FINAL
NAVAL AIR STATION ALAMEDA RESTORATION ADVISORY BOARD
MEETING SUMMARY
http://www.efdsw.navfac.navy.mil/environmental/AlamedaPoint.htm
www.navybracpmo.org
Building 1, Suite 140, Community Conference Center
Alameda Point
Alameda, California

July 7, 2005

The following participants attended the meeting of the Restoration Advisory Board (RAB):

Co-Chairs:	
Thomas Macchiarella	Base Realignment and Closure (BRAC) Program Management Office (PMO) West, BRAC Environmental Coordinator (BEC), Navy Co-chair
Jean Sweeney	RAB Community Co-chair
Attendees:	
Steve Bachofer	Saint Mary's College
Pamela Baur	Sullivan International Group
David Cacciatore	Shaw Environmental & Infrastructure, Inc. (Shaw)
Neil Coe	RAB
Anna-Marie Cook	U.S. Environmental Protection Agency (EPA)
David Cooper	EPA
Ardella Dailey	RAB
Tommie Jean Damrel	Tetra Tech EM Inc. (Tetra Tech)
Tony Dover	RAB
Judy C. Huang	San Francisco Bay Regional Water Quality Control Board (Water Board)
George Humphreys	RAB
Craig Hunter	Tetra Tech
Terry Iwagoshi	Westin Solutions, Inc.
Elizabeth Johnson	City of Alameda
Joan Konrad	RAB
James D. Leach	RAB
Greg Lorton	BRAC PMO West, Lead Remedial Project Manager (RPM)
Frank Matarrese	Alameda City Council

John McGuire	Shaw
John McMillan	Shaw
Bert Morgan	RAB
Peter Russell	Russell Resources Inc/City of Alameda
Dale Smith	RAB/Sierra Club/Audubon Society
Jim Sweeney	RAB Vice Community Co-chair
Luann Tetirick	RAB
Michael John Torrey	RAB/Housing Authority of the City

The meeting agenda is provided in Attachment A.

MEETING SUMMARY

I. Approval of Minutes

Ms. Sweeney, community co-chair, called the meeting to order at 6:35 p.m.

Ms. Sweeney asked for comments on the minutes from the RAB meeting held on June 2, 2005. Mr. Torrey, Ms. Smith, and Mr. Humphreys provided the following comments:

Mr. Torrey's Comment

- Mr. Torrey said that he would like to clarify his comments on page 8 of 9 in the first paragraph of Section VI. The statement read, "Mr. Torrey then provided some examples of how animals could be exposed to groundwater. He said that using groundwater to fill a bird bath or a pet's water dish would expose animals to groundwater." Mr. Torrey clarified that his comment was intended to mean that using a garden hose for a bird bath or a pet's water dish would expose animals to groundwater because water from a garden hose is groundwater. Ms. Sweeney replied that she believed her water was not groundwater but city-supplied water. Mr. Leach said that the water supplied by EBMUD comes through the Mokelumne Aqueduct from Calaveras Comanche Reservoir and is the water that is supplied to the garden hose; it is not groundwater.

Ms. Smith's Comments

- Page 6 of 9, second paragraph, revise "Ms. Smith said that the radiological report, which she had read a few years ago…." to read, "Ms. Smith said that the radiological report, which she had read a few days ago..."
- Page 6 of 9, last paragraph, revise "Mr. French replied that a soil cover with institutional controls would be the most feasible because it is less expensive and easier to build…." to read, "Mr. French replied that a soil cover with institutional controls would be the most feasible because it is least expensive and easiest to build…"

Mr. Humphreys' Comments

- Page 5 of 9, last paragraph, revise "Mr. Humphreys asked about the iron wall alternative previously discussed" to read "Mr. Humphreys asked about the funnel and gate treatment system previously discussed."

The minutes were approved by the RAB, with the corrections and exceptions as noted above.

