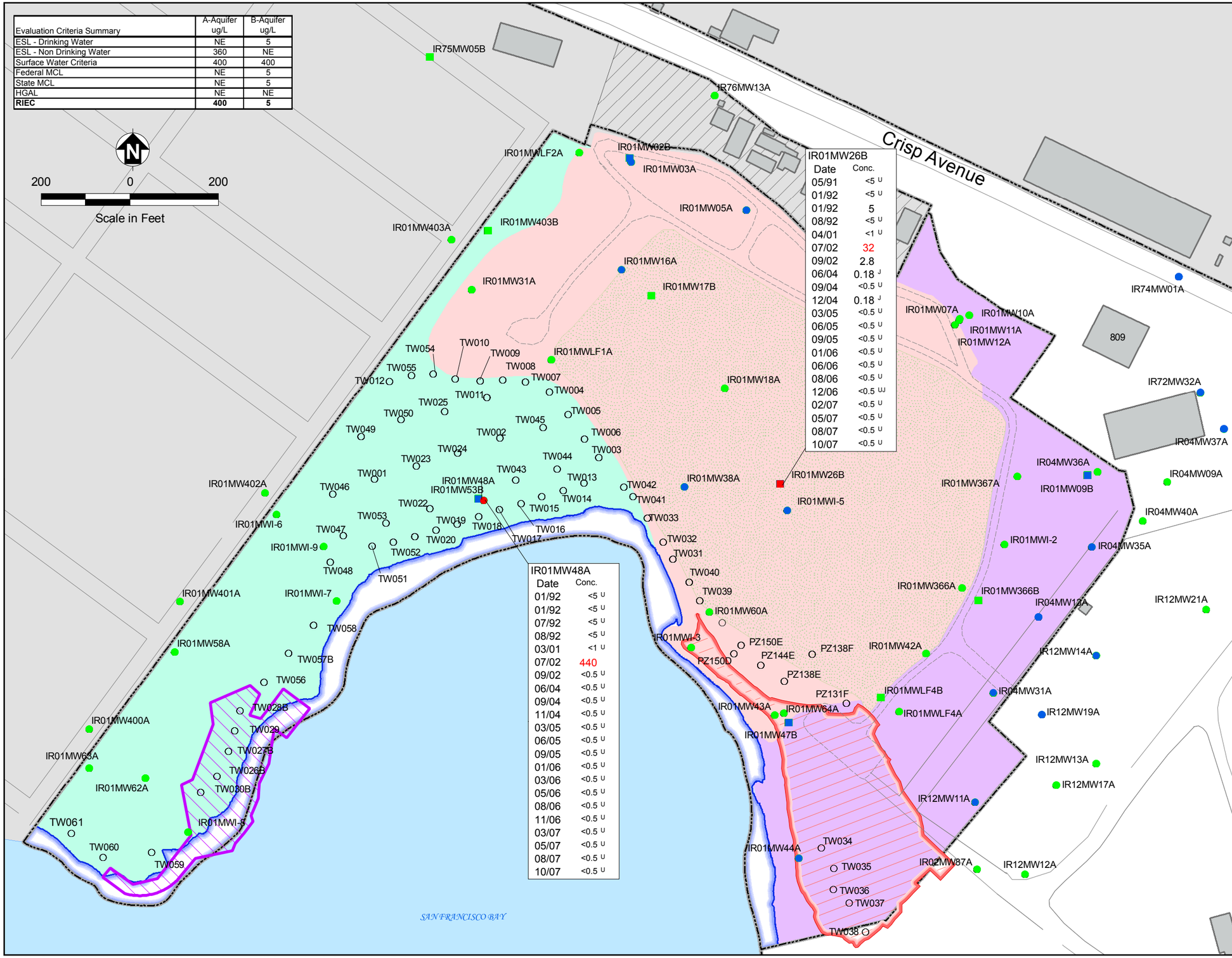
FIGURE 5-50

CARBON TETRACHLORIDE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Carbon Tetrachloride-Wells.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	5
ESL - Non Drinking Water	360	NE
Surface Water Criteria	400	400
Federal MCL	NE	5
State MCL	NE	5
HGAL	NE	NE
RIEC	**400**	**5**



IR01MW26B Date	Conc.
05/91	<5 U
01/92	<5 U
01/92	5
08/92	<5 U
04/01	<1 U
07/02	32
09/02	2.8
06/04	0.18 J
09/04	<0.5 U
12/04	0.18 J
03/05	<0.5 U
06/05	<0.5 U
09/05	<0.5 U
01/06	<0.5 U
06/06	<0.5 U
08/06	<0.5 U
12/06	<0.5 UJ
02/07	<0.5 U
05/07	<0.5 U
08/07	<0.5 U
10/07	<0.5 U

IR01MW48A Date	Conc.
01/92	<5 U
01/92	<5 U
07/92	<5 U
08/92	<5 U
03/01	<1 U
07/02	440
09/02	<0.5 U
06/04	<0.5 U
09/04	<0.5 U
11/04	<0.5 U
03/05	<0.5 U
06/05	<0.5 U
09/05	<0.5 U
01/06	<0.5 U
03/06	<0.5 U
05/06	<0.5 U
08/06	<0.5 U
11/06	<0.5 U
03/07	<0.5 U
05/07	<0.5 U
08/07	<0.5 U
10/07	<0.5 U

- Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
- A-aquifer Well
- B-aquifer Well
- Not Analyzed for Analyte
- Analyte Not Detected
- Analyte Exceeds Reporting Limit
- Analyte Exceeds Criterion
- Road
- Gravel Road
- Metal Slag Area (2007 excavation limit)[a]
- PCB Hot Spot Area (2007 excavation limit)[a]
- Limit of Landfill Cap
- Parcel Boundary
- Building
- UCSF Compound
- Landfill Area
- East Adjacent Area
- Panhandle Area
- Shoreline Area
- San Francisco Bay
- Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
J = estimated
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
UJ = Analyte is considered not present above the level of the associated value; the associated value is considered quantitatively estimated.
µg/L = microgram per liter

Well ID → IR01MW60A
Sample Date (mm/yy) → Date / Conc.
05/07 527
08/07 646
10/07 633 J ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

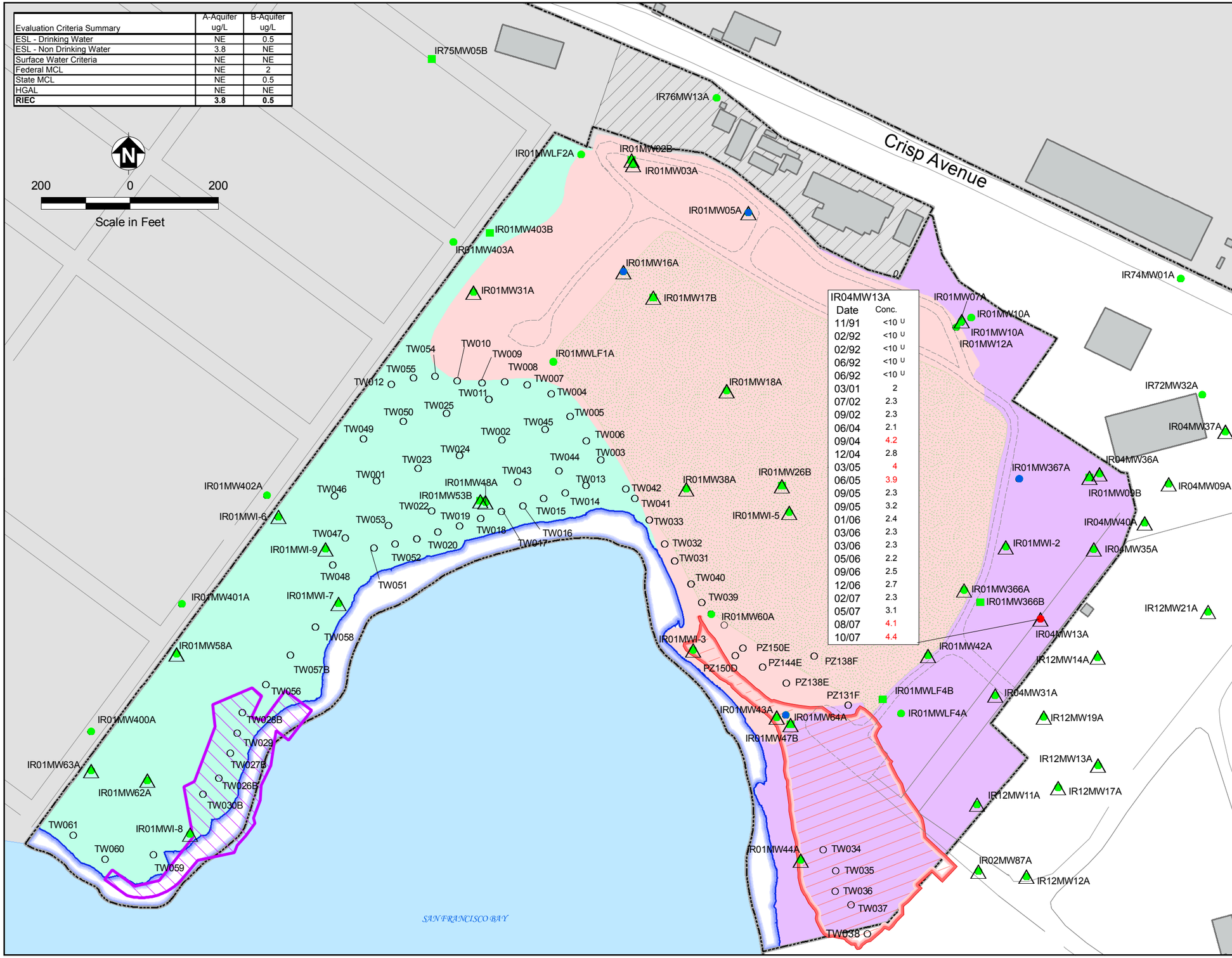
FIGURE 5-51

TRICHLOROETHENE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Trichloroethene.mxd

Evaluation Criteria Summary	A-Aquifer ug/L	B-Aquifer ug/L
ESL - Drinking Water	NE	0.5
ESL - Non Drinking Water	3.8	NE
Surface Water Criteria	NE	NE
Federal MCL	NE	2
State MCL	NE	0.5
HGAL	NE	NE
RIEC	**3.8**	**0.5**



IR04MW13A	
Date	Conc.
11/91	<10 U
02/92	<10 U
02/92	<10 U
06/92	<10 U
06/92	<10 U
03/01	2
07/02	2.3
09/02	2.3
06/04	2.1
09/04	4.2
12/04	2.8
03/05	4
06/05	3.9
09/05	2.3
09/05	3.2
01/06	2.4
03/06	2.3
03/06	2.3
05/06	2.2
09/06	2.5
12/06	2.7
02/07	2.3
05/07	3.1
08/07	4.1
10/07	4.4

Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
µg/L = microgram per liter

Well ID → IR01MW60A

Date	Conc.
05/07	527
08/07	646
10/07	633 J

Sample Date (mm/yy) → ← Chemical Concentration (µg/L) and Qualifier

ENGINEERING/REMEDIATION RESOURCES GROUP, INC.
ERRG

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

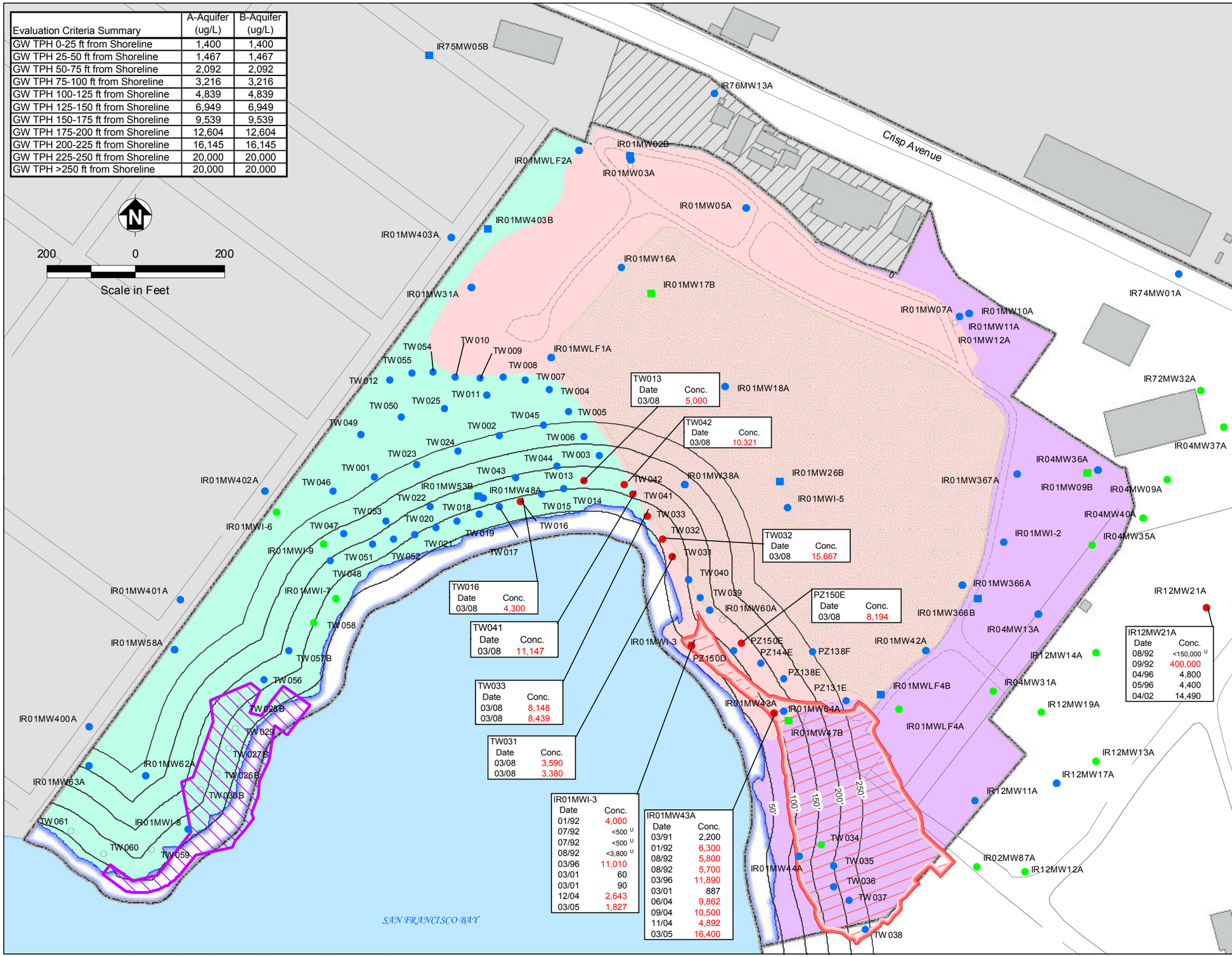
FIGURE 5-52

VINYL CHLORIDE IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\Vinyl Chloride-Wells.mxd

Evaluation Criteria Summary	A-Aquifer (ug/L)	B-Aquifer (ug/L)
GW TPH 0-25 ft from Shoreline	1,400	1,400
GW TPH 25-50 ft from Shoreline	1,467	1,467
GW TPH 50-75 ft from Shoreline	2,092	2,092
GW TPH 75-100 ft from Shoreline	3,216	3,216
GW TPH 100-125 ft from Shoreline	4,839	4,839
GW TPH 125-150 ft from Shoreline	6,949	6,949
GW TPH 150-175 ft from Shoreline	9,539	9,539
GW TPH 175-200 ft from Shoreline	12,604	12,604
GW TPH 200-225 ft from Shoreline	16,145	16,145
GW TPH 225-250 ft from Shoreline	20,000	20,000
GW TPH >250 ft from Shoreline	20,000	20,000



Reporting Limit Exceeds Aquatic Criterion (for at least one sample)
A-aquifer Well
B-aquifer Well
Not Analyzed for Analyte
Analyte Not Detected
Analyte Exceeds Reporting Limit
Analyte Exceeds Criterion
Road
Gravel Road
Metal Slag Area (2007 excavation limit)[a]
PCB Hot Spot Area (2007 excavation limit)[a]
Limit of Landfill Cap
Parcel Boundary
Building
UCSF Compound
Landfill Area
East Adjacent Area
Panhandle Area
Shoreline Area
San Francisco Bay
Non-Navy Property
– 50' – Distance from Shoreline (in feet)

Notes:

[a] Post- excavation boundaries in PCB Hot Spot Area and Metal Slag Area are consistent with information presented in final removal action completion reports (Tetra Tech EC Inc., 2007a and 2007b). Soil removal in these areas (up to depths of 14 feet bgs) are expected to reduce groundwater concentrations (to be verified by ongoing monitoring).

Results are shown for locations where data has exceeded the RIEC. Red text indicates results that exceed the RIEC. Where results are shown as non-detect (<), the reporting limit follows.

bgs = below ground surface
Conc. = concentration
ESL = environmental screening level
HGAL = Hunters Point groundwater ambient level
MCL = Maximum Contaminant Level
NE = not established
PCB = polychlorinated biphenyl
RIEC = Remedial Investigation Evaluation Criterion
U = value was not detected above the reporting limit
UCSF = University of California, San Francisco
µg/L = microgram per liter

Well ID → IR01MW60A
Sample Date (mm/yy) → Date Conc. 05/07 527 08/07 646 10/07 633 J ← Chemical Concentration (µg/L) and Qualifier

ERRG ENGINEERING/REMEDIATION RESOURCES GROUP, INC.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 5-53

TOTAL TPH IN GROUNDWATER

Remedial Investigation/Feasibility Study for Parcel E-2

P:\2005_Projects\25-049_Navy_HPS_E-2_RI-FS\N_Maps&Drawings\GIS\Projects\Landfill\Section 4\Water\SumTPH-Wells.mxd

Tables

Table 5-1. Data Summary - Anions Detected in Parcel E-2 Groundwater

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Anion	Aquifer	Detection Frequency[(a)]	Range of Reporting Limits (µg/L)	Range of Results (µg/L)
Bromide	A	140 / 147	500 - 12,500	48 - 189,000
	B	84 / 89	500 - 12,500	430 - 53,500
Chloride	A	461 / 461	80 - 1,000,000	30,600 - 18,500,000
	B	172 / 172	80 - 200,000	10,640 - 3,200,000
Cyanide	A	47 / 381	0.1 - 10	0.24 - 80
	B	6 / 156	0.01 - 10	5.4 - 20
Fluoride	A	164 / 263	100 - 10,000	80 - 2,700
	B	49 / 142	100 - 10,000	80 - 2,100
Nitrate	A	105 / 454	10 - 5,000	10 - 16,400
	B	93 / 163	10 - 5,000	20 - 38,700
Nitrite	A	17 / 420	0.1 - 50,000	4 - 59,000
	B	14 / 158	0.1 - 5,000	6 - 12,600
Orthophosphate	A	52 / 368	50 - 20,000	70 - 1,400
	B	14 / 151	50 - 5,000	80 - 1,100
Sulfate	A	155 / 163	1,000 - 50,000	190 - 981,000
	B	82 / 99	1,000 - 25,000	620 - 333,000
Sulfide	A	372 / 538	3 - 100,000	3 - 2,430,000
	B	79 / 211	3 - 50,000	5 - 286,000
Total Kjeldahl Nitrogen	A	225 / 242	70 - 3,100	270 - 43,700
	B	119 / 137	70 - 1,400	290 - 13,800
Un-ionized Ammonia	A	278 / 302[(1)]	0.5 - 1,750[(1)]	1 - 2,075[(2)]
	B	99 / 137[(1)]	20 - 530[(1)]	0 - 2,271[(2)]

Notes:

(a) Rejected data are not included in detection frequency

(1) Values for ammonia

(2) Values for unionized ammonia, calculated based on ammonia detections and other field parameters

µg/L micrograms per liter

Table 5-2. Data Summary - Metals Detected in Parcel E-2 Groundwater and HGAL Information

