

**SUBJECT: HTW – BCT Meeting**  
**September 18, 2008**  
**9:00 a.m.**

| Check<br>(✓) | Name             | Organization  | Phone        | E-mail address                                                                     |
|--------------|------------------|---------------|--------------|------------------------------------------------------------------------------------|
|              | Kate Burger      | DTSC          | 916/255-6537 | <a href="mailto:kburger@dtsc.ca.gov">kburger@dtsc.ca.gov</a>                       |
|              | Franklin Mark    | DTSC          | 916/255-3584 | FMark@dtsc.ca.gov                                                                  |
|              | Martin Hausladen | U.S. EPA      | 415/972-3007 | Hausladen.martin@epamail.epa.gov                                                   |
|              | Lewis Mitani     | U.S. EPA      | 415/972-3032 | <a href="mailto:Mitani.lewis@epa.gov">Mitani.lewis@epa.gov</a>                     |
|              | Grant Himebaugh  | RWQCB         | 805/542-4636 | Ghimebaugh@waterboards.ca.gov                                                      |
|              | Bill Mabey       | TechLaw Inc   | 415/281-8730 | bmabey@techlawinc.com                                                              |
|              | Gail Youngblood  | Fort Ord BRAC | 831/242-7918 | <a href="mailto:gail.youngblood@us.army.mil">gail.youngblood@us.army.mil</a>       |
|              | Derek Lieberman  | Ahtna         | 831/242-4873 | <a href="mailto:dlieberman@ahtnagov.com">dlieberman@ahtnagov.com</a>               |
|              | Bill Collins     | Fort Ord BRAC | 831/242-7920 | <a href="mailto:William.K.Collins@us.army.mil">William.K.Collins@us.army.mil</a>   |
|              | Rob Robinson     | Fort Ord BRAC | 831/242-7900 | <a href="mailto:clinton.w.robinson@us.army.mil">clinton.w.robinson@us.army.mil</a> |
|              | George Siller    | COE           | 916/557-7418 | George.L.Siller@usace.army.mil                                                     |
|              | David Eisen      | COE           | 831/393-9692 | David.Eisen@usace.army.mil                                                         |

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|--------------|----------------------|---------------|-----------------------|--------------------------------------------------------------------------------------------------|
|              | Mark Eldridge        | AEC           | 410/436-6325          | <a href="mailto:Mark.h.eldridge@us.army.mil">Mark.h.eldridge@us.army.mil</a>                     |
| <i>RM</i>    | Peter Kelsall        | Shaw E&I      | 831/883-5810 ext. 810 | <a href="mailto:Peter.Kelsall@shawgrp.com">Peter.Kelsall@shawgrp.com</a>                         |
| <i>DSK</i>   | David Kelly          | Shaw E&I      | 925/288-2321          | <a href="mailto:David.kelly@shawgrp.com">David.kelly@shawgrp.com</a>                             |
| <i>Jm</i>    | Jen Moser            | GEM/Shaw E&I  | 831/883-5812          | <a href="mailto:Jen.moser@shawgrp.com">Jen.moser@shawgrp.com</a>                                 |
|              | Eric Schmidt         | Shaw E&I      | 831/883-5809          | <a href="mailto:Eric.Schmidt@shawgrp.com">Eric.Schmidt@shawgrp.com</a>                           |
| <i>ET</i>    | Ed Ticken            | MACTEC E&C    | 415/884-3176          | <a href="mailto:ejticken@mactec.com">ejticken@mactec.com</a>                                     |
| <i>ME</i>    | Marc Edwards         | COE           |                       | <a href="mailto:Marc.A.Edwards@usace.army.mil">Marc.A.Edwards@usace.army.mil</a>                 |
|              | Michael Taraszki     | MACTEC E&C    | 415/884-3325          | <a href="mailto:mdtaraski@mactec.com">mdtaraski@mactec.com</a>                                   |
|              | Chuck Holman         | Ahtna         | 916/372-2000          | <a href="mailto:cholman@ahtnagov.com">cholman@ahtnagov.com</a>                                   |
|              | Kelly O'Meara        | Ahtna         | 916/372-2000          | <a href="mailto:komeara@ahtnagov.com">komeara@ahtnagov.com</a>                                   |
|              | Christopher Prescott | USACE         |                       | <a href="mailto:Christopher.E.Prescott@usace.army.mil">Christopher.E.Prescott@usace.army.mil</a> |
|              | Melissa Broadston    | Fort Ord BRAC | 831/393-1284          | <a href="mailto:Melissa.broadston@us.army.mil">Melissa.broadston@us.army.mil</a>                 |
| <i>Phone</i> | Roy Evans            | HGL           | 303/984-1167 xt. 5    | <a href="mailto:revans@hgl.com">revans@hgl.com</a>                                               |
| <i>RR</i>    | Roman Racca          | DTSC          |                       |                                                                                                  |



**HTW BCT Meeting**

September 2008

| <b>Item</b>                    | <b>Action</b> | <b>Comment</b>                              |
|--------------------------------|---------------|---------------------------------------------|
| OU1 Groundwater Remediation    | Status Update | HGL                                         |
| OU1 Off-Site                   | Status Update |                                             |
| OU2 and 2/12 Treatment Systems | Status Update |                                             |
| Other Groundwater Issues       | Status Update | Quarterly sampling                          |
| OUCTP                          | Status Update | RD/RA Work Plan                             |
| OU2 Landfill Gas               | Status Update |                                             |
| Basewide Range Assessment      | Status Update | No Action Approval Memos, HA<br>161 IA Memo |
| Site 39 ROD                    | Status Update |                                             |
| FFA Schedule                   | Status Update |                                             |
| FOST/FOSET Issues              | Status Update |                                             |
| Calendar Update                | Update        |                                             |

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## Former Fort Ord Groundwater Treatment Systems Operational Data and Status BCT Meeting, September 18, 2008

**Table 1:** OU2 and Sites 2/12 GWTP Treatment Statistics.

|                          | Volume Treated<br>(gallons) | Average Flow<br>(gallons per<br>minute) | Percent of<br>Time Online | COC Mass<br>Removed<br>(lbs) |
|--------------------------|-----------------------------|-----------------------------------------|---------------------------|------------------------------|
| <b>OU2</b>               |                             |                                         |                           |                              |
| August 2008              | 29,437,610                  | 659                                     | 100                       | 2.79                         |
| Total since October 1995 | 4.296 billion               |                                         |                           | 571.83                       |
| <b>Sites 2/12</b>        |                             |                                         |                           |                              |
| August 2008              | 6,563,900                   | 147                                     | 100                       | 1.18                         |
| Total since May 1999     | 1.130 billion               |                                         |                           | 395.18                       |

**Table 2:** OU2 and Sites 2/12 GWTP Calendar of events.

| <b>Key Events for OU2 and Sites 2/12 for August 2008</b>                                                               |        |         |           |          |        |                                   |
|------------------------------------------------------------------------------------------------------------------------|--------|---------|-----------|----------|--------|-----------------------------------|
| Sunday                                                                                                                 | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday                          |
| *20 USAN Notices in August.<br>None of these alerts required the<br>personal attention of the Senior<br>GWTP Operator. |        |         |           |          | 1      | 2                                 |
|                                                                                                                        |        | 3       | 4         | 5        | 6      | 7                                 |
| 10                                                                                                                     | 11     | 12      | 13        | 14       | 15     | 16<br>EW-OU2-09-A<br>pump failed. |
| 17                                                                                                                     | 18     | 19      | 20        | 21       | 22     | 23                                |
| 24/31                                                                                                                  | 25     | 26      | 27        | 28       | 29     | 30                                |



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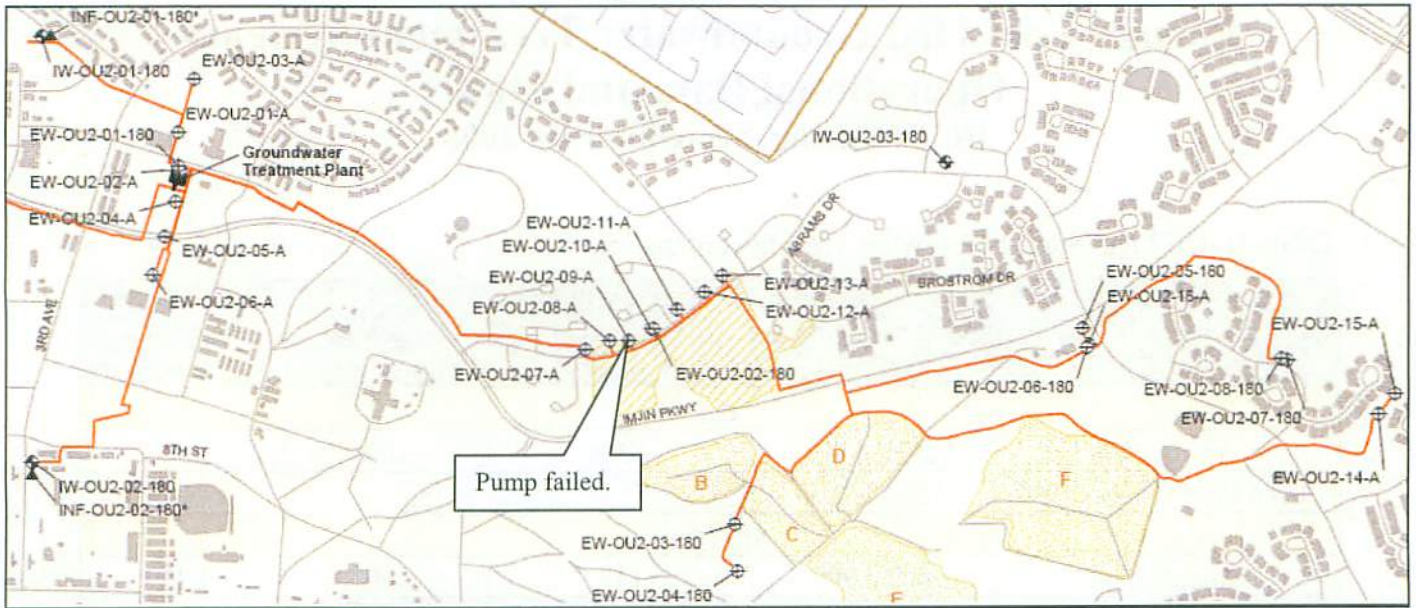


Figure 1: OU2 GWTP Treatment Events August 2008.