II. Co-Chair Announcements

Ms. Sweeney announced that she e-mailed to the RAB members a list of the documents she received this month. She added that she could provide a hard copy if requested for those members without e-mail.

Ms. Sweeney thanked Mr. Matarrese for following up on the incinerator question posed during the June RAB meeting. She said that the team walked to the site and viewed a low blue building some white piping and a short stack next to Building 397, which is large. Ms. Sweeney asked if this stack served as the exhaust for the catalytic oxidizing system that burns the vapor at high temperatures. Mr. Macchiarella responded that the stack is tall and extends up the side of Building 397. Ms. Huang added that two large chimney-like box structures are at Building 397 and that this stack, described as a silver pipe with a brown cap that extends to the top of the building, is next to one of them.

Mr. Torrey clarified that oxidizing means to incinerate. Mr. Matarrese said that he requested two items from the EPA representatives: (1) details on the permit requirements for the oxidation unit/catalytic converter, and (2) to make sure that it is still operating as designed and at quality standards.
Mr. Matarrese said that Mr. Torrey is correct and a catalytic converter burns and incinerates gases.
Mr. Matarrese said that he hopes the EPA will advise the community that the stack is safe because the community is aware that the unit is operating.

Ms. Cook said that EPA is sensitive to the jurisdiction of the petroleum program. Ms. Cook also said that her colleagues at the Regional Water Quality Control Board are aware of the permit and that the requirements are being enforced. Ms. Cook deferred any additional comments on the system to Ms. Huang. Ms. Huang said that the system has been monitored and that the latest results for the system's inlet and outlet were all within the limits of the permit. Ms. Huang also commented that Shaw has exceeded the requirements to monitor for chlorinated compounds at the inlet to ensure that dioxins cannot be formed.

Ms. Huang said that she wanted to clarify the word "incinerator" and also the system's operation. She said that the petroleum-rich vapor phase is heated to about 600 to 700 degrees Fahrenheit, which is then not actually burned but is passed through a platinum catalyst. This chemical reaction is not open-flame burning, as is suggested by the term "incinerator." The heating allows the chemical reaction to take place.

Ms. Huang also apologized to the RAB members on communication and said that she feels she is not meeting their expectations. Ms. Huang requested that, if possible, the RAB members could offer a better process for disseminating the information on events in their neighborhoods. Ms. Huang offered her business cards to the meeting attendees to personally contact her. Mr. Lorton said that a possible change in the communication process has been discussed at prior meetings. Ms. Huang responded that she feels more is needed.

Ms. Smith asked about the frequency for monitoring the stack emissions. Mr. McMillan said that the permit requires the system must be constantly monitored for performance once it is on line and proven to be operating effectively. He added that, in addition to permit requirements, stack emissions are monitored monthly for volatile organic compounds (VOCs) by collecting air samples into a Summa canister.
Ms. Smith asked for clarification on the constant system monitoring and whether it was through a computer. Mr. McMillan said that a strip chart is used to automatically record the temperature of the system; if the system falls below the approved temperature range for the processes, the safety switches will automatically cut off the system.

Mr. Humphreys asked about temperatures and emissions during system operations. Ms. Huang said that she would report back on system functioning and the emissions quality of the system. Mr. Humphreys asked if it is possible to additionally monitor load changes and transient peaks in temperature. Ms. Huang said that a steady state in the system is assumed and that the system will shut down if the optimum conditions are not maintained. Mr. McMillan added that the entire system will shut down if its performance requirements are not met. Mr. Matarrese further asked if any untreated gases could leave the system if conditions were not maintained. Ms. Huang said that Shaw designed the system with many fail-safe mechanisms to control its performance.

Ms. Sweeney said that the exhaust stacks in the neighborhood have raised much concern and that she appreciates as much information on them as is possible.

Mr. Macchiarella distributed the list of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) program documents planned for July and August 2005 (Attachment B-1). Mr. Macchiarella pointed out that the new BRAC web site is listed on the top of the handout (www.navybracpmo.org).