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Metal	Aquifer	Detection Frequency[a]	Range of Reporting Limits (mg/L)	Range of Results (mg/L)	HGAL (mg/L)	Detections Exceeding HGAL
Aluminum	A	90 / 569	10 - 500	15.33 - 183,000	NE	NE
	B	28 / 164	10 - 100	22.2 - 4,040	NE	NE
Antimony	A	162 / 564	0.02 - 160	0.17 - 286	43.3	9
	B	39 / 162	0.1 - 32	0.25 - 96.3	NE	NE
Arsenic	A	239 / 574	0.2 - 31	1.1 - 462	27.3	36
	B	57 / 162	1 - 12.3	1.2 - 27.7	NE	NE
Barium	A	577 / 578	0.1 - 25	15.7 - 7,480	504	162
	B	162 / 162	0.1 - 10	8.9 - 423	NE	NE
Beryllium	A	34 / 564	0.1 - 10	0.11 - 5.1	1.40	9
	B	13 / 162	0.1 - 2	0.25 - 2	NE	NE
Cadmium	A	51 / 570	0.2 - 25	0.4 - 48.4	5.08	13
	B	7 / 164	0.2 - 5	0.4 - 8	NE	NE
Calcium	A	273 / 274	8.2 - 5,000	7,820 - 461,000	NE	NE
	B	38 / 38	8.5 - 500	5,870 - 112,000	NE	NE
Chromium	A	288 / 571	0.4 - 25	0.52 - 2750	15.7	38
	B	80 / 163	0.5 - 5	1.4 - 80	NE	NE
Chromium VI	A	0 / 184	10 - 10	0 - 0	NE	NE
	B	1 / 23	10 - 10	130 - 130	NE	NE
Cobalt	A	222 / 563	0.4 - 52	0.56 - 529	20.8	11
	B	42 / 162	0.5 - 8.8	0.56 - 12.6	NE	NE
Copper	A	140 / 573	0.25 - 50	0.97 - 15,900	28.0	33
	B	52 / 162	0.4 - 8	1.1 - 11.8	NE	NE
Iron	A	180 / 274	3.5 - 400	11.4 - 333,000	2,380	75
	B	21 / 38	5 - 400	15.3 - 9,630	NE	NE
Lead	A	127 / 577	0.01 - 320	0.04 - 6520	14.4	34
	B	26 / 162	0.02 - 5	0.07 - 14.2	NE	NE
Magnesium	A	274 / 274	4 - 10,000	8,630 - 1,250,000	1,440,000	NE
	B	38 / 38	19.4 - 10,000	17,000 - 308,000	NE	NE
Manganese	A	560 / 563	0.1 - 50	0.4 - 14,200	8,140	3
	B	158 / 162	0.1 - 25	2.2 - 4,150	NE	NE
Mercury	A	64 / 570	0.045 - 10	0.05 - 325	0.60	NE
	B	6 / 162	0.047 - 0.28	0.05 - 2.8	NE	NE
Molybdenum	A	74 / 221	0.6 - 35	1.1 - 40.2	61.9	NE
	B	4 / 30	0.8 - 7	3.5 - 17.2	NE	NE
Nickel	A	377 / 581	0.7 - 89	1.5 - 6,260	96.5	31
	B	63 / 162	0.8 - 28.8	1.3 - 85.5	NE	NE
Potassium	A	271 / 274	80 - 8,000	722.06 - 388,000	448,000	NE
	B	37 / 38	80 - 883	1,360 - 91,000	NE	NE
Selenium	A	145 / 574	1 - 29	1.75 - 474	14.5	21
	B	27 / 159	1 - 29	3.6 - 55	NE	NE
Silver	A	33 / 566	0.04 - 24.6	0.27 - 8.6	7.43	3
	B	3 / 161	0.4 - 7	1.1 - 1.6	NE	NE
Sodium	A	274 / 274	18 - 55,200	57,900 - 10,700,000	9,242,000	3
	B	38 / 38	18 - 33,400	81,600 - 1,700,000	NE	NE
Thallium	A	15 / 536	0.004 - 32	0.004 - 132	13.0	1
	B	1 / 159	0.02 - 18	0.2 - 0.2	NE	NE
Vanadium	A	126 / 224	0.4 - 20	1.3 - 553	26.62	13
	B	13 / 31	0.5 - 6	5.2 - 20.3	NE	NE
Zinc	A	117 / 578	0.3 - 250	1.97 - 6,840	75.7	38
	B	25 / 162	0.3 - 50	4.2 - 68.3	NE	NE

Notes:

(a) Rejected data are not included in detection frequency

HGAL Hunters Point groundwater ambient level

NE not established

mg/L milligrams per liter

Table 5-3. Data Summary - Pesticides and PCBs Detected in Parcel E-2 Groundwater

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Chemical	Aquifer	Detection Frequency[a]	Range of Reporting Limits (µg/L)	Range of Results (µg/L)
Total PCBs	A	80 / 518	-	0.1 - 74
	B	0 / 164	-	NE
4,4'-DDD	A	8 / 443	0.01 - 10	0.0045 - 0.07
	B	0 / 163	0.01 - 0.5	NE
4,4'-DDE	A	3 / 443	0.01 - 5	0.0064 - 0.02
	B	1 / 163	0.01 - 0.5	0.01 - 0.01
4,4'-DDT	A	13 / 443	0.01 - 5	0.0071 - 0.1
	B	0 / 163	0.01 - 0.5	NE
Aldrin	A	0 / 443	0.005 - 2.5	NE
	B	0 / 163	0.005 - 0.25	NE
alpha-BHC	A	0 / 445	0.005 - 2.5	NE
	B	0 / 164	0.005 - 0.25	NE
alpha-Chlordane	A	3 / 443	0.005 - 25	0.0098 - 0.03
	B	0 / 163	0.005 - 2.5	NE
Azinphos Methyl	A	0 / 243	1.9 - 25	NE
	B	0 / 138	1.9 - 5	NE
beta-BHC	A	9 / 443	0.005 - 2.5	0.0081 - 0.39
	B	1 / 163	0.005 - 0.25	0.03 - 0.03
Bolstar	A	0 / 243	0.5 - 2.5	NE
	B	0 / 138	0.5 - 1	NE
Chlorpyrifos	A	3 / 243	0.5 - 2.5	0.016 - 0.26
	B	3 / 138	0.5 - 1	0.014 - 0.1
Coumaphos	A	0 / 243	1 - 5	NE
	B	0 / 138	1 - 2	NE
Demeton	A	0 / 210	1 - 5	NE
	B	0 / 130	1 - 1	NE
Demeton-O	A	0 / 31	0.96 - 1	NE
	B	0 / 6	0.96 - 0.96	NE
Demeton-S	A	0 / 33	0.96 - 1	NE
	B	0 / 8	0.96 - 1	NE
Diazinon	A	5 / 243	0.5 - 2.5	0.01 - 0.5
	B	2 / 138	0.5 - 1	0.015 - 0.016
Dichlorvos	A	0 / 243	0.96 - 5	NE
	B	0 / 138	0.96 - 1	NE
Dimethoate	A	0 / 210	0.5 - 2.5	NE
	B	0 / 130	0.5 - 0.5	NE
Disulfoton	A	0 / 242	0.5 - 2.5	NE
	B	0 / 137	0.5 - 1	NE
delta-BHC	A	7 / 442	0.005 - 2.5	0.004 - 0.01
	B	0 / 163	0.005 - 0.25	NE
Dieldrin	A	7 / 444	0.01 - 5	0.01 - 0.1
	B	0 / 163	0.01 - 0.5	NE
Endosulfan I	A	1 / 443	0.005 - 2.5	0.03 - 0.03
	B	0 / 164	0.005 - 0.25	NE
Endosulfan II	A	2 / 445	0.01 - 5	0.01 - 0.026
	B	0 / 164	0.01 - 0.5	NE
Endosulfan Sulfate	A	2 / 442	0.01 - 5	0.01 - 0.08
	B	0 / 164	0.01 - 0.5	NE
Endrin	A	5 / 441	0.01 - 5	0.008 - 0.04
	B	0 / 164	0.01 - 0.5	NE
Endrin Aldehyde	A	7 / 316	0.01 - 4.7	0.01 - 0.06
	B	0 / 143	0.01 - 0.1	NE
Endrin Ketone	A	2 / 400	0.01 - 5	0.01 - 0.07
	B	0 / 156	0.01 - 0.5	NE

Table 5-3. Data Summary - Pesticides and PCBs Detected in Parcel E-2 Groundwater *(continued)*
Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Chemical	Aquifer	Detection Frequency[a]	Range of Reporting Limits (µg/L)	Range of Results (µg/L)
EPN	A	0 / 210	0.5 - 2.5	NE
	B	0 / 130	0.5 - 0.5	NE
Ethion	A	0 / 210	0.5 - 2.5	NE
	B	0 / 130	0.5 - 0.5	NE
Ethoprop	A	0 / 243	0.5 - 2.5	NE
	B	0 / 138	0.5 - 1	NE
Famphur	A	0 / 210	3.5 - 17.5	NE
	B	0 / 130	3.5 - 3.5	NE
Fensulfothion	A	0 / 243	0.96 - 12.5	NE
	B	0 / 138	0.96 - 2.5	NE
Fenthion	A	0 / 243	0.5 - 2.5	NE
	B	0 / 138	0.5 - 1	NE
gamma-BHC (lindane)	A	5 / 443	0.005 - 2.5	0.008 - 0.047
	B	0 / 164	0.005 - 0.25	NE
gamma-Chlordane	A	10 / 322	0.005 - 25	0.005 - 0.1
	B	0 / 138	0.05 - 3	NE
Heptachlor	A	8 / 444	0.005 - 2.5	0.0067 - 0.46
	B	0 / 165	0.005 - 0.25	NE
Heptachlor Epoxide	A	6 / 446	0.005 - 2.5	0.0073 - 0.06
	B	0 / 164	0.005 - 0.25	NE
Heptachlor Epoxide A	A	4 / 35	0.0094 - 0.1	0.007 - 0.037
	B	0 / 8	0.0094 - 0.0098	NE
Heptachlor Epoxide B	A	3 / 35	0.0094 - 0.1	0.0051 - 0.015
	B	0 / 8	0.0094 - 0.0098	NE
Malathion	A	1 / 210	0.5 - 2.5	0.07 - 0.07
	B	0 / 130	0.5 - 0.5	NE
Merphos	A	0 / 243	0.5 - 2.5	NE
	B	0 / 138	0.5 - 1	NE
Methoxychlor	A	0 / 444	0.05 - 25	NE
	B	0 / 163	0.05 - 2.5	NE
Methyl Parathion	A	0 / 243	0.5 - 2.5	NE
	B	0 / 138	0.5 - 1	NE
Mevinphos	A	0 / 243	1.9 - 17.5	NE
	B	0 / 138	1.9 - 3.5	NE
Naled	A	0 / 243	1.9 - 12.5	NE
	B	0 / 138	1.9 - 2.5	NE
Parathion	A	0 / 210	0.5 - 2.5	NE
	B	0 / 130	0.5 - 0.5	NE
Phorate	A	0 / 243	0.5 - 2.5	NE
	B	0 / 138	0.5 - 1	NE
Ronnel	A	0 / 243	0.5 - 2.5	NE
	B	0 / 138	0.5 - 1	NE
Stirophos	A	0 / 210	0.5 - 2.5	NE
	B	0 / 130	0.5 - 1	NE
Sulfotep	A	0 / 210	0.5 - 2.5	NE
	B	0 / 130	0.5 - 0.5	NE
Trichloronate	A	0 / 243	0.5 - 2.5	NE
	B	0 / 138	0.5 - 1	NE
Tokuthion	A	0 / 243	0.5 - 2.5	NE
	B	0 / 138	0.5 - 1	NE
Toxaphene	A	0 / 434	0.5 - 50	NE
	B	0 / 164	0.5 - 5	NE

Table 5-3. Data Summary - Pesticides and PCBs Detected in Parcel E-2 Groundwater *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Notes:

(a)	rejected data are not included in detection frequency
BHC	benzene hexachloride
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
NE	not established
PCB	polychlorinated biphenyl
µg/L	micrograms per liter

Table 5-4. Data Summary - SVOCs Detected in Parcel E-2 Groundwater

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

SVOC	Aquifer	Detection Frequency[a]	Range of Reporting Limits (mg/L)	Range of Results (mg/L)
1,2,4-Trichlorobenzene	A	18 / 500	1 - 1,000	10
	B	0 / 169	1 - 10	NE
1,2-Dichlorobenzene	A	3 / 458	1 - 50	0.2 - 1.2
	B	0 / 162	1 - 10	NE
1,3-Dichlorobenzene	A	17 / 458	1 - 50	0.5 - 13
	B	0 / 162	1 - 10	NE
1,4-Dichlorobenzene	A	52 / 458	1 - 50	0.2 - 16
	B	0 / 162	1 - 10	NE
2,2'-Oxybis(1-chloropropane)	A	0 / 153	14	NE
	B	0 / 75	10	NE
2,4,5-Trichlorophenol	A	0 / 229	2 - 250	NE
	B	0 / 34	2 - 50	NE
2,4,6-Trichlorophenol	A	0 / 494	1 - 100	NE
	B	0 / 165	1 - 10	NE
2,4-Dichlorophenol	A	1 / 494	1 - 100	0.1
	B	0 / 165	1 - 10	NE
2,4-Dimethylphenol	A	17 / 494	1 - 100	0.1 - 27.3
	B	1 / 165	1 - 10	2
2,4-Dinitrophenol	A	0 / 489	2 - 250	NE
	B	0 / 164	2 - 50	NE
2,4-Dinitrotoluene	A	0 / 500	1 - 100	NE
	B	0 / 169	1 - 10	NE
2,6-Dinitrotoluene	A	0 / 500	1 - 100	NE
	B	0 / 169	1 - 10	NE
2-Chloronaphthalene	A	0 / 500	1 - 100	NE
	B	0 / 169	1 - 10	NE
2-Chlorophenol	A	1 / 494	1 - 100	0.07
	B	1 / 165	1 - 10	10
2-Methylnaphthalene	A	41 / 500	1 - 100	0.2 - 24
	B	7 / 169	1 - 10	1 - 13
2-Methylphenol	A	6 / 494	1 - 100	0.2 - 7.7
	B	0 / 165	1 - 10	NE
2-Nitroaniline	A	0 / 229	2 - 250	NE
	B	0 / 34	2 - 50	NE
2-Nitrophenol	A	1 / 500	1 - 100	2.3
	B	0 / 169	1 - 20	NE
3,3'-Dichlorobenzidine	A	0 / 484	1 - 100	NE
	B	0 / 169	1 - 24	NE
3-Nitroaniline	A	0 / 235	2 - 250	NE
	B	0 / 38	2 - 50	NE
4,6-Dinitro-2-Methylphenol	A	0 / 494	2 - 250	NE
	B	0 / 165	2 - 50	NE
4-Bromophenyl-phenylether	A	0 / 500	1 - 100	NE
	B	0 / 169	1 - 10	NE
4-Chloro-3-Methylphenol	A	2 / 494	1 - 100	4.4 - 14
	B	0 / 165	1 - 20	NE
4-Chloroaniline	A	0 / 235	1 - 100	NE
	B	0 / 38	1 - 10	NE
4-Chlorophenyl-phenylether	A	0 / 500	1 - 100	NE
	B	0 / 169	1 - 10	NE
4-Methylphenol	A	39 / 484	1 - 100	0.6 - 72
	B	1 / 169	1 - 10	3
4-Nitroaniline	A	0 / 235	2 - 250	NE
	B	0 / 38	2 - 50	NE

Table 5-4. Data Summary - SVOCs Detected in Parcel E-2 Groundwater *(continued)*
Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

SVOC	Aquifer	Detection Frequency[a]	Range of Reporting Limits (mg/L)	Range of Results (mg/L)
4-Nitrophenol	A	1 / 494	2 - 250	7.5 - 7.5
	B	0 / 165	2 - 50	NE
Acenaphthene	A	56 / 500	1 - 100	0.2 - 29.11
	B	5 / 169	1 - 10	2 - 12
Acenaphthylene	A	11 / 500	1 - 100	0.27 - 2
	B	0 / 169	1 - 10	NE
Anthracene	A	7 / 500	1 - 100	0.2 - 3
	B	0 / 169	1 - 10	NE
Azobenzene	A	0 / 5	9.4 - 9.8	NE
	B	0 / 3	9.4 - 10	NE
Benzo(a)anthracene	A	10 / 500	1 - 100	0.08 - 8.7
	B	1 / 169	1 - 10	0.9
Benzo(a)pyrene	A	7 / 500	1 - 100	0.2 - 3
	B	1 / 169	1 - 10	0.83
Benzo(b)fluoranthene	A	7 / 498	1 - 100	0.2 - 6
	B	2 / 169	1 - 10	0.61 - 1
Benzo(g,h,i)perylene	A	4 / 498	1 - 100	0.4 - 3
	B	0 / 169	1 - 10	NE
Benzo(k)fluoranthene	A	2 / 498	1 - 100	0.2 - 1.1
	B	1 / 169	1 - 10	1.2
Benzoic Acid	A	10 / 440	47 - 200	1.2 - 21.59
	B	0 / 161	47 - 50	NE
Benzyl Alcohol	A	1 / 398	9.4 - 50	0.75
	B	0 / 154	9.4 - 20	NE
Bis(2-chloroethoxy)methane	A	0 / 500	1 - 100	NE
	B	0 / 169	1 - 10	NE
Bis(2-chloroethyl)ether	A	0 / 500	1 - 100	NE
	B	0 / 169	1 - 10	NE
Bis(2-ethylhexyl)phthalate	A	2 / 499	1 - 40	53 - 84
	B	1 / 169	1 - 10	160
Butylbenzylphthalate	A	1 / 500	1 - 100	19
	B	0 / 169	1 - 10	NE
Carbazole	A	4 / 102	1 - 100	0.3 - 0.69
	B	2 / 15	1 - 10	0.36 - 0.4
Chrysene	A	17 / 500	1 - 100	0.06 - 10
	B	1 / 169	1 - 10	1.2
Dibenz(a,h)anthracene	A	2 / 498	1 - 100	0.3 - 1.3
	B	0 / 169	1 - 10	NE
Dibenzofuran	A	34 / 500	1 - 100	0.36 - 16.68
	B	4 / 169	1 - 10	2.5 - 8
Diethylphthalate	A	5 / 500	1 - 100	3 - 25
	B	0 / 169	1 - 10	NE
Dimethylphthalate	A	0 / 500	1 - 100	NE
	B	0 / 169	1 - 10	NE
di-n-Butylphthalate	A	2 / 500	1 - 100	12 - 25
	B	0 / 169	1 - 10	NE
di-n-Octylphthalate	A	0 / 500	1 - 100	NE
	B	0 / 169	1 - 10	NE
Fluoranthene	A	21 / 500	1 - 100	0.08 - 13
	B	4 / 169	1 - 10	0.3 - 6.7
Fluorene	A	54 / 500	1 - 100	0.1 - 17.91
	B	5 / 169	1 - 10	0.8 - 6.8
Hexachlorobenzene	A	0 / 500	1 - 100	NE
	B	0 / 169	1 - 10	NE

Table 5-4. Data Summary - SVOCs Detected in Parcel E-2 Groundwater *(continued)*
Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

SVOC	Aquifer	Detection Frequency[(a)]	Range of Reporting Limits (mg/L)	Range of Results (mg/L)
Hexachlorobutadiene	A	0 / 500	1 - 100	NE
	B	0 / 169	1 - 10	NE
Hexachlorocyclopentadiene	A	1 / 500	1 - 100	10
	B	0 / 169	1 - 50	NE
Hexachloroethane	A	0 / 500	1 - 100	NE
	B	0 / 169	1 - 10	NE
Indeno(1,2,3-cd)pyrene	A	4 / 498	1 - 100	0.3 - 3
	B	0 / 169	1 - 10	NE
Isophorone	A	0 / 500	1 - 100	NE
	B	0 / 169	1 - 10	NE
Naphthalene	A	65 / 500	1 - 100	0.08 - 190
	B	9 / 169	1 - 10	1.9 - 37
Nitrobenzene	A	0 / 500	1 - 100	NE
	B	0 / 169	1 - 10	NE
n-Nitroso-di-n-propylamine	A	0 / 500	1 - 100	NE
	B	0 / 169	1 - 10	NE
n-Nitrosodimethylamine	A	0 / 270	9.4 - 25	NE
	B	0 / 134	9.4 - 10	NE
n-Nitrosodiphenylamine	A	6 / 500	1 - 100	0.4 - 6
	B	0 / 169	1 - 10	NE
Pentachlorophenol	A	1 / 494	2 - 250	6
	B	0 / 165	2 - 50	NE
Phenanthrene	A	33 / 500	1 - 100	0.1 - 39
	B	5 / 169	1 - 10	0.6 - 9
Phenol	A	48 / 494	1 - 100	0.8 - 120
	B	0 / 165	1 - 10	NE
Pyrene	A	20 / 500	1 - 100	0.07 - 15
	B	5 / 169	1 - 10	0.7 - 5.2

Notes:

(a) Rejected data are not included in detection frequency
NE not established
SVOC semivolatile organic compound
µg/L micrograms per liter

