MINUTES
NAVAL WEAPONS STATION (NAVWPNSTA) SEAL BEACH
RESTORATION ADVISORY BOARD (RAB)
AND COMMUNITY MEETING
March 14, 2006

Participants:

Blake, Geoffrey
Daverin, John / GeoSyntec Consultants
Dudakis, Jason / Orange County Water District
Garrison, Kirsten / CH2M HILL
Grinyer, Walter / GeoSyntec Consultants
Hannon, Patricia / Regional Water Quality Control Board, Santa Ana Region
Jordan, Jack
Le, Si / Naval Facilities Engineering Command, Southwest (NAVFAC SW)
Leibel, Katherine / Department of Toxic Substances Control
Major, Dave / GeoSyntec Consultants
Mark, Dave / Orange County Water District
Murchison, Dave / Department of Toxic Substances Control
Peoples, J.P. / RAB Community Co-chair
Smith, Gregg / NAVWPSNTA Seal Beach Public Affairs Officer (PAO)
Sovich, Tim / Orange County Water District
Tamashiro, Pei-Fen / NAVWPNSTA Seal Beach and RAB Navy Co-chair
Vesely, Gene
Whittenberg, Lee / City of Seal Beach

WELCOME

At 6:00 p.m., P. Tamashiro, Navy Co-chair began the meeting by welcoming the participants. She introduced J.P. Peoples, RAB Community Co-chair. She introduced S. Le, NAVFAC SW Lead Remedial Project Manager (RPM) and G. Smith, NAVWPNSTA Seal Beach Public Affairs Officer (PAO).

RAB members were encouraged to direct any questions regarding environmental issues or the Installation Restoration (IR) Program to G. Smith or P. Tamashiro.

Attendees were asked to introduce themselves. P. Tamashiro announced that the RAB meeting would proceed with a status update on the ongoing IR Program.

PROJECT HIGHLIGHTS

The RAB meeting continued with a status update on the ongoing IR Program presented by S. Le.

The following sites were discussed:

- Site 42 – Auto Shop Sump/Waste Oil Tank; Sites 44/45 – Former Waste Otto Fuel Drum Storage; and Solid Waste Management Unit (SWMU) 57 – Paint Locker Area; Cleanup
- Site 14 - Abandoned Leaking Gasoline Underground Storage Tank (UST), Additional Groundwater Delineation

- Site 70 - Research, Testing, and Evaluation (RT&E) Area; Groundwater Monitoring Program
- Site 70 Revised Feasibility Study (RFS), Proposed Plan (PP), and Record of Decision (ROD)
- Site 40 - Concrete/Pit Gravel Area, Remedial Action
- Site 74 – Old Skeet Range, Net Environmental Benefit Analysis (NEBA) and Engineering Evaluation and Cost Analysis (EE/CA)
- Site 4 – Perimeter Road; Site 5 – Clean Fill Disposal Area; Site 6 – Explosives Burning Ground; and Site 7 – Station Landfill, Long-term Groundwater Monitoring Program

Hard copies of the slide presentation were unavailable as a handout at the meeting. It was announced that the slide presentation could be e-mailed to the RAB meeting attendees, if requested. L. Whittenberg and J. Jordan requested a copy of the slide presentation from the Navy. P. Tamashiro e-mailed the slide presentation to L. Whittenberg and J. Jordan on Wednesday, March 15, 2006.

Questions and answers posed after the Project Highlights presentation are summarized below:

Slide 3

Question: Does the contaminated groundwater plume associated with the leaking underground fuel tanks at Site 14 extend into the National Wildlife Refuge (NWR)?

Response by P. Tamashiro: There are several groundwater monitoring wells located along the boundary of the NWR. Some groundwater sampling results collected from these wells confirm that contamination is present in the groundwater. However, the levels of contamination are not at concentrations that pose an ecological risk.

Question: So the Navy is not treating the groundwater plume in the NWR?

Answer: No, however the Navy continues to monitor the groundwater within the NWR as part of the ongoing groundwater monitoring program for Site 14.

Slides 4 & 5

Question: Is the emulsified vegetable oil (EVO) currently being injected into the contaminated groundwater plume at Site 70?

Answer: The EVO has been injected in limited quantities during the Remedial Design Optimization (RDO) field investigation and pilot testing. The results of this testing was used to identify the radius of injection within specific units. The distribution of the injected EVO was monitored in down gradient wells. EVO distribution ranged from 10 to 12 feet during injection.

Question: Is this observation a new finding?

Answer: Not necessarily. The injection well spacing at Site 70 will be designed to address the expected lateral movement (estimated to be within a 10-foot radius of the injection point). Field tests will be conducted to evaluate the EVO distribution and determine the extent of influence within varying soil zones. A continuous soil core will be collected from the drilling of one of every five injection wells to confirm the lithology of the site.

