DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHWEST
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132-5190

5090
Ser RAE30.TM/463
October 13, 2011

Ms. Kelly Dorsey
California Environmental Protection Agency
California Regional Water Quality Control Board
Mitigation & Cleanup Unit
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Mr. Tayseer Mahmoud
California Environmental Protection Agency
Department of Toxic Substances Control
Brownfields and Environmental Restoration Program
5796 Corporate Avenue
Cypress, CA 90630

Mr. Martin Hausladen
U. S. Environmental Protection Agency
Region IX, Code SFD-8-B
75 Hawthorne Street
San Francisco, CA 94105-3901

SUBJECT: MEETING MINUTES FOR THE 105th FEDERAL FACILITIES AGREEMENT (FFA) MEETING DATED SEPTEMBER 15th, 2011, MARINE CORPS BASE CAMP PENDLETON

Dear Ms. Dorsey, Mr. Mahmoud, Mr. Hausladen:

Enclosed are the minutes to the Marine Corps Base, Camp Pendleton Federal Facilities Agreement (FFA) meeting Number 105, held on September 15th, 2011. Should you have questions, please call me at (619) 532-1502.

Sincerely,

Theresa L Morley

THERESA MORLEY
By direction

Enclosures: (1) 105th FFA Teleconference Minutes
(2) 105th FFA Teleconference Agenda
(3) Sign in Sheet
(4) Deliverables/Fieldwork Spreadsheets
(5) Preliminary Results, Landfill Gas Monitoring for Non Methane Organic Compounds (NMOCs), IR Site 7, Box Canyon Landfill
(6) Site 21 Pilot Study Update
(7) Conceptual Site Model and Proposed Actions for ESI, IR Site 1118
(8) Site 1116 Work Plan Addendum
(9) Site 1115 Pilot Study Update
(10) Update for Revegetation Sites
(11) Site 1119 Project Update

Copy to: CG, MCB Camp Pendleton (Attn: ACOS, Environmental Security - Mr. Joe Murtaugh)

PARSONS

Contract No. N62473-09-D-1212
Document Control No. SDV-1212-0014-0034
Parsons Project No. 747324

PROJECT NOTE NO. 55

SUBJECT: Marine Corps Base (MCB) Camp Pendleton Federal Facilities Agreement (FFA) Meeting (No. 105)

DATE HELD: 15 Sept 2011

Attendees:

Theresa Morley (Naval Facilities Engineering Command, Southwest [NAVFAC SW]), Adam Hill (NAVFAC SW), Derral VanWinkle (NAVFAC SW), Tracy Sahagun (MCB Camp Pendleton), Joseph Murtaugh (MCB Camp Pendleton), Martin Hausladen (United States Environmental Protection Agency [USEPA or EPA]), Bill Mabey (Tech Law), Kimberly Day (California [Cal] EPA/Department of Toxic Substances Control [DTSC]), Steve Siefert (IO Environmental and Infrastructure), Steve Griswold (Parsons), and Josh Sacker (Parsons).

Attendees by Teleconference: Cheryl Prowell (San Diego Regional Water Quality Control Board [RWQCB or Water Board), Kelly Dorsey (RWQCB), and Tayseer Mahmoud (DTSC).

Introduction and Status of Deliverables and Fieldwork

A one-day meeting was held at the Regional Water Quality Control Board (RWQCB) Central Coast regional office in San Luis Obispo to update the FFA Team (Team) on program status. Refer to attached sign-in sheet and agenda.

Following introductions, Ms. Morley discussed the planned deliverables and fieldwork (refer to attached deliverables spreadsheet). Items that are marked final will be removed from the next version of the deliverables spreadsheet. Several of the items listed were discussed in presentations during this FFA meeting.

Site 7 (Preliminary Results of Box Canyon Non-Methane Organic Compounds (NMOC) Investigation)

Mr. Hill presented an update on the Site 7 landfill NMOC monitoring preliminary results (refer to attached slides). Samples were obtained from 38 gas probes at 17 locations. Contaminants that were detected above the site-specific risk-based screening levels (RBSLs) were acrolein, chloroform, and vinyl chloride. Refer to the attached maps for locations of chemical of concern (COC) detections.

There was discussion regarding the possible sources of acrolein. Mr. Hill noted that it is typically the result of smoke, smoking, burning of meat or fat, and that it is not really known exactly where it is coming from at this site. There was not an issue with the

quality assurance/quality control (QA/QC) results for the site that would call any of the results into question. The report of sampling results will be delivered to the agencies in December, well before the official FFA date of June 2012. A health risk assessment will be included in the report. Ms. Day said that all the compounds should be included in the risk assessment, and that the contribution of each COC to the total risk could also be shown.

Site 21 (Oxidation Pond – Pilot Test Rationale and Plan)

Mr. Griswold presented a summary of findings of the pilot study conducted at the site in which in situ bioremediation (ISB) was used to reduce concentrations of chlorinated solvents in groundwater (see attached slides). As noted during the last FFA meeting, the pilot study was considered successful in achieving significant reductions in target COCs (chlorinated ethenes) in and near the treatment areas.

Going forward, it was recommended that the pilot study be expanded in order to answer whether ISB can also successfully reduce contamination in an area of the site with lower volatile organic compound (VOC) concentrations in groundwater. If this technology can be used successfully in these areas, then it would potentially affect the alternatives to be evaluated in the Feasibility Study (FS). Mr. Griswold noted that this expanded pilot study would not be the final remedy for the site, because the pilot study does not target all contamination at the site, including fuel-related compounds in shallow groundwater.

The technical memorandum summarizing the results of the initial pilot study is being sent to the FFA Team for review by October 19, 2011, and a work plan outlining the planned expanded pilot study would be provided to the team sometime this winter 2011. Ms. Morley noted that a Sampling and Analysis (SAP) Addendum would not be needed for the expanded pilot study. Therefore, the work plan addendum would briefly outline the proposed approach to implement the expanded pilot study.

After some discussion of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process for this site, Ms. Morley confirmed that the site would have a Feasibility Study, a Proposed Plan, and a Record of Decision, before a final remedy could take place.

Mr. Griswold noted that the current FFA date for the draft Feasibility Study is June 19, 2012. If the results of the expanded pilot study were to be incorporated into the Draft FS, then the FFA date would need to be pushed out to allow for incorporation of that data. All present at the meeting agreed to this. Ms. Morley will follow-up with a revised FFA date for this document. [Note: The revised date for the Site 21 FS was developed after the meeting and is included in these meeting minutes for reference; the new proposed date is April 15, 2013.]

Site 1118 (Conceptual Site Model Presentation of 26 Area Sub-site Building 2664)

Mr. VanWinkle provided a recap of the investigations at the Former Base Laundry and Dry Cleaning Facility Sub-site Building 2664 (refer to attached slides). During the historical removal of the underground storage tank (UST), tetrachloroethene (PCE) was detected in soil samples collected beneath the USTs. NAVFAC has conducted a recent groundwater gauging event of water levels to resolve discrepancies between historical

groundwater contours of the site and recent investigations. Historical operations on the site involved dry cleaning and storage of PCE. A conceptual site model of the geology of the site was presented, including an interpretation that the subsurface topography of fine grained layers (primarily silt) is controlling the irregular occurrence of groundwater at the site. Groundwater mounding may possibly be related to a leak in a water line. NAVFAC personnel will be meeting with the Base utilities department soon to find possible water line locations.

Mr. Hausladen suggested that the cross sections could be used to construct fence diagrams to aid in interpretation of the geology. Dr. Mabey asked if isotope ratios might be helpful in determining the source for the water mounding. Mr. Van Winkle said he would look into those suggestions, but also noted that total dissolved solids (TDS) may be a useful geochemical indicator for the site.

Mr. Van Winkle discussed the data gaps for the site, including the need to confirm the extent of the silt layer to the east, the occurrence of groundwater in the east-northeast part the site, and the groundwater gradient in the south and southeast.

Ms. Dorsey indicated the RWQCB was interested in defining the groundwater plume to the north, and installing soil gas points further to the north than proposed. Mr. Hausladen asked if additional characterization can be done to the northeast of the USTs during the investigation and not just demobilize before consulting with agencies. Mr. Van Winkle indicated that the plan is flexible, and that as real-time data comes in from the field, the agencies will be consulted and adjustments can be made. Ms. Dorsey requested that the RWQCB be advised of when the field work is going to occur. Ms. Morley indicated that Mr. Van Winkle would be available to oversee the work in the field to help make real time decisions. The agencies indicated that they would provide prompt responses for concurrence from NAVFAC on the step out sampling locations on a real-time basis.

Site 1116 (14 Area Groundwater)

Ms. Morley discussed the approach for the Site 1116 Work Plan Addendum, which covers the additional investigation work at UST Sites 1491, 14008, and 14112 (refer to the attached slides).

Proposed work at Site 1491 involves drilling 15 cone penetrometer test (CPT) holes and sampling groundwater to further define the extent of VOCs in the downgradient area, and groundwater wells will be installed based on these results. At Site 14008, proposed work will involve research to identify possible USTs, drilling 10 CPTs, collecting groundwater samples at three depths, defining the extent of VOCs in the downgradient area, and then installing permanent wells based on CPT results. At site 14112, the site will be monitored for free product, groundwater samples will be collected beneath the free product, and a permanent monitoring well will be installed downgradient of MW-5 and MW-10. Ms. Morley indicated the contamination is bounded at the site. The schedule involves submitting a Work Plan to the Navy and Base on 15 September 2011, and then for the FFA Team to receive the draft in late September. The revised Engineering Evaluation/Cost Analysis (EE/CA) and Action Memo are currently under Navy review, and will be submitted to the agencies in mid-October. The results may

require adjustments to the treatment system layouts, but are not expected to change the proposed remedial alternatives.

Mr. Hausladen requested that north arrows be included on all figures in the presentations, and that if Monitored Natural Attenuation (MNA) becomes part of the remedial alternative, it will require a deed restriction after the Record of Decision (ROD).