Mr. Macchiarella also distributed an additional sheet describing work by the Government Accountability Office (GAO) on groundwater treatment options. The report discusses technologies and how the Department of Defense (DOD) evaluates groundwater treatment technologies. The GAO report may be found at http://www.gao.gov/highlights/d05666high.pdf.

Mr. Macchiarella announced that the Navy staff for the Alameda Point team will be changing within the next few months. New staff will be added and two members will be leaving the team, Jennifer Stewart and Darren Newton. Ms. Stewart is moving to Washington D.C., and Mr. Newton has been promoted and is transitioning to another team. Mr. Macchiarella said that there will also be a shift in BRAC teams to prepare for extra workload. Ron Plaseied, the current base closure manager, will be replaced by Alan Lee. Mr. Lee has experience as a base closure manager on several bases in California.

Ms. Smith asked if Mr. Lee has an environmental background. Mr. Macchiarella said that it is not an expectation for the base closure manager to have an engineering or environmental background; but fortunately for the team, Mr. Lee is an engineer, has been a BRAC environmental coordinator, and also has a military background.

III. Site Management Plan (SMP) Presentation

Mr. Macchiarella said that the SMP can be found in the repository for public review. He demonstrated how all pages of the document were summarized in one chart for ease of review. Mr. Macchiarella said that the SMP is currently in its 30-day review period; in accordance with the Federal Facilities Agreement (FFA), the schedule is developed with the regulatory agencies. It is submitted to the agencies for official review and concurrently distributed to the public for comment. Mr. Macchiarella said the SMP is an extension of the current schedules; the funding should support the work planned in fiscal year 2006. Mr. Macchiarella said that comments will be accepted on the SMP until July 15. Ms. Sweeney asked if there is any possibility that the project schedules will change. Mr. Macchiarella responded that the schedules are adjusted as the projects progress as a result of changing site conditions and difficulty in acquiring regulatory reviews. Mr. Macchiarella noted with Ms. Cook that projects are moving forward as anticipated and as quickly as is practical.

Ms. Smith commented that Site 2 should be removed from the SMP schedule since it is being transferred from one federal owner to another federal owner. Ms. Smith also noted that Site 2 is more complex than Site 1, which is to be developed for reuse, and that she had found a waste cell that has not been removed. Ms. Smith said that she asked Claudia Domingo (Navy) why the cell has not been removed, and that Ms. Domingo responded that many of the remediation studies do not occur because the transfer is from federal entity to federal entity. Mr. Macchiarella said that this information is not correct and that the question may have been misunderstood. Ms. Smith said that she found a major petroleum issue at the site, but that when she brought it to the Navy's attention, the response was that it is a federal to federal transfer and that the U.S. Fish and Wildlife Service had not requested the information. Ms. Smith then questioned why further studies for the site were listed in the SMP.

Mr. Macchiarella said that the team is continuing to progress on Sites 1 and 2; although the sites are similar; Site 1 is slightly ahead of Site 2. Both Site 1 and Site 2 are moving forward in the CERCLA process, and the federal to federal transfer projected for Site 2 has not altered the schedule. Ms. Smith said that there should be no process review because it is a federal to federal transfer, and the U.S. Fish and Wildlife Service will address it. Mr. Macchiarella commented that the U.S. Fish and Wildlife Service may disagree. Ms. Smith said that Ms. Domingo has said that the U.S. Fish and Wildlife Service would be responsible for any remediation, and not the Navy. Mr. Macchiarella said that this statement may be true after the property is transferred. Ms. Smith said that she was concerned because she was advised that the CERCLA process would not apply in this situation. Mr. Macchiarella responded that it is possible if the property were transferred to the U.S. Fish and Wildlife Service that the service would assume responsibility for any remaining CERCLA activities; however, this transfer of responsibilities has not been finalized.