P. Tamashiro continued the RAB meeting by indicating that there would be only one RAB presentation that evening. She explained that three industry experts from GeoSyntec Consultants were present to discuss enhanced in situ bioremediation at Site 70:

W. Grinyer, Professional Geologist and Site 70 Project Manager

J. Daverin, Professional Geologist, Certified Hydrogeologist, and Site 70 GIS/3-D modeling

D. Major, Ph.D. and Site 70 Principal-in-Charge (PIC)

PRESENTATION – ENHANCED IN SITU BIOREMEDIATION AT SITE 70 (RESEARCH, TESTING, AND EVALUATION [RT&E] AREA)

W. Grinyer and J. Daverin proceeded with the first half of the presentation. Copies of the slide presentation were made available as a handout at the meeting. The following questions were asked during the first half of the presentation:

Question: You indicated that the deep clay layer was locally continuous beneath the deep sand layer. What is the approximate depth at which the deep clay layer occurs?

Answer: Subsurface data identified a deep clay layer consistently occurred at approximately 168 to 179 feet below ground surface (bgs) and a deep sand layer consistently occurred approximately 5 to 15 below the top of the deep clay layer. Therefore, the top of the deep sand layer is located approximately 180 feet bgs, and the top of the deep clay varies from 168 to 179 feet bgs.

Question: What is the significance of selecting 250 parts per billion (ppb) as the target contamination level for the conceptual model?

Answer: Trichloroethylene (TCE) contamination at this concentration is great enough to sustain the microorganisms that are required to be present during the bioremediation. At concentrations below 50 ppb, studies have shown the microbial activity is too low to facilitate the bioremediation process.

In addition, 250 ppb concentration encapsulates approximately 90 percent of the contamination mass, so it represents a major portion of the groundwater plume.

Question: What is the concentration of the data point represented by the red dot?

Answer: The red dot represents a concentration of 132 parts per million (ppm) or 132,000 ppb.

Note: The concentration data points were not depicted in the hard copy handout of the slide presentation. However, this information was depicted in the animated PowerPoint slide presentation during the 3-dimensional model discussion.

Question: In the geologic cross-section, is the deep sand unit represented in dark blue?

Answer: Yes, the deep sand unit is represented in dark blue.

Question: What accounts for the difference in the extent of the two groundwater plumes? Is it due to the differing amount of data collected during these two data collection periods?

Note: The groundwater plume comparison in the third slide at the bottom of page 7, depicts the differences in the extent of the groundwater plume based upon data collected between 1996 and 1998 during the Extended Removal Site Evaluation (ERSE) phase, and data collected in 2005 during the Remedial Design Optimization (RDO) phase and the Fifth Annual Groundwater Monitoring (GWM) Program data.

Answer: The difference in plume morphology indicated by these two data sets is likely due to differences in the sampling network implemented for these two data collection periods. In addition, there was an 8-year data gap, during which plume migration would have been expected to occur. There is also a certain degree of professional judgment that comes into consideration. Given the lithology of the site, it is likely that the contamination migrated more laterally than vertically, which would support that the plume morphology more closely resembles that depicted by the ERSE data (which included more data points).

Question: Does the model include kriging?

Answer: Yes, in the 3-dimensional model, there are 10 to 1 more vertical data points than lateral data points so that the data is spread.

Question: Does this support that migration is 10 times easier laterally than vertically?

Answer: It is correct that, within these lithological conditions, lateral migration is easier than vertical, but the model depiction is not actual migration below the current distribution of contamination.

Question: How did the contamination get below the current contamination?

Answer: There were two data points that occurred vertically very close to one another, but were separated by confining units and this had to be accounted for, so the data was extrapolated beyond the current distribution of contamination in the model.

Question: What is kriging?

Answer: Kriging is a geostatistial method of contouring to estimate the contamination levels in a given data cell. It is an extrapolation of the data.

Question: What is the concentration clean up goal for Site 70?

Answer: The regulatory standard for TCE in drinking water is 5 ppb.

Question: What mechanism would cause the groundwater plume to migrate vertically down to the deep clay layer over such a wide area?

Answer: Groundwater flow is likely the cause. However, the deep clay layer acts locally as a confining layer to further vertical migration.

Question: Is the contaminated groundwater flowing through the clay?

Answer: There is significantly less flow through the clay. It may take 30-40 years for water to flow through a 10- to 15-foot clay layer of this type versus 1 to 2 years through the same thickness of sand.

Question: Wouldn't contaminated water flow dynamics be different? The data in the model supports that the groundwater plume extends down into the clay layer.