Site 1115 (FSSG Lot)

Mr. Griswold presented a summary of findings of the pilot study conducted at the site in which in situ bioremediation (ISB) was used to reduce concentrations of chlorinated solvents in site groundwater (see attached slides). As noted during the last FFA meeting, reductive dechlorination was induced where organic substrate was delivered, but dissolved phase total organic carbon (TOC) did not migrate beyond the immediate injection area to downgradient monitoring wells. The relatively low permeability of the site soils are preventing favorable geochemical processes from occurring at the desired distances from the injection points. Refer to the attached slides.

Mr. Griswold explained that further pilot testing of enhanced bioremediation would not yield any additional useful information toward feasibility study alternatives. In addition, it is unlikely that this technology can be implemented in a cost-effective manner on a large scale at the site; however, this technology might be effectively applied to target specific hot spots identified based on potential risks to human health.

In lieu of additional pilot testing, current plans for the site include collecting specific additional site data to confirm the extent of contamination prior to finalizing the RI/FS. The Department of the Navy (DON) proposes to install monitoring wells screened at two intervals at two locations, and to re-sample 15 selected existing wells at the site.

Dr. Mabey noted that it is likely that MNA will need to be incorporated as part of the remedy for this site. Also, note that MNA can include the mechanisms of dispersion and diffusion.

Upcoming tasks include submitting a technical memorandum summarizing results of the pilot study (due September 16, 2011 to the agencies), preparing a work plan addendum outlining the additional planned field work (which is planned for Winter 2012), and preparing a Remedial Investigation/Feasibility Study (RI/FS) Report (current FFA schedule has date of April 16, 2012).

Mr. Griswold noted that Appendix M in the Operable Unit (OU) 5 RI/FS presented all historical data for Site 1115, and that the planned new data collection would supplement that information and that all data would be provided in the upcoming RI/FS. Mr. Hausladen requested that the revised figures more clearly show which wells are dry.

Mr. Griswold noted if the results of the additional investigation were to be incorporated into the Draft RI/FS, then the FFA date would need to be pushed out to allow for incorporation of that data. All present at the meeting agreed to this. Ms. Morley will follow-up with a revised FFA date for this document. [Note: The revised date for the Site 1115 Draft RI/FS was developed after the meeting and is included in these meeting minutes for reference; the new proposed date is October 31, 2012.]Dr. Mabey asked what the overall remedial plan was for this site. Mr. Griswold discussed possible FS options, including targeting chlorinated VOC hotspots with ISB and possible use of

oxygen-releasing compounds for the elevated fuel-related portions of the site, such as for Site 1 benzene. Ms Day asked if there was site-specific soil data at the site that could be used for Johnson & Ettinger (J&E) modeling, and Mr. Griswold said that a significant amount of soil logging has been done at over 50 boring locations at the site.

Ms. Prowell said that building design considerations, such as vapor intrusion barriers, could be incorporated into future land use restrictions, but that in that case the site would not have unrestricted land use.

Re-vegetation Update

Mr. Seifert provided an overview of the progress of re-vegetation that has been implemented at Sites 1A, 1A-1, 1D, 1H, 1111, and 30. "Before and after" photographs were presented for each site. Presentation slides are attached. Mr. Seifert discussed efforts to eradicate non-native species during the re-vegetation effort. Overall results indicate re-vegetation efforts have been successful in establishing native vegetation.

Site 1119 (26 Area and vicinity Groundwater – Phase II Well Installations)

Mr. Griswold summarized the status of the Site 1119 RI/FS, including the implementation of the phases of the Work Plan (refer to attached slides). To date, water levels have been obtained at 51 existing monitoring wells, and samples have been obtained from the existing wells identified in the Work Plan, with the exception of two locations that could not be accessed due to the presence of sensitive species during the breeding season.

Passive diffusion bag (PDB) sampling and hydrasleeve sampling were conducted at multiple depths in Well 26016 and the observation well at 26018. In addition, old non-functional pumps were pulled out of many of the existing wells in order to allow for new sampling to proceed.

Following the initial well sampling, a meeting was held on 29 August with NAVFAC, Base Environmental Security (ES), Base Office of Water Resources (OWR), Base Facilities Management Division (FMD), and Stetson Engineers to adjust planned new monitoring wells locations. Based on the historical and recent data, there appears to be a lower likelihood of COCs being present on the "river" side (northwest side) of the canyon, and a higher likelihood that COCs are present on the southeast side of the canyon, associated with the industrialized area of the Upper Ysidora subbasin. Therefore, the proposed well location closet to the riverbed was relocated to a position upgradient of the well 26018. Also, the planned well location close to Site 2666 was moved to near building 2642 because Site 2666 will be investigated as part of Site 1118.

Mr. Griswold also mentioned that the wells were renumbered from south to north, which is different from the numbering provided in the Work Plan. Ms. Morley said that a new figure would be sent to the FFA Team showing the revised well locations, along with a figure showing the old locations, or possibly incorporating the old and new locations on one figure.

Site 150 Discussion

Brief discussion was held regarding the upcoming Site 150 investigation. It will be performed using a phased approach, and Mr. Van Winkle agreed to be in the field to expedite field decisions and report results to the agencies. Ms. Dorsey said that Beatrice Griffey is the case manager for Site 150 and would need to make the decisions about how the investigation would be performed. Mr. Mahmoud said that DTSC was agreeable to the planned approach.

Meeting Wrap-up and Schedule for Next Meeting

The next FFA Meeting is scheduled to be held at Parsons office in Pasadena on January 19, 2012.

MCB Camp Pendleton
105th FFA Meeting Agenda

Central Coast Water Board
895 Aerovista Place, Suite 101
San Luis Obispo, CA 93401

September 15th, 2011

0900 – 0915	**Welcome and Introductions (Navy)**
0915 – 0930	**Project Deliverables and Planned/In Progress Field Work Status (Navy)**
0930 – 1000	**Results of Site 7 (Box Canyon) Non-Methane Organic Compound Investigation (Trevet)**
1000 – 1030	**Site 21 (Oxidation Pond) Pilot Test Rationale and Plan (Parsons)**
1030 – 1045	**Break**
1045 – 1130	**Site 1118 (21, 26, 52 Area Groundwater) Conceptual Site Model Presentation (Navy)**
1130 – 1200	**Site 1116 (14 Area Groundwater) Site Inspection Addendum Presentation (Navy)**
1200 – 1300	**Lunch**
1300 – 1330	**Additional Sampling Site 1115 (FSSG Lot) Presentation (Parsons)**
1330 – 1345	**Revegetation Presentation (SDV JV)**
1345 – 1415	**Site 1119 – Consensus on Phase II Well Installation (Parsons)**
1415 – 1430	**Meeting Conclusion / Action Items**

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CLIENT 105th FFA Meeting JOB NO. SHEET OF
SUBJECT MCB CAMP PENDLETON SIGN-IN SHEET BY DATE Sept 15 2011
CKD. REVISION

NAME	ORG.	tele./email
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Steve Siefert	SDV	(619) 280-3278 ~~ssiefert@i.o~~ steves@~~jacenvironmental.com~~ sdvjv.com

MCB Camp Pendleton Deliverables Spreadsheet

Date: 9/159/11

				Date Due	Agency Comments	Response Received From:		
Item	**Document**	**Contractor**	**Status**	**to Agencies**	**Due By**	**EPA**	**DTSC**	**RWQCB**
1	SAP for NMOC Sampling at Site 7 - Box Canyon	Trevet/Parsons	FINAL	11/8/10	1/17/11	**X**	**X**	**X**
2	RI/FS Work Plan for Site 1119 - 26 Area Groundwater	Parsons	FINAL	11/11/10	1/10/2011 (24)	**NC**	**X**	**X**
3	Site Inspection Report for Site 1118 - 21/26/52 Area Groundwater	SeaAlaska	FINAL	12/15/10	2/14/11	**NC**	**X**	**X**
4	Remedial Action Closure Report for OU4 Site 1D for Soil - Burn Ash Site	SDV	Responding to agency comments	12/21/10	2/21/11	**X**	**X**	**X**
5	Site Inspection Work Plan for Site 150 - SEERMA Site	SDV/TEC	Responding to agency comments	3/3/11	5/3/11**	**X**	**X**	**X**
6	Proposed Plan for 22/23 Area Groundwater	Parsons	FINAL	3/23/11	5/23/11	**X**	**X**	**X**
7	Proposed Plan for NFA at Site 1111*	SDV	FINAL	4/11/11	6/10/11	**X**	**X**	**X**
8	Remedial Investigation Report for Site 1114 - 41 Area Arroyo	Trevet	Responding to agency comments	4/29/11	6/29/11	**X**	**X**	**X**
9	EE/CA for Site 1116 (14 Area Groundwater)	SDV	Document recalled to revise alternatives	8/15/11				
10	Annual Groundwater Monitoring Report - Site 7 - Box Canyon	Trevet	With agencies	6/13/11	8/9/11	**NC**	**28-Jul**	**1-Aug**
11	Data Gap Analysis Work Plan for Site 1D - Burn Ash Site	SDV	With agencies	6/22/11	8/22/11	**23-Aug**	**15-Aug**	**8-Aug**
12	ESI Work Plan for Site 62 - Asphalt Batch Plant	RBA	With agencies	8/1/11	9/29/11			
13	Memo to File for Site 7 - Box Canyon	Trevet	With agencies	8/11/11	10/10/11			
14	Technical Addendum for GCCS Design	Trevet/Geosyntech	With agencies	8/19/11	soon			
15	Design Information for Pilot Study 22/23 Area GW	RBA/Geosyntech	With agencies	8/24/11	10/24/11			
16	Removal Action Work Plan - Site 33 (52 Area Armory)	Shaw	With agencies	8/31/11	10/28/11			
17	Action Memorandum for Site 1116 - 3 subsites	SDV	On hold pending EE/CA revision					
18	Pilot Study Tech Memo - Site 1115 FSSG Lot	Noreas/Parsons	Preparing draft	9/16/11				
19	SI Addendum Work Plan for Site 1116 - 14 Area Groundwater	ECM	Preparing pre-draft	9/30/11				
20	Pilot Study Tech Memo - Site 21 Oxidation Pond	Noreas/Parsons	Preparing pre-draft	10/19/11				
21	Groundwater Monitoring Report - 12 Area Site 13	SDV	Sample 4th Quarter in June	10/19/11				
22	Site Inspection Report for Site 1117 - 15/16 Area Groundwater	ERRG	Preparing pre-draft	11/11/11				