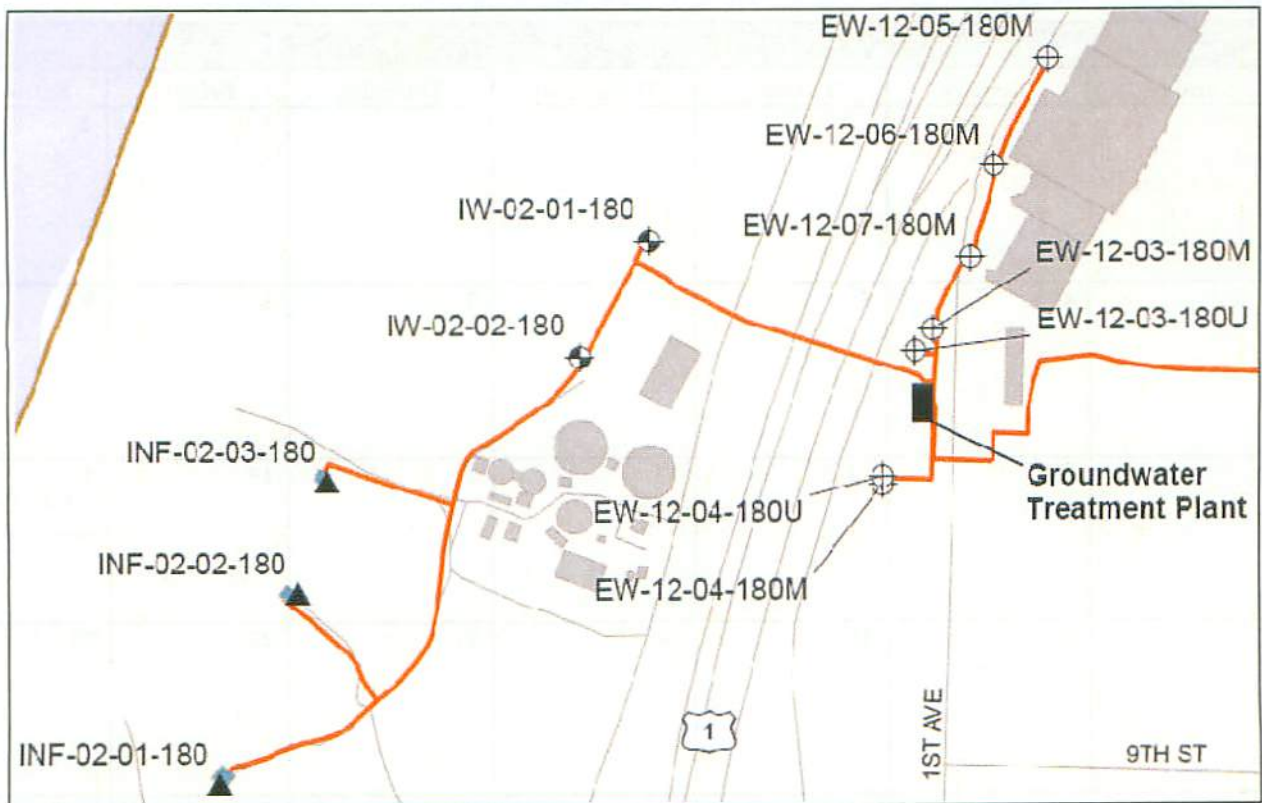


Figure 2: Sites 2/12 GWTP Treatment Events August 2008.

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**Table 3:** August 2008 OU2 Analytical Results at TS-OU2-INJ.

| COC                  | Discharge Limit (µg/L)‡ | Sample Date / Analytical Results |            |
|----------------------|-------------------------|----------------------------------|------------|
|                      |                         | 08/05/2008                       | 08/20/2008 |
| 1,1-DCA              | 5.0*                    | 1.2                              | 1.1        |
| 1,2-DCA              | 0.5                     | 0.27 J                           | 0.22 J     |
| 1,2-DCP †            | 0.5                     | ND                               | ND         |
| Benzene              | 0.5                     | ND                               | ND         |
| Carbon Tetrachloride | 0.5                     | ND                               | ND         |
| Chloroform           | 2.0*                    | 0.54                             | 0.52       |
| Cis-1,2-DCE          | 6.0*                    | 1.5                              | 1.4        |
| Methylene Chloride   | 0.5                     | ND                               | ND         |
| PCE                  | 0.5                     | ND                               | ND         |
| TCE                  | 0.5                     | 0.20 J                           | 0.17 J     |
| Vinyl Chloride       | 0.5                     | ND                               | ND         |

**Table 4:** August 2008 Sites 2/12 Analytical Results at TS-212-INJ

| COC            | Discharge Limit (µg/L)‡ | Sample Date / Analytical Results |            |            |           |
|----------------|-------------------------|----------------------------------|------------|------------|-----------|
|                |                         | 08/05/2008                       | 08/13/2008 | 08/20/2008 | 8/26/08** |
| 1,1-DCE        | 6                       | ND                               | ND         | ND         | ND        |
| 1,2-DCA        | 0.5                     | 0.25 J                           | 0.26 J     | 0.24 J     | 0.21 J    |
| 1,3-DCP †      | 0.5                     | ND                               | ND         | ND         | ND        |
| Chloroform     | 2                       | 0.51                             | 0.52       | 0.48 J     | 0.38 J    |
| Cis-1,2 DCE    | 6                       | 1.4                              | 1.4        | 1.4        | 2.2       |
| PCE            | 3                       | ND                               | ND         | ND         | ND        |
| TCE            | 5                       | 0.20 J                           | 0.20 J     | 0.17 J     | 0.16 J    |
| Vinyl Chloride | 0.1                     | ND                               | ND         | ND         | ND        |

**NOTES:**

J The analyte was positively identified, but the associated numerical value is an approximate concentration greater than the Method Detection Limit (MDL) but less than the Practical Quantitation Limit (PQL).

ND The analyte was not detected above MDL.

\* Discharge limits for low carbon affinity compounds were increased to the Aquifer Cleanup Level (ACL).

‡ Discharge limits are the ACLs for injection over the plume.

† The reported value is the sum of both cis- and trans-isomers.

\*\* Preliminary data; validation has not been completed.

J± Data are qualified as estimated, with a high (+) or low (-) bias likely to have occurred. False positives or false negatives are unlikely to have been reported.



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**Table 5: August 2008 OU2 and Sites 2/12 Extraction Well Status.**

| Well Identification                | % On | Avg. gpm | Total Gallons     | % of Total   | Comments                                  |
|------------------------------------|------|----------|-------------------|--------------|-------------------------------------------|
| <b>Site 12 Extraction Wells</b>    |      |          |                   |              |                                           |
| EW-12-05-180M                      | 22.8 | 19.7     | 879,900           | 13.4         |                                           |
| EW-12-06-180M                      | 98.3 | 127.2    | 5,678,700         | 86.5         |                                           |
| EW-12-07-180M                      | 0.1  | 0.1      | 5,300             | 0.1          |                                           |
| EW-12-03-180U                      | 0    | 0.0      | 0                 | 0.0          | Well offline due to low concentrations.   |
| EW-12-03-180M                      | 0    | 0.0      | 0                 | 0.0          | Well offline due to low concentrations.   |
| EW-12-04-180U                      | 0    | 0.0      | 0                 | 0.0          | Well offline due to low concentrations.   |
| EW-12-04-180M                      | 0    | 0.0      | 0                 | 0.0          | Ceased operating on 11/21/2005.           |
| <b>Total 2/12 gallons treated:</b> |      |          | <b>6,563,900</b>  | <b>100.0</b> |                                           |
| <b>OU2 Extraction Wells</b>        |      |          |                   |              |                                           |
| <b>Western Network</b>             |      |          |                   |              |                                           |
| EW-OU2-01-A                        | 0    | 0.0      | 0                 | 0.0          | Well offline due to low concentrations.   |
| EW-OU2-02-A                        | 43.3 | 18.0     | 804,180           | 2.7          |                                           |
| EW-OU2-03-A                        | 0    | 0.0      | 0                 | 0.0          | Well offline due to low concentrations.   |
| EW-OU2-04-A                        | 99.4 | 27.9     | 1,246,550         | 4.2          |                                           |
| EW-OU2-05-A                        | 100  | 51.0     | 2,276,640         | 7.7          |                                           |
| EW-OU2-06-A                        | 73.6 | 27.9     | 1,247,540         | 4.2          |                                           |
| EW-OU2-01-180                      | 0    | 0.0      | 0                 | 0.0          | No pump in well.                          |
| <b>Total gallons extracted:</b>    |      |          | <b>5,574,910</b>  | <b>18.9</b>  |                                           |
| <b>Eastern Network</b>             |      |          |                   |              |                                           |
| EW-OU2-07-A                        | 0    | 0.0      | 0                 | 0.0          | Well offline due to low concentrations.   |
| EW-OU2-08-A                        | 38.6 | 3.3      | 146,990           | 0.5          | Well offline due to low concentrations.   |
| EW-OU2-09-A                        | 25.3 | 7.1      | 317,700           | 1.1          | Pump failed August 16.                    |
| EW-OU2-10-A                        | 99.9 | 27.5     | 1,229,310         | 4.2          |                                           |
| EW-OU2-11-A                        | 0    | 0.0      | 0                 | 0.0          | Well offline due to area construction.    |
| EW-OU2-12-A                        | 0    | 0.0      | 0                 | 0.0          | Well offline due to area construction.    |
| EW-OU2-13-A                        | 100  | 30.0     | 1,339,800         | 4.6          |                                           |
| EW-OU2-02-180                      | 0    | 0.0      | 0                 | 0.0          | Well offline pending installation of VFD. |
| <b>Total gallons extracted:</b>    |      |          | <b>3,033,800</b>  | <b>10.3</b>  |                                           |
| <b>Shoppette</b>                   |      |          |                   |              |                                           |
| EW-OU2-05-180                      | 67.4 | 88.2     | 3,938,700         | 13.4         |                                           |
| EW-OU2-06-180                      | 99.4 | 152.6    | 6,810,400         | 23.1         |                                           |
| EW-OU2-16-A                        | 98.6 | 20.5     | 901,400           | 3.1          |                                           |
| <b>Total gallons extracted:</b>    |      |          | <b>11,650,500</b> | <b>39.6</b>  |                                           |
| <b>CSUMB</b>                       |      |          |                   |              |                                           |
| EW-OU2-14-A                        | 0    | 0.0      | 0                 | 0.0          | Well offline due to low concentrations.   |
| EW-OU2-15-A                        | 0    | 0.0      | 0                 | 0.0          | Well offline due to low concentrations.   |
| <b>Total gallons extracted:</b>    |      |          | <b>0</b>          | <b>0.0</b>   |                                           |
| <b>Landfill</b>                    |      |          |                   |              |                                           |
| EW-OU2-03-180                      | 99.2 | 147.8    | 6,596,000         | 22.4         |                                           |
| EW-OU2-04-180                      | 0.4  | 0.5      | 21400             | 0.1          | Well offline due to low concentrations.   |
| <b>Total gallons extracted:</b>    |      |          | <b>6,617,400</b>  | <b>22.5</b>  |                                           |
| <b>Bunker Hill</b>                 |      |          |                   |              |                                           |
| EW-OU2-08-180                      | 99.6 | 57.4     | 2,561,000         | 8.7          |                                           |
| <b>Total gallons extracted:</b>    |      |          | <b>2,561,000</b>  | <b>8.7</b>   |                                           |
| <b>Total OU2 gallons treated:</b>  |      |          | <b>29,437,610</b> | <b>100.0</b> |                                           |