Answer: It is true that chlorinated solvents could penetrate through the clay layer easier than water. But I believe your point is whether the groundwater plume is in contact with the clay layer. Because of the lack of data points in this location, a kriging algorithm was applied that extrapolated the data into the clay layer. There is no data to support whether the contamination has entered the clay or not, or even where the contamination ends above the clay layer. However, there are 12 data points from the ERSE phase that report a non-detect for contamination in the clay layer.

Comment by Regulator: This model seems to more clearly report contamination conditions that are likely closer to the actual site conditions. As a regulator, we fight to have these types of modeling efforts conducted.

Comment by Regulator: The data points seem to provide a good defense for the groundwater TCE plume not extending into the clay layer. However, the model then extrapolates the data to support the possibility that TCE is extending into the clay layer. As a regulator, it seems that there is evidence that the groundwater plume had migrated to the clay layer and may have penetrated into the clay layer.

Comment by Regulator: We should remember that the model represents the groundwater contamination plume at a concentration of 250 ppb.

Response: It is also important to understand that most of the ERSE data points represent a one-time data collection with only one data sample, so we have been unable to go back and recreate the exact data collection methods and conditions.

It is also important to recognize that a groundwater plume comparison between the 1996-1998 ERSE data and the 2005 RDO and GWM Program data shows that the monitoring network is sufficiently complete to describe the plume morphology.

Question: Over how large of an area does the groundwater plume extend laterally?

Answer: The groundwater plume is approximately 700 to 800 feet wide and 2,800 to 3,000 feet long.

Question: Is the goal to remediate the entire groundwater plume?

Answer: Dave Major will answer this question later as part of the presentation tonight.

BREAK

The RAB took a 10-minute break prior to the beginning the second half of the presentation.

PRESENTATION (CONTINUED) – ENHANCED IN SITU BIOREMEDIATION AT SITE 70 (RESEARCH, TESTING, AND EVALUATION [RT&E] AREA)

D. Major proceeded with the second half of the presentation. The following questions were asked during and after the second half of the presentation:

Question: Did you previously say that the *dehalococcoides* spp. likes metals?

Answer: No, I don't believe so. I believe I stated that this microorganism likes chlorinated compounds. I also indicated that this microorganism is facilitated by "helper" bacteria that absorb metals and produce an enzyme. This enzyme can, in turn, be transferred to the *dehalococcoides* spp., enabling them to perform reductive dechlorination.

Question: Do any of these "helper" bacteria produce a slime byproduct that could act as a physical barrier to reduce permeability of the aquifer?

Answer: This would represent only a small percentage of the aquifer pore space and any resulting reduction in permeability has been factored into the bioremediation design.

Question: Is the remediation goal at Site 70 to treat the source area only?

Answer: No, the remediation goal at Site 70 is to treat both the source area and the groundwater plume.

Question: With respect to the biobarrier treatment strategy, is the goal to capture the groundwater contamination at concentrations at 250 ppb and above only within the first sand unit?

Answer: The goal of the biobarriers is to target concentrations in excess of 250 ppb TCE within the permeable zones identified in the conceptual model. The biobarriers will be constructed within the permeable zones represented by the first sand, shell horizon, and second sand units. Biobarriers will be constructed throughout the dissolved phase plume to provide treatment throughout the dissolved phase plume over the active remediation phase.

Question: What is the basis for determining that natural attenuation will appropriately address remaining TCE contamination at concentrations below 100 ppb? It would seem that even at this concentration, the groundwater plume would continue to migrate laterally.

Answer: The operation of the biobarrier will end at the point that the remediation goal is met, that is, once 90 percent of the TCE contamination mass at concentrations at or above 250 ppb has been removed. It is also believed that at this stage of the bioremediation process, the biobarrier would be less efficient. The biobarriers will continue to treat groundwater that flows through the barrier, but natural attenuation will become the primary remedial method going forward.

Comment by Regulator: This scenario assumes that natural attenuation will be sufficient?

Answer: You are right. This is exactly why the remediation program includes ongoing site monitoring and analysis.

Comment by Regulator: It should also be recognized that the attenuation rate will decrease over time.

Answer: The degradation rates will be set once the half-life is set. They should be consistent unless the geochemical makeup changes.

Comment by Regulator: Most projects deal with active remediation until the multiple of the maximum contaminant level (MCL) is below 5 or 10 times the MCL. This project would stop active remediation when the contamination concentration is still 50 times the MCL for the drinking water standard of 5 ppb.

Answer: The Navy will effectively remove over 90 percent of the total contamination mass through injection of EVO and *dehalococcoides* spp. and active biobarrier remediation. In addition, remember that the groundwater plume will only reduce in size over time.

Question: How will the distribution of the EVO be controlled across a vertical distance of 43 feet?

Answer: The remedial design considers the radius of influence for the EVO. The minimum distance between injection wells will account for any variances in EVO distribution.