Table 5-5. Data Summary - VOCs Detected in Parcel E-2 Groundwater

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

VOC	Aquifer	Detection Frequency[a]	Range of Reporting Limits (mg/L)	Range of Results (mg/L)
1,1,1-Trichloroethane	A	39 / 637	0.5 - 100	0.1 - 159.16
	B	0 / 171	0.5 - 5	NE
1,1,2-Trichloroethane	A	0 / 637	0.5 - 100	NE
	B	0 / 171	0.5 - 5	NE
1,1,2,2-Tetrachloroethane	A	1 / 636	0.5 - 100	2
	B	0 / 171	0.5 - 5	NE
1,1,2-Trichloro-1,2,2-Trifluoroethane	A	2 / 434	0.5 - 100	0.58 - 0.6
	B	1 / 141	0.5 - 5	0.85
1,1-Dichloroethane	A	80 / 637	0.5 - 200	0.1 - 55.32
	B	0 / 171	0.5 - 5	NE
1,1-Dichloroethene	A	30 / 636	0.5 - 100	0.89 - 64
	B	0 / 171	0.5 - 5	NE
1,1-Dichloropropene	A	0 / 4	1 - 4	NE
	B	0 / 3	1 - 1	NE
1,2,3-Trichlorobenzene	A	0 / 71	1 - 20	NE
	B	0 / 10	1 - 2	NE
1,2,3-Trichloropropane	A	0 / 367	1 - 200	NE
	B	1 / 134	1 - 1	0.55
1,2,4-Trichlorobenzene	A	7 / 462	0.5 - 100	0.23 - 0.7
	B	1 / 147	0.5 - 2	0.5 - 0.5
1,2,4-Trimethylbenzene	A	3 / 5	0.7 - 4	0.7 - 3.7
	B	3 / 3	1 - 1	1.1 - 2.2
1,2-Dibromo-3-Chloropropane	A	0 / 462	1 - 400	NE
	B	0 / 147	1 - 2	NE
1,2-Dibromoethane	A	0 / 99	1 - 20	NE
	B	0 / 16	1 - 2	NE
1,2-Dichlorobenzene	A	53 / 463	0.5 - 100	0.09 - 84
	B	1 / 147	0.5 - 1	0.09
1,2-Dichloroethane	A	33 / 637	0.5 - 100	0.14 - 2
	B	16 / 171	0.5 - 5	0.13 - 3.5
1,2-Dichloroethene (total)	A	11 / 175	0.5 - 25	0.8 - 10
	B	0 / 24	0.5 - 5	NE
1,2-Dichloropropane	A	0 / 637	0.5 - 100	NE
	B	0 / 171	0.5 - 5	NE
1,3,5-Trimethylbenzene	A	3 / 5	1 - 4	0.8 - 1.1
	B	3 / 3	1 - 1	0.4 - 0.7
1,3-Dichlorobenzene	A	52 / 463	0.5 - 100	0.11 - 7.7
	B	0 / 147	0.5 - 1	NE
1,3-Dichloropropane	A	0 / 4	1 - 4	NE
	B	0 / 3	1 - 1	NE
1,4-Dichlorobenzene	A	81 / 464	0.5 - 100	0.11 - 19
	B	0 / 147	0.5 - 1	NE
2,2-Dichloropropane	A	0 / 4	1 - 4	NE
	B	0 / 3	1 - 1	NE
2-Butanone	A	2 / 207	4 - 200	2.2 - 3
	B	0 / 33	4 - 20	NE
2-Chlorotoluene	A	0 / 4	1 - 4	NE
	B	0 / 3	1 - 1	NE
2-Hexanone	A	3 / 237	4 - 200	2 - 3
	B	0 / 38	4 - 20	NE
4-Chlorotoluene	A	0 / 4	1 - 4	NE
	B	0 / 3	1 - 1	NE
4-Methyl-2-Pentanone	A	9 / 205	4 - 200	1.9 - 26.95
	B	0 / 33	4 - 20	NE

Table 5-5. Data Summary - VOCs Detected in Parcel E-2 Groundwater *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

VOC	Aquifer	Detection Frequency[a]	Range of Reporting Limits (mg/L)	Range of Results (mg/L)
Acetone	A	1 / 227	4 - 200	66
	B	0 / 27	4 - 20	NE
Benzene	A	195 / 638	0.5 - 100	0.11 - 44
	B	8 / 171	0.5 - 5	0.46 - 4.1
Bromobenzene	A	0 / 367	0.5 - 100	NE
	B	0 / 134	0.5 - 1	NE
Bromochloromethane	A	0 / 99	0.5 - 11	NE
	B	0 / 16	0.5 - 1	NE
Bromodichloromethane	A	0 / 637	0.5 - 100	NE
	B	0 / 171	0.5 - 5	NE
Bromoform	A	0 / 637	0.5 - 100	NE
	B	0 / 171	0.5 - 5	NE
Bromomethane	A	1 / 637	0.5 - 200	0.38 - 0.38
	B	1 / 171	0.5 - 10	2.3
Carbon Disulfide	A	35 / 274	0.5 - 25	0.19 - 8
	B	2 / 40	0.5 - 5	3
Carbon Tetrachloride	A	0 / 637	0.5 - 100	NE
	B	1 / 171	0.5 - 5	3
Chlorobenzene	A	138 / 638	0.5 - 100	0.11 - 110
	B	2 / 171	0.5 - 5	0.42 - 0.44
Chloroethane	A	37 / 637	0.5 - 100	0.21 - 10
	B	1 / 171	0.5 - 10	0.3
Chloroform	A	33 / 637	0.5 - 100	0.1 - 2.4
	B	13 / 171	0.5 - 5	0.38 - 4.4
Chloromethane	A	10 / 637	0.5 - 100	0.2 - 4
	B	0 / 171	0.5 - 10	NE
cis-1,2-Dichloroethene	A	87 / 464	0.5 - 100	0.12 - 50
	B	5 / 147	0.5 - 1	0.21 - 0.8
cis-1,3-Dichloropropene	A	0 / 637	0.5 - 100	NE
	B	0 / 171	0.5 - 5	NE
Cyclohexane	A	11 / 66	1 - 10	0.21 - 2.4
	B	1 / 7	1 - 1	0.55
Dibromochloromethane	A	0 / 637	0.5 - 100	NE
	B	0 / 171	0.5 - 5	NE
Dibromomethane	A	0 / 367	0.5 - 100	NE
	B	0 / 134	0.5 - 1	NE
Dichlorodifluoromethane	A	0 / 434	0.5 - 200	NE
	B	0 / 141	0.5 - 1	NE
Ethylbenzene	A	74 / 637	0.5 - 100	0.1 - 51
	B	6 / 171	0.5 - 5	0.24 - 1
Hexachlorobutadiene	A	0 / 4	1 - 4	NE
	B	0 / 3	1 - 1	NE
Isopropylbenzene	A	28 / 74	0.8 - 20	0.07 - 60
	B	1 / 10	1 - 2	0.09
Methyl Acetate	A	0 / 66	1 - 10	NE
	B	0 / 7	1 - 1	NE
Methylcyclohexane	A	11 / 70	1 - 10	0.2 - 4
	B	1 / 7	1 - 1	0.2
Methylene Chloride	A	1 / 637	0.5 - 1000	3
	B	1 / 171	0.5 - 10	2.4
Naphthalene	A	2 / 4	1 - 4	0.3 - 2.7
	B	1 / 3	1 - 1	0.3
n-Butylbenzene	A	0 / 4	1 - 4	NE
	B	0 / 3	1 - 1	NE

Table 5-5. Data Summary - VOCs Detected in Parcel E-2 Groundwater *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

VOC	Aquifer	Detection Frequency[(a)]	Range of Reporting Limits (mg/L)	Range of Results (mg/L)
o-Xylene	A	19 / 72	0.5 - 5	0.11 - 4.8
	B	4 / 10	0.5 - 1	1.2 - 2.3
para-Isopropyl Toluene	A	0 / 3	1 - 4	NE
	B	0 / 3	1 - 1	NE
Propylbenzene	A	4 / 6	0.5 - 4	0.4 - 2
	B	1 / 3	1 - 1	0.2
sec-Butylbenzene	A	2 / 5	1 - 4	1
	B	0 / 3	1 - 1	NE
Styrene	A	0 / 273	0.5 - 25	NE
	B	0 / 40	0.5 - 5	NE
tert-Butylbenzene	A	0 / 4	1 - 4	NE
	B	0 / 3	1 - 1	NE
tert-Butyl Methyl Ether	A	57 / 468	0.5 - 100	0.08 - 7
	B	0 / 147	0.5 - 1	NE
Tetrachloroethene	A	46 / 636	0.5 - 100	0.11 - 81
	B	1 / 171	0.5 - 5	0.23
Toluene	A	97 / 637	0.5 - 100	0.1 - 7
	B	14 / 171	0.5 - 5	0.12 - 1.6
trans-1,2-Dichloroethene	A	24 / 462	0.5 - 100	0.23 - 8.5
	B	0 / 147	0.5 - 1	NE
trans-1,3-Dichloropropene	A	0 / 637	0.5 - 100	NE
	B	1 / 171	0.5 - 5	0.67
Trichloroethene	A	87 / 638	0.5 - 100	0.12 - 440
	B	9 / 171	0.5 - 5	0.18 - 32
Trichlorofluoromethane	A	3 / 434	0.5 - 100	0.21 - 0.82
	B	1 / 141	0.5 - 1	3.8
Vinyl Chloride	A	27 / 638	0.5 - 100	0.36 - 4.4
	B	0 / 171	0.5 - 10	NE
Xylene (total)	A	130 / 637	0.5 - 100	0.2 - 170
	B	10 / 171	0.5 - 5	0.22 - 5.7
Vinyl Acetate	A	0 / 130	10 - 50	NE
	B	0 / 23	10 - 10	NE

Notes:

(a) Rejected data are not included in detection frequency
NE not established
VOC volatile organic compound
mg/L milligrams per liter

Table 5-6. Data Summary - Petroleum Hydrocarbons Detected in Parcel E-2 Groundwater
Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Petroleum Hydrocarbon	Aquifer	Detection Frequency[(a)]	Range of Reporting Limits (mg/L)	Range of Results (mg/L)
Gasoline-Range Organics	A	118 / 444	0.05 - 2,000	10 - 1,100
	B	3 / 138	20 - 500	17 - 22
Diesel-Range Organics	A	259 / 476	50 - 3,800	56 - 7,100
	B	15 / 158	50 - 500	50 - 490
Motor Oil-Range Organics	A	223 / 339	100 - 2,500	89 - 9,800
	B	6 / 138	100 - 500	65 - 360
Total Oil and Grease	A	42 / 251	500 - 5,000	3,300 - 12,900
	B	18 / 130	500 - 5,000	3,300 - 6,000
Total Petroleum Hydrocarbons[(1)]	A	311 / 479	--	11 - 400,000
	B	27 / 158	--	10 - 512

Notes:
(a) Rejected data are not included in detection frequency
(1) Values for total petroleum hydrocarbons are calculated, thus they have no laboratory reporting limits
mg/L milligrams per liter

Table 5-7. Limits and Standards for Parcel E-2 Aquifers– Anions

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

		ESL - Drinking Water[1]		ESL - Nondrinking Water[2]		Federal MCL[3]		State MCL[4]		HGAL[5]		Surface Water Criteria[6]		RIEC[a]		
Anion	Aquifer	Conc. (µg/L)	Comments	Conc. (µg/L)	Comments	Conc. (µg/L)	Comments	Conc. (mg/L)	Comments	Conc. (µg/L)	Comments	Conc. (µg/L)	Comments	Conc. (µg/L)	Comments	Detections Exceeding RIEC
Un-ionized Ammonia	A	NE		NE		NE		NE		NE		25	Basin Plan	25	SW Criteria	103
	B	NE		NE		--		--		NE		25	Basin Plan	25	SW Criteria	25
Bromide	A	NE		NE		NE	NE	NE		NE		NE		NE		NE
	B	NE		NE		--	NE	--		NE		NE		NE		NE
Chloride	A	NE		NE		NE	NE	NE		NE		NE		NE		NE
	B	NE		NE		--	NE	--		NE		NE		NE		NE
Fluoride	A	NE		NE		NE	NE	NE		NE		NE		NE		NE
	B	NE		NE		4,000	NE	2,000		NE		NE		2,000	State MCL	1
Nitrate	A	NE		NE		NE	NE	NE		NE		NE		NE		NE
	B	NE		NE		10,000	NE	45,000		NE		NE		10,000	Federal MCL	15
Nitrite	A	NE		NE		NE	NE	NE		NE		NE		NE		NE
	B	NE		NE		1,000	NE	1,000		NE		NE		1,000	Federal MCL	2
Total Kjeldahl Nitrogen	A	NE		NE		NE	NE	NE		NE		NE		NE		NE
	B	NE		NE		--	NE	--		NE		NE		NE		NE
Orthophosphate	A	NE		NE		NE	NE	NE		NE		NE		NE		NE
	B	NE		NE		--	NE	--		NE		NE		NE		NE
Cyanide	A	NE		1	Aquatic Habitat Goal	NE	NE	NE		NE		1	Basin Plan	1	SW Criteria	45
	B	1	Aquatic Habitat Goal	NE		200	NE	150		NE		1	Basin Plan	1	SW Criteria	6
Sulfate	A	NE		NE		NE	NE	NE		NE		NE		NE		NE
	B	NE		NE		--	NE	--		NE		NE		NE		NE
Sulfide as Hydrogen Sulfide	A	NE		NE		NE	NE	NE		NE		2	Basin Plan	2	SW Criteria	372
	B	NE		NE		--	NE	--		NE		2	Basin Plan	2	SW Criteria	79

Notes:

(a) In most cases the RIEC selected is based most conservative limit or standard. There are two exceptions:
- ESLs based on an aquatic habitat goals were not considered because they utilize criteria for freshwater aquatic habitats and are not applicable to Parcel E-2; the surface water criterion (based on either promulgated or recommended criteria for saltwater aquatic habitats) was developed to evaluate the effects to aquatic receptors in San Francisco Bay
- In the case of metals, if the lowest limit or standard is exceeded by the HGAL, the HGAL is selected as the RIEC (applicable to the A-aquifer only)

Conc.	concentration	MCL	maximum contaminant level	RIEC	remedial investigation evaluation criteria
DW	drinking water	mg/L	milligrams per liter	SW	surface water
ESL	environmental screening level	NDW	nondrinking water	µg/L	micrograms per liter
GDGI	groundwater data gaps investigation	NE	not established	--	No criteria established for this chemical
HGAL	Hunters Point groundwater ambient level				

References:

(1) San Francisco Bay Regional Water Quality Control Board. 2008. "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Appendix 1, Table F-1a. Groundwater Screening Levels (groundwater IS a current or potential drinking water resource), Interim Final." May.

(2) San Francisco Bay Regional Water Quality Control Board. 2008. "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Appendix 1, Table F-1b. Groundwater Screening Levels (groundwater IS NOT a current or potential drinking water resource), Interim Final." May.

(3) U.S. Environmental Protection Agency, Title 40, Code of Federal Regulations, Parts 141 [Primary MCLs} and 143 [Secondary MCLs], <http://www.epa.gov/waterscience/drinking/standards>

(4) California Department of Public Health (CDPH). 2008. Drinking water standards [maximum contaminant levels (MCLs)]. Available Online at: http://www.cdph.ca.gov/certlic/drinkingwater/Pages/Chemicalcontaminants.aspx

(5) PRC Environmental Management, Inc. 1996b. "Technical Memorandum: Estimation of HPS Groundwater Ambient Levels, Hunters Point Shipyard, San Francisco, California." September 16.

(6) Based on compilation of promulgated and recommended criteria for saltwater aquatic life (see Appendix M, Table M-1). Specific sources are listed below:

Basin Plan: San Francisco Bay Regional Water Quality Control Board. 2007. *San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan)*. January.

California Toxics Rule: U.S. Environmental Protection Agency (EPA). 2000. *Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California.* 40 Code of Federal Regulations Part 131. May 18.

National Ambient Water Quality Criteria: Central Valley Regional Water Quality Control Board. 2007. *A Compilation of Water Quality Goals.* Prepared by Jon B. Marshack, Central Valley Region. August.

National Recommended Water Quality Criteria: EPA. 2006. *National Recommended Water Quality Criteria.*

Table 5-8. Limits and Standards for Parcel E-2 Aquifers– Metals

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

		ESL - Drinking Water[1]		ESL - Nondrinking Water(2)		Federal MCL[3]		State MCL[4]		HGAL[5]		Surface Water Criteria[6]		RIEC[a]		Detections Exceeding RIEC
Metal	Aquifer	Conc. (µg/L)	Comments	Conc. (µg/L)	Comments	Conc. (µg/L)	Comments	Conc. (mg/L)	Comments	Conc. (µg/L)	Comments	Conc. (µg/L)	Comments	Conc. (µg/L)	Comments	
Aluminum	A	NE		--		NE		NE		--		NE		NE		NE
	B	--		NE		NE		1,000		NE		NE		1,000	State MCL	4
Antimony	A	NE		30	Aquatic Habitat Goal	NE		NE		43.3		NE		43.3	HGAL	9
	B	6	DW Toxicity	NE		6		6		NE		NE		6	Federal MCL	20
Arsenic	A	NE		36	Aquatic Habitat Goal	NE		NE		27.3		36	Basin Plan	36	Basin Plan	30
	B	36	Aquatic Habitat Goal	NE		10		50		NE		36	Basin Plan	10	Federal MCL	12
Barium	A	NE		1,000	Aquatic Habitat Goal	NE		NE		504		NE		504	HGAL	162
	B	1,000	DW Toxicity	NE		2,000		1,000		NE		NE		1,000	State MCL	0
Beryllium	A	NE		2.65	Aquatic Habitat Goal	NE		NE		1.40		NE		1.4	HGAL	9
	B	2.65	Aquatic Habitat Goal	NE		4		4		NE		NE		4	Federal MCL	0
Cadmium	A	NE		1.1	Aquatic Habitat Goal	NE		NE		5.08		8.8	NRWQC	8.8	SW Criteria	7
	B	1.1	Aquatic Habitat Goal	NE		5		5		NE		8.8	NRWQC	5	Federal MCL	2
Calcium	A	NE		--		NE		NE		--		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Chromium	A	NE		180	Aquatic Habitat Goal	NE		NE		15.7		NE		15.7	HGAL	38
	B	50	DW Toxicity	NE		100		50		NE		NE		50	State MCL	4
Chromium VI	A	NE		11	Aquatic Habitat Goal	NE		NE		--		50	Basin Plan	50	SW Criteria	0
	B	11	Aquatic Habitat Goal	NE		--		--		NE		50	Basin Plan	50	SW Criteria	1
Cobalt	A	NE		3	Aquatic Habitat Goal	NE		NE		20.8		NE		20.8	HGAL	11
	B	3	Aquatic Habitat Goal	NE		--		--		NE		NE		NE		NE
Copper	A	NE		3.1	Aquatic Habitat Goal	NE		NE		28.0		3.1	Basin Plan	28.0	HGAL	33
	B	3.1	Aquatic Habitat Goal	NE		1,300		1,300		NE		3.1	Basin Plan	3.1	SW Criteria	19
Iron[b]	A	NE		--		NE		NE		2,380		NE		2,380	HGAL	75
	B	--		NE		300		--		NE		NE		300	Federal MCL	15
Lead	A	NE		2.5	Aquatic Habitat Goal	NE		NE		14.4		8.1	Basin Plan	14.4	HGAL	34
	B	2.5	Aquatic Habitat Goal	NE		15		15		NE		8.1	Basin Plan	8.1	SW Criteria	6
Magnesium	A	NE		--		NE		NE		1,440,000		NE		1,440,000	HGAL	0
	B	--		NE		--		--		NE		NE		NE		NE
Manganese	A	NE		--		NE		NE		8,140		NE		8,140	HGAL	3
	B	--		NE		--		--		NE		NE		NE		NE
Mercury	A	NE		0.012	Aquatic Habitat Goal	NE		NE		0.60		0.025	Basin Plan	0.60	HGAL	27
	B	0.012	Aquatic Habitat Goal	NE		2		2		NE		0.025	Basin Plan	0.025	SW Criteria	6
Molybdenum	A	NE		240	Aquatic Habitat Goal	NE		NE		61.9		NE		61.9	HGAL	0
	B	35	DW Toxicity	NE		--		--		NE		NE		35	DW ESL	0
Nickel	A	NE		8.2	Aquatic Habitat Goal	NE		NE		96.5		8.2	Basin Plan	96.5	HGAL	31
	B	8.2	Aquatic Habitat Goal	NE		--		100		NE		8.2	Basin Plan	8.2	SW Criteria	31
Potassium	A	NE		NE		NE		NE		448,000		NE		448,000	HGAL	0
	B	NE		NE		--		--		NE		NE		NE		NE
Selenium	A	NE		5	Aquatic Habitat Goal	NE		NE		14.5		71	CA Toxics Rule	71	SW Criteria	2
	B	5	Aquatic Habitat Goal	NE		50		50		NE		71	CA Toxics Rule	50	Federal MCL	1
Silver	A	NE		0.19	Aquatic Habitat Goal	NE		NE		7.43		0.38	CA Toxics Rule	7.43	HGAL	3
	B	0.19	Aquatic Habitat Goal	NE		--		--		NE		0.38	CA Toxics Rule	0.38	SW Criteria	3
Sodium[b]	A	NE		--		NE		NE		9,242,000		NE		9,242,000	HGAL	3
	B	--		NE		--		--		NE		NE		NE		NE
Thallium	A	NE		20	Aquatic Habitat Goal	NE		NE		13.0		426	NAWQC	426	SW Criteria	0
	B	2	DW Toxicity	NE		2		2		NE		426	NAWQC	2	Federal MCL	0
Vanadium	A	NE		19	Aquatic Habitat Goal	NE		NE		26.6		NE		26.6	HGAL	13
	B	15	DW Toxicity	NE		--		--		NE		NE		15	DW ESL	6
Zinc	A	NE		81	Aquatic Habitat Goal	NE		NE		75.7		81	Basin Plan	81	SW Criteria	38
	B	81	Aquatic Habitat Goal	NE		--		--		NE		81	Basin Plan	81	SW Criteria	0

Table 5-8. Limits and Standards for Parcel E-2 Aquifers– Metals *(continued)*
Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Notes:

(a) In most cases the RIEC selected is based most conservative limit or standard. There are two exceptions:
- ESLs based on an aquatic habitat goals were not considered because they utilize criteria for freshwater aquatic habitats and are not applicable to Parcel E-2; the surface water criterion (based on either promulgated or recommended criteria for saltwater aquatic habitats) was developed to evaluate the effects to aquatic receptors in San Francisco Bay
- In the case of metals, if the lowest limit or standard is exceeded by the HGAL, the HGAL is selected as the RIEC (applicable to the A-aquifer only)

(b) Iron and sodium are ubiquitous in groundwater and therefore their extents were not evaluated in the nature and extent evaluation presented in Section 5.