**Site 39 Remedial Action  
Status Update  
9/18/2008**

## Documents

| <b>Document</b>                           | <b>Schedule</b>                                       | <b>Comments</b>                                             |
|-------------------------------------------|-------------------------------------------------------|-------------------------------------------------------------|
| Habitat Restoration Plan<br>ROD Amendment | Agency comment due 9/30.<br>Issue Draft Final by 9/18 | Extension requested<br>comments incorporated                |
| RD/RAWP                                   | Issue Draft by 9/30                                   | Army comments incorporated; In<br>internal Shaw back check. |

## Ongoing Engineering Activities

### Site 39

- Evaluate cost impact for placing temporary water pipeline for dust control at HAs 18/19 instead of trucking water.
- Data management and reporting of HMP plant species survey (transects) for remediation areas.

### OU2 Landfills

- Evaluate E/F Hill as borrow source for vegetative cover. Prepare grading plan.

## Future Field Activities

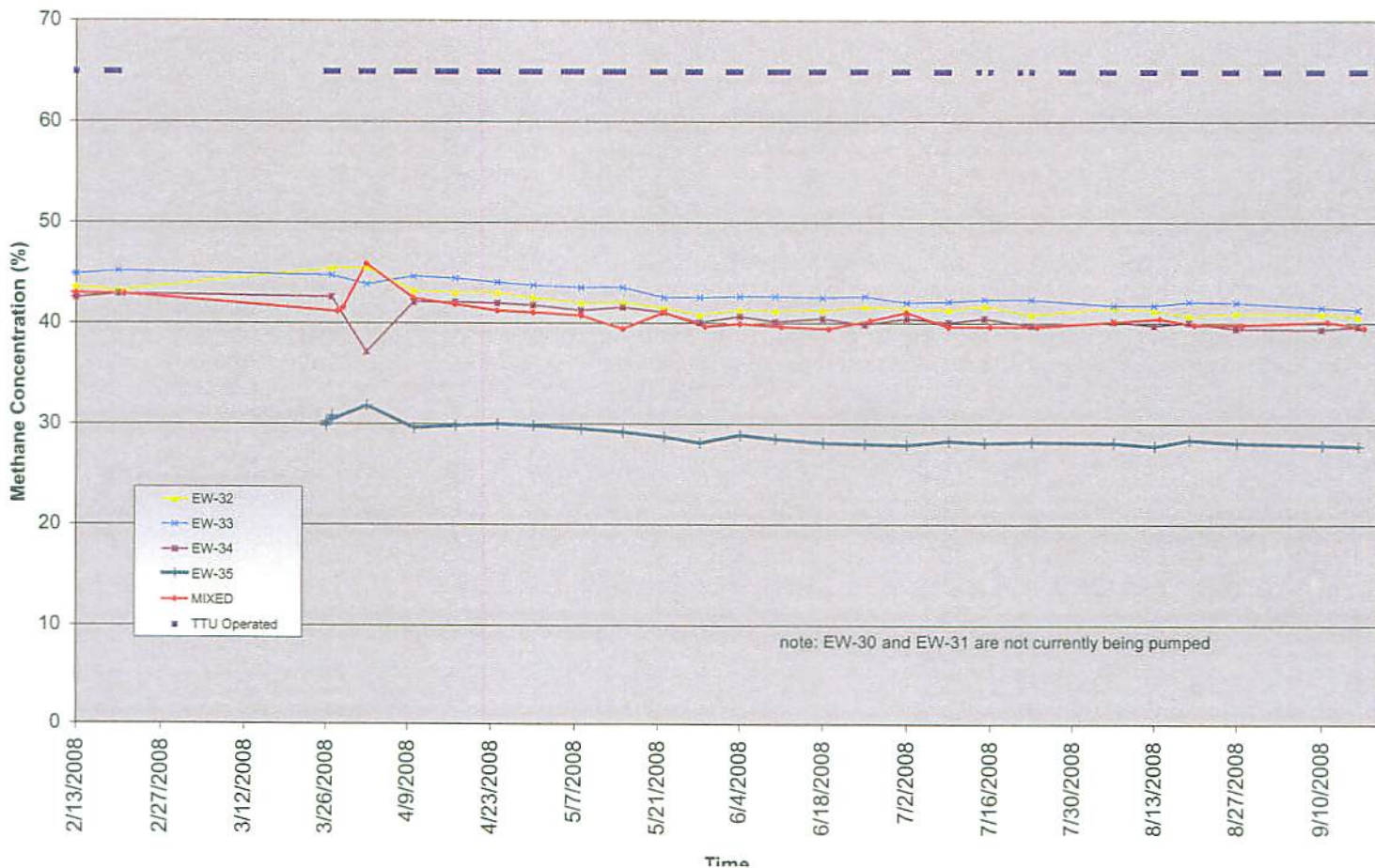
- Wetland monitoring - Ponds 8 and 30 still need survey data if possible before range remediation. No ponding from 2006 through 2008.
- Site Preparation scheduled to start January 2009.
- Excavation scheduled to start March 2009.

Thermal Treatment Unit  
Operation Summary  
2007/2008

|                                          |                 |
|------------------------------------------|-----------------|
| Start Date/Time:                         | 4/4/2006        |
| Last Reading Date/Time:                  | 9/17/2008 16:30 |
| Total Hours (2006):                      | 6528            |
| Total Hours Operated (2006):             | 2891.50         |
| % Operation (2006):                      | 44.3%           |
| Total Hours (2007):                      | 8760            |
| Total Hours Operated (2007):             | 4035.4          |
| % Operation (2007):                      | 48.7%           |
| Total Hours (2008):                      | 6256.5          |
| Total Hours Operated (2008):             | 2017.9          |
| % Operation (2008):                      | 32.3%           |
| Cumulative % Operation (since 4/4/2006): | 41.5%           |

|                                  |        |
|----------------------------------|--------|
| Pounds of Methane Removed (2007) | 372759 |
| Pounds of Methane Removed (2008) | 154282 |

Methane Concentration vs. Time  
(after 02-13-08)  
Interior Extraction Wells



# Operable Unit Carbon Tetrachloride Plume Remedial Action Work Plan Presentation

- Remedial Action Work Plan Structure
- Remedial Action Objectives
- Selected Remedial Actions
- Conceptual Model
- Groundwater Monitoring Program
- A-Aquifer Remedial Design
  - A-Aquifer Remedial Action Design Basis
  - A-Aquifer Remedial Action System Construction
  - A-Aquifer Remedial Action System Operation
  - A-Aquifer Remedial Action Monitoring
  - A-Aquifer Remedial Action Preliminary Schedule