Also, we will observe the distance of EVO distribution during the injection process. The lithology of the site can be checked and the injection design can be recalibrated, such as increasing the injection times or adjusting the injection locations, so the EVO is distributed optimally.

The remedial design could also incorporate extraction wells near the injection wells to overlap and pull the EVO distribution to certain areas. A combination of extraction and injection wells is being evaluated for the design to maximize distribution of EVO laterally and vertically.

Question: When you consider that higher concentrations will occur in the dense non-aqueous phase liquid (DNAPL), do you feel that the EVO delivery system is sufficient?

Answer: The injection well system will encompass the entire source area, so the EVO delivery system should be sufficient, and the plume contamination is mostly dissolved phase.

Note: The case study for Launch Complex (LC) 34 was for DNAPL using similar methods as proposed here. The LC 34 case study used a recirculation process to control groundwater flow through the test cell. The duration of the test was 12 months and in that time 98.5% of the mass was removed. Dr. Major also noted that this study was reviewed by the United States Environmental Protection Agency (USEPA) Superfund Innovative Technology Evaluation (SITE) Program. After three years, samples from the test cell indicated no detected chlorinated compounds at this site.

Question: So you don't believe there are any deep, dark absorption areas where DNAPL may exist?

Answer: If these areas exist, the drilling and lithologic logging will most likely identify them. Also, if the lithology of the site includes a 20-foot thick clay layer, and if DNAPL reached this layer and penetrated into the clay layer, which then swelled and sealed the contamination within, there is really no known technology that could remove 100 percent of the contamination. This technology is based on the premise that the EVO and microbes will go where the groundwater flow allows, which should also be the areas where contamination has migrated.

Question: Do you have an estimate for the cost per pound for the contamination removal at Site 70?

Answer: I don't know if we've developed a cost for removal in these terms.

Note. According to the Navy, this estimate has not been calculated due to too many uncertainties of the site condition.

Comment by Regulator: It would be helpful to develop performance monitoring details for the project and include them in the Proposed Plan. This would be appropriate to appear proactive as opposed to waiting until the remedial engineering design phase to define the performance monitoring program.

Response by the Navy: Each document in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process has a very specific purpose. The Proposed Plan is not intended to describe the details of the remedial design and construction. In addition, the Proposed Plan is intended to serve more as a fact sheet describing the project in layman's terms. The Proposed Plan is not a design document. The design document will have an evaluation monitoring plan.

Comment by Regulator: Generic performance criteria for the monitoring plan would be helpful to include in the Proposed Plan. The specific design of the biobarriers could be more appropriate in the design document, but some component of the monitoring criteria that could be carried forward into the Record of Decision (ROD) would show the Navy's commitment to long-term monitoring.

Response by the Navy: The Navy is committed to complying with applicable regulatory requirements. Suitable information regarding the long-term monitoring plan and performance criteria for Site 70 will be included in the appropriate documentation. The ROD is probably the most appropriate document to identify performance criteria for the monitoring plan.

The regulatory agencies will have the opportunity to review and comment on the Proposed Plan, and the ROD will be developed based upon comments received on the Proposed Plan. If the regulatory agencies wish to provide formal comment regarding inclusion of performance criteria in the ROD, they may do so as part of their comments to the Proposed Plan.

Comment by P. Tamashiro: The schedule for the Proposed Plan is as follows:

Thursday, 30 March 2006	Notice Final Proposed Plan for general public comment
Tuesday, 18 April 2006	Public Meeting

The Navy would like to hold the Public Meeting in the Seal Beach City Council chambers if they're available.

Response by L. Whittenberg: The council chambers are generally available on Tuesday evenings.

Question: What is the time frame between the installation of the wells for the injection of the EVO and *dehalococcoides* spp. and the installation of the biobarriers?

Answer:	There are a total of 57 injection wells and 10 monitoring wells to be installed for the source area. A conservative assumption is that it will take 1 day for each well installation (approximately 60 to 70 days). Injection of the EVO will take additional time, as the pump rate for the EVO is estimated at 1 day per foot. There are a minimum of 4 phases over the total project (for treatment of the source area and dissolved phase plume) to implement. A detailed sequential schedule will be included in the final design document.
Response by the Navy:	Implementation of the remedial action at Site 70 is dependent on schedule, but also available funding. It is not likely that 100 percent of the funds required for the action will be available at the start. It is more likely that the remedial action will be implemented in phases.

COMMUNITY FORUM

P. Tamashiro announced that the next RAB meeting would be held the second Tuesday of May 2006. She stated that two technical presentations would be presented to the RAB:

(1) Site 70 Research Study

(2) Site 42, 44/45, and SWMU 57 Removal Action Work Plan

ADJOURNMENT

P. Tamashiro adjourned the meeting at approximately 8:25 p.m.

Note: This is a meeting summary, not an actual transcript.