CA	California
Conc.	concentration
DW	drinking water
ESL	environmental screening level
GDGI	groundwater data gaps investigation
HGAL	Hunters Point groundwater ambient level
MCL	maximum contaminant level
mg/L	milligrams per liter
NAWQC	National Ambient Water Quality Criteria
NDW	nondrinking water
NE	not established
NRWQC	National Recommended Water Quality Criteria
RIEC	remedial investigation evaluation criteria
SW	surface water
µg/L	micrograms per liter
--	No criteria established for this chemical

References:

(1) San Francisco Bay Regional Water Quality Control Board. 2008. "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Appendix 1, Table F-1a. Groundwater Screening Levels (groundwater IS a current or potential drinking water resource), Interim Final." May.

(2) San Francisco Bay Regional Water Quality Control Board. 2008. "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Appendix 1, Table F-1b. Groundwater Screening Levels (groundwater IS NOT a current or potential drinking water resource), Interim Final."

(3) U.S. Environmental Protection Agency, Title 40, Code of Federal Regulations, Parts 141 [Primary MCLs} and 143 [Secondary MCLs], <http://www.epa.gov/waterscience/drinking/standards>

(4) California Department of Public Health (CDPH). 2008. Drinking water standards [maximum contaminant levels (MCLs)]. Available Online at: http://www.cdph.ca.gov/certlic/drinkingwater/Pages/Chemicalcontaminants.aspx

(5) PRC Environmental Management, Inc. 1996b. "Technical Memorandum: Estimation of HPS Groundwater Ambient Levels, Hunters Point Shipyard, San Francisco, California." September 16.

(6) Based on compilation of promulgated and recommended criteria for saltwater aquatic life (see Appendix M, Table M-1). Specific sources are listed below:

Basin Plan: San Francisco Bay Regional Water Quality Control Board. 2007. *San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan)*. January.

California Toxics Rule: U.S. Environmental Protection Agency (EPA). 2000. *Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California.* 40 Code of Federal Regulations Part 131. May 18.

National Ambient Water Quality Criteria: Central Valley Regional Water Quality Control Board. 2007. *A Compilation of Water Quality Goals.* Prepared by Jon B. Marshack, Central Valley Region. August.

National Recommended Water Quality Criteria: EPA. 2006. *National Recommended Water Quality Criteria.*

Table 5-9. Limits and Standards for Parcel E-2 Aquifers– Pesticides and PCBs (

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Chemical	Aquifer	ESL - Drinking Water[1]		ESL - Nondrinking Water[2]		Federal MCL[3]		State MCL[4]		HGAL[5]		Surface Water Criteria[6]		RIEC[a]		Detections Exceeding RIEC
		Conc. (µg/L)	Comments	Conc. (µg/L)	Comments	Conc. (µg/L)	Comments	Conc. (mg/L)	Comments	Conc. (µg/L)	Comments	Conc. (µg/L)	Comments	Conc. (µg/L)	Comments	
Total PCBs	A	NE		16	Ceiling Value	NE		NE		NE		0.03	CA Toxics Rule	0.03	SW Criteria	80
	B	0.014	Aquatic Habitat Goal	NE		500		--		NE		0.03	CA Toxics Rule	0.03	SW Criteria	0
4,4'-DDD	A	NE		80	Ceiling Value	NE		NE		NE		0.001	NRWQC	0.001	SW Criteria	8
	B	0.001	Aquatic Habitat Goal	NE		--		--		NE		0.001	NRWQC	0.001	SW Criteria	0
4,4'-DDE	A	NE		20	Ceiling Value	NE		NE		NE		0.001	NRWQC	0.001	SW Criteria	3
	B	0.001	Aquatic Habitat Goal	NE		--		--		NE		0.001	NRWQC	0.001	SW Criteria	1
4,4'-DDT	A	NE		1.5	Ceiling Value	NE		NE		NE		0.001	CA Toxics Rule	0.001	SW Criteria	13
	B	0.001	Aquatic Habitat Goal	NE		--		--		NE		0.001	CA Toxics Rule	0.001	SW Criteria	0
Aldrin	A	NE		8.5	Ceiling Value	NE		NE		NE		0.001	NRWQC	0.26	SW Criteria	0
	B	0.002	Aquatic Habitat Goal	NE		--		--		NE		0.001	NRWQC	0.26	SW Criteria	0
alpha-BHC	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
alpha-Chlordane	A	NE		--		NE		NE		NE		0.004	CA Toxics Rule	0.004	SW Criteria	3
	B	--		NE		--		--		NE		0.004	CA Toxics Rule	0.004	SW Criteria	0
Azinphos Methyl	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
beta-BHC	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Bolstar	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Chlorpyrifos	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Coumaphos	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
delta-BHC	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Demeton	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Demeton-O	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Demeton-S	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Diazinon	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Dichlorvos	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Dieldrin	A	NE		93.0	Ceiling Value	NE		NE		NE		0.0019	CA Toxics Rule	0.0019	SW Criteria	7
	B	0.0019	Aquatic Habitat Goal	NE		--		--		NE		0.0019	CA Toxics Rule	0.0019	SW Criteria	0
Dimethoate	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Disulfoton	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Endosulfan I	A	NE		75.0	Ceiling Value	NE		NE		NE		0.0087	NRWQC	0.0087	SW Criteria	1
	B	0.0	Aquatic Habitat Goal	NE		--		--		NE		0.0087	NRWQC	0.0087	SW Criteria	0
Endosulfan II	A	NE		75	Ceiling Value	NE		NE		NE		0.0087	NRWQC	0.0087	SW Criteria	2
	B	--		NE		--		--		NE		0.0087	NRWQC	0.0087	SW Criteria	0
Endosulfan Sulfate	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Endrin	A	NE		130.0	Ceiling Value	NE		NE		NE		0.0023	CA Toxics Rule	0.0023	SW Criteria	5
	B	0.0023	Aquatic Habitat Goal	NE		2		2		NE		0.0023	CA Toxics Rule	0.0023	SW Criteria	0
Endrin Aldehyde	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Endrin Ketone	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE

Table 5-9. Limits and Standards for Parcel E-2 Aquifers– Pesticides and PCBs *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Chemical	Aquifer	ESL - Drinking Water[1]		ESL - Nondrinking Water[2]		Federal MCL[3]		State MCL[4]		HGAL[5]		Surface Water Criteria[6]		RIEC[a]		Detections Exceeding RIEC
		Conc. (µg/L)	Comments	Conc. (µg/L)	Comments	Conc. (µg/L)	Comments	Conc. (mg/L)	Comments	Conc. (µg/L)	Comments	Conc. (µg/L)	Comments	Conc. (µg/L)	Comments	
EPN	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Ethion	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Ethoprop	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Famphur	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Fensulfothion	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Fenthion	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
gamme-BHC (lindane)	A	NE		3,500	Ceiling Value	NE		NE		NE		0.032	NRWQC	0.032	SW Criteria	2
	B	0.016	Aquatic Habitat Goal	NE		0.2		0.2		NE		0.032	NRWQC	0.032	SW Criteria	0
gamma-Chlordane	A	NE		--		NE		NE		NE		0.004	CA Toxics Rule	0.004	SW Criteria	10
	B	--		NE		--		--		NE		0.004	CA Toxics Rule	0.004	SW Criteria	0
Heptachlor	A	NE		28.0	Ceiling Value	NE		NE		NE		0.0036	CA Toxics Rule	0.0036	SW Criteria	8
	B	0.0036	Aquatic Habitat Goal	NE		0.4		0.01		NE		0.0036	CA Toxics Rule	0.0036	SW Criteria	0
Heptachlor Epoxide	A	NE		180.0	Ceiling Value	NE		NE		NE		0.0036	CA Toxics Rule	0.0036	SW Criteria	6
	B	0.0036	Aquatic Habitat Goal	NE		0.2		0.01		NE		0.0036	CA Toxics Rule	0.0036	SW Criteria	0
Heptachlor Epoxide A	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Heptachlor Epoxide B	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Malathion	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Merphos	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Methoxychlor	A	NE		20	Ceiling Value	NE		NE		NE		0.003	NRWQC	0.003	SW Criteria	0
	B	0.003	Aquatic Habitat Goal	NE		40		30		NE		0.003	NRWQC	0.003	SW Criteria	0
Methyl Parathion	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Mevinphos	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Naled	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Parathion	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Phorate	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Ronnel	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Stirophos	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Sulfotep	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Trichlornate	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Tokuthion	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Toxaphene	A	NE		140	Ceiling Value	NE		NE		NE		0.0002	CA Toxics Rule	0.0002	SW Criteria	0
	B	0.0002	Aquatic Habitat Goal	NE		3		3		NE		0.0002	CA Toxics Rule	0.0002	SW Criteria	0

Table 5-9. Limits and Standards for Parcel E-2 Aquifers– Pesticides and PCBs *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Notes:

(a) In most cases the RIEC selected is based most conservative limit or standard. There are two exceptions:

- ESLs based on an aquatic habitat goals were not considered because they utilize criteria for freshwater aquatic habitats and are not applicable to Parcel E-2; the surface water criterion (based on either promulgated or recommended criteria for saltwater aquatic habitats) was developed to evaluate the effects to aquatic receptors in San Francisco Bay
- In the case of metals, if the lowest limit or standard is exceeded by the HGAL, the HGAL is selected as the RIEC (applicable to the A-aquifer only)

BHC	benzene hexachloride	EPN	ethyl p-nitrophenylphenylpharpharathioate	NE	not established
CA	California	ESL	environmental screening level	NRWQC	National Recommended Water Quality Criteria
Conc.	concentration	GDGI	groundwater data gaps investigation	PCB	polychlorinated biphenyl
DDD	dichlorodiphenyldichloroethane	HGAL	Hunters Point groundwater ambient level	RIEC	remedial investigation evaluation criteria
DDE	dichlorodiphenyldichloroethene	MCL	maximum contaminant level	SW	surface water
DDT	dichlorodiphenyltrichloroethane	mg/L	milligrams per liter	µg/L	micrograms per liter
DW	drinking water	NDW	nondrinking water	--	No criteria established for this chemical

References:

(1) San Francisco Bay Regional Water Quality Control Board. 2008. "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Appendix 1, Table F-1a. Groundwater Screening Levels (groundwater IS a current or potential drinking water resource), Interim Final." May.

(2) San Francisco Bay Regional Water Quality Control Board. 2008. "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Appendix 1, Table F-1b. Groundwater Screening Levels (groundwater IS NOT a current or potential drinking water resource), Interim Final." May.

(3) U.S. Environmental Protection Agency, Title 40, Code of Federal Regulations, Parts 141 [Primary MCLs} and 143 [Secondary MCLs], <http://www.epa.gov/waterscience/drinking/standards>

(4) California Department of Public Health (CDPH). 2008. Drinking water standards [maximum contaminant levels (MCLs)]. Available Online at: http://www.cdph.ca.gov/certlic/drinkingwater/Pages/Chemicalcontaminants.aspx

(5) PRC Environmental Management, Inc. 1996b. "Technical Memorandum: Estimation of HPS Groundwater Ambient Levels, Hunters Point Shipyard, San Francisco, California." September 16.

(6) Based on compilation of promulgated and recommended criteria for saltwater aquatic life (see Appendix M, Table M-1). Specific sources are listed below:

Basin Plan: San Francisco Bay Regional Water Quality Control Board. 2007. *San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan)*. January.

California Toxics Rule: U.S. Environmental Protection Agency (EPA). 2000. *Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California.* 40 Code of Federal Regulations Part 131. May 18.

National Ambient Water Quality Criteria: Central Valley Regional Water Quality Control Board. 2007. *A Compilation of Water Quality Goals.* Prepared by Jon B. Marshack, Central Valley Region. August.

National Recommended Water Quality Criteria: EPA. 2006. *National Recommended Water Quality Criteria.*

Table 5-10. Limits and Standards for Parcel E-2 Aquifers– SVOCs

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

SVOC	Aquifer	ESL - Drinking Water[1] Conc. (µg/L)	Comments	ESL - Nondrinking Water[2] Conc. (µg/L)	Comments	Federal MCL[3] Conc. (µg/L)	Comments	State MCL[4] Conc. (mg/L)	Comments	HGAL[5] Conc. (µg/L)	Comments	Surface Water Criteria[6] Conc. (µg/L)	Comments	RIEC[a] Conc. (µg/L)	Comments	Detections Exceeding RIEC
1,2,4-Trichlorobenzene	A	NE		25	Aquatic Habitat Goal	NE		NE		NE		129	NAWQC	129	SW Criteria	0
	B	5	DW Toxicity	NE		70		5		NE		129	NAWQC	5	State MCL	0
1,2-Dichlorobenzene	A	NE		14	Aquatic Habitat Goal	NE		NE		NE		129	NAWQC	129	SW Criteria	0
	B	10	Ceiling Value	NE		600		600		NE		129	NAWQC	10	DW ESL	0
1,3-Dichlorobenzene	A	NE		65	Aquatic Habitat Goal	NE		NE		NE		129	NAWQC	129	SW Criteria	0
	B	65	Aquatic Habitat Goal	NE		--		--		NE		129	NAWQC	129	SW Criteria	0
1,4-Dichlorobenzene	A	NE		15	Aquatic Habitat Goal	NE		NE		NE		129	NAWQC	129	SW Criteria	0
	B	5	Ceiling Value	NE		75		5		NE		129	NAWQC	5	State MCL	0
2,2'-Oxybis(1-chloropropane)	A	NE		12	Aquatic Habitat Goal	NE		NE		NE		NE		NE		NE
	B	0.014	DW Toxicity	NE		--		--		NE		NE		0.014	DW ESL	0
2,4,5-Trichlorophenol	A	NE		11	Aquatic Habitat Goal	NE		NE		NE		NE		NE		NE
	B	11	Aquatic Habitat Goal	NE		--		--		NE		NE		NE		NE
2,4,6-Trichlorophenol	A	NE		97	Aquatic Habitat Goal	NE		NE		NE		NE		NE		NE
	B	0.7	DW Toxicity	NE		--		--		NE		NE		0.7	DW ESL	0
2,4-Dichlorophenol	A	NE		3	Ceiling Value	NE		NE		NE		NE		3	NDW ESL	0
	B	0.3	Ceiling Value	NE		--		--		NE		NE		0.3	DW ESL	0
2,4-Dimethylphenol	A	NE		110	Aquatic Habitat Goal	NE		NE		NE		NE		NE		NE
	B	100	DW Toxicity	NE		--		--		NE		NE		100	DW ESL	0
2,4-Dinitrophenol	A	NE		150	Aquatic Habitat Goal	NE		NE		NE		970	NAWQC	970	SW Criteria	0
	B	15	Aquatic Habitat Goal	NE		--		--		NE		970	NAWQC	970	SW Criteria	0
2,4-Dinitrotoluene	A	NE		120.00	Aquatic Habitat Goal	NE		NE		NE		118	NAWQC	118	SW Criteria	0
	B	0.05	DW Toxicity	NE		--		--		NE		118	NAWQC	0.051	DW ESL	0
2,6-Dinitrotoluene	A	NE		--		NE		NE		NE		118	NAWQC	118	SW Criteria	0
	B	--		NE		--		--		NE		118	NAWQC	118	SW Criteria	0
2-Chloronaphthalene	A	NE		--		NE		NE		NE		1.5	NAWQC	1.5	SW Criteria	0
	B	--		NE		--		--		NE		1.5	NAWQC	1.5	SW Criteria	0
2-Chlorophenol	A	NE		1.8	Ceiling Value	NE		NE		NE		NE		1.8	NDW ESL	0
	B	0.18	Ceiling Value	NE		--		--		NE		NE		0.18	DW ESL	1
2-Methylnaphthalene	A	NE		2.1	Aquatic Habitat Goal	NE		NE		NE		NE		NE		NE
	B	2.1	Aquatic Habitat Goal	NE		--		--		NE		NE		NE		NE
2-Methylphenol	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
2-Nitroaniline	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
2-Nitrophenol	A	NE		--		NE		NE		NE		970	NAWQC	970	SW Criteria	0
	B	--		NE		--		--		NE		970	NAWQC	970	SW Criteria	0
3,3'-Dichlorobenzidine	A	NE		250	Aquatic Habitat Goal	NE		NE		NE		NE		NE		NE
	B	0.029	DW Toxicity	NE		--		--		NE		NE		0.029	DW ESL	0
3-Nitroaniline	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
4,6-Dinitro-2-Methylphenol	A	NE		--		NE		NE		NE		970	NAWQC	970	SW Criteria	0
	B	--		NE		--		--		NE		970	NAWQC	970	SW Criteria	0
4-Bromophenyl-phenylether	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
4-Chloro-3-Methylphenol	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
4-Chloroaniline	A	NE		5	Aquatic Habitat Goal	NE		NE		NE		NE		NE		NE
	B	5	Aquatic Habitat Goal	NE		--		--		NE		NE		NE		NE
4-Chlorophenyl-phenylether	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
4-Methylphenol	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
4-Nitroaniline	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE

Table 5-10. Limits and Standards for Parcel E-2 Aquifers– SVOCs *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

SVOC	Aquifer	ESL - Drinking Water[1] Conc. (µg/L)	Comments	ESL - Nondrinking Water[2] Conc. (µg/L)	Comments	Federal MCL[3] Conc. (µg/L)	Comments	State MCL[4] Conc. (mg/L)	Comments	HGAL[5] Conc. (µg/L)	Comments	Surface Water Criteria[6] Conc. (µg/L)	Comments	RIEC[a] Conc. (µg/L)	Comments	Detections Exceeding RIEC
4-Nitrophenol	A	NE		--		NE		NE		NE		970	NAWQC	970	SW Criteria	0
	B	--		NE		--		--		NE		970	NAWQC	970	SW Criteria	0
Acenaphthene	A	NE		230	Aquatic Habitat Goal	NE		NE		NE		710	NAWQC	710	SW Criteria	0
	B	20	Ceiling Value	NE		--		--		NE		710	NAWQC	20	DW ESL	0
Acenaphthylene	A	NE		30	Aquatic Habitat Goal	NE		NE		NE		60	NAWQC	60	SW Criteria	0
	B	30	Aquatic Habitat Goal	NE		--		--		NE		60	NAWQC	60	SW Criteria	0
Anthracene	A	NE		0.73	Aquatic Habitat Goal	NE		NE		NE		60	NAWQC	60	SW Criteria	0
	B	0.73	Aquatic Habitat Goal	NE		--		--		NE		60	NAWQC	60	SW Criteria	0
Azobenzene	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--	DW Toxicity	NE		--		--		NE		NE		NE		NE
Benzo(a)anthracene	A	NE		0.027	Aquatic Habitat Goal	NE		NE		NE		60	NAWQC	60	SW Criteria	0
	B	0.027	Aquatic Habitat Goal	NE		--		--		NE		60	NAWQC	60	SW Criteria	0
Benzo(a)pyrene	A	NE		0.014	Aquatic Habitat Goal	NE		NE		NE		60	NAWQC	60	NDW ESL	0
	B	0.014	Aquatic Habitat Goal	NE		0.2		0.2		NE		60	NAWQC	0.2	Federal MCL	1
Benzo(b)fluoranthene	A	NE		0.03	Aquatic Habitat Goal	NE		NE		NE		60	NAWQC	60	SW Criteria	0
	B	0.03	Aquatic Habitat Goal	NE		--		--		NE		60	NAWQC	60	SW Criteria	0
Benzo(g,h,i)perylene	A	NE		0.1	Aquatic Habitat Goal	NE		NE		NE		60	NAWQC	60	SW Criteria	0
	B	0.01	Aquatic Habitat Goal	NE		--		--		NE		60	NAWQC	60	SW Criteria	0
Benzo(k)fluoranthene	A	NE		0.4	Ceiling Value	NE		NE		NE		60	NAWQC	0.4	NDW ESL	1
	B	0.03	DW Toxicity	NE		--		--		NE		60	NAWQC	0.029	DW ESL	1
Benzoic Acid	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Benzyl Alcohol	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Bis(2-chloroethoxy)methane	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Bis(2-chloroethyl)ether	A	NE		12	Aquatic Habitat Goal	NE		NE		NE		NE		NE		NE
	B	0.03	DW Toxicity	NE		--		--		NE		NE		0.032	DW ESL	0
Bis(2-Chloroisopropyl)ether	A	NE		12	Aquatic Habitat Goal	NE		NE		NE		NE		NE		NE
	B	0.014	DW Toxicity	NE		--		--		NE		NE		0.014	DW ESL	0
Bis(2-ethylhexyl)phthalate	A	NE		32	Aquatic Habitat Goal	NE		NE		NE		NE		NE		NE
	B	4	DW Toxicity	NE		6		4		NE		NE		4	State MCL	1
Butylbenzylphthalate	A	NE		--		NE		NE		NE		3.4	NAWQC	3.4	SW Criteria	1
	B	--		NE		--		--		NE		3.4	NAWQC	3.4	SW Criteria	0
Carbazole	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Chrysene	A	NE		0.35	Aquatic Habitat Goal	NE		NE		NE		60	NAWQC	60	SW Criteria	0
	B	3.50E-01	Aquatic Habitat Goal	NE		--		--		NE		60	NAWQC	60	SW Criteria	0
Dibenz(a,h)anthracene	A	NE		0.25	Ceiling Value	NE		NE		NE		60	NAWQC	0.25	NDW ESL	2
	B	4.80E-03	DW Toxicity	NE		--		--		NE		60	NAWQC	0.0048	DW ESL	0
Dibenzofuran	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Diethylphthalate	A	NE		1.5	Aquatic Habitat Goal	NE		NE		NE		3.4	NAWQC	3.4	SW Criteria	4
	B	1.5	Aquatic Habitat Goal	NE		--		--		NE		3.4	NAWQC	3.4	SW Criteria	0
Dimethylphthalate	A	NE		1.5	Aquatic Habitat Goal	NE		NE		NE		3.4	NAWQC	3.4	SW Criteria	0
	B	1.5	Aquatic Habitat Goal	NE		--		--		NE		3.4	NAWQC	3.4	SW Criteria	0
di-n-Butylphthalate	A	NE		--		NE		NE		NE		3.4	NAWQC	3.4	SW Criteria	2
	B	--		NE		--		--		NE		3.4	NAWQC	3.4	SW Criteria	0
di-n-Octylphthalate	A	NE		--		NE		NE		NE		3.4	NAWQC	3.4	SW Criteria	0
	B	--		NE		--		--		NE		3.4	NAWQC	3.4	SW Criteria	0
Fluoranthene	A	NE		8	Aquatic Habitat Goal	NE		NE		NE		16	NAWQC	16	SW Criteria	0
	B	8	Aquatic Habitat Goal	NE		--		--		NE		16	NAWQC	16	SW Criteria	0
Fluorene	A	NE		3.9	Aquatic Habitat Goal	NE		NE		NE		60	NAWQC	60	SW Criteria	1[b]
	B	3.9	Aquatic Habitat Goal	NE		--		--		NE		60	NAWQC	60	SW Criteria	0