Mr. Humphreys said that the southwest corner of Site 2 was used as a hazardous waste landfill but that it comprises only a portion of the total land area that will be transferred to the U.S. Fish and Wildlife Service. He added that Ms. Domingo is probably describing the balance of the area outside of the landfill. Mr. Humphreys said that he understood that the U.S. Fish and Wildlife Service did not want the land. Mr. Macchiarella said that it is possible that the Fish and Wildlife Service may not accept the property; however, another agency may want it. Ms. Smith said the Audubon Society and Sierra Club have ongoing interests in these transfers, which involve difficult environmental issues. She said that the environmental cleanup responsibilities of any land transferred prior to remedial actions would not release the federal government of these responsibilities.

Ms. Konrad said that the Veterans Administration (VA) may be interested in property. Ms. Johnson responded that the VA has hired consultants and is discussing potential uses for the property. Ms. Smith commented that the VA has acquired a large parcel in the San Joaquin Valley for 200,000 burial sites.

IV. Petroleum Program Overview and Update

Mr. Lorton said that the following presentation (Attachment B-2) is intended as an update to the ongoing total petroleum hydrocarbon (TPH) program at Alameda Point. Mr. Lorton said that he has transferred responsibilities for the TPH program to Michelle Hurst; however, she was not available for this meeting. Mr. Lorton recognized Mr. McMillan (Shaw) for his support on the TPH program.

Mr. Lorton said that the presentation would focus on each site since November 2004, when the last TPH update was provided. (Slide 2) Current free product removals are in operation for gasoline at Site 22 and jet fuel at Building 410. Other corrective actions are continuing on sites where free product has been detected in the past, but free product has for the most part been removed. Outstanding issues include dissolved phase hydrocarbons in groundwater.

Corrective action areas are represented in color on Slide 3 as follows:

- Blue indicates active free product removal areas
- White indicates areas with residual contamination, primarily dissolved phase contamination
- Yellow indicates areas with ongoing free product investigations that have not involved corrective actions

Slide 4 presents the original process installed at Building 397, Site 7, and Corrective Action Site 6. The system was designed for use in one or more groundwater wells to draw off free product that is present in a vapor phase and in a floating liquid phase. The vapor phase is removed using a vacuum blower, and the floating product phase is removed by a pump, which should minimize the amount of groundwater removed. The process is referred to as dual-phase or dual vacuum extraction. The main focus of the process is the removal of floating product; therefore, it is not specifically designed to capture and treat hydrocarbons that may be dissolved in the groundwater or present in soils that lie above the groundwater, known as the unsaturated (or vadose) zone, although in the course of dual vacuum extraction, some air sparging of groundwater and soil vapor extraction does in fact take place. The vapor and the liquid drawn from the wells are transferred into a knock-out drum that separates the vapor from the liquid, which is primarily water. The liquid is pumped to an oil/water separator, which removes any free product for disposal at an appropriate facility and conveys the water to a pump, which moves it through a filter and two activated carbon drums to remove organic contaminants prior to discharge. The vapor passes through activated carbon to remove organic contaminants prior to emission. The activated carbon is in the form of pellets that adsorb the hydrocarbons from the vapor. This process was used at Building 397, Site 7, and Corrective Action Site 6, until October, when the system at Building 397 was changed to the catalytic converter system.

Ms. Smith asked Mr. Lorton if the exhaust from this system contains hydrocarbons. Mr. Lorton replied that the exhaust contains air and carbon dioxide, but is mostly nitrogen. Ms. Sweeney asked if there was any ethane or methane in the exhaust. Mr. Lorton responded that ethane and methane are adsorbed by the carbon; the intention of the carbon is to adsorb the organic compounds and a variety of other compounds. Note that methane is less readily adsorbed than ethane, however. Most other hydrocarbons are readily adsorbed by activated carbon. Although most compounds are not altered, they adhere to the carbon at the molecular level.