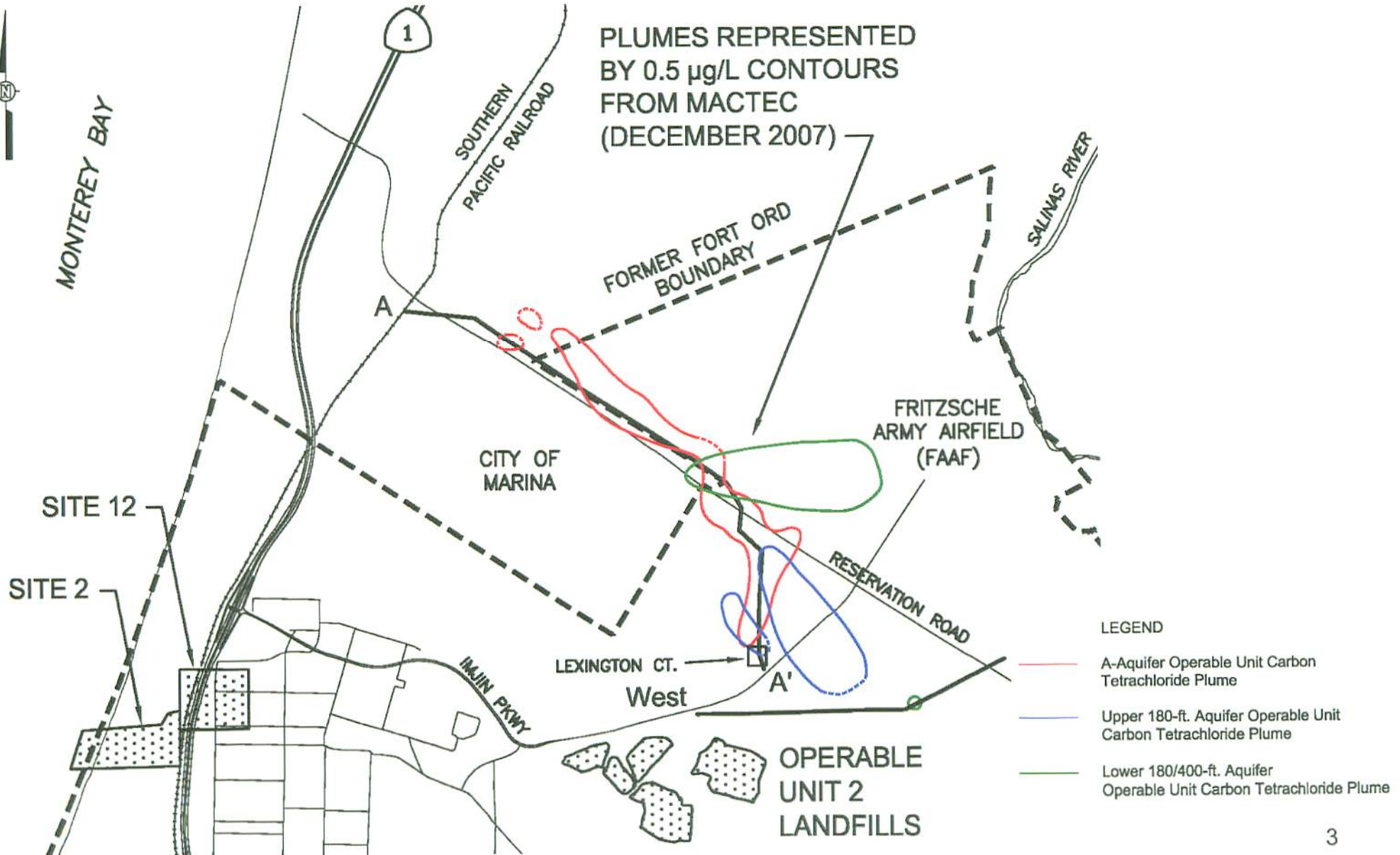


# Operable Unit Carbon Tetrachloride Plume Remedial Action Work Plan Structure

## Work Plan Table of Contents

- Introduction
- Site Location and History
- Site Hydrogeologic Setting
- Nature and Extent of Impacted Groundwater
- Conceptual Model
- Technical Project Planning
- OUCTP Groundwater Monitoring Program
- Regulatory Requirements and Permitting
- Pre-Construction Activities
- Protection of Environmental Resources
- Site Safety and Health Plan
- Contractor Quality Control Plan
- Appendix A – Operable Unit Carbon Tetrachloride A-Aquifer Remedial Design
  - Introduction
  - Remedial Approach
  - Treatment System Components
  - Enhanced *in situ* Bioremediation Treatment Operations
  - Sampling and Analysis Plan
  - Program Evaluation, Reporting and Modifications
- Appendix B – Operable Unit Carbon Tetrachloride Plume Upper 180-Foot Aquifer Remedial Design
  - To be submitted at a later date
- Appendix C – Operable Unit Carbon Tetrachloride Plume Lower 180-Foot Aquifer Remedial Design
  - To be submitted at a later date
- Appendix D – Activity Hazard Analyses
- Appendix E – Prohibition Zone and Special Groundwater Protection Zone Maps

# Plume Location Map December 2007



# Operable Unit Carbon Tetrachloride Plume Remedial Action Objectives

- Human health risk is within acceptable range since exposure pathways for contaminated groundwater are incomplete.
- Groundwater within the OUCTP is located in a Prohibition Zone of the Special Groundwater Protection Zone. Installation of new supply wells is prohibited by Monterey County.
- ARARs (federal and state MCLs) considered to meet long-term potential risks and provide unrestricted use of groundwater at the site.



# Operable Unit Carbon Tetrachloride Plume Remedial Action Objectives

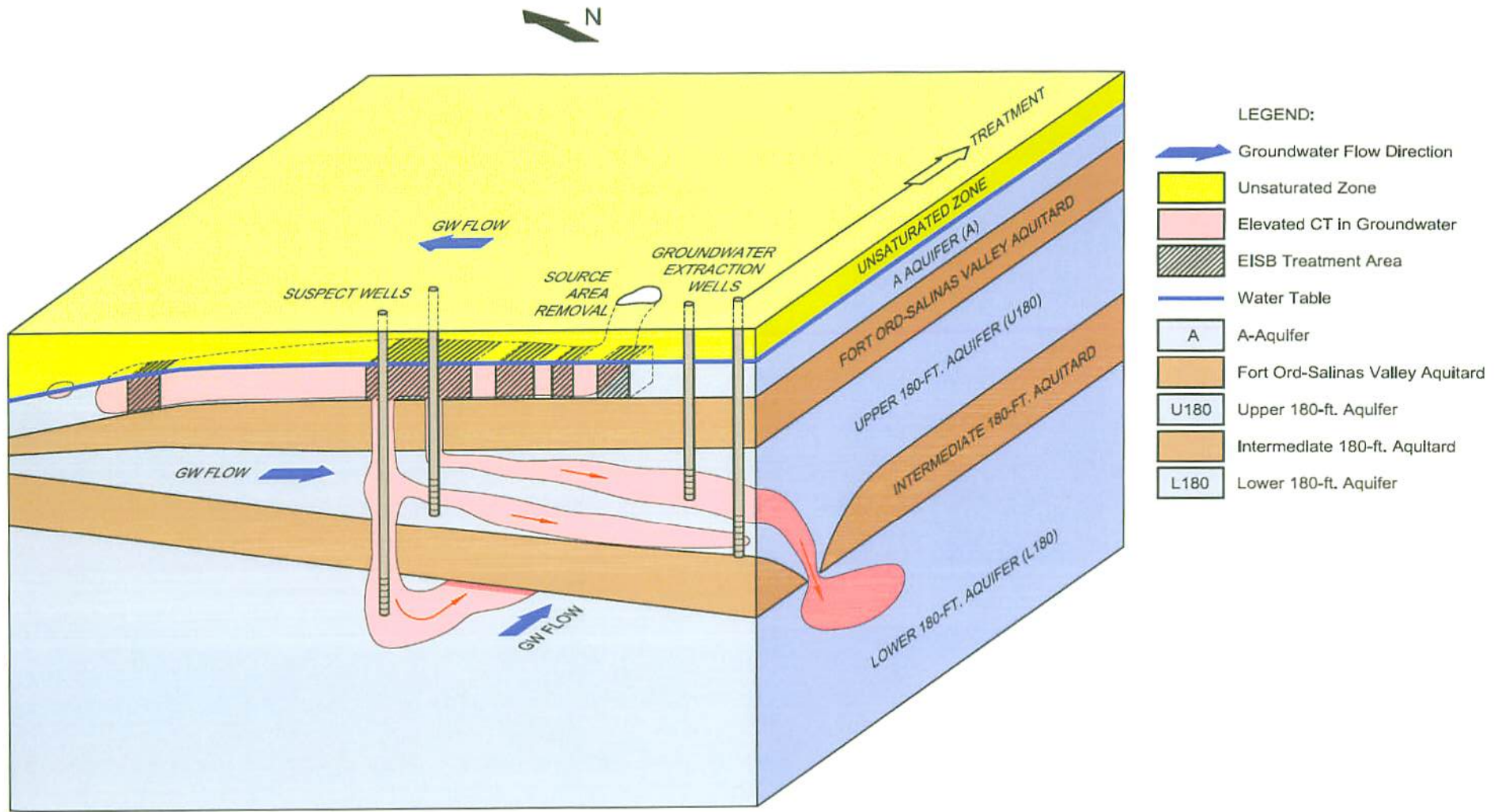
**Chemicals of Concern and Aquifer Cleanup Levels, Record of Decision, Operable Unit Carbon Tetrachloride Plume**

| Chemicals of Concern          | Maximum Contaminant Levels |                              | Aquifer Cleanup Levels <sup>c</sup><br>µg/L | State or Federal MCL Selected as the ACL | Maximum Chemical Concentration Detected |                           | Aquifer Discharge Levels <sup>f</sup> |
|-------------------------------|----------------------------|------------------------------|---------------------------------------------|------------------------------------------|-----------------------------------------|---------------------------|---------------------------------------|
|                               | State <sup>a</sup><br>µg/L | Federal <sup>b</sup><br>µg/L |                                             |                                          | Historical <sup>d</sup><br>µg/L         | 2004 <sup>e</sup><br>µg/L |                                       |
| <b>A-Aquifer</b>              |                            |                              |                                             |                                          |                                         |                           |                                       |
| CT                            | 0.5                        | 5                            | 0.5                                         | State                                    | 19                                      | 15                        | 0.5                                   |
| PCE                           | 5                          | 5                            | 5                                           | State                                    | 1.63                                    | 0.87                      | 0.5                                   |
| TCE                           | 5                          | 5                            | 5                                           | State                                    | 6.4                                     | 4.9                       | 0.5                                   |
| DCE                           | 6                          | 7                            | 6                                           | State                                    | 0.44                                    | 0.44                      | 0.5                                   |
| Chloroform                    | --                         | --                           | 2 <sup>g</sup>                              | Other                                    | 1.8                                     | 1.8                       | 0.5                                   |
| 1,2 DCE                       | 6                          | 70                           | 6                                           | State                                    | 0.44                                    | 0.44                      | 0.5                                   |
| Dichloromethane               | 5                          | 5                            | 5                                           | State                                    | 17                                      | ND                        | 0.5                                   |
| Vinyl Chloride                | 0.5                        | 2                            | 0.1 <sup>h</sup>                            | Other                                    | ND                                      | ND                        | 0.1                                   |
| <b>Upper 180-Foot Aquifer</b> |                            |                              |                                             |                                          |                                         |                           |                                       |
| CT                            | 0.5                        | 5                            | 0.5                                         | State                                    | 9.8                                     | 3.5                       | 0.5                                   |
| <b>Lower 180-Foot Aquifer</b> |                            |                              |                                             |                                          |                                         |                           |                                       |
| 1,2 DCA                       | 0.5                        | 5                            | 0.5                                         | State                                    | 1.7                                     | 1.2                       | 0.5                                   |
| CT                            | 0.5                        | 5                            | 0.5                                         | State                                    | 6.95                                    | 3.6                       | 0.5                                   |

µg/L denotes micrograms per liter.  
 1,2-DCA denotes 1,2-dichloroethane.  
 1,2-DCE denotes 1,2-dichloroethylene.  
 ACL denotes aquifer cleanup level.  
 CT denotes carbon tetrachloride.  
 DCE denotes 1,1-dichloroethylene.  
 DLRS denotes detection limits for purpose of reporting  
 ND denotes Not Detected.  
 MCL denotes maximum contaminant level.  
 PHGS denotes public health goals.  
 PCE denotes tetrachloroethene.  
 TCE denotes trichloroethene.