Table 5-10. Limits and Standards for Parcel E-2 Aquifers– SVOCs *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

SVOC	Aquifer	ESL - Drinking Water[1] Conc. (µg/L)	Comments	ESL - Nondrinking Water[2] Conc. (µg/L)	Comments	Federal MCL[3] Conc. (µg/L)	Comments	State MCL[4] Conc. (mg/L)	Comments	HGAL[5] Conc. (µg/L)	Comments	Surface Water Criteria[6] Conc. (µg/L)	Comments	RIEC[a] Conc. (µg/L)	Comments	Detections Exceeding RIEC
Hexachlorobenzene	A	NE		3.7	Aquatic Habitat Goal	NE		NE		NE		129	NAWQC	129	SW Criteria	0
	B	1	DW Toxicity	NE		1		1		NE		129	NAWQC	1	DW ESL	0
Hexachlorobutadiene	A	NE		0.93	Aquatic Habitat Goal	NE		NE		NE		6.4	NAWQC	6.4	SW Criteria	0
	B	0.45	DW Toxicity	NE		--		--		NE		6.4	NAWQC	0.45	DW ESL	0
Hexachlorocyclopentadiene	A	NE		--		NE		NE		NE		1.4	NAWQC	1.4	SW Criteria	1
	B	--		NE		50		50		NE		1.4	NAWQC	1.4	SW Criteria	0
Hexachloroethane	A	NE		12	Aquatic Habitat Goal	NE		NE		NE		188	NAWQC	188	SW Criteria	0
	B	0.9	DW Toxicity	NE		--		--		NE		188	NAWQC	0.9	DW ESL	0
Indeno(1,2,3-cd)pyrene	A	NE		4.80E-02	Aquatic Habitat Goal	NE		NE		NE		60	NAWQC	60	SW Criteria	0
	B	4.80E-02	Aquatic Habitat Goal	NE		--		--		NE		60	NAWQC	60	SW Criteria	0
Isophorone	A	NE		--		NE		NE		NE		2,580	NAWQC	2580	SW Criteria	0
	B	--		NE		--		--		NE		2,580	NAWQC	2580	SW Criteria	0
Naphthalene	A	NE		24	Aquatic Habitat Goal	NE		NE		NE		470	NAWQC	470	SW Criteria	0
	B	17	DW Toxicity	NE		--		--		NE		470	NAWQC	17	DW ESL	2
Nitrobenzene	A	NE		--		NE		NE		NE		1,336	NAWQC	1336	SW Criteria	0
	B	--		NE		--		--		NE		1,336	NAWQC	1336	SW Criteria	0
n-Nitroso-di-n-propylamine	A	NE		--		NE		NE		NE		660,000	NAWQC	660,000	SW Criteria	0
	B	--		NE		--		--		NE		660,000	NAWQC	660,000	SW Criteria	0
n-Nitrosodimethylamine	A	NE		--		NE		NE		NE		660,000	NAWQC	660,000	SW Criteria	0
	B	--		NE		--		--		NE		660,000	NAWQC	660,000	SW Criteria	0
n-Nitrosodiphenylamine	A	NE		--		NE		NE		NE		660,000	NAWQC	660000	SW Criteria	0
	B	--		NE		--		--		NE		660,000	NAWQC	660,000	SW Criteria	0
Pentachlorophenol	A	NE		7.9	Aquatic Habitat Goal	NE		NE		NE		7.9	CA Toxics Rule	7.9	SW Criteria	0
	B	1	DW Toxicity	NE		1		1		NE		7.9	CA Toxics Rule	1	DW ESL	0
Phenanthrene	A	NE		4.6	Aquatic Habitat Goal	NE		NE		NE		60	NAWQC	60	SW Criteria	1[b]
	B	4.6	Aquatic Habitat Goal	NE		--		--		NE		60	NAWQC	60	SW Criteria	0
Phenol	A	NE		260	Aquatic Habitat Goal	NE		NE		NE		1,160	NAWQC	1,160	SW Criteria	0
	B	5	Ceiling Value	NE		--		--		NE		1,160	NAWQC	5	DW ESL	0
Pyrene	A	NE		2	Aquatic Habitat Goal	NE		NE		NE		60	NAWQC	60	SW Criteria	0
	B	2	Aquatic Habitat Goal	NE		--		--		NE		60	NAWQC	60	SW Criteria	0

Notes:

(a) In most cases the RIEC selected is based most conservative limit or standard. There are two exceptions:
- ESLs based on an aquatic habitat goals were not considered because they utilize criteria for freshwater aquatic habitats and are not applicable to Parcel E-2; the surface water criterion (based on either promulgated or recommended criteria for saltwater aquatic habitats) was developed to evaluate the effects to aquatic receptors in San Francisco Bay
- In the case of metals, if the lowest limit or standard is exceeded by the HGAL, the HGAL is selected as the RIEC (applicable to the A-aquifer only)

(b) Single exceedance of the RIEC was detected in a well located outside the Parcel E-2 boundary, therefore the extent of this chemical was not evaluated in the nature and extent evaluation presented in Section 5.

CA	California	MCL	maximum contaminant level	RIEC	remedial investigation evaluation criteria
Conc.	concentration	mg/L	milligrams per liter	SVOC	semivolatile organic compound
DW	drinking water	NDW	nondrinking water	SW	surface water
ESL	environmental screening level	NE	not established	µg/L	micrograms per liter
GDGI	groundwater data gaps investigation	NAWQC	National Ambient Water Quality Criteria	--	No criteria established for this chemical
HGAL	Hunters Point groundwater ambient level	PCB	polychlorinated biphenyl		

References:

(1) San Francisco Bay Regional Water Quality Control Board. 2008. "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Appendix 1, Table F-1a. Groundwater Screening Levels (groundwater IS a current or potential drinking water resource), Interim Final." May.

(2) San Francisco Bay Regional Water Quality Control Board. 2008. "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Appendix 1, Table F-1b. Groundwater Screening Levels (groundwater IS NOT a current or potential drinking water resource), Interim Final." May.

(3) U.S. Environmental Protection Agency, Title 40, Code of Federal Regulations, Parts 141 [Primary MCLs} and 143 [Secondary MCLs], <http://www.epa.gov/waterscience/drinking/standards>

(4) California Department of Public Health (CDPH). 2008. Drinking water standards [maximum contaminant levels (MCLs)]. Available Online at: http://www.cdph.ca.gov/certlic/drinkingwater/Pages/Chemicalcontaminants.aspx

(5) PRC Environmental Management, Inc. 1996b. "Technical Memorandum: Estimation of HPS Groundwater Ambient Levels, Hunters Point Shipyard, San Francisco, California." September 16.

(6) Based on compilation of promulgated and recommended criteria for saltwater aquatic life (see Appendix M, Table M-1). Specific sources are listed below:

Basin Plan: San Francisco Bay Regional Water Quality Control Board. 2007. *San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan)*. January.

California Toxics Rule: U.S. Environmental Protection Agency (EPA). 2000. *Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California.* 40 Code of Federal Regulations Part 131. May 18.

National Ambient Water Quality Criteria: Central Valley Regional Water Quality Control Board. 2007. *A Compilation of Water Quality Goals.* Prepared by Jon B. Marshack, Central Valley Region. August.

National Recommended Water Quality Criteria: EPA. 2006. *National Recommended Water Quality Criteria.*

Table 5-11. Limits and Standards for Parcel E-2 Aquifers– VOCs

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

VOC	Aquifer	ESL - Drinking Water[1] Conc. (µg/L)	Comments	ESL - Nondrinking Water[2] Conc. (µg/L)	Comments	Federal MCL[3] Conc. (µg/L)	Comments	State MCL[4] Conc. (mg/L)	Comments	HGAL[5] Conc. (µg/L)	Comments	Surface Water Criteria[6] Conc. (µg/L)	Comments	RIEC[a] Conc. (µg/L)	Comments	Detections Exceeding RIEC
1,1,1,2-Tetrachloroethane	A	NE		930	Aquatic Habitat Goal	NE		NE		NE		NE		NE		NE
	B	1.3	DW Toxicity	NE		--		--		NE		NE		1.3	DW ESL	0
1,1,1-Trichloroethane	A	NE		62	Aquatic Habitat Goal	NE		NE		NE		6,240	NAWQC	6240	SW Criteria	0
	B	62	Aquatic Habitat Goal	NE		200		200		NE		6,240	NAWQC	200	Federal MCL	0
1,1,2-Trichloroethane	A	NE		350	Indoor Air Impacts	NE		NE		NE		NE		350	NDW ESL	0
	B	5	DW Toxicity	NE		5		5		NE		NE		5	Federal MCL	0
1,1,2,2-Tetrachloroethane	A	NE		190	Indoor Air Impacts	NE		NE		NE		1,804	NAWQC	190	NDW ESL	0
	B	1	DW Toxicity	NE		--		1		NE		1,804	NAWQC	1	State MCL	0
1,1,2-Trichloro-1,2,2-	A	NE		--		NE		NE		NE		NE		NE		NE
Trifluoroethane	B	--		NE		--		1,200		NE		NE		1200	State MCL	0
1,1-Dichloroethane	A	NE		47	Aquatic Habitat Goal	NE		NE		NE		NE		NE		NE
	B	5	DW Toxicity	NE		--		5		NE		NE		5	State MCL	0
1,1-Dichloroethene	A	NE		25	Aquatic Habitat Goal	NE		NE		NE		44,800	NAWQC	44800	SW Criteria	0
	B	6	DW Toxicity	NE		7		6		NE		44,800	NAWQC	6	State MCL	0
1,1-Dichloropropene	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
1,2,3-Trichlorobenzene	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
1,2,3-Trichloropropane	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		70		5		NE		NE		5	State MCL	0
1,2,4-Trichlorobenzene	A	NE		--		NE		NE		NE		129	NAWQC	129	SW Criteria	0
	B	--		NE		70		5		NE		129	NAWQC	5	State MCL	0
1,2,4-Trimethylbenzene	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
1,2-Dibromo-3-Chloropropane	A	NE		0.2	Aquatic Habitat Goal	NE		NE		NE		NE		NE		NE
	B	0.2	Aquatic Habitat Goal	NE		0.2		0.2		NE		NE		0.2	Federal MCL	0
1,2-Dibromoethane	A	NE		150	Indoor Air Impacts	NE		NE		NE		NE		150	NDW ESL	0
	B	0.05	DW Toxicity	NE		0.05		0.05		NE		NE		0.05	Federal MCL	0
1,2-Dichlorobenzene	A	NE		14	Aquatic Habitat Goal	NE		NE		NE		129	NAWQC	129	SW Criteria	0
	B	10	Ceiling value	NE		600		600		NE		129	NAWQC	10	DW ESL	0
1,2-Dichloroethane	A	NE		200	Indoor Air Impacts	NE		NE		NE		22,600	NAWQC	200	NDW ESL	0
	B	0.5	DW Toxicity	NE		0.5		0.5		NE		22,600	NAWQC	0.5	DW ESL	10
1,2-Dichloroethene (total)	A	NE		--		NE		NE		NE		44,800	NAWQC	44800	SW Criteria	0
	B	--		NE		--		--		NE		44,800	NAWQC	44800	SW Criteria	0
1,2-Dichloropropane	A	NE		100	Ceiling value	--		--		NE		3040	NAWQC	100	NDW ESL	0
	B	5	DW Toxicity	NE		5		5		NE		3040	NAWQC	5	DW ESL	0
1,3,5-Trimethylbenzene	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
1,3-Dichlorobenzene	A	NE		65	Aquatic Habitat Goal	NE		NE		NE		129	NAWQC	129	SW Criteria	0
	B	65	Aquatic Habitat Goal	NE		--		--		NE		129	NAWQC	129	SW Criteria	0
1,3-Dichloropropane	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		0.5		NE		NE		0.5	State MCL	0
1,4-Dichlorobenzene	A	NE		150	Aquatic Habitat Goal	NE		NE		NE		129	NAWQC	129	SW Criteria	0
	B	5	Ceiling value	NE		75		5		NE		129	NAWQC	5	State MCL	0
2,2-Dichloropropane	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
2-Butanone (MEK)	A	NE		14,000	Aquatic Habitat Goal	NE		NE		NE		NE		NE		NE
	B	4,200	DW Toxicity	NE		--		--		NE		NE		4200	DW ESL	0
2-Chlorotoluene	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE

Table 5-11. Limits and Standards for Parcel E-2 Aquifers– VOCs *(continued)*
Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

VOC	Aquifer	ESL - Drinking Water[1] Conc. (µg/L)	Comments	ESL - Nondrinking Water[2] Conc. (µg/L)	Comments	Federal MCL[3] Conc. (µg/L)	Comments	State MCL[4] Conc. (mg/L)	Comments	HGAL[5] Conc. (µg/L)	Comments	Surface Water Criteria[6] Conc. (µg/L)	Comments	RIEC[a] Conc. (µg/L)	Comments	Detections Exceeding RIEC
2-Hexanone	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
4-Chlorotoluene	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
4-Methyl-2-Pentanone	A	NE		170	Aquatic Habitat Goal	NE		NE		NE		NE		NE		NE
	B	120	DW Toxicity	NE		--		--		NE		NE		120	DW ESL	0
Acetone	A	NE		1,500	Aquatic Habitat Goal	NE		NE		NE		NE		NE		NE
	B	1,500	Aquatic Habitat Goal	NE		--		--		NE		NE		NE		NE
Benzene	A	NE		46	Aquatic Habitat Goal	NE		NE		NE		700	NAWQC	700	SW Criteria	0
	B	1	DW Toxicity	NE		5		1		NE		700	NAWQC	1	State MCL	5
Bromobenzene	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Bromochloromethane	A	NE		--		NE		NE		NE		6,400	NAWQC	6,400	SW Criteria	0
	B	--		NE		--		--		NE		6,400	NAWQC	6,400	SW Criteria	0
Bromodichloromethane	A	NE		170	Indoor Air Impacts	NE		NE		NE		6,400	NAWQC	170	NDW ESL	0
	B	100	DW Toxicity	NE		80		--		NE		6,400	NAWQC	80	Federal MCL	0
Bromoform	A	NE		1,100	Aquatic Habitat Goal	NE		NE		NE		6,400	NAWQC	6,400	SW Criteria	0
	B	100	DW Toxicity	NE		100		--		NE		6,400	NAWQC	100	Federal MCL	0
Bromomethane	A	NE		160	Aquatic Habitat Goal	NE		NE		NE		6,400	NAWQC	6,400	SW Criteria	0
	B	9.8	DW Toxicity	NE		--		--		NE		6,400	NAWQC	9.8	DW ESL	0
Carbon Disulfide	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Carbon Tetrachloride	A	NE		9.3	Indoor Air Impacts	NE		NE		NE		6,400	NAWQC	9.3	NDW ESL	0
	B	0.5	DW Toxicity	NE		5		0.5		NE		6,400	NAWQC	0.5	State MCL	1
Chlorobenzene	A	NE		25	Aquatic Habitat Goal	NE		NE		NE		129	NAWQC	129	SW Criteria	0
	B	25	Aquatic Habitat Goal	NE		100		70		NE		129	NAWQC	70	State MCL	0
Chloroethane	A	NE		12	Aquatic Habitat Goal	NE		NE		NE		NE		NE		NE
	B	12	Aquatic Habitat Goal	NE		--		--		NE		NE		NE		NE
Chloroform	A	NE		330	Indoor Air Impacts	NE		NE		NE		6,400	NAWQC	330	NDW ESL	0
	B	70	DW Toxicity	NE		--		--		NE		6,400	NAWQC	70	DW ESL	0
Chloromethane	A	NE		41	Indoor Air Impacts	NE		NE		NE		6,400	NAWQC	41	NDW ESL	0
	B	41	Indoor Air Impacts	NE		--		--		NE		6,400	NAWQC	41	DW ESL	0
cis-1,2-Dichloroethene	A	NE		5,900	Aquatic Habitat Goal	NE		NE		NE		44,800	NAWQC	44,800	SW Criteria	0
	B	6	DW Toxicity	NE		70		6		NE		44,800	NAWQC	6	State MCL	0
cis-1,3-Dichloropropene	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Cyclohexane	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Dibromochloromethane	A	NE		--		NE		NE		NE		6,400	NAWQC	6400	SW Criteria	0
	B	--		NE		60		--		NE		6,400	NAWQC	60	Federal MCL	0
Dibromomethane	A	NE		--		NE		NE		NE		--		NE		NE
	B	--		NE		--		--		NE		--		NE		NE
Dichlorodifluoromethane	A	NE		--		NE		NE		NE		6,400	NAWQC	6,400	SW Criteria	0
	B	--		NE		--		--		NE		6,400	NAWQC	6,400	SW Criteria	0
Ethylbenzene	A	NE		43	Aquatic Habitat Goal	NE		NE		NE		86	NAWQC	86	SW Criteria	0
	B	30	Ceiling value	NE		700		300		NE		86	NAWQC	30	DW ESL	0
Hexachlorobutadiene	A	NE		0.93	Aquatic Habitat Goal	NE		NE		NE		6.4	NAWQC	6.4	SW Criteria	0
	B	0.45	DW Toxicity	NE		--		--		NE		6.4	NAWQC	0.45	DW ESL	0
Isopropylbenzene	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE

Table 5-11. Limits and Standards for Parcel E-2 Aquifers– VOCs *(continued)*
Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

VOC	Aquifer	ESL - Drinking Water[1] Conc. (µg/L)	Comments	ESL - Nondrinking Water[2] Conc. (µg/L)	Comments	Federal MCL[3] Conc. (µg/L)	Comments	State MCL[4] Conc. (mg/L)	Comments	HGAL[5] Conc. (µg/L)	Comments	Surface Water Criteria[6] Conc. (µg/L)	Comments	RIEC[a] Conc. (µg/L)	Comments	Detections Exceeding RIEC
Methyl Acetate	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Methylcyclohexane	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Methylene Chloride	A	NE		2,200	Aquatic Habitat Goal	NE		NE		NE		6,400	NAWQC	6,400	SW Criteria	0
	B	5	DW Toxicity	NE		5		5		NE		6,400	NAWQC	5	DW ESL	0
Naphthalene	A	NE		24	Aquatic Habitat Goal	NE		NE		NE		470	NAWQC	470	SW Criteria	0
	B	17	DW Toxicity	NE		--		--		NE		470	NAWQC	17	DW ESL	0
n-Butylbenzene	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
o-Xylene	A	NE		100	Aquatic Habitat Goal	NE		NE		NE		NE		NE		NE
	B	20	Ceiling value	NE		10,000		--		NE		NE		20	DW ESL	0
para-Isopropyl Toluene	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Propylbenzene	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
sec-Butylbenzene	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Styrene	A	NE		100	Aquatic Habitat Goal	NE		NE		NE		NE		NE		NE
	B	10	Ceiling value	NE		100		100		NE		NE		10	DW ESL	0
tert-Butylbenzene	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
tert-Butyl Methyl Ether	A	NE		1800	Ceiling Value	NE		NE		NE		8,000	Other Criteria	1,800	NDW ESL	0
	B	5	Ceiling value	NE		--		13		NE		8,000	Other Criteria	5	DW ESL	0
Tetrachloroethene	A	NE		120	Aquatic Habitat Goal	NE		NE		NE		450	NAWQC	450	SW Criteria	0
	B	5	DW Toxicity	NE		5		5		NE		450	NAWQC	5	Federal MCL	0
Toluene	A	NE		130	Aquatic Habitat Goal	NE		NE		NE		5,000	NAWQC	5,000	SW Criteria	0
	B	40	Ceiling value	NE		1,000		150		NE		5,000	NAWQC	40	DW ESL	0
trans-1,2-Dichloroethene	A	NE		590	Aquatic Habitat Goal	NE		NE		NE		44,800	NAWQC	44,800	SW Criteria	0
	B	10	DW Toxicity	NE		100		10		NE		44,800	NAWQC	10	DW ESL	0
trans-1,3-Dichloropropene	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE
Trichloroethene	A	NE		360	Aquatic Habitat Goal	NE		NE		NE		400	NAWQC	400	SW Criteria	1
	B	5	DW Toxicity	NE		5		5		NE		400	NAWQC	5	Federal MCL	1
Trichlorofluoromethane	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		150		NE		NE		150	State MCL	0
Vinyl Chloride	A	NE		3.8	Indoor Air Impacts	NE		NE		NE		NE		3.8	NDW ESL	5
	B	0.5	DW Toxicity	NE		2		0.5		NE		NE		0.5	State MCL	0
Xylene (total)	A	NE		100	Aquatic Habitat Goal	NE		NE		NE		NE		NE		NE
	B	20	Ceiling value	NE		10,000		1,750		NE		1,750		20	DW ESL	0
Vinyl Acetate	A	NE		--		NE		NE		NE		NE		NE		NE
	B	--		NE		--		--		NE		NE		NE		NE

Table 5-11. Limits and Standards for Parcel E-2 Aquifers– VOCs *(continued)*
Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Notes:

(a) In most cases the RIEC selected is based most conservative limit or standard. There are two exceptions:
- ESLs based on an aquatic habitat goals were not considered because they utilize criteria for freshwater aquatic habitats and are not applicable to Parcel E-2; the surface water criterion (based on either promulgated or recommended criteria for saltwater aquatic habitats) was developed to evaluate the effects to aquatic receptors in San Francisco Bay
- In the case of metals, if the lowest limit or standard is exceeded by the HGAL, the HGAL is selected as the RIEC (applicable to the A-aquifer only)

CA	California	NDW	nondrinking water
Conc.	concentration	NE	not established
DW	drinking water	NAWQC	National Ambient Water Quality Criteria
ESL	environmental screening level	RIEC	remedial investigation evaluation criteria
GDGI	groundwater data gaps investigation	SW	surface water
HGAL	Hunters Point groundwater ambient level	VOC	volatile organic compounds
MCL	maximum contaminant level	µg/L	micrograms per liter
mg/L	milligrams per liter	--	No criteria established for this chemical

References:

(1) San Francisco Bay Regional Water Quality Control Board. 2008. "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Appendix 1, Table F-1a. Groundwater Screening Levels (groundwater IS a current or potential drinking water resource), Interim Final." May.