After the source is removed, the biosparging process (Slide 5) can begin. Biosparging introduces small amounts of oxygen into the groundwater to biologically “oxidize” the hydrocarbons in groundwater through bacterial action. Groundwater problems continue in Alameda and most gas station sites because the bacterial oxidation of hydrocarbons proceeds until the bacteria deplete the oxygen; the system then becomes anaerobic and slows down. By adding air into the water, the process can be accelerated, and the conversion of hydrocarbons to carbon dioxide proceeds faster with the presence of air — as opposed to an anaerobic environment, where bacteria break down methane and carbon dioxide.

Building 397 was the first free product removal area (Slide 6). Operation of the system began in March 2002 and operated as a dual vacuum extraction system until October 2004, removing about 1,250 pounds of jet fuel. However, concentrations in samples from one well located under the building suggest some free product may remain. This system also handled vapor and groundwater from other sites. This system may be reactivated again to treat additional TPH that may reside under the building.

Site 7 is the most recently established of the closed gas stations located on Main Street (Slide 7), where methyl tert-butyl ether (MTBE), a gasoline additive, was detected in the groundwater. Remedial systems involving free product removal and air sparging were operated there from May 2002 to September 2003. Almost 10,000 pounds of gasoline were recovered in the vapor phase. During the remedial activities, some fuel lines were discovered that appeared to be sources of contamination in soil. As a result, the lines were removed as well as some resulting contamination. Some residual TPH, gasoline, and MTBE remain in one well each at the site. Ms. Sweeney asked if there was any free product from the fuel lines. Mr. Lorton answered that no free product was associated with removal of the fuel lines.

Parcel 37 was the last active aircraft fueling station north of the western hangar zone (Slide 8). Contamination found at the site was jet fuel. The tanks were removed, and free product was found near the edges of the original tank excavation. The remedial system operated from March 2002 to September 2003, removing just over 5,000 pounds of jet fuel. Mr. Torrey asked if jet fuel meant diesel fuel. Mr. Lorton answered that jet fuel is JP-5 and that jet fuel and diesel fuel have similar boiling points but are different mixtures. Biosparging is continuing at the site to resolve the petroleum sheen in one well and several wells with TPH at concentrations above the screening criteria for ecological concerns.

Area 37 contained 24 underground fuel tanks that were used to store a variety of petroleum products and wastes (Slide 9). Four separate groundwater plumes have been identified. There was no free product at the site; therefore, only biosparging treatment was used in mid-March 2003. Elevated concentrations of TPH remain in only one well, in the southern end of the site near Site 27. There are no indications of chlorinated compounds in this area that might be associated with dioxins from Site 27. A separate small area of free product southwest of Building 14 was treated using vacuum extraction. The product, which appeared to be 10/10 oil, a heavy nonvolatile oil, remains in two of the wells in the area. Ms. Smith asked if this residual was the result of "ganglia." Mr. Lorton responded that this issue was the most perplexing at the site and is still causing problems: after it is removed, it returns. Mr. Lorton further noted that it is a heavy oil with relatively low risk to the environment.

The remaining sites to be discussed are within a 500- to 600-foot radius of Building 397 (Slide 10); Building 530 is an aircraft defueling area, Site 22 is a gas station, and Building 410 is a paint stripping facility and possible aircraft defueling area. Shaw expanded the existing treatment system to treat these additional areas. The system at Building 530 came on line first, then Correction Area 4C (Site 22), and finally Building 410.

The area of concern at Building 530 is the defueling area west of the building (Slide 11). Fuel apparently leaked out of the collection system into the underlying soil. Low fuel thickness was noted initially, but the thickness increased during remedial activities. Approximately 56,000 pounds of jet fuel were removed, of which 39,600 pounds were recovered as free product. Biosparging of groundwater is currently under way to address the remaining TPH in groundwater at the site.