# Operable Unit Carbon Tetrachloride Plume Selected Remedial Actions

- A-Aquifer – Enhanced *in situ* Bioremediation
  - Treat selected segments of the Plume near the source area.
    - Significant reduction in overall mass of COCs.
    - Enhance natural attenuation of plume downgradient of the treatment areas.
- Upper 180-Foot Aquifer – Groundwater Extraction and Treatment Within the OU2 GWETS.
  - Groundwater extraction from one or more wells at downgradient segment of the Plume.
    - Evaluate effectiveness of existing extraction wells.
  - Treat extracted groundwater at OU2 groundwater extraction and treatment system.
- Lower 180-Foot Aquifer – Monitored Natural Attenuation with Wellhead Treatment Contingency.
- All Aquifers - Institutional Controls
- Groundwater Monitoring Program



NOT TO SCALE

Operable Unit Carbon Tetrachloride Plume  
Conceptual Model



# Operable Unit Carbon Tetrachloride Plume Groundwater Monitoring Program

- Continuation of Basewide Groundwater Monitoring Program
  - Conducted in accordance with the *Draft Final Basewide Sampling and Analysis Plan, Groundwater Monitoring Program Sites 2 and 12, OU2, and OUCTP, Former Fort Ord, California* (MACTEC, 2007).
  - Separate statistical evaluations may be conducted using the collected data to evaluate the natural attenuation of COCs

# A-Aquifer Groundwater Elevation Contour Map September 2007



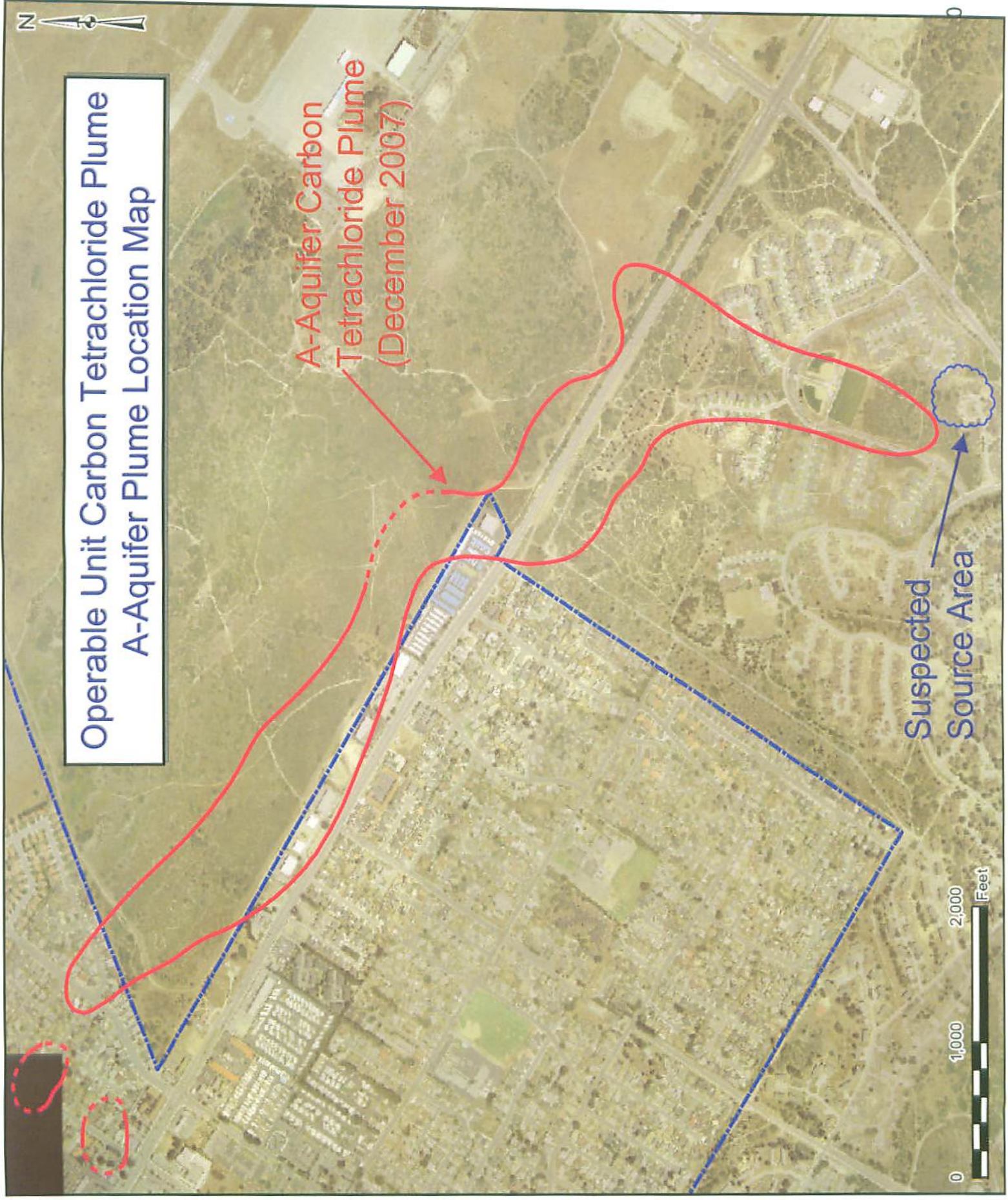




Operable Unit Carbon Tetrachloride Plume  
A-Aquifer Plume Location Map

A-Aquifer Carbon  
Tetrachloride Plume  
(December 2007)

Suspected  
Source Area





# Operable Unit Carbon Tetrachloride A-Aquifer Remedial Approach

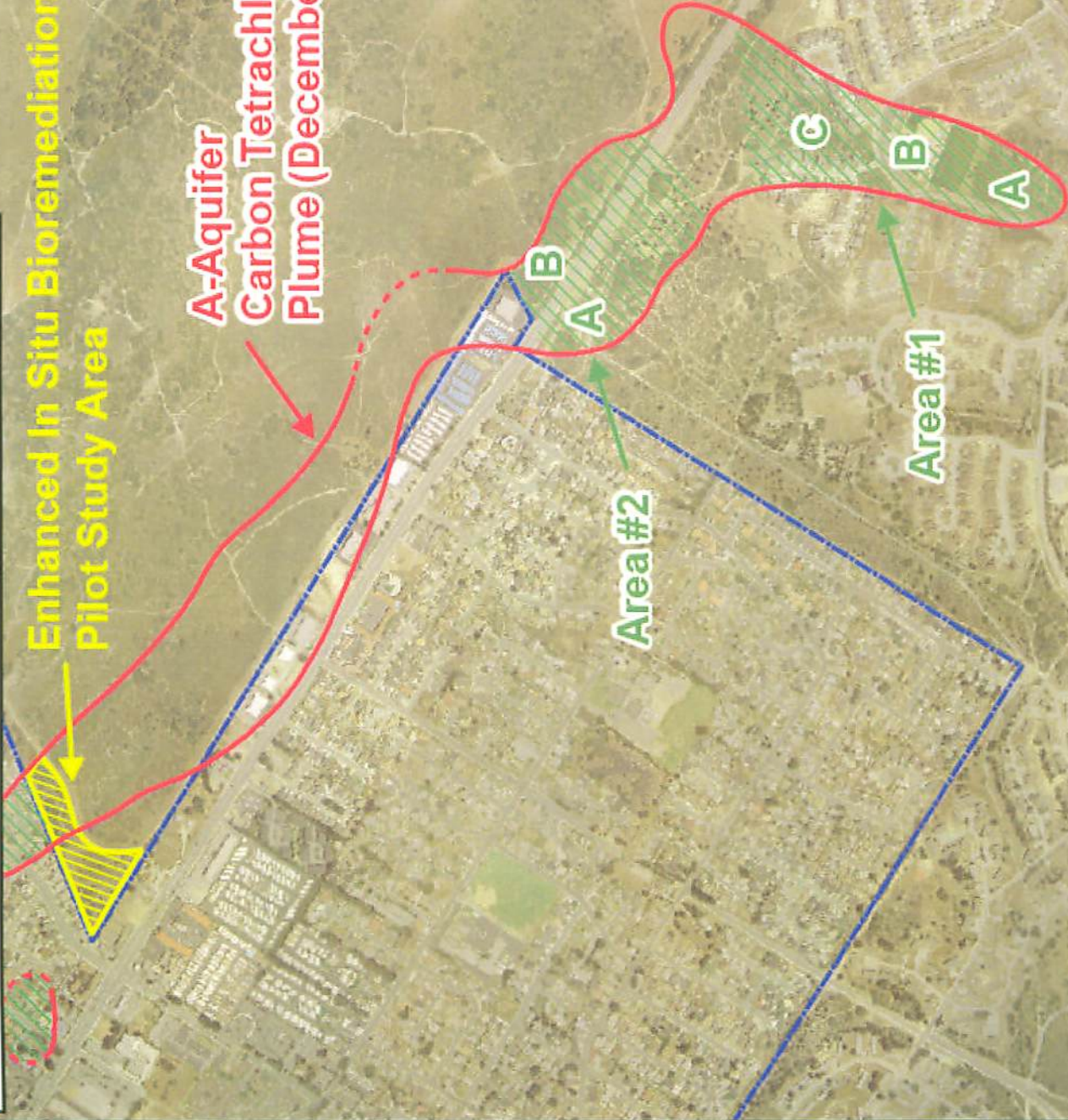
- Conduct enhanced in situ bioremediation treatment at locations within the plume where the highest carbon tetrachloride concentrations remain in groundwater.
  - Source area (Area #1)
  - Middle section of the plume (Area #2)
- Conduct treatment system monitoring for COCs and natural attenuation parameters at each deployment area.
  - During EISB implementation to evaluate substrate distribution and effectiveness of treatment.
  - Following EISB to evaluate rebound and enhanced natural attenuation.
- Continue quarterly groundwater monitoring for the entire site to evaluate long-term changes in concentration over time.
  - Monitoring wells may be added, as necessary.
- Maintain institutional controls to limit access to groundwater until ACLs are met.