(2) San Francisco Bay Regional Water Quality Control Board. 2008. "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Appendix 1, Table F-1b. Groundwater Screening Levels (groundwater IS NOT a current or potential drinking water resource), Interim Final." May.

(3) U.S. Environmental Protection Agency, Title 40, Code of Federal Regulations, Parts 141 [Primary MCLs} and 143 [Secondary MCLs], <http://www.epa.gov/waterscience/drinking/standards>

(4) California Department of Public Health (CDPH). 2008. Drinking water standards [maximum contaminant levels (MCLs)]. Available Online at: http://www.cdph.ca.gov/certlic/drinkingwater/Pages/Chemicalcontaminants.aspx

(5) PRC Environmental Management, Inc. 1996b. "Technical Memorandum: Estimation of HPS Groundwater Ambient Levels, Hunters Point Shipyard, San Francisco, California." September 16.

(6) Based on compilation of promulgated and recommended criteria for saltwater aquatic life (see Appendix M, Table M-1). Specific sources are listed below:

Basin Plan: San Francisco Bay Regional Water Quality Control Board. 2007. *San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan)*. January.

California Toxics Rule: U.S. Environmental Protection Agency (EPA). 2000. *Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California.* 40 Code of Federal Regulations Part 131. May 18.

National Ambient Water Quality Criteria: Central Valley Regional Water Quality Control Board. 2007. *A Compilation of Water Quality Goals.* Prepared by Jon B. Marshack, Central Valley Region. August.

National Recommended Water Quality Criteria: EPA. 2006. *National Recommended Water Quality Criteria.*

Other (MTBE) Criteria: San Francisco Bay Regional Water Quality Control Board. 1998. *Recommended Interim Water Quality Objectives (or Aquatic Life Criteria) for Methyl Tertiary-Butyl Ether (MTBE)*. October 1.

Table 5-12. Limits and Standards for Parcel E-2 Aquifers– Petroleum Hydrocarbons
Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Chemical	Aquifer	ESL - Drinking Water[1]		ESL - Nondrinking Water[2]		Federal MCL[3]		State MCL[4]		HGAL[5]		Surface Water Criteria[6]		RIEC[a]		Detections Exceeding RIEC
		Conc. (µg/L)	Comments	Conc. (µg/L)	Comments	Conc. (µg/L)	Comments	Conc. (mg/L)	Comments	Conc. (µg/L)	Comments	Conc. (µg/L)	Comments	Conc. (µg/L)	Comments	
Gasoline-Range Organics	A	NE		210	Ceiling Value	NE		NE		NE		1,400 - 20,000	Other Criteria	210	NDW ESL	13
	B	100	Ceiling Value	NE		--		--		NE		1,400 - 20,000	Other Criteria	100	DW ESL	0
Diesel-Range Organics	A	NE		210	Ceiling Value	NE		NE		NE		1,400 - 20,000	Other Criteria	210	NDW ESL	216
	B	100	Ceiling Value	NE		--		--		NE		1,400 - 20,000	Other Criteria	100	DW ESL	13
Motor Oil-Range Organics	A	NE		--		NE		NE		NE		1,400 - 20,000	Other Criteria	NE		NE
	B	--		NE		--		--		NE		1,400 - 20,000	Other Criteria	NE		NE
Total Oil and Grease	A	NE		210	Ceiling Value	NE		NE				NE		210	NDW ESL	42
	B	100	Ceiling Value	NE		--		--				NE		100	DW ESL	18
Total Petroleum Hydrocarbons	A	NE		--		NE		NE		NE		1,400 - 20,000	Other Criteria	1,400 - 20,000	SW Criteria	23
	B	--		NE		--		--		NE		1,400 - 20,000	Other Criteria	1,400 - 20,000	SW Criteria	0

Notes:

(a) In most cases the RIEC selected is based most conservative limit or standard. There are two exceptions:
- ESLs based on an aquatic habitat goals were not considered because they utilize criteria for freshwater aquatic habitats and are not applicable to Parcel E-2; the surface water criterion (based on either promulgated or recommended criteria for saltwater aquatic habitats) was developed to evaluate the effects to aquatic receptors in San Francisco Bay
- In the case of metals, if the lowest limit or standard is exceeded by the HGAL, the HGAL is selected as the RIEC (applicable to the A-aquifer only)

CA	California
Conc.	concentration
DW	drinking water
ESL	environmental screening level
GDGI	groundwater data gaps investigation
HGAL	Hunters Point groundwater ambient level
MCL	maximum contaminant level
mg/L	milligrams per liter
NDW	nondrinking water
NE	not established
RIEC	remedial investigation evaluation criteria
SW	surface water
µg/L	micrograms per liter
--	No criteria established for this chemical

References:

(1) San Francisco Bay Regional Water Quality Control Board. 2008. "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Appendix 1, Table F-1a. Groundwater Screening Levels (groundwater IS a current or potential drinking water resource), Interim Final." May.

(2) San Francisco Bay Regional Water Quality Control Board. 2008. "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Appendix 1, Table F-1b. Groundwater Screening Levels (groundwater IS NOT a current or potential drinking water resource), Interim Final." May.

(3) U.S. Environmental Protection Agency, Title 40, Code of Federal Regulations, Parts 141 [Primary MCLs} and 143 [Secondary MCLs], <http://www.epa.gov/waterscience/drinking/standards>

(4) California Department of Public Health (CDPH). 2008. Drinking water standards [maximum contaminant levels (MCLs)]. Available Online at: http://www.cdph.ca.gov/certlic/drinkingwater/Pages/Chemicalcontaminants.aspx

(5) PRC Environmental Management, Inc. 1996b. "Technical Memorandum: Estimation of HPS Groundwater Ambient Levels, Hunters Point Shipyard, San Francisco, California." September 16.

(6) Total TPH aquatic criteria assigned as a function of distance from shoreline; the source of these criteria is: Shaw Environmental, Inc. 2007. *Final New Preliminary Screening Criteria and Petroleum Program Strategy, Hunters Point Shipyard, San Francisco, California.* December 21.

Table 5-13. List of All RIECs that Apply to Parcel E-2 Aquifers *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Chemical	Aquifer	RIEC Conc. (µg/L)	RIEC Comments	Detections Exceeding RIEC	Range of Reporting Limits (mg/L)	Detection Frequency	Reporting Limits Exceeding RIEC	Frequency of Reporting Limits Exceeding RIEC (%)
Anions								
Un-ionized Ammonia	A	25	SW Criteria	103	0.5 - 1,750[1]	278 / 302[1]	0	0
	B	25	SW Criteria	25	20 - 530[1]	99 / 137[1]	0	0
Chloride	A	NE		NE	80 - 1,000,000	461 / 461	0	0
	B	NE		NE	80 - 200,000	172 / 172	0	0
Fluoride	A	NE		NE	100 - 10,000	164 / 263	0	0
	B	2,000	State MCL	1	100 - 10,000	49 / 142	1	<1
Nitrate	A	NE		NE	10 - 5,000	105 / 454	0	0
	B	10,000	Federal MCL	15	10 - 5,000	93 / 163	0	0
Nitrite	A	NE		NE	0.1 - 50,000	17 / 420	0	0
	B	1,000	Federal MCL	2	0.1 - 5,000	14 / 158	0	0
Total Kjeldahl Nitrogen	A	NE		NE	70 - 3,100	225 / 242	0	0
	B	NE		NE	70 - 1,400	119 / 137	0	0
Orthophosphate	A	NE		NE	50 - 20,000	52 / 368	0	0
	B	NE		NE	50 - 5,000	14 / 151	0	0
Cyanide	A	1	SW Criteria	45	0.1 - 10	48 / 381	37	10
	B	1	SW Criteria	6	0.01 - 10	6 / 156	5	3
Sulfate	A	NE		NE	1,000 - 50,000	155 / 163	0	0
	B	NE		NE	1,000 - 25,000	82 / 99	0	0
Sulfide	A	2	SW Criteria	372	3 - 100,000	372 / 538	357	66
	B	2	SW Criteria	79	3 - 50,000	79 / 211	72	34
Metals								
Aluminum	A	NE		NE	10 - 500	90 / 569	0	0
	B	1,000	State MCL	4	10 - 100	28 / 164	0	0
Antimony	A	43.3	HGAL	9	0.02 - 160	162 / 564	0	0
	B	6	Federal MCL	20	0.1 - 32	39 / 162	1	<1
Arsenic	A	36	Basin Plan	30	0.2 - 31	239 / 574	0	0
	B	10	Federal MCL	12	1 - 12.3	57 / 162	0	0
Barium	A	504	HGAL	162	0.1 - 25	577 / 578	0	0
	B	1,000	State MCL	0	0.1 - 10	162 / 162	0	0
Beryllium	A	1.4	HGAL	9	0.1 - 10	34 / 564	17	3
	B	4	Federal MCL	0	0.1 - 2	13 / 162	0	0
Cadmium	A	8.8	SW Criteria	7	0.2 - 25	51 / 570	2	<1
	B	5	Federal MCL	2	0.2 - 5	7 / 164	0	0

Table 5-13. List of All RIECs that Apply to Parcel E-2 Aquifers *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Chemical	Aquifer	RIEC Conc. (µg/L)	RIEC Comments	Detections Exceeding RIEC	Range of Reporting Limits (mg/L)	Detection Frequency	Reporting Limits Exceeding RIEC	Frequency of Reporting Limits Exceeding RIEC (%)
Metals *(continued)*								
Calcium	A	NE		NE	8.2 - 5,000	273 / 274	0	0
	B	NE		NE	8.5 - 500	38 / 38	0	0
Chromium	A	15.7	HGAL	38	0.4 - 25	288 / 571	0	0
	B	50	State MCL	4	0.5 - 5	80 / 163	0	0
Chromium VI	A	50	SW Criteria	0	10 - 10	0 / 184	0	0
	B	50	SW Criteria	1	10 - 10	1 / 23	0	0
Cobalt	A	20.8	HGAL	11	0.4 - 52	222 / 563	3	1
	B	NE		NE	0.5 - 8.8	42 / 162	0	0
Copper	A	28.0	HGAL	33	0.25 - 50	140 / 573	2	<1
	B	3.1	SW Criteria	19	0.4 - 8	52 / 162	43	27
Iron	A	2,380	HGAL	75	3.5 - 400	180 / 274	0	0
	B	300	Federal MCL	15	5 - 400	21 / 38	1	3
Lead	A	14.4	HGAL	34	0.01 - 320	127 / 577	7	1
	B	8.1	SW Criteria	6	0.02 - 5	26 / 162	0	0
Magensium	A	1,440,000	HGAL	0	4 - 10,000	274 / 274	0	0
	B	NE		NE	19.4 - 10,000	38 / 38	0	0
Manganese	A	8,140	HGAL	3	0.1 - 50	560 / 563	0	0
	B	NE		NE	0.1 - 25	158 / 162	0	0
Mercury	A	0.60	HGAL	27	0.045 - 10	64 / 570	5	1
	B	0.025	SW Criteria	6	0.047 - 0.28	6 / 162	6	4
Molybdenum	A	61.9	HGAL	0	0.6 - 35	74 / 221	0	0
	B	35	DW ESL	0	0.8 - 7	4 / 30	0	0
Nickel	A	96.5	HGAL	31	0.7 - 89	377 / 581	0	0
	B	8.2	SW Criteria	31	0.8 - 28.8	63 / 162	3	2
Potassium	A	448,000	HGAL	0	80 - 8,000	271 / 274	0	0
	B	NE		NE	80 - 883	37 / 38	0	0
Selenium	A	71	SW Criteria	2	1 - 29	145 / 574	0	0
	B	50	Federal MCL	1	1 - 29	27 / 159	0	0
Silver	A	7.43	HGAL	3	0.04 - 24.6	33 / 566	0	0
	B	0.38	SW Criteria	3	0.4 - 7	3 / 161	3	2
Sodium	A	9,242,000	HGAL	3	18 - 55,200	274 / 274	0	0
	B	NE		NE	18 - 33,400	38 / 38	0	0
Thallium	A	426	SW Criteria	0	0.004 - 33	15 / 536	0	0
	B	2	Federal MCL	0	0.02 - 18	1 / 159	0	0

Table 5-13. List of All RIECs that Apply to Parcel E-2 Aquifers *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Chemical	Aquifer	RIEC Conc. (µg/L)	RIEC Comments	Detections Exceeding RIEC	Range of Reporting Limits (mg/L)	Detection Frequency	Reporting Limits Exceeding RIEC	Frequency of Reporting Limits Exceeding RIEC (%)
Metals *(continued)*								
Vanadium	A	26.6	HGAL	13	0.4 - 20	126 / 224	0	0
	B	15	DW ESL	6	0.5 - 6	13 / 31	0	0
Zinc	A	81	SW Criteria	38	0.3 - 250	117 / 578	2	<1
	B	81	SW Criteria	0	0.3 - 50	25 / 162	0	0
Volatile Organic Compounds								
1,1,1,2-Tetrachloroethane	A	NE		NE	NE	NE	0	0
	B	1.3	DW ESL	0	0	0	0	0
1,1,1-Trichloroethane	A	6,240	SW Criteria	0	0.5 - 100	39 / 637	0	0
	B	200	Federal MCL	0	0.5 - 5	0 / 171	0	0
1,1,2-Trichloroethane	A	350	NDW ESL	0	0.5 - 100	0 / 637	0	0
	B	5	Federal MCL	0	0.5 - 5	0 / 171	0	0
1,1,2,2-Tetrachloroethane	A	190	NDW ESL	0	0.5 - 100	1 / 636	0	0
	B	1	State MCL	0	0.5 - 5	0 / 171	0	0
1,1,2-Trichloro-1,2,2-Trifluoroethane	A	NE		NE	0.5 - 100	2 / 434	0	0
	B	1,200	State MCL	0	0.5 - 5	1 / 141	0	0
1,1-Dichloroethane	A	NE		NE	0.5 - 200	80 / 637	0	0
	B	5	State MCL	0	0.5 - 5	0 / 171	0	0
1,1-Dichloroethene	A	44,800	SW Criteria	0	0.5 - 100	30 / 636	0	0
	B	6	State MCL	0	0.5 - 5	0 / 171	0	0
1,1-Dichloropropene	A	NE		NE	1 - 4	0 / 4	0	0
	B	NE		NE	1 - 1	0 / 3	0	0
1,2,3-Trichlorobenzene	A	NE		NE	1 - 20	0 / 71	0	0
	B	NE		NE	1 - 2	0 / 10	0	0
1,2,3-Trichloropropane	A	NE		NE	1 - 200	0 / 367	0	0
	B	5	State MCL	0	1 - 1	1 / 134	0	0
1,2,4-Trichlorobenzene	A	129	SW Criteria	0	0.5 - 100	7 / 462	0	0
	B	5	State MCL	0	0.5 - 2	1 / 147	0	0
1,2,4-Trimethylbenzene	A	NE		NE	0.7 - 4	3 / 5	0	0
	B	NE		NE	1 - 1	3 / 3	0	0
1,2-Dibromo-3-Chloropropane	A	NE		NE	1 - 400	0 / 462	0	0
	B	0.2	Federal MCL	0	1 - 2	0 / 147	0	0
1,2-Dibromoethane	A	150	NDW ESL	0	1 - 20	0 / 99	0	0
	B	0.05	Federal MCL	0	1 - 2	0 / 16	0	0

Table 5-13. List of All RIECs that Apply to Parcel E-2 Aquifers *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Chemical	Aquifer	RIEC Conc. (µg/L)	RIEC Comments	Detections Exceeding RIEC	Range of Reporting Limits (mg/L)	Detection Frequency	Reporting Limits Exceeding RIEC	Frequency of Reporting Limits Exceeding RIEC (%)
Volatile Organic Compounds *(continued)*								
1,2-Dichlorobenzene	A	129	SW Criteria	0	0.5 - 100	53 / 463	0	0
	B	10	DW ESL	0	0.5 - 1	1 / 147	0	0
1,2-Dichloroethane	A	200	NDW ESL	0	0.5 - 100	33 / 637	0	0
	B	0.5	DW ESL	10	0.5 - 5	16 / 171	0	0
1,2-Dichloroethene (total)	A	44800	SW Criteria	0	0.5 - 25	11 / 175	0	0
	B	44800	SW Criteria	0	0.5 - 5	0 / 24	0	0
1,2-Dichloropropane	A	100	NDW ESL	0	0.5 - 100	0 / 637	0	0
	B	5	DW ESL	0	0.5 - 5	0 / 171	0	0
1,3,5-Trimethylbenzene	A	NE		NE	1 - 4	3 / 5	0	0
	B	NE		NE	1 - 1	3 / 3	0	0
1,3-Dichlorobenzene	A	129	SW Criteria	0	0.5 - 100	52 / 463	0	0
	B	129	SW Criteria	0	0.5 - 1	0 / 147	0	0
1,3-Dichloropropane	A	NE		NE	1 - 4	0 / 4	0	0
	B	0.5	State MCL	0	1 - 1	0 / 3	0	0
1,4-Dichlorobenzene	A	129	SW Criteria	0	0.5 - 100	81 / 464	0	0
	B	5	State MCL	0	0.5 - 1	0 / 147	0	0
2,2-Dichloropropane	A	NE		NE	1 - 4	0 / 4	0	0
	B	NE		NE	1 - 1	0 / 3	0	0
2-Butanone	A	NE		NE	4 - 200	2 / 207	0	0
	B	4,200	DW ESL	0	4 - 20	0 / 33	0	0
2-Chlorotoluene	A	NE		NE	1 - 4	0 / 4	0	0
	B	NE		NE	1 - 1	0 / 3	0	0
2-Hexanone	A	NE		NE	4 - 200	3 / 237	0	0
	B	NE		NE	4 - 20	0 / 38	0	0
4-Chlorotoluene	A	NE		NE	1 - 4	0 / 4	0	0
	B	NE		NE	1 - 1	0 / 3	0	0
4-Methyl-2-Pentanone	A	NE		NE	4 - 200	9 / 205	0	0
	B	120	DW ESL	0	4 - 20	0 / 33	0	0
Acetone	A	NE		NE	4 - 200	1 / 227	0	0
	B	NE		NE	4 - 20	0 / 27	0	0
Benzene	A	700	SW Criteria	0	0.5 - 100	195 / 638	0	0
	B	1	State MCL	5	0.5 - 5	8 / 171	0	0
Bromobenzene	A	NE		NE	0.5 - 100	0 / 367	0	0
	B	NE		NE	0.5 - 1	0 / 134	0	0