Site 22 was the next to come on line; treatment of vapors has involved a catalytic oxidation system, because it responds better for gasoline than does a vapor-phase carbon system (Slide 12). Catalytic oxidation also was chosen over thermal oxidation because the concentrations of gasoline recovered from the site were not high enough to maintain thermal oxidation. The catalytic oxidation system acts in the same manner as a catalytic converter on a car, which oxidizes any unburned hydrocarbons. The system, although hot, does not contain an open flame; instead, the reaction takes place in the presence of a catalyst. The exhaust stack from the catalytic oxidizer is attached to the side of the Building 397 vent stack.

Ms. Sweeney asked Mr. Lorton to explain the problem with Corrective Action Area 4C (Slide 13). Mr. Lorton responded that it is the former service station located south of the soccer field and commented that it was shut down before the early 1980s, before MTBE was added to gasoline. The treatment system started operation in June 2004 and was shut down in October because of a high consumption of carbon. Approximately 8,000 pounds of gasoline have been removed from the site. The system was converted to catalytic oxidation before it came back on line in June 2005 and is currently in operation. Additionally, biosparging and air sparging are under way in selected wells. Mr. Torrey asked if one of the selected wells is just south of the soccer field. Mr. Lorton explained that the wells undergoing sparging are easily identified because they contain piping that is above ground. He further presented a map of the location of the biosparging wells, which are in the southeast area of the site.

Free product as jet fuel was encountered in wells just east of Building 410 (Slide 14). As a result of the issues associated with introducing an oxidizer to free product, the area east of the paint stripping facility underwent free product removal. This area appeared to be associated with defueling. The system has been operating since May 2005, and approximately 360 pounds of jet fuel have been removed from the site.

Slide 15 shows the cumulative performance of all TPH sites using dual vacuum extraction. Building 530 is the main contributor to the overall performance of the system. Over 80,000 pounds of fuel have been removed to date.

Slides 16, 17, and 18 summarize the performances at each specific site. Slide 16 presents the TPH contaminant concentration ranges over the affected Building 530 site during July 2002 and October 2004 and compares the concentrations to ecological risk criteria used for screening the groundwater contaminations. Following system shut down in October 2004, there is still one area of TPH concern, which is located in the original contaminant area, where free product has rebounded. The area north of the site is not fully delineated but will be addressed in the CERCLA program for Site 13.

Slide 17 and 18 show the performance of the system for Corrective Action Area 7, which occupies the same area as CERCLA Site 7. The free product west of Main Street is shown before and after the system operated. The slide shows only one area that exceeds the cleanup criteria in October 2004. MTBE is shown on Slide 18. MTBE has been greatly reduced and, as shown, it is apparent that the utility corridor has acted as a sufficient barrier to the east to block the shallow contamination.

Ms. Konrad asked about the level of cleanup these sites can achieve. Mr. Lorton responded that the goal is to achieve drinking water criteria; however, these criteria may not be achieved at some sites. Any sites with elevated levels of contaminants will require assistance from the Regional Water Quality Control Board to ensure that the maximum efforts have been applied. After the current treatment systems are shut down, the residual hydrocarbons are expected to be present at low enough concentrations that would be reduced effectively by natural attenuation. Mr. Lorton said that the Navy is working with the agencies at the other sites to determine what criteria are most appropriate. Because there is a potential for water to reach the bay, an ecological criterion of 1.4 parts per million is currently being used as the action level for Site 7 and Corrective Action Area 6. The drinking water criteria and other, more stringent, criteria are also being considered. The agencies do not regulate total TPH; however, they do regulate concentrations of benzene, toluene, ethyl benzene, and xylene, which are associated with gasoline, but not diesel fuel.

Ms. Smith asked that a map to present the corrective action areas be provided to the RAB. Mr. Macchiarella responded that an 11- by 17-inch map will be provided at the next meeting.

V. Site 5 (Aircraft Rework Facility) Removal Action Update

Dr. Cacciatore introduced himself as a senior project engineer with Shaw. He said that his presentation will describe the results of the six-phase heating project for dense nonaqueous phase liquid (DNAPL) at Site 5, just around the corner from Building 1. He also noted that the presentation consists of an overview (Slide 3) of the full-scale six-phase heating application, and descriptions of the background at Site 5, the application of the system, the results of the work, and future work at the site, as well as a summary.