**Operable Unit Carbon Tetrachloride Plume  
Remedial Action Treatment Areas**

**Enhanced In Situ Bioremediation  
Pilot Study Area**

**A-Aquifer  
Carbon Tetrachloride  
Plume (December 2007)**



**B**

**A**

**C**

**B**

**A**

**Area #1**

**Area #2**



# Operable Unit Carbon Tetrachloride Plume A-Aquifer Remedial Action Design Basis

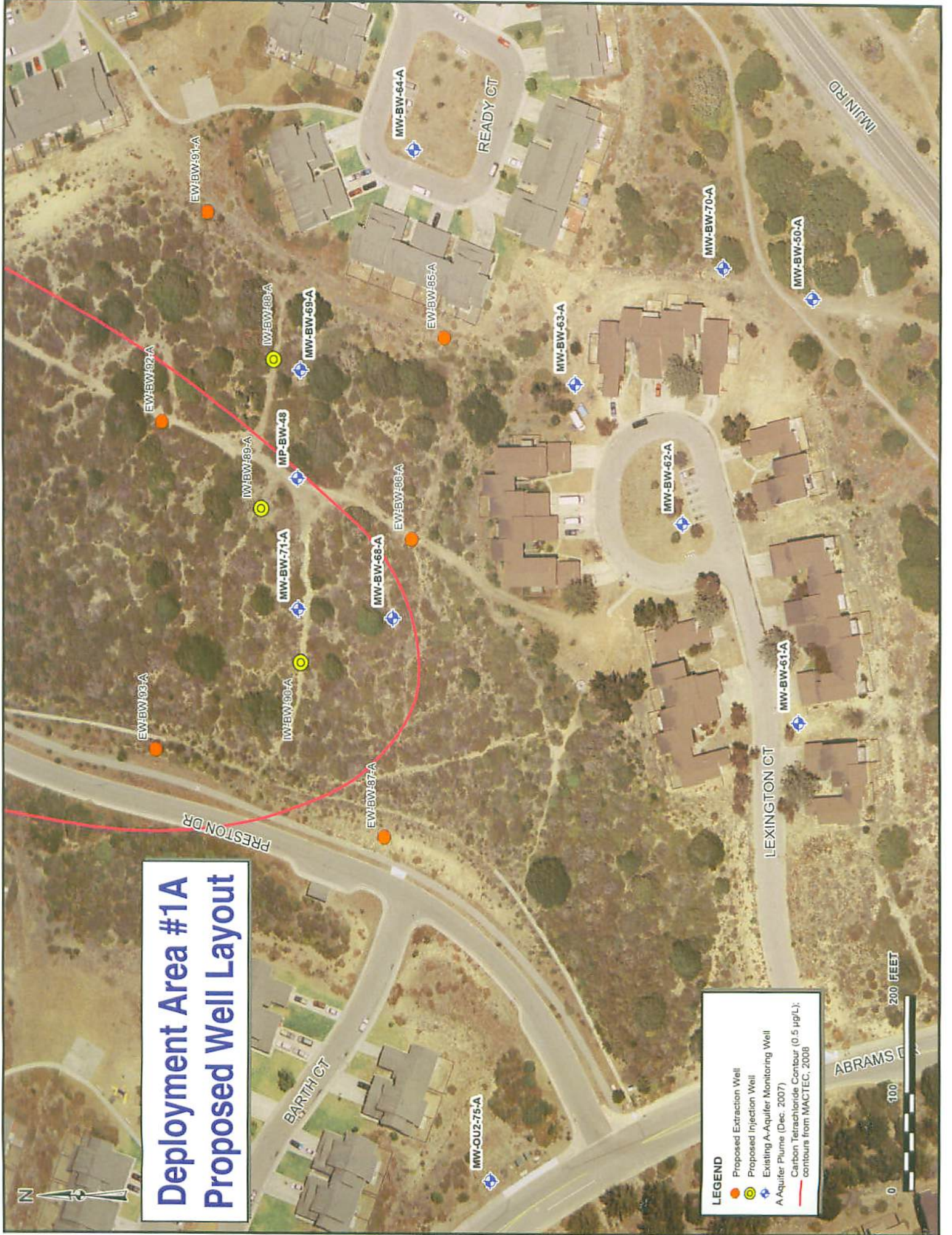
- EISB Pilot Study Data Applied to Full-Scale Remediation
  - Well Spacing
    - Approximately 150 to 200 feet between injection and extraction wells.
  - Injection/Extraction Rates
    - Inject substrate for 1 hour out of every 6 hours to enhance distribution.
    - Up to 2 to 1 - extraction to injection wells.
  - Substrate Concentrations
    - Target concentration of 500 ug/L sodium lactate in the aquifer.
      - Deployment Area 1A – 7,500 gallons
      - Deployment Area 1B – 6,000 gallons
      - Deployment Area 1C – 9,300 gallons
      - Deployment Area 2A – 11,900 gallons
      - Deployment Area 2B – 13,400 gallons
    - Injection concentration as high as 5,000 to 7000 ug/L to minimize well biofouling.
  - Lessons Learned
    - Extraction and injection flowrates will be lower than estimates based on slug/pump tests.
    - Biofouling
      - Minimized by increasing substrate injection concentration
      - Hydrogen peroxide effective at cleaning well for a limited time.
      - Increased injection pressure may cause well failure.
    - Failure of wells
      - Ensure wells are properly installed and modify surface completions as necessary.
      - Lower maximum injection pressure.
    - Recirculating groundwater after substrate injection enhances distribution



# Operable Unit Carbon Tetrachloride Plume Remedial Action System Construction

- Install groundwater extraction, injection, and monitoring wells.
  - Well number and location are based on:
    - Contaminant distribution
    - Ability to distribute substrate between wells (design parameters from pilot study)
    - Capacity of processing system (up to 15 extraction wells and 7 injection wells)
    - Surface features (buildings, roads, access, ground surface slope, endangered plants)
- Install processing equipment
  - Contained in 40 foot transport container (constructed during Pilot Study)
    - Substrate storage tank
    - Metering pumps
    - Controls (fully automated system with shutdown and call out)
- Install underground utilities





# Deployment Area #1A Proposed Well Layout

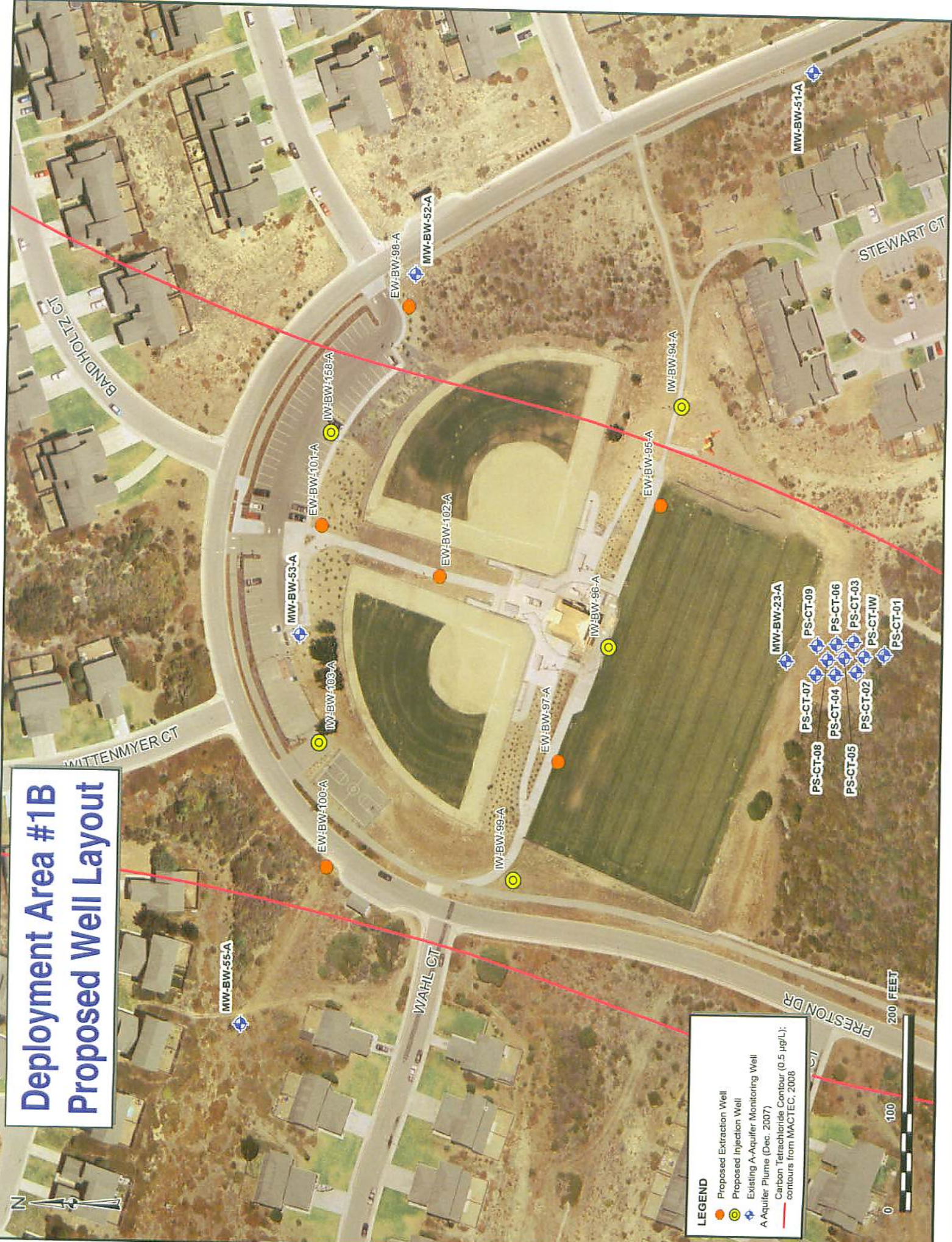
**LEGEND**

- Proposed Extraction Well
- Proposed Injection Well
- ⊕ Existing A-Aquifer Monitoring Well
- ⊕ A Aquifer Plume (Dec. 2007)
- Carbon Tetrachloride Contour (0.5 µg/L); contours from MACTEC, 2008





# Deployment Area #1B Proposed Well Layout



**LEGEND**

- Proposed Extraction Well
- Proposed Injection Well
- Existing A-Aquifer Monitoring Well
- A-Aquifer Plume (Dec. 2007)  
Carbon Tetrachloride Contour (0.5 µg/L);  
contours from MACTEC, 2008







Photo 1: North edge of soccer field facing east.



Photo 2: North edge of soccer field facing west.

Photo 3 (right):  
South of basketball  
court facing north.



Photo 4 (left): Between  
baseball diamonds  
facing south.

Photo 5 (below):  
Between baseball  
diamonds facing north.