Table 5-13. List of All RIECs that Apply to Parcel E-2 Aquifers *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Chemical	Aquifer	RIEC Conc. (µg/L)	RIEC Comments	Detections Exceeding RIEC	Range of Reporting Limits (mg/L)	Detection Frequency	Reporting Limits Exceeding RIEC	Frequency of Reporting Limits Exceeding RIEC (%)
Volatile Organic Compounds *(continued)*								
Bromochloromethane	A	6,400	SW Criteria	0	0.5 - 11	0 / 99	0	0
	B	6,400	SW Criteria	0	0.5 - 1	0 / 16	0	0
Bromodichloromethane	A	170	NDW ESL	0	0.5 - 100	0 / 637	0	0
	B	80	Federal MCL	0	0.5 - 5	0 / 171	0	0
Bromoform	A	6,400	SW Criteria	0	0.5 - 100	0 / 637	0	0
	B	100	Federal MCL	0	0.5 - 5	0 / 171	0	0
Bromomethane	A	6,400	SW Criteria	0	0.5 - 200	1 / 637	0	0
	B	9.8	DW ESL	0	0.5 - 10	1 / 171	0	0
Carbon Disulfide	A	NE		NE	0.5 - 25	35 / 274	0	0
	B	NE		NE	0.5 - 5	2 / 40	0	0
Carbon Tetrachloride	A	9.3	NDW ESL	0	0.5 - 100	0 / 637	0	0
	B	0.5	State MCL	1	0.5 - 5	1 / 171	1	<1
Chlorobenzene	A	129	SW Criteria	0	0.5 - 100	138 / 638	0	0
	B	70	State MCL	0	0.5 - 5	2 / 171	0	0
Chloroethane	A	NE		NE	0.5 - 100	37 / 637	0	0
	B	NE		NE	0.5 - 10	1 / 171	0	0
Chloroform	A	330	NDW ESL	0	0.5 - 100	33 / 637	0	0
	B	70	DW ESL	0	0.5 - 5	13 / 171	0	0
Chloromethane	A	41	NDW ESL	0	0.5 - 100	10 / 637	0	0
	B	41	DW ESL	0	0.5 - 10	0 / 171	0	0
cis-1,2-Dichloroethene	A	44,800	SW Criteria	0	0.5 - 100	87 / 464	0	0
	B	6	State MCL	0	0.5 - 1	5 / 147	0	0
cis-1,3-Dichloropropene	A	NE		NE	0.5 - 100	0 / 637	0	0
	B	NE		NE	0.5 - 5	0 / 171	0	0
Cyclohexane	A	NE		NE	1 - 10	11 / 66	0	0
	B	NE		NE	1 - 1	1 / 7	0	0
Dibromochloromethane	A	6,400	SW Criteria	0	0.5 - 100	0 / 637	0	0
	B	60	Federal MCL	0	0.5 - 5	0 / 171	0	0
Dibromomethane	A	NE		NE	0.5 - 100	0 / 367	0	0
	B	NE		NE	0.5 - 1	0 / 134	0	0
Dichlorodifluoromethane	A	6,400	SW Criteria	0	0.5 - 200	0 / 434	0	0
	B	6,400	SW Criteria	0	0.5 - 1	0 / 141	0	0
Ethylbenzene	A	86	SW Criteria	0	0.5 - 100	74 / 637	0	0
	B	30	DW ESL	0	0.5 - 5	6 / 171	0	0

Table 5-13. List of All RIECs that Apply to Parcel E-2 Aquifers *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Chemical	Aquifer	RIEC Conc. (µg/L)	RIEC Comments	Detections Exceeding RIEC	Range of Reporting Limits (mg/L)	Detection Frequency	Reporting Limits Exceeding RIEC	Frequency of Reporting Limits Exceeding RIEC (%)
Volatile Organic Compounds *(continued)*								
Hexachlorobutadiene	A	6.4	SW Criteria	0	1 - 4	0 / 4	0	0
	B	0.45	DW ESL	0	1 - 1	0 / 3	0	0
Isopropylbenzene	A	NE		NE	0.8 - 20	28 / 74	0	0
	B	NE		NE	1 - 2	1 / 10	0	0
Methyl Acetate	A	NE		NE	1 - 10	0 / 66	0	0
	B	NE		NE	1 - 1	0 / 7	0	0
Methylcyclohexane	A	NE		NE	1 - 10	11 / 70	0	0
	B	NE		NE	1 - 1	1 / 7	0	0
Methylene Chloride	A	6,400	SW Criteria	0	0.5 - 1000	1 / 637	0	0
	B	5	DW ESL	0	0.5 - 10	1 / 171	0	0
Naphthalene	A	470	SW Criteria	0	1 - 4	2 / 4	0	0
	B	17	DW ESL	0	1 - 1	1 / 3	0	0
n-Butylbenzene	A	NE		NE	1 - 4	0 / 4	0	0
	B	NE		NE	1 - 1	0 / 3	0	0
o-Xylene	A	NE		NE	0.5 - 5	19 / 72	0	0
	B	20	DW ESL	0	0.5 - 1	4 / 10	0	0
para-Isopropyl Toluene	A	NE		NE	1 - 4	0 / 3	0	0
	B	NE		NE	1 - 1	0 / 3	0	0
Propylbenzene	A	NE		NE	0.5 - 4	4 / 6	0	0
	B	NE		NE	1 - 1	1 / 3	0	0
sec-Butylbenzene	A	NE		NE	1 - 4	2 / 5	0	0
	B	NE		NE	1 - 1	0 / 3	0	0
Styrene	A	NE		NE	0.5 - 25	0 / 273	0	0
	B	10	DW ESL	0	0.5 - 5	0 / 40	0	0
tert-Butylbenzene	A	NE		NE	1 - 4	0 / 4	0	0
	B	NE		NE	1 - 1	0 / 3	0	0
tert-Butyl Methyl Ether	A	1,800	NDW ESL	0	0.5 - 100	57 / 468	0	0
	B	5	DW ESL	0	0.5 - 1	0 / 147	0	0
Tetrachloroethene	A	450	SW Criteria	0	0.9	46 / 636	0	0
	B	5	Federal MCL	0	0.5 - 5	1 / 171	0	0
Toluene	A	5,000	SW Criteria	0	0.5 - 100	97 / 637	0	0
	B	40	DW ESL	0	0.5 - 5	14 / 171	0	0
trans-1,2-Dichloroethene	A	44,800	SW Criteria	0	0.5 - 100	24 / 462	0	0
	B	10	DW ESL	0	0.5 - 1	0 / 147	0	0

Table 5-13. List of All RIECs that Apply to Parcel E-2 Aquifers *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Chemical	Aquifer	RIEC Conc. (µg/L)	RIEC Comments	Detections Exceeding RIEC	Range of Reporting Limits (mg/L)	Detection Frequency	Reporting Limits Exceeding RIEC	Frequency of Reporting Limits Exceeding RIEC (%)
Volatile Organic Compounds *(continued)*								
trans-1,3-Dichloropropene	A	NE		NE	0.5 - 100	0 / 637	0	0
	B	NE		NE	0.5 - 5	1 / 171	0	0
Trichloroethene	A	400	SW Criteria	1	0.5 - 100	87 / 638	0	0
	B	5	Federal MCL	1	0.5 - 5	9 / 171	0	0
Trichlorofluoromethane	A	NE		NE	0.5 - 100	3 / 434	0	0
	B	150	State MCL	0	0.5 - 1	1 / 141	0	0
Vinyl Chloride	A	3.8	NDW ESL	5	0.5 - 100	27 / 638	0	0
	B	0.5	State MCL	0	0.5 - 10	0 / 171	0	0
Xylene (total)	A	NE		NE	0.5 - 100	130 / 637	0	0
	B	20	DW ESL	0	0.5 - 5	10 / 171	0	0
Vinyl Acetate	A	NE		NE	10 - 50	0 / 130	0	0
	B	NE		NE	10 - 10	0 / 23	0	0
Semivolatile Organic Compounds								
1,2,4-Trichlorobenzene	A	129	SW Criteria	0	1 - 1,000	18 / 500	0	0
	B	5	State MCL	0	1 - 10	0 / 169	0	0
1,2-Dichlorobenzene	A	129	SW Criteria	0	1 - 50	3 / 458	0	0
	B	10	DW ESL	0	1 - 10	0 / 162	0	0
1,3-Dichlorobenzene	A	129	SW Criteria	0	1 - 50	17 / 458	0	0
	B	129	SW Criteria	0	1 - 10	0 / 162	0	0
1,4-Dichlorobenzene	A	129	SW Criteria	0	1 - 50	52 / 458	0	0
	B	5	State MCL	0	1 - 10	0 / 162	0	0
2,2'-Oxybis(1-chloropropane)	A	NE		NE	14	0 / 153	0	0
	B	0.014	DW ESL	0	10 - 10	0 / 75	0	0
2,4,5-Trichlorophenol	A	NE		NE	2 - 250	0 / 229	0	0
	B	NE		NE	2 - 50	0 / 34	0	0
2,4,6-Trichlorophenol	A	NE		NE	1 - 100	0 / 494	0	0
	B	0.7	DW ESL	0	1 - 10	0 / 165	0	0
2,4-Dichlorophenol	A	3	NDW ESL	0	1 - 100	1 / 494	0	0
	B	0.3	DW ESL	0	1 - 10	0 / 165	0	0
2,4-Dimethylphenol	A	NE		NE	1 - 100	17 / 494	0	0
	B	100	DW ESL	0	1 - 10	1 / 165	0	0
2,4-Dinitrophenol	A	970	SW Criteria	0	2 - 250	0 / 489	0	0
	B	970	SW Criteria	0	2 - 50	0 / 164	0	0

Table 5-13. List of All RIECs that Apply to Parcel E-2 Aquifers *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Chemical	Aquifer	RIEC Conc. (µg/L)	RIEC Comments	Detections Exceeding RIEC	Range of Reporting Limits (mg/L)	Detection Frequency	Reporting Limits Exceeding RIEC	Frequency of Reporting Limits Exceeding RIEC (%)
Semivolatile Organic Compounds *(continued)*								
2,4-Dinitrotoluene	A	118	SW Criteria	0	1 - 100	0 / 500	0	0
	B	0.051	DW ESL	0	1 - 10	0 / 169	0	0
2,6-Dinitrotoluene	A	118	SW Criteria	0	1 - 100	0 / 500	0	0
	B	118	SW Criteria	0	1 - 10	0 / 169	0	0
2-Chloronaphthalene	A	1.5	SW Criteria	0	1 - 100	0 / 500	0	0
	B	1.5	SW Criteria	0	1 - 10	0 / 169	0	0
2-Chlorophenol	A	1.8	NDW ESL	0	1 - 100	1 / 494	1	<1
	B	0.18	DW ESL	1	1 - 10	1 / 165	1	<1
2-Methylnaphthalene	A	NE		NE	1 - 100	41 / 500	0	0
	B	NE		NE	1 - 10	7 / 169	0	0
2-Methylphenol	A	NE		NE	1 - 100	6 / 494	0	0
	B	NE		NE	1 - 10	0 / 165	0	0
2-Nitroaniline	A	NE		NE	2 - 250	0 / 229	0	0
	B	NE		NE	2 - 50	0 / 34	0	0
2-Nitrophenol	A	970	SW Criteria	0	1 - 100	1 / 500	0	0
	B	970	SW Criteria	0	1 - 20	0 / 169	0	0
3,3'-Dichlorobenzidine	A	NE		NE	1 - 100	0 / 484	0	0
	B	0.029	DW ESL	0	1 - 24	0 / 169	0	0
3-Nitroaniline	A	NE		NE	2 - 250	0 / 235	0	0
	B	NE		NE	2 - 50	0 / 38	0	0
4,6-Dinitro-2-Methylphenol	A	970	SW Criteria	0	2 - 250	0 / 494	0	0
	B	970	SW Criteria	0	2 - 50	0 / 165	0	0
4-Bromophenyl-phenylether	A	NE		NE	1 - 100	0 / 500	0	0
	B	NE		NE	1 - 10	0 / 169	0	0
4-Chloro-3-Methylphenol	A	NE		NE	1 - 100	2 / 494	0	0
	B	NE		NE	1 - 20	0 / 165	0	0
4-Chloroaniline	A	NE		NE	1 - 100	0 / 235	0	0
	B	NE		NE	1 - 10	0 / 38	0	0
4-Chlorophenyl-phenylether	A	NE		NE	1 - 100	0 / 500	0	0
	B	NE		NE	1 - 10	0 / 169	0	0
4-Methylphenol	A	NE		NE	1 - 100	39 / 484	0	0
	B	NE		NE	1 - 10	1 / 169	0	0
4-Nitroaniline	A	NE		NE	2 - 250	0 / 235	0	0
	B	NE		NE	2 - 50	0 / 38	0	0

Table 5-13. List of All RIECs that Apply to Parcel E-2 Aquifers *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Chemical	Aquifer	RIEC Conc. (µg/L)	RIEC Comments	Detections Exceeding RIEC	Range of Reporting Limits (mg/L)	Detection Frequency	Reporting Limits Exceeding RIEC	Frequency of Reporting Limits Exceeding RIEC (%)
Semivolatile Organic Compounds *(continued)*								
4-Nitrophenol	A	970	SW Criteria	0	2 - 250	1 / 494	0	0
	B	970	SW Criteria	0	2 - 50	0 / 165	0	0
Acenaphthene	A	710	SW Criteria	0	1 - 100	56 / 500	0	0
	B	20	DW ESL	0	1 - 10	5 / 169	0	0
Acenaphthylene	A	60	SW Criteria	0	1 - 100	11 / 500	0	0
	B	60	SW Criteria	0	1 - 10	0 / 169	0	0
Anthracene	A	60	SW Criteria	0	1 - 100	7 / 500	1	<1
	B	60	SW Criteria	0	1 - 10	0 / 169	0	0
Azobenzene	A	NE		NE	9.4 - 9.8	0 / 5	0	0
	B	NE		NE	9.4 - 10	0 / 3	0	0
Benzo(a)anthracene	A	60	SW Criteria	0	1 - 100	10 / 500	0	0
	B	60	SW Criteria	0	1 - 10	1 / 169	0	0
Benzo(a)pyrene	A	60	NDW ESL	0	1 - 100	7 / 500	0	0
	B	0.2	Federal MCL	1	1 - 10	1 / 169	1	<1
Benzo(b)fluoranthene	A	60	SW Criteria	0	1 - 100	7 / 498	0	0
	B	60	SW Criteria	0	1 - 10	2 / 169	0	0
Benzo(g,h,i)perylene	A	60	SW Criteria	0	1 - 100	4 / 498	0	0
	B	60	SW Criteria	0	1 - 10	0 / 169	0	0
Benzo(k)fluoranthene	A	0.4	NDW ESL	1	1 - 100	2 / 498	2	<1
	B	0.029	DW ESL	1	1 - 10	1 / 169	1	<1
Benzoic Acid	A	NE		NE	47 - 200	10 / 440	0	0
	B	NE		NE	47 - 50	0 / 161	0	0
Benzyl Alcohol	A	NE		NE	9.4 - 50	1 / 398	0	0
	B	NE		NE	9.4 - 20	0 / 154	0	0
Bis(2-chloroethoxy)methane	A	NE		NE	1 - 100	0 / 500	0	0
	B	NE		NE	1 - 10	0 / 169	0	0
Bis(2-chloroethyl)ether	A	NE		NE	1 - 100	0 / 500	0	0
	B	0.032	DW ESL	0	1 - 10	0 / 169	0	0
Bis(2-ethylhexyl)phthalate	A	NE		NE	1 - 40	2 / 499	0	0
	B	4	State MCL	1	1 - 10	1 / 169	1	<1
Butylbenzylphthalate	A	3.4	SW Criteria	1	1 - 100	1 / 500	1	<1
	B	3.4	SW Criteria	0	1 - 10	0 / 169	0	0
Carbazole	A	NE		NE	1 - 100	4 / 102	0	0
	B	NE		NE	1 - 10	2 / 15	0	0

Table 5-13. List of All RIECs that Apply to Parcel E-2 Aquifers *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Chemical	Aquifer	RIEC Conc. (µg/L)	RIEC Comments	Detections Exceeding RIEC	Range of Reporting Limits (mg/L)	Detection Frequency	Reporting Limits Exceeding RIEC	Frequency of Reporting Limits Exceeding RIEC (%)
Semivolatile Organic Compounds *(continued)*								
Chrysene	A	60	SW Criteria	0	1 - 100	17 / 500	0	0
	B	60	SW Criteria	0	1 - 10	1 / 169	0	0
Dibenz(a,h)anthracene	A	0.25	NDW ESL	2	1 - 100	2 / 498	2	<1
	B	0.0048	DW ESL	0	1 - 10	0 / 169	0	0
Dibenzofuran	A	NE		NE	1 - 100	34 / 500	0	0
	B	NE		NE	1 - 10	4 / 169	0	0
Diethylphthalate	A	3.4	SW Criteria	4	1 - 100	5 / 500	5	1
	B	3.4	SW Criteria	0	1 - 10	0 / 169	0	0
Dimethylphthalate	A	3.4	SW Criteria	0	1 - 100	0 / 500	0	0
	B	3.4	SW Criteria	0	1 - 10	0 / 169	0	0
di-n-Butylphthalate	A	3.4	SW Criteria	2	1 - 100	2 / 500	2	<1
	B	3.4	SW Criteria	0	1 - 10	0 / 169	0	0
di-n-Octylphthalate	A	3.4	SW Criteria	0	1 - 100	0 / 500	0	0
	B	3.4	SW Criteria	0	1 - 10	0 / 169	0	0
Fluoranthene	A	16	SW Criteria	0	1 - 100	21 / 500	1	<1
	B	16	SW Criteria	0	1 - 10	4 / 169	0	0
Fluorene	A	60	SW Criteria	1	1 - 100	54 / 500	1	<1
	B	60	SW Criteria	0	1 - 10	5 / 169	0	0
Hexachlorobenzene	A	129	SW Criteria	0	1 - 100	0 / 500	0	0
	B	1	DW ESL	0	1 - 10	0 / 169	0	0
Hexachlorobutadiene	A	6.4	SW Criteria	0	1 - 100	0 / 500	0	0
	B	0.45	DW ESL	0	1 - 10	0 / 169	0	0
Hexachlorocyclopentadiene	A	1.4	SW Criteria	1	1 - 100	1 / 500	1	<1
	B	1.4	SW Criteria	0	1 - 50	0 / 169	0	0
Hexachloroethane	A	188	SW Criteria	0	1 - 100	0 / 500	0	0
	B	0.9	DW ESL	0	1 - 10	0 / 169	0	0
Indeno(1,2,3-cd)pyrene	A	60	SW Criteria	0	1 - 100	4 / 498	0	0
	B	60	SW Criteria	0	1 - 10	0 / 169	0	0
Isophorone	A	2,580	SW Criteria	0	1 - 100	0 / 500	0	0
	B	2,580	SW Criteria	0	1 - 10	0 / 169	0	0
Naphthalene	A	470	SW Criteria	0	1 - 100	65 / 500	0	0
	B	17	DW ESL	2	1 - 10	9 / 169	0	0
Nitrobenzene	A	1336	SW Criteria	0	1 - 100	0 / 500	0	0
	B	1336	SW Criteria	0	1 - 10	0 / 169	0	0

Table 5-13. List of All RIECs that Apply to Parcel E-2 Aquifers *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Chemical	Aquifer	RIEC Conc. (µg/L)	RIEC Comments	Detections Exceeding RIEC	Range of Reporting Limits (mg/L)	Detection Frequency	Reporting Limits Exceeding RIEC	Frequency of Reporting Limits Exceeding RIEC (%)
Semivolatile Organic Compounds *(continued)*								
n-Nitroso-di-n-propylamine	A	660,000	SW Criteria	0	1 - 100	0 / 500	0	0
	B	660,000	SW Criteria	0	1 - 10	0 / 169	0	0
n-Nitrosodimethylamine	A	660,000	SW Criteria	0	9.4 - 25	0 / 270	0	0
	B	660,000	SW Criteria	0	9.4 - 10	0 / 134	0	0
n-Nitrosodiphenylamine	A	660,000	SW Criteria	0	1 - 100	6 / 500	0	0
	B	660,000	SW Criteria	0	1 - 10	0 / 169	0	0
Pentachlorophenol	A	7.9	SW Criteria	0	2 - 250	1 / 494	1	<1
	B	1	DW ESL	0	2 - 50	0 / 165	0	0
Phenanthrene	A	60	SW Criteria	1	1 - 100	33 / 500	1	<1
	B	60	SW Criteria	0	1 - 10	5 / 169	0	0
Phenol	A	1,160	SW Criteria	0	1 - 100	48 / 494	0	0
	B	5	DW ESL	0	1 - 10	0 / 165	0	0
Pyrene	A	60	SW Criteria	0	1 - 100	20 / 500	1	<1
	B	60	SW Criteria	0	1 - 10	5 / 169	0	0
Pesticides and PCBs								
Total PCBs	A	0.03	SW Criteria	80	-	80 / 518	518	100
	B	0.03	SW Criteria	0	-	0 / 164	164	100
4,4'-DDD	A	0.001	SW Criteria	8	0.01 - 10	8 / 443	8	2
	B	0.001	SW Criteria	0	0.01 - 0.5	0 / 163	0	0
4,4'-DDE	A	0.001	SW Criteria	3	0.01 - 5	3 / 443	3	<1
	B	0.001	SW Criteria	1	0.01 - 0.5	1 / 163	1	<1
4,4'-DDT	A	0.001	SW Criteria	13	0.01 - 5	13 / 443	13	3
	B	0.001	SW Criteria	0	0.01 - 0.5	0 / 1643	0	0
Aldrin	A	0.26	SW Criteria	0	0.005 - 2.5	0 / 443	0	0
	B	0.26	SW Criteria	0	0.005 - 0.25	0 / 163	0	0
alpha-BHC	A	NE		NE	0.005 - 2.5	0 / 445	0	0
	B	NE		NE	0.005 - 0.25	0 / 164	0	0
alpha-Chlordane	A	0.004	SW Criteria	3	0.005 - 25	3 / 443	1	<1
	B	0.004	SW Criteria	0	0.005 - 2.5	0 / 163	0	0
Azinphos Methyl	A	NE		NE	1.9 - 25	0 / 243	0	0
	B	NE		NE	1.9 - 5	0 / 138	0	0
beta-BHC	A	NE		NE	0.005 - 2.5	9 / 443	0	0
	B	NE		NE	0.005 - 0.25	1 / 163	0	0
Bolstar	A	NE		NE	0.5 - 2.5	0 / 243	0	0
	B	NE		NE	0.5 - 1	0 / 138	0	0