*The Proposed Plan has been resubmitted for Site 1111 only

Agencies have commented

MCB Camp Pendleton Fieldwork Spreadsheet

Date: 9/15/11

Item	Field Work	Planned Start Date	Planned Completion Date
1	Quarterly Sampling at Site 21 (Oxidation Pond)	In progress	Delayed - completed early May
2	Quarterly Sampling at 12 Area Site 13	In progress	Complete
3	Field Work for Site 1119 (26 Area GW)	1-Jun-11	10/28/2011 - delayed due to natural resource issues
4	Field Work for NMOC Sampling - Box Canyon	6-Jun-11	Complete
5	Field Work for Site 150 - SEERMA Site		
6	Field Work for Site 1D Data Gap Analysis		
7	Field Work for Site 62 ESI		
8	Field Work for Site 1116 ESI		
9	Field Work for 22/23 Area Groundwater ZVZ Pilot Study		
10	Field Work for Site 33 Remedial Action		

Preliminary Results Landfill Gas Monitoring for Non Methane Organic Compounds (NMOCs), Installation Restoration Program Site 7, Box Canyon Landfill, Marine Corps Base Camp Pendleton

15 September 2011

Overview

- Landfill Gas (LFG) Monitoring was conducted in June and July 2011
- Sampling was conducted in accordance with the Final Work Plan for LFG Monitoring dated May 23, 2011
- 38 gas probes (GPs) from 17 locations were sampled

Overview

- **Only three NMOCs were detected at concentrations exceeding the Site-Specific Tier 1B Risk-Based Screening Levels (RBSLs).**
  - **Acrolein**
  - **Chloroform**
  - **Vinyl Chloride**

Acrolein

- **Acrolein was detected in 13 samples.**
- **Only one detected concentration exceeded the Tier 1B RBSL (13.3 µg/m^3)**
  - **GP-15-5 at a concentration of 22 µg/m^3**

Acrolein

- **Uncertainty – The laboratory reporting limit and method detection limit for acrolein was above the Tier 1B RBSL for acrolein (13.3 µg/m^3) in 13 Samples.**
- **Due to high concentrations of Freon in the samples, laboratory was unable to achieve lower RLs or MDLs.**

Chloroform

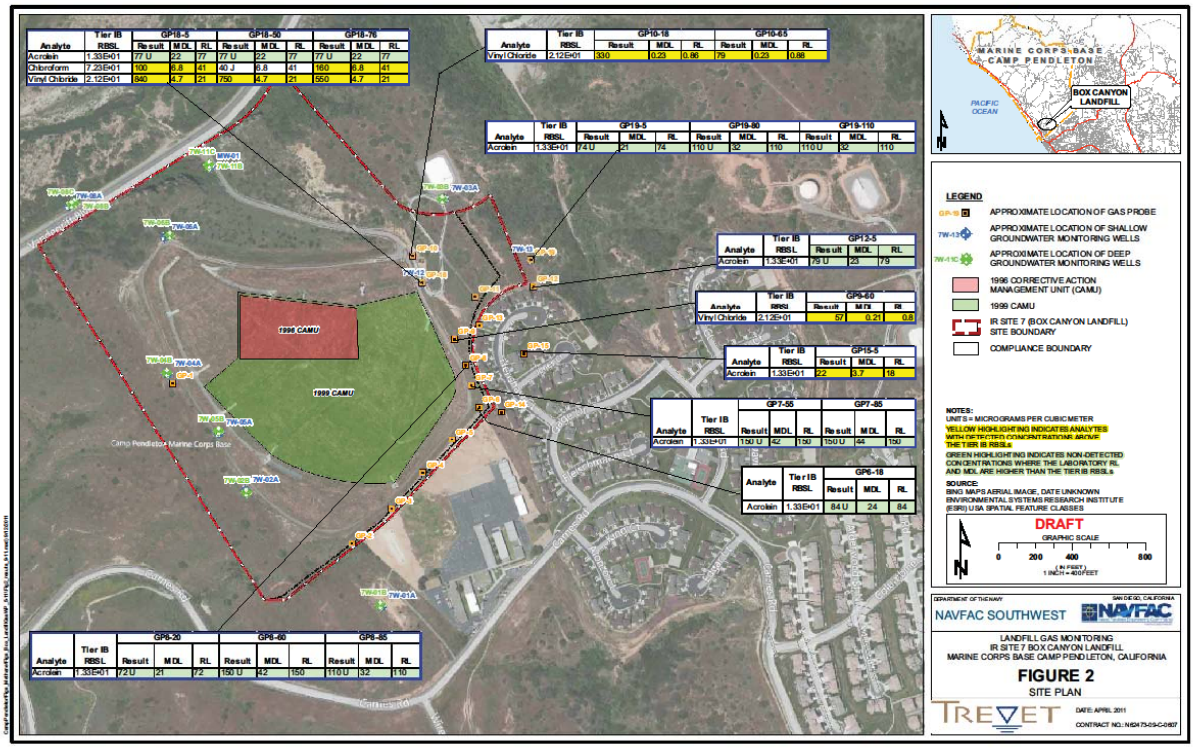
- **Chloroform was detected in 18 samples.**
- **Only two detected concentrations exceeded the Tier 1B RBSL (72.3 µg/m^3)**
  - **GP-18-5 at a concentration of 100 µg/m^3**
  - **GP-18-76 at a concentration of 160 µg/m^3**
- **No instances where the RL or MDL were higher than the RBSL**

Vinyl Chloride

- **Vinyl Chloride was detected in 20 samples.**
- **Six detected concentration exceeded the Tier 1B RBSL (21.2 µg/m^3)**
  - **GP-9-60 at a concentration of 57 µg/m^3**
  - **GP-10-18 at a concentration of 330 µg/m^3**
  - **GP-10-65 at a concentration of 79 µg/m^3**
  - **GP-18-5 at a concentration of 840 µg/m^3**
  - **GP-18-50 at a concentration of 750 µg/m^3**
  - **GP-18-76 at a concentration of 550 µg/m^3**

Vinyl Chloride

- **No instances where the RL or MDL were higher than the RBSL**


MARINE CORPS BASE CAMP PENDLETON
BOX CANYON LANDFILL
PACIFIC OCEAN
LEGEND
APPROXIMATE LOCATION OF GAS PROBE
APPROXIMATE LOCATION OF SHALLOW GROUNDWATER MONITORING WELLS
APPROXIMATE LOCATION OF DEEP GROUNDWATER MONITORING WELLS
1996 CORRECTIVE ACTION MANAGEMENT UNIT (CAMU)
1999 CAMU
IR SITE 7 (BOX CANYON LANDFILL) SITE BOUNDARY
COMPLIANCE BOUNDARY
NOTES:
UNITS = MICROGRAMS PER CUBIC METER
YELLOW HIGHLIGHTING INDICATES ANALYTES WITH DETECTED CONCENTRATIONS ABOVE THE TIER IB RBSLs
GREEN HIGHLIGHTING INDICATES NON-DETECTED CONCENTRATIONS WHERE THE LABORATORY RL AND MDL ARE HIGHER THAN THE TIER IB RBSLs
SOURCE:
BING MAPS AERIAL IMAGE, DATE UNKNOWN
ENVIRONMENTAL SYSTEMS RESEARCH INSTITUTE (ESRI) USA SPATIAL FEATURE CLASSES
DRAFT
GRAPHIC SCALE
0 200 400 800
1 INCH = 400 FEET
DEPARTMENT OF THE NAVY
NAVFAC SOUTHWEST
SAN DIEGO, CALIFORNIA
LANDFILL GAS MONITORING
IR SITE 7 BOX CANYON LANDFILL
MARINE CORPS BASE CAMP PENDLETON, CALIFORNIA
FIGURE 2
SITE PLAN
TREVET
DATE: APRIL 2011
CONTRACT NO.: N62473-09-C-0807
1996 CAMU
1999 CAMU
Camp Pendleton Marine Corps Base

MCB CAMP PENDLETON
SITE 21
PILOT STUDY UPDATE

15 September 2011

105th FFA Meeting

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Site 21 Pilot Study Injection

Pilot Study Update from May FFA Meeting

- Complete reductive dechlorination of TCE to ethene was induced.
- Significant chlorinated solvent total molar mass reductions achieved within and down gradient from the treatment area (90%+ COC molar mass loss in 3 wells and >40% molar mass loss in 3 more wells).
- Near-neutral pH was maintained through month 12.
- Dissolved phase TOC migrated beyond area impacted during injection by month 6 and contracted back to the injection area by month 12.
- Anaerobic conditions were induced over a large area for the first 12 months. Geochemistry outside of the immediate injection area (21W-26 and 21W-27) is expected to revert to aerobic conditions in the coming months.

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Site 21 Pilot Study Injection

Pilot Study Update from May FFA Meeting (continued)

- High concentrations of TOC persist in the injection wells. However, TOC concentrations at 13, 20B, and 23 declined to <20 mg/L by month 12.
- Pilot test is a success.

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Site 21 Recommendations

Recommendations

- Four additional injection wells proposed for the site.
- Pilot Study would not be the final remedy.
- Purpose of additional injection would be to answer the question: Can we reduce contamination in an area of the site with lower VOC concentrations (<100 µg/L)?
- Source area had higher concentrations of several hundred µg/L; ISB results showing significant contaminant reduction.
- ISB generally considered to be difficult to apply at Cl-ethene concentrations below 100 µg/L because dechlorinating microbial consortia has difficulty competing under low Cl-ethene conditions. MNA is generally used; not enough solvent to allow proliferation of microbes.