**Photographs of Existing Features  
Within Deployment Area #1B**



# Deployment Area #1C Proposed Well Layout



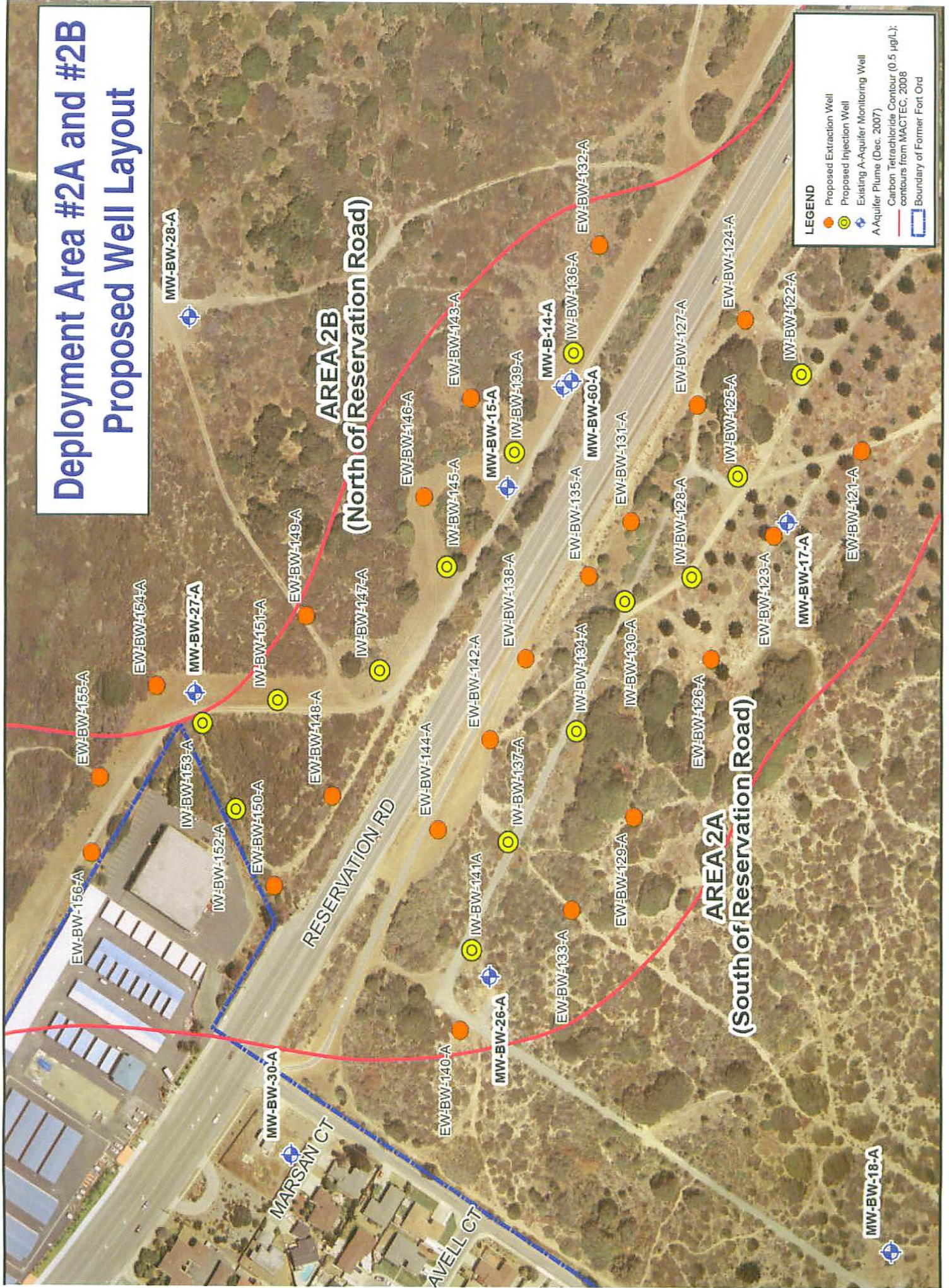
**LEGEND**

- Proposed Extraction Well
- Proposed Injection Well
- Existing A-Aquifer Monitoring Well
- A-Aquifer Plume (Dec. 2007)
- Carbon Tetrachloride Contour (0.5 µg/L); contours from MACTEC, 2008





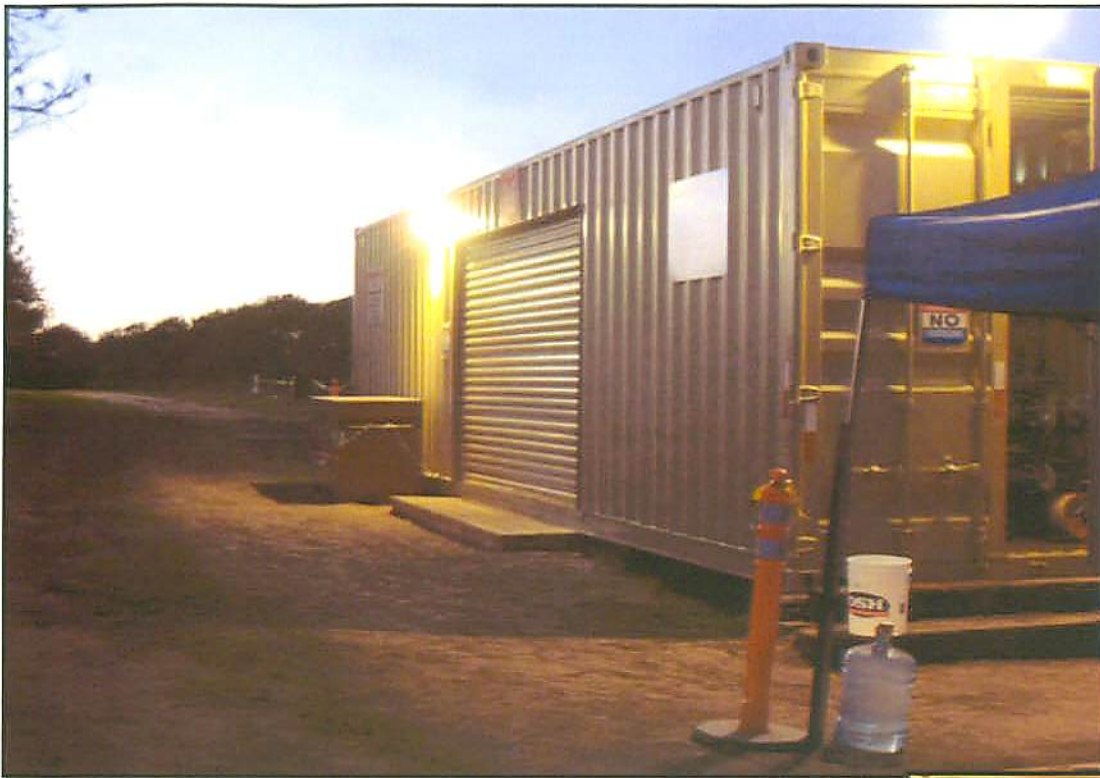
# Deployment Area #2A and #2B Proposed Well Layout



**LEGEND**

- Proposed Extraction Well
- Proposed Injection Well
- Existing A-Aquifer Monitoring Well
- A-Aquifer Plume (Dec. 2007)
- Carbon Tetrachloride Contour (0.5 µg/L); contours from MACTEC, 2008
- Boundary of Former Fort Ord





Exterior View

Interior View



Enhanced in situ Bioremediation  
Process Container

# Operable Unit Carbon Tetrachloride Plume A-Aquifer Remedial Action System Operation

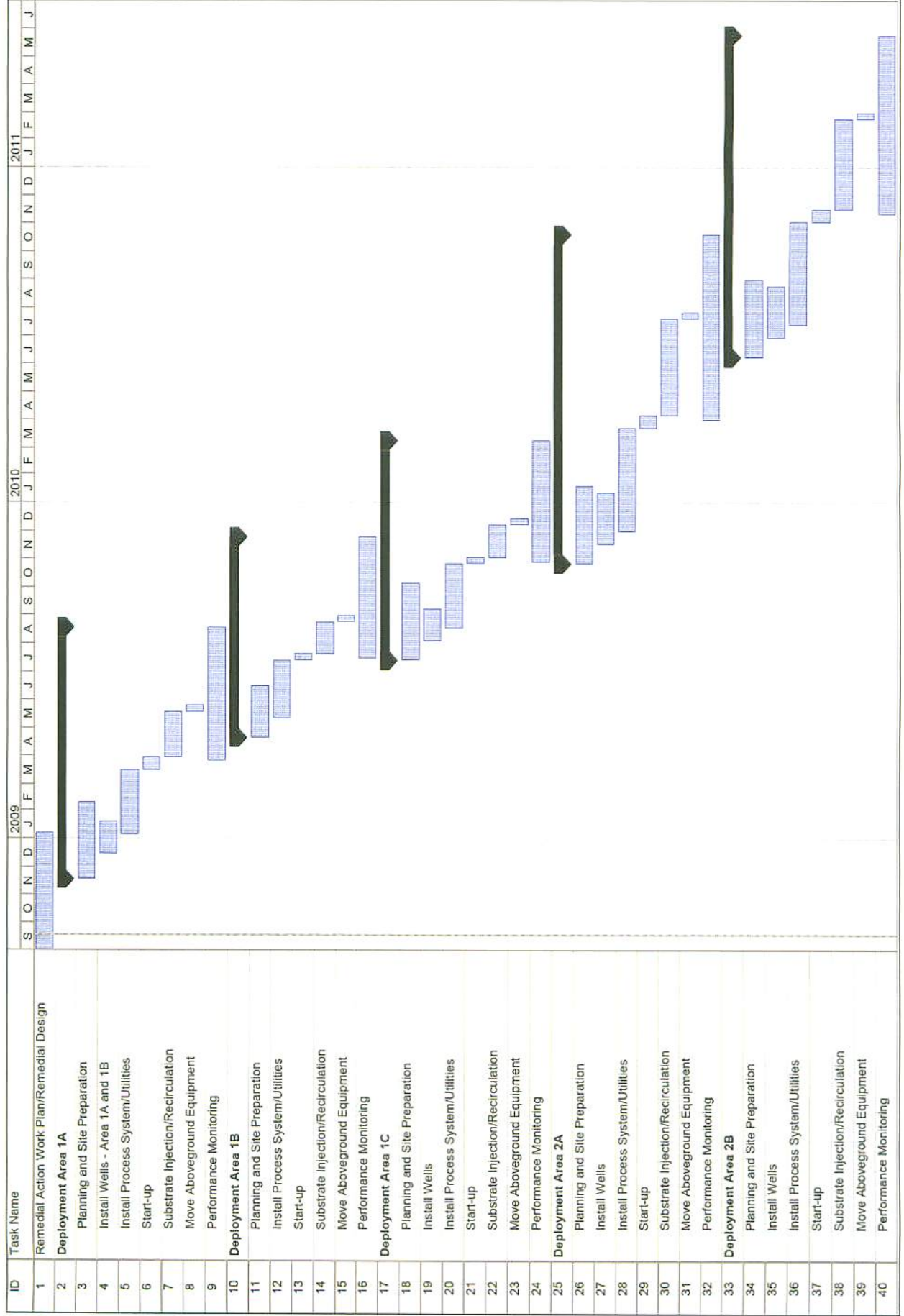
- System Checkout/Start-up
  - Ensure system operating properly.
- Baseline Sampling and Analysis
  - Collect groundwater sample to establish conditions before substrate injection.
- System Operation and Maintenance
  - Start groundwater recycling.
  - Start metering substrate into extracted groundwater and re-inject.
  - Collect samples in extraction and monitoring wells to monitor distribution of substrate.
  - Conduct regular system inspections and maintenance.
  - Address biofouling as necessary.
  - Injection complete when all substrate injected (approximately 1 to 2 months).
  - Recirculate groundwater for approximately 2 weeks after substrate injected to further distribute.
- Move Process Container to Next Area