Table 5-13. List of All RIECs that Apply to Parcel E-2 Aquifers *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Chemical	Aquifer	RIEC Conc. (µg/L)	RIEC Comments	Detections Exceeding RIEC	Range of Reporting Limits (mg/L)	Detection Frequency	Reporting Limits Exceeding RIEC	Frequency of Reporting Limits Exceeding RIEC (%)
Pesticides and PCBs *(continued)*								
Chlorpyrifos	A	NE		NE	0.5 - 2.5	3 / 243	0	0
	B	NE		NE	0.5 - 1	3 / 138	0	0
Coumaphos	A	NE		NE	1 - 5	0 / 243	0	0
	B	NE		NE	1 - 2	0 / 138	0	0
Demeton	A	NE		NE	1 - 5	0 / 210	0	0
	B	NE		NE	1 - 1	0 / 130	0	0
Demeton-O	A	NE		NE	0.96 - 1	0 / 31	0	0
	B	NE		NE	0.96 - 0.96	0 / 6	0	0
Demeton-S	A	NE		NE	0.96 - 1	0 / 33	0	0
	B	NE		NE	0.96 - 1	0 / 8	0	0
Diazinon	A	NE		NE	0.5 - 2.5	5 / 243	0	0
	B	NE		NE	0.5 - 1	2 / 138	0	0
Dichlorvos	A	NE		NE	0.96 - 5	0 / 243	0	0
	B	NE		NE	0.96 - 1	0 / 138	0	0
Dimethoate	A	NE		NE	0.5 - 2.5	0 / 210	0	0
	B	NE		NE	0.5 - 0.5	0 / 130	0	0
Disulfoton	A	NE		NE	0.5 - 2.5	0 / 242	0	0
	B	NE		NE	0.5 - 1	0 / 137	0	0
delta-BHC	A	NE		NE	0.005 - 2.5	7 / 442	0	0
	B	NE		NE	0.005 - 0.25	0 / 163	0	0
Dieldrin	A	0.0019	SW Criteria	7	0.01 - 5	7 / 444	7	2
	B	0.0019	SW Criteria	0	0.01 - 0.5	0 / 163	0	0
Endosulfan I	A	0.0087	SW Criteria	1	0.005 - 2.5	1 / 443	1	<1
	B	0.0087	SW Criteria	0	0.005 - 0.25	0 / 164	0	0
Endosulfan II	A	0.0087	SW Criteria	2	0.01 - 5	2 / 445	2	<1
	B	0.0087	SW Criteria	0	0.01 - 0.5	0 / 164	0	0
Endosulfan Sulfate	A	NE		NE	0.01 - 5	2 / 442	0	0
	B	NE		NE	0.01 - 0.5	0 / 164	0	0
Endrin	A	0.0023	SW Criteria	5	0.01 - 5	5 / 441	5	1
	B	0.0023	SW Criteria	0	0.01 - 0.5	0 / 164	0	0
Endrin Aldehyde	A	NE		NE	0.01 - 4.7	7 / 316	0	0
	B	NE		NE	0.01 - 0.1	0 / 143	0	0

Table 5-13. List of All RIECs that Apply to Parcel E-2 Aquifers *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Chemical	Aquifer	RIEC Conc. (µg/L)	RIEC Comments	Detections Exceeding RIEC	Range of Reporting Limits (mg/L)	Detection Frequency	Reporting Limits Exceeding RIEC	Frequency of Reporting Limits Exceeding RIEC (%)
Pesticides and PCBs *(continued)*								
Endrin Ketone	A	NE		NE	0.01 - 5	2 / 400	0	0
	B	NE		NE	0.01 - 0.5	0 / 156	0	0
EPN	A	NE		NE	0.5 - 2.5	0 / 210	0	0
	B	NE		NE	0.5 - 0.5	0 / 130	0	0
Ethion	A	NE		NE	0.5 - 2.5	0 / 210	0	0
	B	NE		NE	0.5 - 0.5	0 / 130	0	0
Ethoprop	A	NE		NE	0.5 - 2.5	0 / 243	0	0
	B	NE		NE	0.5 - 1	0 / 138	0	0
Famphur	A	NE		NE	3.5 - 17.5	0 / 210	0	0
	B	NE		NE	3.5 - 3.5	0 / 130	0	0
Fensulfothion	A	NE		NE	0.96 - 12.5	0 / 243	0	0
	B	NE		NE	0.96 - 2.5	0 / 138	0	0
Fenthion	A	NE		NE	0.5 - 2.5	0 / 243	0	0
	B	NE		NE	0.5 - 1	0 / 138	0	0
gamme-BHC (lindane)	A	0.032	SW Criteria	2	0.005 - 2.5	5 / 443	4	1
	B	0.032	SW Criteria	0	0.005 - 0.25	0 / 164	0	0
gamma-Chlordane	A	0.004	SW Criteria	10	0.05 - 0.25	10 / 322	10	3
	B	0.004	SW Criteria	0	0.05 - 0.05	0 / 138	0	0
Heptachlor	A	0.0036	SW Criteria	8	0.005 - 2.5	8 / 444	3	<1
	B	0.0036	SW Criteria	0	0.005 - 0.25	0 / 165	0	0
Heptachlor Epoxide	A	0.0036	SW Criteria	6	0.005 - 2.5	6 / 446	2	<1
	B	0.0036	SW Criteria	0	0.005 - 0.25	0 / 164	0	0
Heptachlor Epoxide A	A	NE		NE	0.0094 - 0.1	4 / 35	0	0
	B	NE		NE	0.0094 - 0.0098	0 / 8	0	0
Heptachlor Epoxide B	A	NE		NE	0.0094 - 0.1	3 / 35	0	0
	B	NE		NE	0.0094 - 0.0098	0 / 8	0	0
Malathion	A	NE		NE	0.5 - 2.5	1 / 210	0	0
	B	NE		NE	0.5 - 0.5	0 / 130	0	0
Merphos	A	NE		NE	0.5 - 2.5	0 / 243	0	0
	B	NE		NE	0.5 - 1	0 / 138	0	0
Methoxychlor	A	0.003	SW Criteria	0	0.05 - 25	0 / 444	0	0
	B	0.003	SW Criteria	0	0.05 - 2.5	0 / 163	0	0
Methyl Parathion	A	NE		NE	0.5 - 2.5	0 / 243	0	0
	B	NE		NE	0.5 - 1	0 / 138	0	0

Table 5-13. List of All RIECs that Apply to Parcel E-2 Aquifers *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Chemical	Aquifer	RIEC Conc. (µg/L)	RIEC Comments	Detections Exceeding RIEC	Range of Reporting Limits (mg/L)	Detection Frequency	Reporting Limits Exceeding RIEC	Frequency of Reporting Limits Exceeding RIEC (%)
Pesticides and PCBs *(continued)*								
Mevinphos	A	NE		NE	1.9 - 17.5	0 / 243	0	0
	B	NE		NE	1.9 - 3.5	0 / 138	0	0
Naled	A	NE		NE	1.9 - 12.5	0 / 243	0	0
	B	NE		NE	1.9 - 2.5	0 / 138	0	0
Parathion	A	NE		NE	0.5 - 2.5	0 / 210	0	0
	B	NE		NE	0.5 - 0.5	0 / 130	0	0
Phorate	A	NE		NE	0.5 - 2.5	0 / 243	0	0
	B	NE		NE	0.5 - 1	0 / 138	0	0
Ronnel	A	NE		NE	0.5 - 2.5	0 / 243	0	0
	B	NE		NE	0.5 - 1	0 / 138	0	0
Stirophos	A	NE		NE	0.5 - 2.5	0 / 210	0	0
	B	NE		NE	0.5 - 1	0 / 130	0	0
Sulfotep	A	NE		NE	0.5 - 2.5	0 / 210	0	0
	B	NE		NE	0.5 - 0.5	0 / 130	0	0
Trichloronate	A	NE		NE	0.5 - 2.5	0 / 243	0	0
	B	NE		NE	0.5 - 1	0 / 138	0	0
Tokuthion	A	NE		NE	0.5 - 2.5	0 / 243	0	0
	B	NE		NE	0.5 - 1	0 / 138	0	0
Toxaphene	A	0.0002	SW Criteria	0	0.5 - 50	0 / 434	0	0
	B	0.0002	SW Criteria	0	0.5 - 5	0 / 164	0	0
Petroleum Hydrocarbons								
Gasoline-Range Organics	A	210	NDW ESL	13	0.05 - 2,000	118 / 444	2	<1
	B	100	DW ESL	0	20 - 500	3 / 138	0	0
Diesel-Range Organics	A	210	NDW ESL	216	50 - 3,800	259 / 476	24	5
	B	100	DW ESL	13	50 - 500	15 / 158	0	0
Motor Oil-Range Organics	A	NE		NE	100 - 2,500	223 / 339	0	0
	B	NE		NE	100 - 500	6 / 138	0	0
Total Oil and Grease	A	210	NDW ESL	42	500 - 5,000	42 / 251	42	17
	B	100	DW ESL	18	500 - 5,000	18 / 130	18	14
Total TPH[(2)]	A	1,400 - 20,000	SW Criteria	23	--	311 / 479	--	--
	B	1,400 - 20,000	SW Criteria	0	--	27 / 158	--	--

Table 5-13. List of All RIECs that Apply to Parcel E-2 Aquifers *(continued)*

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Notes:

(1)	Detection frequency for ammonia
(2)	Values for total petroleum hydrocarbons are calculated, thus they have no laboratory reporting limits
BHC	benzene hexachloride
Conc.	concentration
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DW	drinking water
EPN	ethyl p-nitrophenylphenylpharpharathioate
ESL	environmental screening level
GDGI	groundwater data gaps investigation
HGAL	Hunters Point groundwater ambient levels
MCL	maximum contaminant level
mg/L	milligrams per liter
NDW	nondrinking water
NE	not established
PCB	polychlorinated biphenyl
RIEC	remedial investigation evaluation criteria
SW	surface water
TPH	total petroleum hydrocarbons
µg/L	micrograms per liter

Table 5-14. Perimeter Monitoring Wells at Parcel E-2
Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Perimeter Monitoring Well ID No.	Upgradient Parcel Boundary(1)	Downgradient Parcel Boundary(1)	Current BGMP Monitoring Well
IR01MW02B	X		
IR01MW03A	X		
IR01MW05A	X		
IR01MW09B		X	X
IR01MW10A		X	X
IR01MW31A		X	X
IR01MW43A		X	
IR01MW44A		X	
IR01MW47B		X	
IR01MW48A		X	X
IR01MW53B		X	X
IR01MW58A	X		
IR01MW63A	X		X
IR01MW403B	X		X
IR01MW60A		X	X
IR01MWI-3		X	
IR01MWI-6	X		
IR01MWI-7		X	X
IR01MWI-8		X	X
IR01MWLF2A	X		X
IR04MW13A		X	X
IR04MW31A		X	
IR04MW35A		X	
IR04MW36A		X	X
IR12MW11A		X	X

Notes:
(1) Determined based on groundwater elevation mapping performed as part of the BGMP.
BGMP Basewide Groundwater Monitoring Program
RIEC Remedial Investigation Evaluation Criteria

Table 5-15. List of All Possible Areas of Concern in Parcel E-2 Aquifers

Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Well ID No.	Aquifer	General Description of Well Location	Contaminant Group	Chemical Exceeding RIEC	Potential Reason for Inadequate Extent Delineation
IR01MW63A	A	Located along the western parcel boundary at the southern edge of Panhandle Area	Anion	Cyanide	(1) No data on upgradient and downgradient sides of well to determine if contamination is migrating off site or to San Francisco Bay
IR01MW403B	A	Located along the western parcel boundary	Anion	Cyanide	(1) Recent detections exceeding RIEC; more data required to establish persistence and trends
IR01MWLF2A	A	Located along the northern parcel boundary at the northern edge of Landfill Area	Anion	Cyanide	(1) Recent detections exceeding RIEC; more data required to establish persistence and trends
IR01MW60A	A	Located along the shoreline in Panhandle Area	Anion	Cyanide	(1) Recent detections exceeding RIEC; more data required to establish persistence and trends
IR01MW47B	A	Located along the shoreline in Panhandle Area	Anion	Cyanide	(1) Recent detections exceeding RIEC; more data required to establish persistence and trends
			Metal	Antimony	(1) No data on bay side of well
IR01MW53B	A	Located along the shoreline in Panhandle Area	Anion	Nitrate	(1) No data on bay side of well
			Metal	Copper	(1) No data on bay side of well
IR01MW48A	A	Located along shoreline in Panhandle Area	Anion	Cyanide	(1) Recent detections exceeding RIEC; more data required to establish persistence and trends
			Anion	Un-ionized Ammonia	(1) No data on bay side of well (2) Error introduced in calculation of unionized ammonia using ammonia concentrations and field parameters
			Metal	Barium	(1) No data on bay side of well
IR01MWI-3	A	Located along shoreline in Landfill Area, within PCB Hot Spot removal area	Anion	Un-ionized Ammonia	(1) No data on bay side of well (2) Effect of PCB Hot Spot removal action unknown (3) Error introduced in calculation of Un-ionized ammonia using ammonia concentrations and field parameters
			Metal	Antimony	(1) No data on bay side of well (2) Effect of PCB Hot Spot removal action unknown
			Metal	Barium	(1) No data on bay side of well (2) Effect of PCB Hot Spot removal action unknown
			Metal	Chromium (Total)	(1) No data on bay side of well (2) Effect of PCB Hot Spot removal action unknown
			Petroleum Hydrocarbons	TPH (Total)	(1) No data on bay side of well (2) Effect of PCB Hot Spot removal action unknown

Table 5-15. List of All Possible Areas of Concern in Parcel E-2 Aquifers *(continued)*
Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Well ID No.	Aquifer	General Description of Well Location	Contaminant Group	Chemical Exceeding RIEC	Potential Reason for Inadequate Extent Delineation
IR01MW43A	A	Located along shoreline in Landfill Area, within PCB Hot Spot removal area	Anion	Un-ionized Ammonia	(1) No data on bay side of well (2) Error introduced in calculation of unionized ammonia using ammonia concentrations and field parameters (3) Effect of PCB Hot Spot removal action unknown
			Metal	Chromium (Total)	(1) No data on bay side of well (2) Effect of PCB Hot Spot removal action unknown (3) Short data history since elevated concentrations detected
			Metal	Lead	(1) No data on bay side of well (2) Effect of PCB Hot Spot removal action unknown (3) Short data history since elevated concentrations detected
			Metal	Zinc	(1) No method for predicting concentrations in mixing zone and in bay (2) No data on bay side of well (3) Short data history since elevated concentrations detected
			PCBs	PCBs (Total)	(1) Effect of PCB Hot Spot removal action unknown (2) No data on bay side of well
			Petroleum Hydrocarbons	TPH (Total)	(1) No data on bay side of well (2) Effect of PCB Hot Spot removal action unknown
IR01MW47B	B	Located along shoreline in Landfill Area, within PCB Hot Spot removal area	Anion	Un-ionized Ammonia	(1) No data on bay side of well (2) Error introduced in calculation of unionized ammonia using ammonia concentrations and field parameters
			Metal	Antimony	(1) No data on bay side of well (2) Effect of PCB Hot Spot removal action unknown
IR01MW44A	A	Located along shoreline in East Adjacent Area, within PCB Hot Spot removal area	Metal	Chromium (Total)	(1) No data on bay side of well (2) Effect of PCB Hot Spot removal action unknown (3) Short data history since elevated concentrations detected
			Metal	Zinc	(1) No data on bay side of well (2) Effect of PCB Hot Spot removal action unknown (3) Short data history since elevated concentrations detected
			PCBs	PCBs (Total)	(1) Effect of PCB Hot Spot removal action unknown (2) No data on bay side of well
IR01MWI-6	A	Located along shoreline in Panhandle Area	Anion	Cyanide	(1) Well data limited to two sampling events conducted in 1992 (2) No data beyond parcel boundary to help determine if chemical is migrating off site
			PCBs	PCBs (Total)	(1) Short data history since elevated concentration detected; no data collected since 1992 (2) No data on cross-gradient side of well, on non-Navy property

Table 5-15. List of All Possible Areas of Concern in Parcel E-2 Aquifers *(continued)*
Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Well ID No.	Aquifer	General Description of Well Location	Contaminant Group	Chemical Exceeding RIEC	Potential Reason for Inadequate Extent Delineation
TW013	A	Located along shoreline in Panhandle Area	Anion	Un-ionized Ammonia	(1) No data on bay side of well (2) Error introduced in calculation of unionized ammonia using ammonia concentrations and field parameters
			Metal	Barium	(1) No data on bay side of well
			Petroleum Hydrocarbons	TPH (Total)	(1) No data on bay side of well
TW014	A	Located along shoreline in Panhandle Area	Anion	Un-ionized Ammonia	(1) No data on bay side of well (2) Error introduced in calculation of unionized ammonia using ammonia concentrations and field parameters
			Metal	Barium	(1) No data on bay side of well
TW016	A	Located along shoreline in Panhandle Area	Anion	Un-ionized Ammonia	(1) No data on bay side of well (2) Error introduced in calculation of unionized ammonia using ammonia concentrations and field parameters
			Petroleum Hydrocarbons	TPH (Total)	(1) No data on bay side of well
TW018	A	Located along the shoreline in the Panhandle Area	Metal	Copper	(1) No data on bay side of well
TW019	A	Located along the shoreline in the Panhandle Area	Metal	Copper	(1) No data on bay side of well
TW020	A	Located along shoreline in Panhandle Area	Metal	Copper	(1) No data on bay side of well
			Metal	Zinc	(1) No data on bay side of well
TW021	A	Located along shoreline in Panhandle Area	Metal	Lead	(1) No data on bay side of well
			Metal	Zinc	(1) No data on bay side of well
			PCBs	PCBs (Total)	(1) No data on bay side of well
TW028B	A	Located along the shoreline in the Panhandle Area, within Metal Slag removal area	Metal	Lead	(1) No data on bay side of well
TW029	A	Located along the shoreline in the Panhandle Area, within Metal Slag removal area	Metal	Copper	(1) No data on bay side of well
			Metal	Lead	(1) No data on bay side of well
			Metal	Zinc	(1) No data on bay side of well
TW031	A	Located along shoreline in Landfill Area	Anion	Un-ionized Ammonia	(1) No data on bay side of well (2) Error introduced in calculation of unionized ammonia using ammonia concentrations and field parameters
			Metal	Barium	(1) No data on bay side of well
			PCBs	PCBs (Total)	(1) No data on bay side of well
			Petroleum Hydrocarbons	TPH (Total)	(1) No data on bay side of well

Table 5-15. List of All Possible Areas of Concern in Parcel E-2 Aquifers *(continued)*
Remedial Investigation/Feasibility Study Report for Parcel E-2, Hunters Point Shipyard

Well ID No.	Aquifer	General Description of Well Location	Contaminant Group	Chemical Exceeding RIEC	Potential Reason for Inadequate Extent Delineation
TW032	A	Located along shoreline in Landfill Area	Anion	Un-ionized Ammonia	(1) No data on bay side of well (2) Error introduced in calculation of unionized ammonia using ammonia concentrations and field parameters
			Petroleum Hydrocarbons	TPH (Total)	(1) No data on bay side of well
TW033	A	Located along the shoreline in the Landfill Area	Petroleum Hydrocarbons	TPH (Total)	(1) No data on bay side of well
TW039	A	Located along shoreline in Landfill Area	Anion	Un-ionized Ammonia	(1) No data on bay side of well (2) Error introduced in calculation of unionized ammonia using ammonia concentrations and field parameters
			PCBs	PCBs (Total)	(1) No data on bay side of well
TW040	A	Located along shoreline in Landfill Area	Anion	Un-ionized Ammonia	(1) No data on bay side of well (2) Error introduced in calculation of unionized ammonia using ammonia concentrations and field parameters
			Metal	Barium	(1) No data on bay side of well
			PCBs	PCBs (Total)	(1) No data on bay side of well
TW041	A	Located along shoreline in Panhandle Area	Metal	Barium	(1) No data on bay side of well
			Petroleum Hydrocarbons	TPH (Total)	(1) No data on bay side of well
TW042	A	Located along shoreline in Panhandle Area	Metal	Barium	(1) No data on bay side of well
			Petroleum Hydrocarbons	TPH (Total)	(1) No data on bay side of well
PZ150D	A	Located along shoreline in Landfill Area	Anion	Un-ionized Ammonia	(1) No data on bay side of well (2) Error introduced in calculation of unionized ammonia using ammonia concentrations and field parameters
			Metal	Barium	(1) No data on bay side of well
			PCBs	PCBs (Total)	(1) No data on bay side of well

Notes:

PCB polychlorinated biphenyl
RIEC remedial investigation evaluation criteria
TPH total petroleum hydrocarbons