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Site 21 Recommendations

Recommendations

- Due to success at this site, natural microbial population at Site 21 is capable of complete dechlorination at least where cl-ethene concentrations are relatively high. It is expected that the natural microbial consortia present in lower concentration areas will also be capable of complete dechlorination.
- If successful, faster than MNA.
- Injected substrate is supplemented with the site's natural microbial population by extracting groundwater from the portion of the site where enhanced bioremediation is working, and amending that water with carbon substrate and pH buffer to give the bugs something to eat and to maintain neutral anaerobic conditions, then inject it in the new part of the site with lower VOC concentrations

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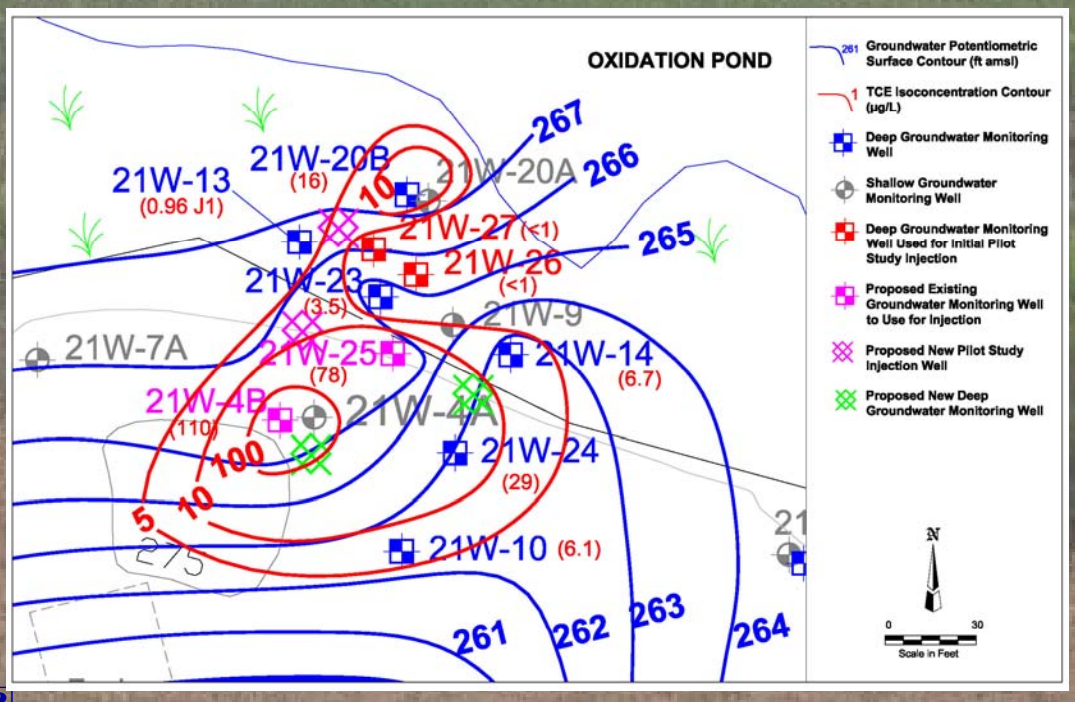
Site 21 May 2011 TCE and Potential New Wells



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Site 21 Pilot Study Injection

Upcoming Tasks

- Technical Memorandum Summarizing Results of Pilot Study - October 19, 2011
- Sampling and Analysis Plan Addendum Outlining Enhanced Pilot Study - Winter 2011
- FS Report - Current FFA Date June 19, 2012

Site Update
Conceptual Site Model
and Proposed Actions for ESI

IR SITE 1118

Sub-site Building 2664

MCB CAMP PENDLETON

105th FFA MEETING

15 SEPTEMBER 2011

Agenda/Objectives

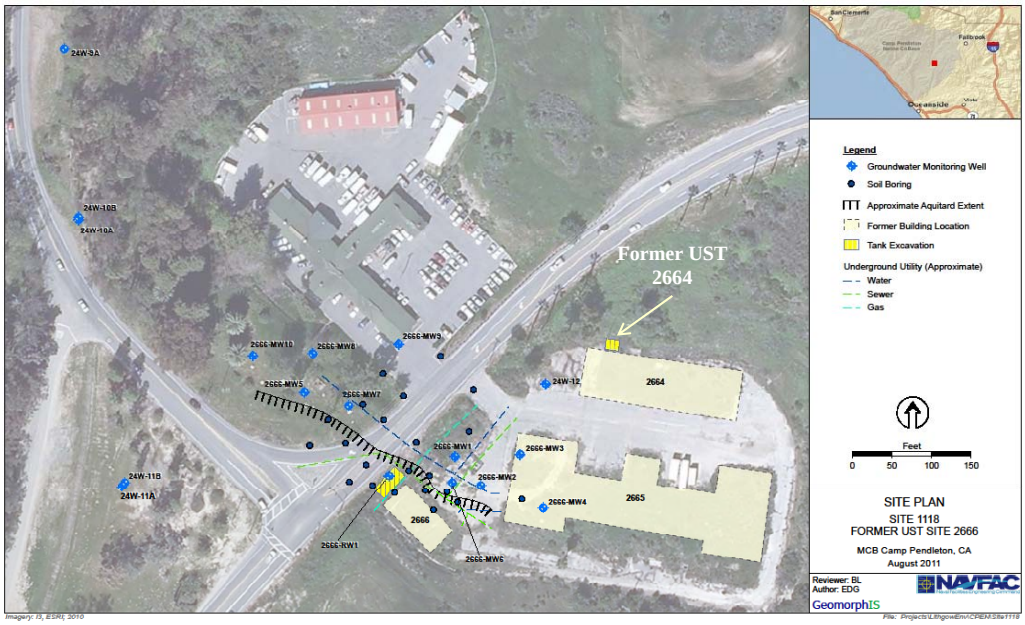
- Recap
- Conceptual Site Model
- Data Gaps Discussion
- Proposed Approach
- Summary

Recap from May 2011 FFA Mtg

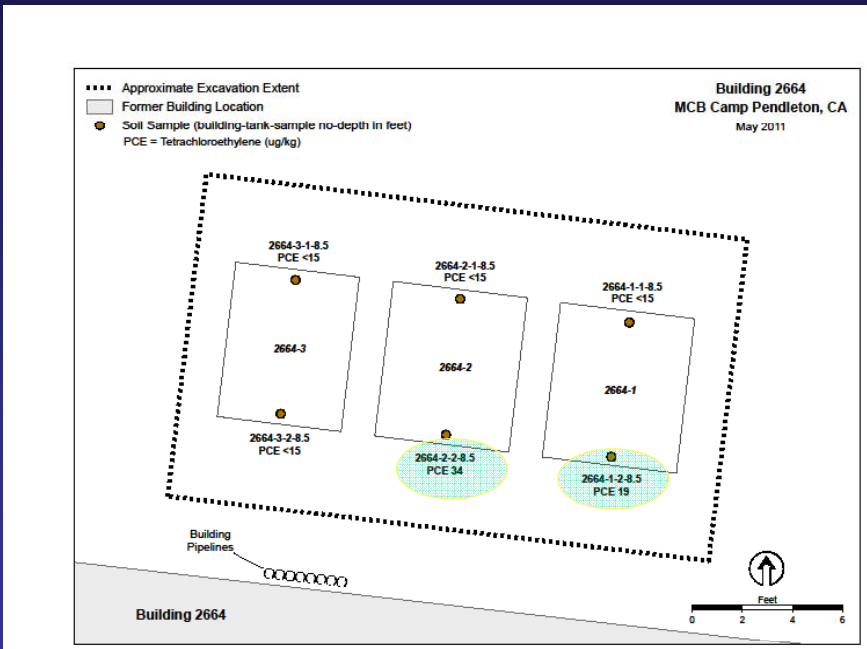
- Historical Site Evaluation
  - Significant data gathering exists which needs to be consolidated in to a Conceptual Site Model
  - Requires additional information prior to decision making
  - Site VOC concentrations are generally low and hence require approach focused on this geographic location
  - Navy recent evaluation of water levels is cohesive with historical gradient directions

- Future Actions
  - Incorporate historical information into a Conceptual Site Model
  - Identify data gaps and memorialize approach in a SAP
  - Future actions to include soil gas and further groundwater evaluation