# Operable Unit Carbon Tetrachloride Plume A-Aquifer Remedial Action Monitoring

- **Baseline Sampling and Analysis**
  - Conducted at each deployment area prior to substrate injection.
  - Analyze for all EISB parameters.
- **Performance (Treatment) Monitoring**
  - Conducted at each deployment area during substrate injection.
  - Screen weekly for hydrochemistry parameters.
  - For the first month of substrate injection, collect samples every other week for off-site analysis of EISB parameters.
  - After one month and for up to six months after substrate injection is initiated, collect samples monthly for off-site analysis of EISB parameters.
  - The specific wells and analysis will be determined based on the number and location of wells and the data collected over time.
- **Post-Treatment Monitoring**
  - Conducted in concurrence with long-term monitoring after performance monitoring is completed.
  - Continue monitoring the EISB process in a limited number of wells in each deployment area.
    - Monitor further treatment of contaminated water that flows into the treatment area.
    - Monitor oxidation of deployment area over time.
    - Evaluate rebound.
  - The number of wells and specific analysis will be reduced over time.
  - Conducted until ACLs are achieved
- **Long-Term Monitoring (All Aquifers)**
  - Quarterly monitoring of COCs in designated wells within the plume.
  - Conducted after ACLs are achieved in each well, as necessary, to support site closure.

# Operable Unit Carbon Tetrachloride Plume A-Aquifer Remedial Action Preliminary Schedule





**OPERABLE UNIT 1  
OFF-SITE GROUNDWATER EXTRACTION PILOT STUDY**

**STATUS – September 17, 2008**

**FIELD WORK**

- Well construction complete – December 21
  - 2 extraction wells
  - 3 monitoring wells
- Draft Final OUI Pilot Study Work Plan distributed – April 22
- Baseline sampling and analysis – June 14
- System construction completed – July 16
- Monitoring well (City of Marina) installation – July 28
- System start-up – August 5
- Monitoring well (City of Marina) development – August 8
- System switched from generator to permanent power (MCWD) – August 13.

**SCHEDULE**

- Weekly monitoring through September
- Quarterly sampling or monitoring wells - September 15.

**DATA (Preliminary)**

- August analytical results.
- August treatment system summary.

**PROBLEMS/CHANGES**

- Treated groundwater is being discharged to a discharge basin within the MCWD property. An injection well was not installed.
- One monitoring well has been installed in the City of Marina to determine the downgradient extent of the plume. Well number and location is based on the decision criteria in the Draft Work Plan.
- Extraction pump in well EW-OU1-93-A failed on August 17. The pump was replaced and restarted on August 26. The extraction rate was reduced to minimize pump cycling.

**Summary of Operable Unit 1 Process System  
Operating Parameters  
August 1 - 28, 2008**

|                    | Volume Treated<br>(gallons) | Average Flowrate<br>(gallons per<br>minute) | Percent of<br>Month Online | Mass TCE<br>Removed<br>(pounds) | Notes                                                                                                                                         |
|--------------------|-----------------------------|---------------------------------------------|----------------------------|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>EW-OU1-92-A</b> |                             |                                             |                            |                                 |                                                                                                                                               |
| August 2008        | 603,005                     | 20.1                                        | 75.9                       | 0.0154                          |                                                                                                                                               |
| Total              | 603,005                     |                                             |                            | 0.0154                          |                                                                                                                                               |
| <b>EW-OU1-93-A</b> |                             |                                             |                            |                                 |                                                                                                                                               |
| August 2008        | 306,978                     | 19.2                                        | 40.6                       | 0.0272                          | Extraction pump failed on 8/17. Pump replaced and restarted on 8/26.                                                                          |
| Total              | 306,978                     |                                             |                            | 0.0272                          |                                                                                                                                               |
| <b>System</b>      |                             |                                             |                            |                                 |                                                                                                                                               |
| August 2008        | 890,147                     | 29.9                                        | 75.9                       | 0.0370                          | System started August 5, 2008. System shut down 8/6, 8/11, and 8/12 due to generator maintenance. System switched to permanent power on 8/13. |
| Total              | 890,147                     |                                             |                            | 0.0370                          |                                                                                                                                               |



**Summary of Operable Unit 1 Process System  
Trichlorethene Analytical Results**

| Date            | Sample Location             |                             |                                |                        |                        |  |
|-----------------|-----------------------------|-----------------------------|--------------------------------|------------------------|------------------------|--|
|                 | Extraction Wells            |                             | Granular Activated Carbon Beds |                        |                        |  |
|                 | OU1PS-EW-92                 | OU1PS-EW-93                 | OU1PS-INF                      | OU1PS-BTW              | OU1PS-EFF              |  |
| August 5, 2008  | <b>1.2<sup>a</sup></b> µg/L | <b>14<sup>b</sup></b> µg/L  |                                |                        |                        |  |
| August 11, 2008 | <b>3.4<sup>c</sup></b> µg/L | <b>8.7<sup>d</sup></b> µg/L | <b>5.4<sup>e</sup></b> µg/L    | <0.5 <sup>f</sup> µg/L | <0.5 <sup>g</sup> µg/L |  |
| August 18, 2008 | <b>3.7<sup>h</sup></b> µg/L | <b>6.1<sup>i</sup></b> µg/L | <b>4.7<sup>k</sup></b> µg/L    | <0.5 <sup>m</sup> µg/L | <0.5 <sup>n</sup> µg/L |  |
| August 25, 2008 | <b>3.8<sup>p</sup></b> µg/L | not operating               | <b>3.6<sup>q</sup></b> µg/L    | <0.5 <sup>r</sup> µg/L | <0.5 <sup>s</sup> µg/L |  |

<sup>a</sup> additional compounds detected: benzene - 0.66J µg/L; isopropylbenzene - 0.95J µg/L

<sup>b</sup> additional compounds detected: isopropylbenzene - 0.37J µg/L; cis-1,2-dichloroethylene - 0.43J µg/L

<sup>c</sup> additional compounds detected: benzene - 1.7 µg/L; isopropylbenzene - 1.3 µg/L

<sup>d</sup> additional compounds detected: benzene - 0.32J µg/L; isopropylbenzene - 0.58J µg/L; cis-1,2-dichloroethylene - 0.31J µg/L

<sup>e</sup> additional compounds detected: benzene - 0.56J µg/L; isopropylbenzene 0.76J µg/L

<sup>f</sup> additional compounds detected: isopropylbenzene 0.52J µg/L

<sup>g</sup> additional compounds detected: benzene - 0.84J µg/L; isopropylbenzene 0.62J µg/L

<sup>h</sup> additional compounds detected: benzene - 1.0 µg/L; isopropylbenzene - 1.4 µg/L

<sup>i</sup> additional compounds detected: isopropylbenzene - 0.39J µg/L; cis-1,2-dichloroethylene - 0.21J µg/L

<sup>k</sup> additional compounds detected: benzene - 0.27J µg/L; isopropylbenzene 0.55J µg/L

<sup>m</sup> additional compounds detected: isopropylbenzene 0.26J µg/L

<sup>n</sup> additional compounds detected: isopropylbenzene 0.39J µg/L

<sup>p</sup> additional compounds detected: benzene - 0.33J µg/L; isopropylbenzene - 1.2 µg/L

<sup>q</sup> additional compounds detected: isopropylbenzene 0.47J µg/L

<sup>r</sup> additional compounds detected: isopropylbenzene 0.33J µg/L

<sup>s</sup> additional compounds detected: benzene - 0.46J µg/L; isopropylbenzene - 0.69J µg/L

Detections are shown in bold.

µg/L denotes micrograms per liter.

Data qualified as "J" is estimated.

## HGL AGENDA & NOTES

Fort Ord HTW BCT Meeting  
9:00 AM, 18 September 2008  
Monterey, California

### 1. Groundwater Remediation System Update

Northwest Treatment System (NWTS) has operated continuously since last update on 18 August 2008. Total volume pumped through 15 September 2008 is 66,098,750 gallons. The average treatment rate over the last few weeks has been 91.7 gallons per minute.

The last bi-monthly samples from the treatment system and extraction wells were collected on 21 July; preliminary results were reported in August as shown below. The preliminary data has since been validated and was accepted as originally reported with no qualifiers added.

- System influent TCE concentration decreased slightly to 3.6 µg/L (from 3.9 µg/L in May).
- System influent cis-1,2-DCE concentration increased slightly to 0.41 µg/L (from 0.36 µg/L in May).
- System effluent concentrations were below detection limit for all ten compounds monitored.
- TCE at individual extraction wells (except MW-85) and system influent slightly lower than the previous sample in May; MW-85 increased from 2.5 to 4.4 ppb.
- All extraction wells showed TCE concentrations less than 5 µg/L except the two wells located in the central portion of the plume: MW-87 (9.1 µg/L) and EW-71 (14 µg/L).

### 2. Long Term Monitoring Update

Third quarter (includes annual frequency wells) samples will be collected during the week beginning 29 September. The bi-monthly system performance samples will be collected concurrently with the 3<sup>rd</sup> Quarter LTM samples.

### 3. NWTS Operation Relative to Carbon Change-out

Cis-1,2-DCE has been detected at concentrations below the method detection limit of 0.5 µg/L in the treatment system sample collected at the mid-point of the GAC process (i.e., as influent to the lag vessels). As shown in the graph below, these concentrations (0.11 µg/L, 0.21 µg/L, and 0.34 µg/L in March, May and July, respectively) have been slowly increasing but remain well below the peak influent concentration (1.7 µg/L) and an order of magnitude below the Aquifer Cleanup Level (6.0 µg/L). No other compounds have been detected in the effluent from the lead GAC units.

The carbon adsorption efficiency for cis-1,2-DCE is less than that for TCE. HGL will continue to monitor the concentration trends for both cis-1,2-DCE and TCE in the NWTS and schedule future carbon change-out(s) accordingly. HGL proposes to schedule such change-outs if the TCE



concentration in the mid-point sample exceeds 0.5  $\mu\text{g/L}$  or if the cis-1,2-DCE concentration exceeds 3.0  $\mu\text{g/L}$ .