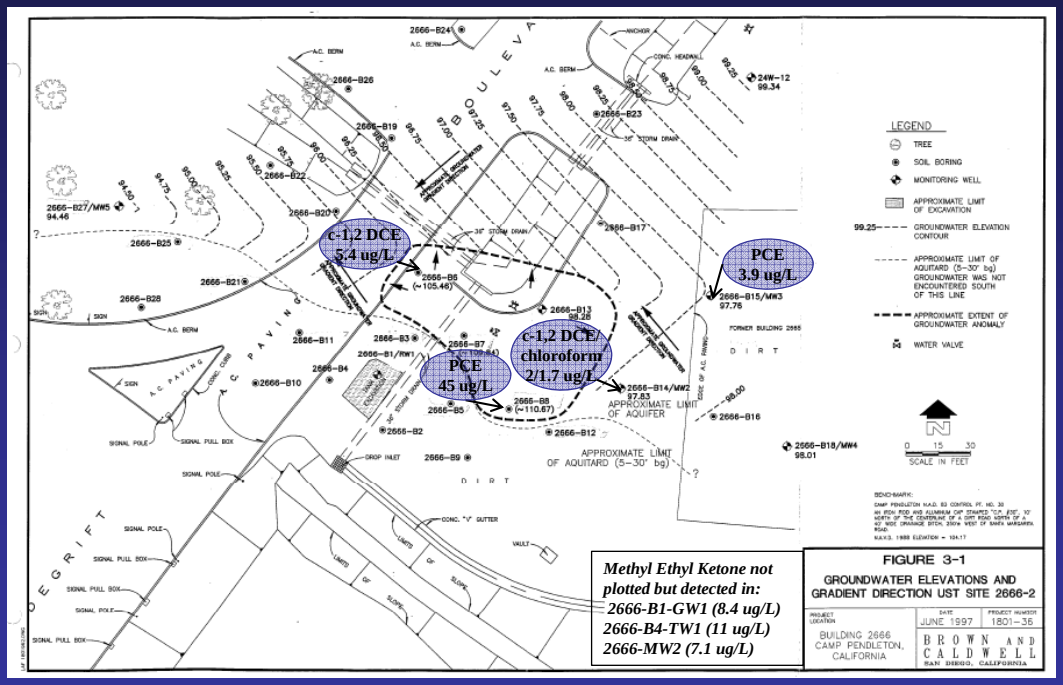
Overall Site Map



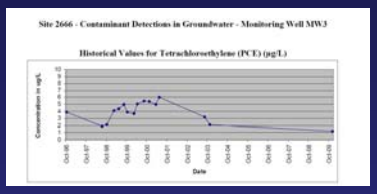
Summary of UST Removal UST 2664

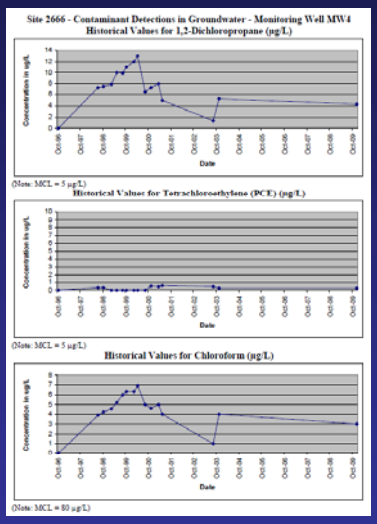


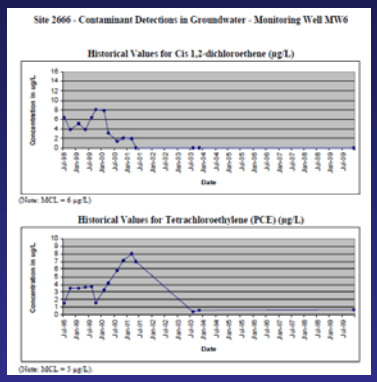
Summary of UST 2666 Site Assessment – groundwater and chlorinated solvents

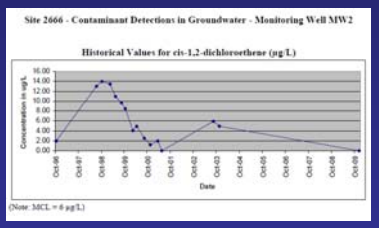


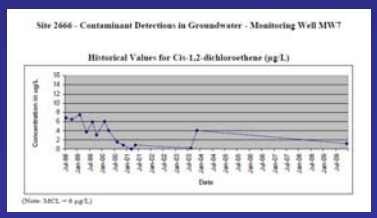
Summary of Analytical Data to Date











Concentrations lower than historical results and below MCLs

Conceptual Site Model – Data Sources

- UST 2664 Tank Removal/Pipeline Removal
- UST Site 2666 Site Assessment and Sparge System Installation & Operation
- UST Site Assessment Report Building 2662
- RI for 24 Area (Group A Sites)

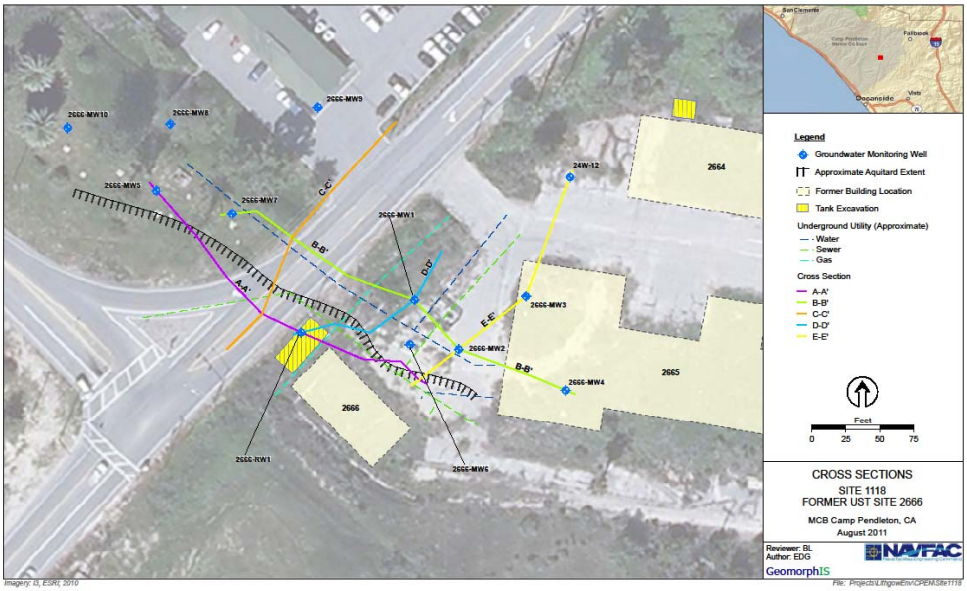
Conceptual Site Model – Key Concepts

- Geology under Buildings 2664, 2665, and 2666
  - Alluvial Sediments underlain by fine grained bedrock
  - Fine grained bedrock rises and is exposed on elevated sides of site
  - Overall geometry is like a basin (hypothesis) with water in center portions
- Hydrogeology
  - Historically GW gradient has been to the southwest in alluvial sediments
  - Mounding – exists now and was observed historically
    - either a water line leak or left over condition from sparge system
    - Interferes with typical expected gradient in this environment

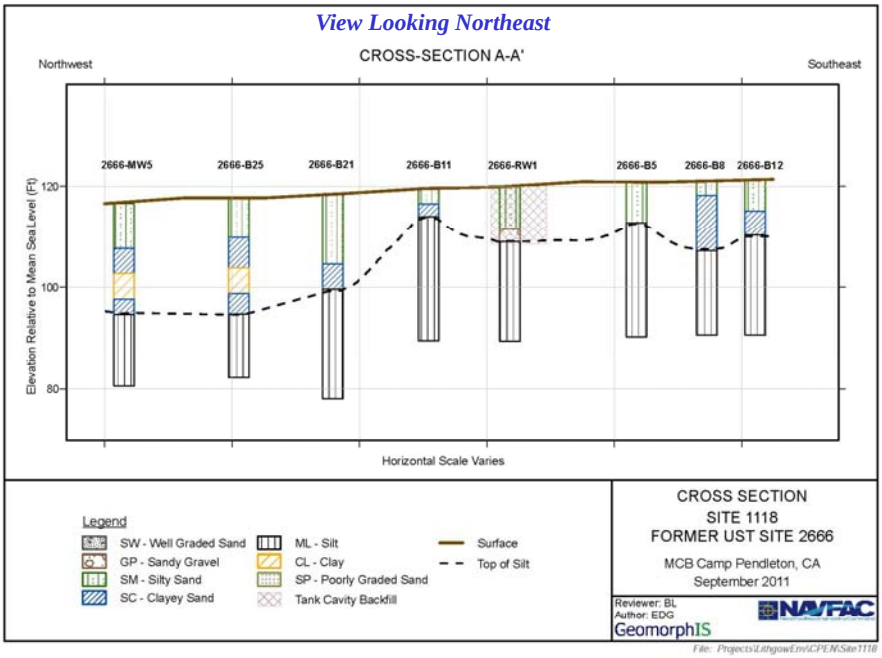
Navy Site Visit 2011 – view looking east

Site is located in a basin, surrounded on all sides by low hills

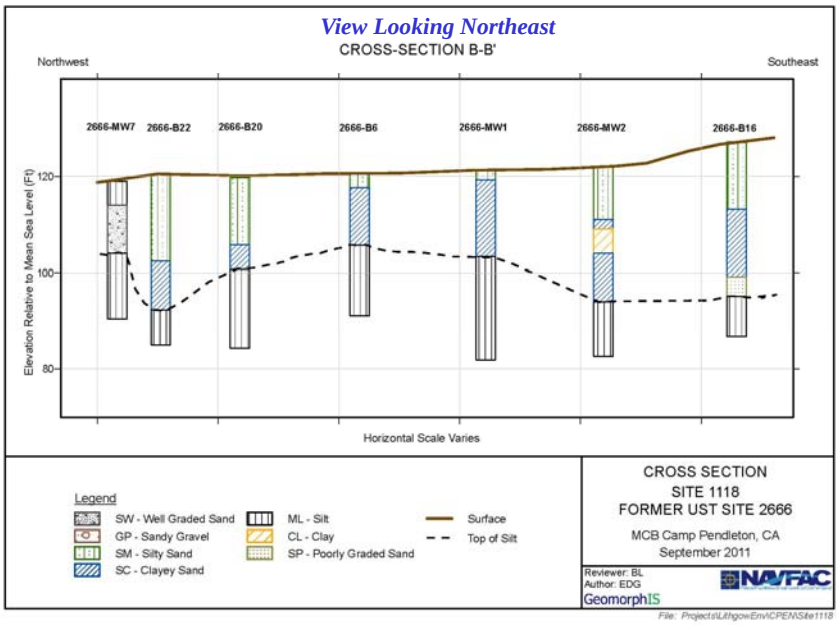
Site Conceptual Model – Cross Section Locations



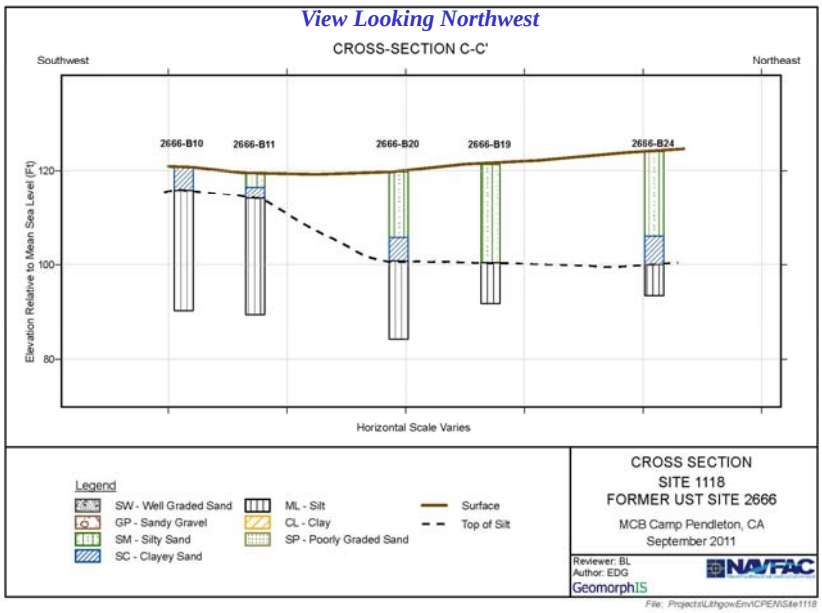
Site Conceptual Model – Cross Section A-A'



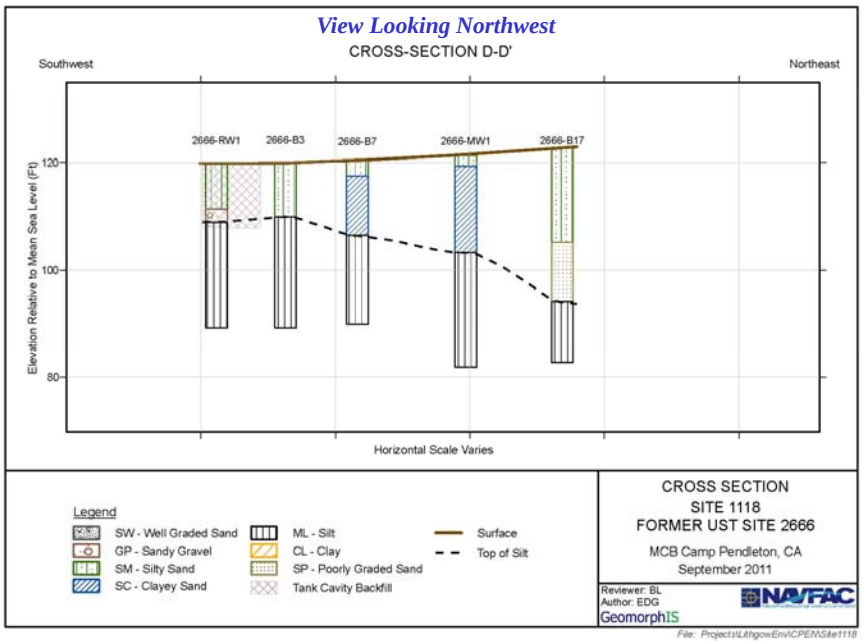
Site Conceptual Model – Cross Section B-B’



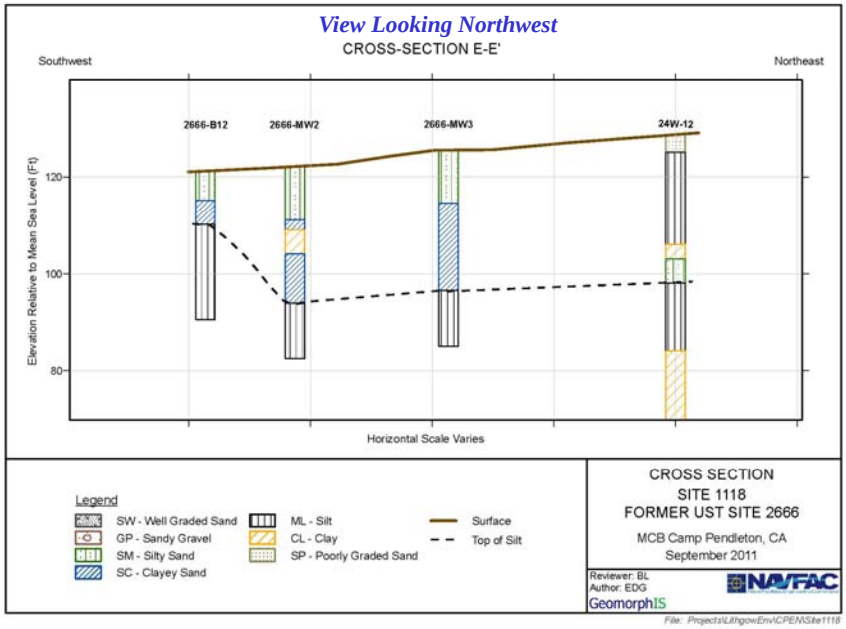
Site Conceptual Model – Cross Section C-C’



Site Conceptual Model – Cross Section D-D’

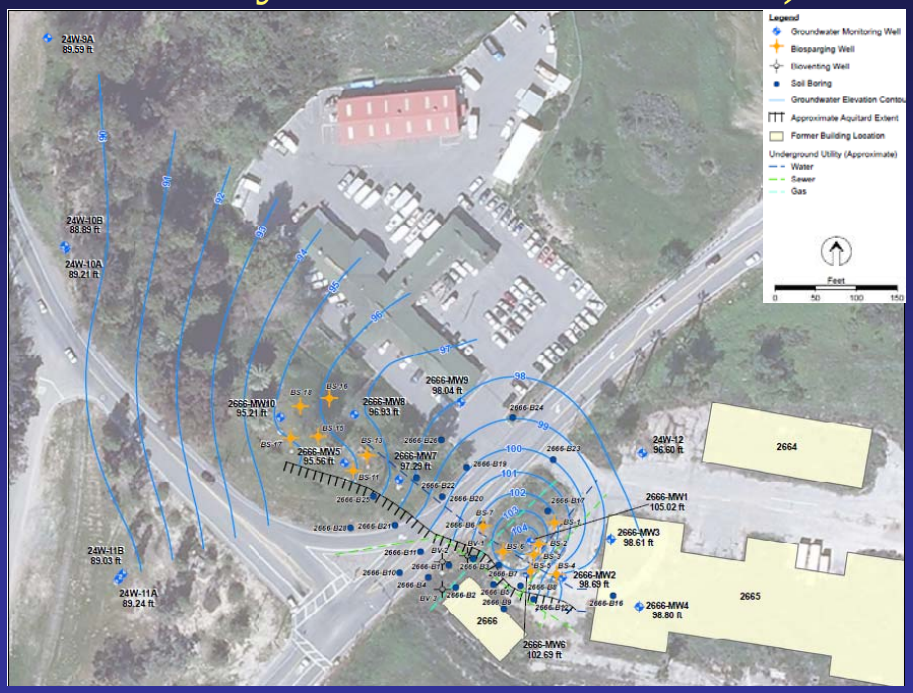


Site Conceptual Model – Cross Section E-E’



Site Map with Top of Bedrock Silt Layer

Groundwater Gradient Contours (based on May 2011 measurements)



Conceptual Site Model – Data Gaps

- Geology
  - Does siltstone rise towards edge of site to NE?
  - Does depth to siltstone decrease to NE and SE?
- Hydrogeology
  - Does water exist in sediments to NE?
  - What is gradient direction in S, SE
- Contaminant F&T
  - Do CHCs exist in groundwater below former Bldg 2664?
  - Can a clear plume area be distinguished starting from tank or pipeline location?
  - Do CHCs exist in soil gas below former Bldg 2664?

Proposed Approach

- Tiered Soil Gas Evaluation
  - 4 primary (1st tier) soil gas locations
  - Up to 9 secondary or tertiary (2nd or 3rd Tier) soil gas locations – dependent upon results from previous tier
- Tiered GW Evaluation
  - 5 Primary (1st tier) Temporary wells
  - Up to 12 secondary or tertiary (2nd or 3rd Tier) Temporary wells – dependent upon results from previous tier
  - 4 Permanent Monitoring Wells – dependent upon temporary well results

Proposed Approach – Soil Gas

Proposed Approach – Groundwater

Summary

- Navy has used historical model to create Site Conceptual Model
- Used CSM to evaluate data gaps
- ESI = Tiered sampling approach for soil gas and groundwater
- ESI will fill data gaps to refine CSM

MARINES
THE FEW. THE PROUD.

MARINE CORPS BASE
CAMP PENDLETON

COMMENTS/QUESTIONS?

NAVFAC
Naval Facilities Engineering Command

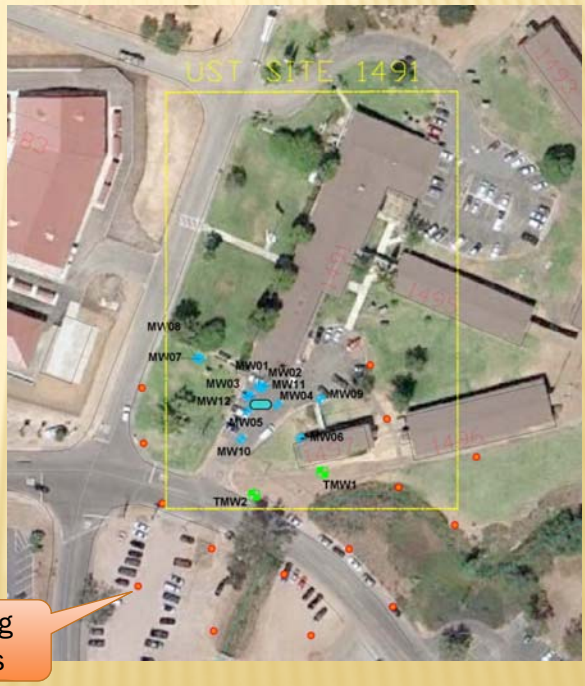
Marine Corps Base Camp Pendleton
San Diego County, California

Site 1116 Work Plan Addendum

- History
  - March 2007 - Nine UST sites in Area 14 transferred to IR Program. Designated as Site 1116.
  - 2010 – Site Inspection investigated previously identified VOCs in soil and groundwater at six sites (1491, 14112, 14121, 14125, 14127 and 140008)
  - February 2011 – SI Report recommended additional investigations three sites (1491, 14112 and 140008)

Site 1116 Work Plan Addendum

- Scope of Work –Site 1491
  - Drill and Sample at 15 CPT locations
  - Drilling Locations are downgradient of known TPH and VOC impacts
  - Collect groundwater samples from three depths in prominent water bearing zones
  - Identify lateral and vertical distribution of VOCs in downgradient area
  - Install Permanent monitoring wells based on the results of CPT sampling results



CPT Boring Locations

Site 1116 Work Plan Addendum

- Scope of Work –Site 140008
  - Conduct UST Search (Property records and GPR/Geophysical survey)
  - Drill and Sample at 10 CPT locations
  - Drilling Locations are downgradient of known TPH and VOC impacts
  - Collect groundwater samples from three depths in prominent water bearing zones
  - Identify lateral and vertical distribution of VOCs in downgradient area
  - Install Permanent monitoring wells based on the results of CPT sampling results

CPT Boring Locations

Site 1116 Work Plan Addendum

- Scope of Work –Site 14112
  - Monitor site for free product
  - Collect groundwater sample beneath free product zone
  - Install Permanent monitoring well downgradient of MW-5 and MW-10

SUMMARY OF WORK AT SITE 1116

- ESI Work Plan to Navy 15 Sep 11
  - To agencies late September
- Revised EE/CA and Action Memo in Navy review
  - To agencies mid-October
  - ESI results may require adjustment of treatment system layouts, but not expected to change proposed remedial alternatives

MCB CAMP PENDLETON
SITE 1115
PILOT STUDY UPDATE

15 September 2011

105th FFA Meeting

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Site 1115 Pilot Study Injection

Pilot Study Update from May FFA Meeting

- Reductive dechlorination was induced where organic substrate was delivered.
- Significant chlorinated solvent total molar mass reductions achieved within the treatment area.
- Minimal solvent reduction in downgradient wells.
- Dissolved phase TOC did not migrate beyond area impacted during injection within the first 14 months.
- Geochemical impacts associated with substrate did migrate slowly to eventually impact 1115-MW4, 1115-MW5, S5/8/9/17-MW48, and 1115-MW6 (diffusion dominated or very slow radial flow).

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Site 1115 Pilot Study Injection

Pilot Study Update from May FFA Meeting (Continued)

- Initial injection treatment area was larger than expected due to larger ROI. However, post injection TOC migration is minimal so no advective expansion due to slow groundwater flow and low permeability soils.
- Future injections of any reagent will have to be designed to emplace treatment zones during injection.
- Neutral conditions were maintained through 14 months of treatment.
- Organic substrate should last for at least an additional 6 to 12 months.
- Benzene concentrations remained relatively unchanged.

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Site 1115 Pilot Study Injection

Recommendations

- Further pilot testing of enhanced bioremediation would not yield any additional useful information toward feasibility study alternatives.
- DON plans to collect specific additional site data to confirm extent of known plumes prior to finalizing the RI/FS.
- DON proposes to install two monitoring wells screened at two intervals each and resample up to 15 selected existing wells at the site. Proposed well locations placed to better define plume extent.

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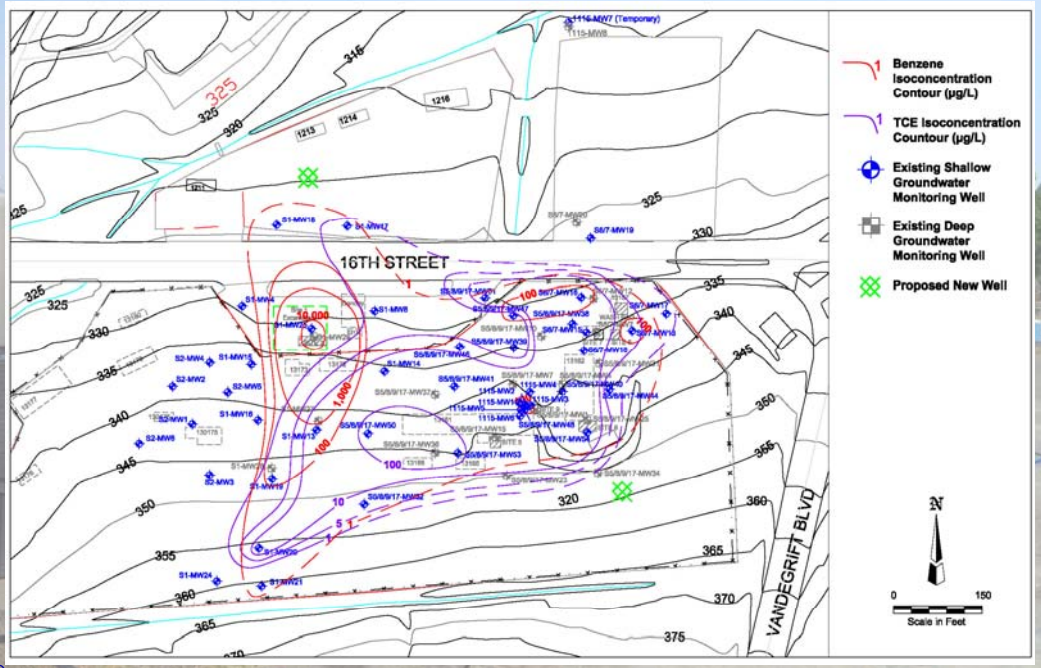
Site 1115 Fieldwork Update

Proposed Fieldwork



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Site 1115 Fieldwork Update

Upcoming Tasks

- Technical Memorandum Summarizing Results of Pilot Study - September 16, 2011
- Sampling and Analysis Plan Addendum Outlining Additional Fieldwork - Winter 2011
- RI/FS Report - Current FFA Date April 16, 2012

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105TH FFA MEETING
MCB CAMP PENDLETON

UPDATE FOR REVEGETATION SITES AT MARINE CORPS BASE CAMP PENDLETON, CALIFORNIA

September 15, 2011

RE-VEGETATION UPDATE

- PROJECT OVERVIEW
  - SITE 1A
  - SITE 1A-1
  - SITE 1D
  - SITE 1H
  - SITE 1111
  - SITE 30

SITE 1A

Before:

SITE 1A

During:

SITE 1A

After:

SITE 1A

Now:

SITE 1A-1

Before:

SITE 1A-1

During:

SITE 1A-1

After:

SITE 1A-1

Now:

SITE 1D

Before:

SITE 1D

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SITE 1D

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Before:

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SITE 1H

After:

SITE 1H

Now:

SITE 1111

Before:

SITE 1111

During:

Confirm if this is after.

SITE 1111

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SITE 1111

Now:

SITE 30

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SITE 30

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105TH FFA MEETING
MCB CAMP PENDLETON

UPDATE FOR REVEGETATION SITES AT MARINE CORPS BASE CAMP PENDLETON, CALIFORNIA

September 15, 2011

MCB CAMP PENDLETON
SITE 1119 PROJECT UPDATE

15 September 2011

105th FFA Meeting

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SITE 1119

Site Overview

- Defined as groundwater in the vicinity of Base wells 26016 and 26018.
- The VOCs that have been detected in the subject wells are trichloroethylene (TCE), *cis*-1,2-dichloroethene (*cis*-1,2-DCE), and trichloropropane (1,2,3-TCP).
- Upgradient of 22/23 Area Groundwater

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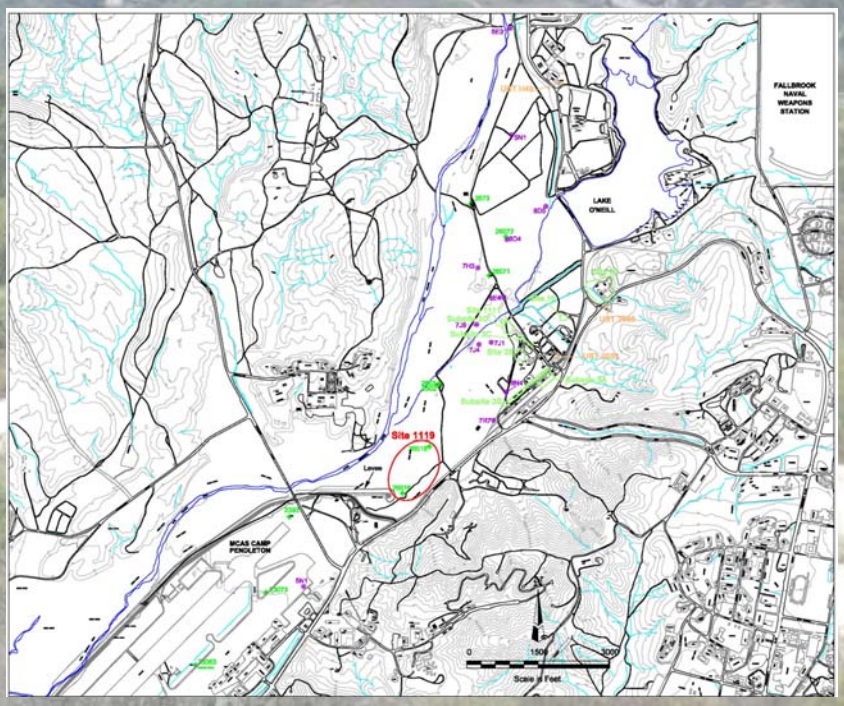
SITE 1119

Location



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SITE 1119

Status of RI Work Plan Phased Approach

- ✓ Determine groundwater elevation at all 51 known existing monitoring wells. Also, evaluate suitability of wells for sampling.
- ✓ Sample groundwater at 16 existing groundwater monitoring wells to determine current chemical concentrations in site groundwater.
- ✓ Sample groundwater at 26016 and observation well at 26018 using passive diffusion bags (PDBs) and hydrosleeves to obtain a current vertical profile of chemical concentrations.
- ✓ Based on the data obtained from sampling existing groundwater wells and 26016 and 26018-OW, determine placement of new wells, either near a known source area if VOCs are found, or placed to define lateral and vertical contaminant distribution in the Santa Margarita River aquifer upgradient of Site 1119.
- ❖ Install and develop new monitoring wells at eight locations, with up to four nested wells at each location, and collect geotechnical soil data from the well boreholes to fill data gaps that currently exist with the existing network of monitoring wells.
- ❖ Sample and analyze groundwater at the new groundwater monitoring wells.

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SITE 1119

Update

- Measured water levels in 47 wells. Wells at Former USTs H9, H49, and 2653 no longer exist. Additional OWR wells identified. Needed to pull old pumps in order to sample.

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SITE 1119

Update (continued)

- Groundwater samples collected at wells 26016 and 26018-OW at multiple depths using passive diffusion bags (PDBs) and hydrosleeves and 12 existing wells in July 2011.

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SITE 1119

Update (continued)

- Certain well locations could not be accessed due to the breeding season of sensitive species.
- Remaining monitoring wells will be sampled at a later date after the breeding season.

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SITE 1119

Sampling Results to Date

- Previous groundwater detections in 26016 included 11 microgram per liter (µg/L) of TCE, reported by CDM in 2008 and 0.51 µg/L of TCE in a USGS surface discharge sample collected in 2009.
- Recent testing (July 2011) as part of the Site 1119 RI indicated TCE detections ranging from 0.57 to 1.7 µg/L in depth-specific groundwater samples from well 26016, with concentrations increasing with depth.
- USGS testing at 26016 also reported 1,2,3-TCP at 0.0064 µg/L in the 80-foot depth specific sample. Low level *cis*-1,2-DCE was detected in this same sample (0.45 µg/L). No other analytical results have indicated the presence of 1,2,3-TCP in wells 26016 or 26018.
- Sampling at well 26018-OW has indicated multiple TCE detections, with a maximum detection of 2.3 µg/L, and multiple detections of approximately 2 µg/L, including recent samples tested as part of the liquid-phase granular activated carbon (LGAC) operations at well 26018. These detections were consistent with test results (2.1 µg/L) from a surface discharge sample collected by the USGS in 2009.

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SITE 1119

Technical Meeting

- Meeting held on 29 August with NAVFAC, MCB Camp Pendleton ES, Office of Base Water Resources, FMD, and Stetson Engineers to review results to date and adjust planned new monitoring well locations.
- New well locations determined based on recent groundwater sampling results and review of data from Stetson Engineers, including depth to bedrock and alluvial thickness maps.
- Following a discussion of the existing OWR observation well locations, it was decided that three additional existing OWR wells should be sampled using passive diffusion bags (PDBs), in case the lab results suggest that the locations of two of the new monitoring wells should be adjusted. (Note: Field reconnaissance by Parson since the meeting has confirmed that one of these three no longer exists).
- Stetson to provide the reference points used for the well TOCs. (Note: Stetson provided data for a subset of the site wells.)

SITE 1119

New Monitoring Well Locations

- Targeting locations (IR, RFA, or UST Sites) downgradient of former sites where chemicals were known to have been historically detected
- Also place new monitoring wells closer to wells 26016 and 26018, determine depths and pathways of contaminants, and “work outward” from those wells toward a possible source.
- Current hypothesis is that contaminants are likely coming from somewhere in the more “industrialized area” of the basin, and that it is less likely that observed contaminants in 26016 and 26018 are coming from the northwest side of the basin.
- Planned monitoring well 1119-MW-7 should not be drilled where planned, and instead a new well could be installed southeast of Well 2602. This concept is supported by the lack of observed contamination in Base wells 2602/2603, 26004, 2671, and observation wells 7J8 and 7H3.

SITE 1119

New Monitoring Well Locations

- Proposed monitoring well near former UST 2666 (1119-MW-8) was not needed and was re-located because site will be addressed separately by NAVFAC under the Site 1118 investigation. Therefore, a new location was placed between Buildings 26031 and 2642.
- All wells were re-numbered from south to north, working away from Site 1119.
- Biological monitoring requirements: Based on meeting of September 7, 2011, prior to mobilization of drill rig, monitoring and mitigation measures will be implemented, including toad fences and monitoring for nesting birds under the MBTA.

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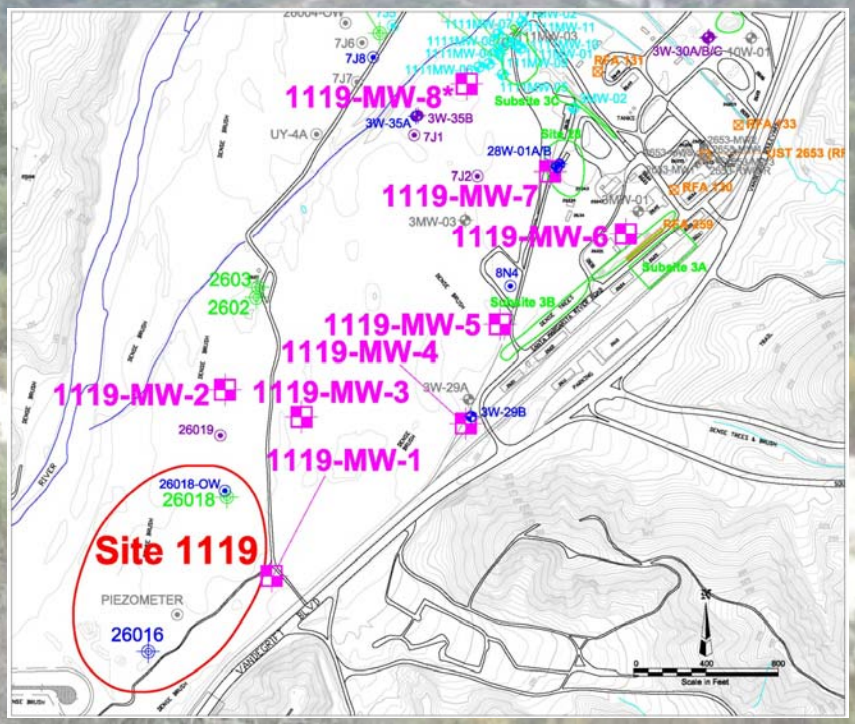
SITE 1119

Proposed Wells Locations



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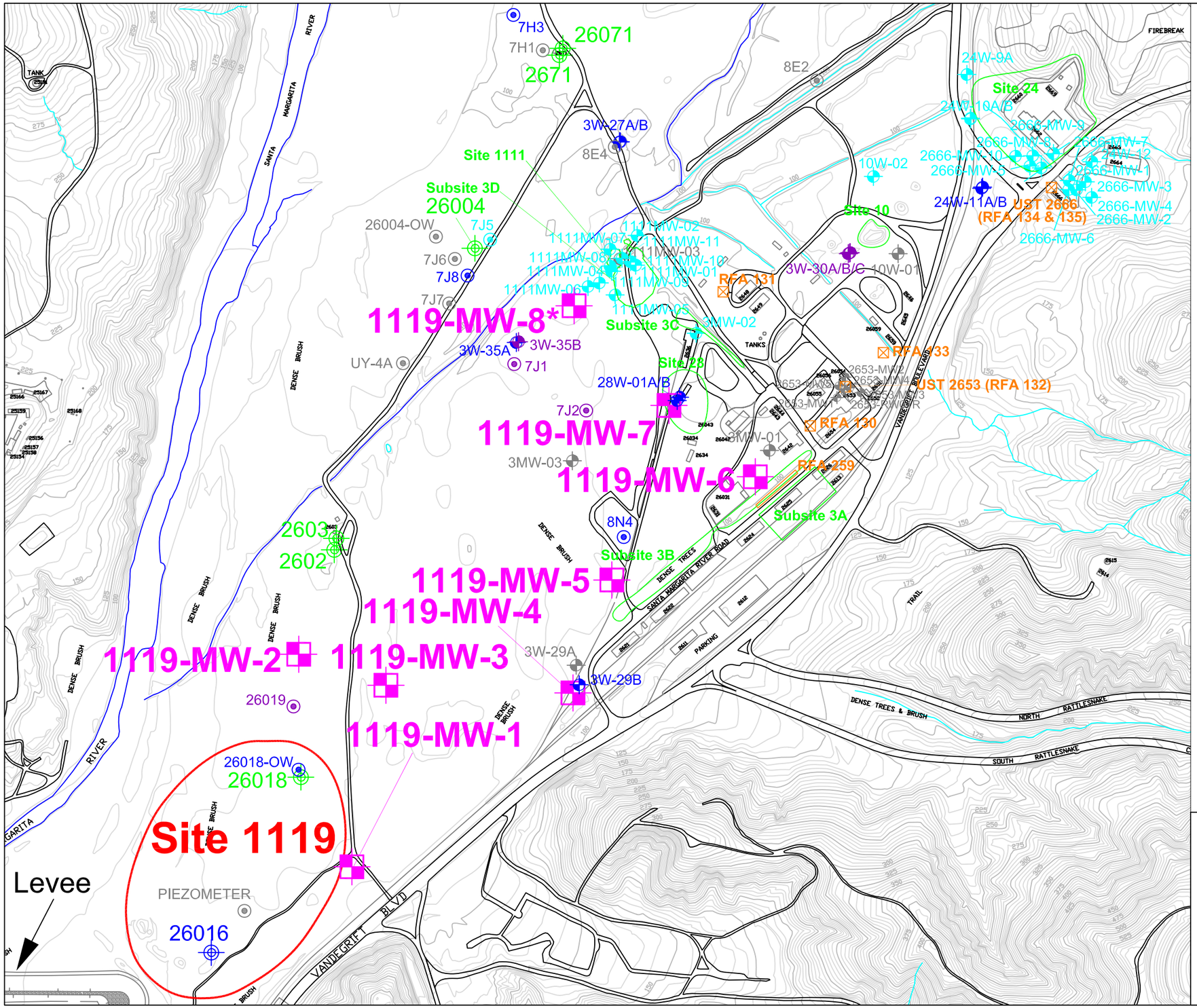

Legend

- Site 1119 Boundary
- Former IR Site Boundary
- Former UST or RFA Site
- Production Well
- Observation Well Not Included in Program
- Observation Well Sounded June 2011
- Observation Well Sounded June 2011 and Sampled July 2011
- Groundwater Monitoring Well Previously Destroyed or Damaged
- Groundwater Monitoring Well Sounded June 2011
- Groundwater Monitoring Well Sounded June 2011 and Sampled July 2011
- Proposed Observation Well to Sample After Breeding Season
- Proposed Groundwater Monitoring Well to Sample After Breeding Season
- Proposed New Groundwater Monitoring Well to Install

1119-MW-8* Note: May not be required based on sampling results.

N

0 500 1000

Scale in Feet

DRAFT

Figure 1

Site 1119
Proposed Groundwater Monitoring Well Locations

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Pasadena, CA

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