Six-phase heating technology involves installing electrodes vertically into the soil and applying electricity (Slide 4). The resistivity of the soil then heats the area. Three-phase power is converted from the utility provider to six-phase. Electricity is applied to the electrodes and over time the soil and water between the electrodes heat (boil) the pools of DNAPL. The boiling strips the contamination from the media into a vapor phase which moves upward through the soil. The vapor phase is then collected above ground and treated with granular activated carbon.

Site 5 is mainly Building 5 (Slide 5), which housed machine and plating shops that used solvents. The original full-scale system was designed to treat the portion of the plume beneath the site that contained contaminant concentrations at or above 10,000 parts per billion (ppb). The plume contour that defined the limits of this portion of the plume encircled one-third of an acre and extended about 30 feet below ground surface. The soil in this area is artificial fill from the ground surface to about 17 feet below ground surface, and the fill is underlain by the bay sediment unit. The artificial fill is medium to fine grained, and the bay sediment is a clay unit. Groundwater is between 4 and 7 feet below ground surface. The site has a 6 to 8 inch concrete cover that trapped the vapors resulting from the treatment process.

Slide 6 shows Building 5 in blue and the two 10,000 ppb plumes in red. The pilot-test and full-scale application are also presented.

Contaminants of concern (COC) (Slide 7) include the main contaminant, 1,1,1-trichloroethane (TCA), which has been detected at concentrations above 2,000,000 ppb within the 10,000 ppb contour. Other chlorinated solvents are also found at the site. These contaminants are different than the TPH just presented, as they tend to form ganglia in the soil and unlike TPH do not float on the water. Instead, they sink. The contaminant layer will flow beneath the water and leach to the solubility limits into the water, making them difficult to clean up.

The full-scale application at Site 5 was based on a pilot test; it involved a target temperature of 90 degrees Celsius, and required the driving of sheet piles into the loose sands and fill material at the site to serve as electrodes. Multiple sheet-piles were used as a single electrode, which increased the surface area and heated the media to 90 degrees Celsius down to 20 to 30 feet below ground surface within a 3-month period. The area was controlled remotely through a computer modem and was equipped with a laser perimeter security/safety shut-down ability to protect unauthorized intruders from injury.

Slide 9 shows one of the 1-megawatt power supply units used at the site. There are read-out controls and a safety stop system, and incoming power and the six-phase power to the system at this unit are monitored. The controls are behind the doors. The three doors on the side are units that regulate the power on each of the six-phase units. The panels below house the transformers.

Slide 10 shows the layout of the hexagons, each with six electrodes. It shows the pairs of cells that were connected to a single power supply. The cells were phased and wired to promote conductivity across the area between the cells. This array allowed for not only six-phase cells alone to be powered but for

phasing to expand the area of influence. The full capacity of the power supplies and the conductivity of the site were taken into account to maximize the design to the full-scale study.

Slide 11 shows an overhead of the 10,000 ppb outline running across the front of Building 5. This picture was taken before the electrodes were installed. The additional power supplies are also shown, which are powered by Alameda Power and Telecom. Mr. Torrey asked if the site was around the corner from Building 1, and Dr. Cacciatore answered that it is.

Slide 12 presents a photograph of one of the sheet piles being installed using an excavator with a vibratory head that vibrates and drives the sheet pile into the ground. Ms. Sweeney asked if the surface area was all concrete. Dr. Cacciatore showed the area where existing concrete was cut to install one electrode (Slide 13). A tab was then welded onto each of the sheet piles for connection to an electrical supply. Ms. Smith asked about the height of the sheet piles. Dr. Cacciatore responded that the four hexagons were about 15 feet long, and that 18-feet-long piles had been installed in the other corner area. The widths range from 2 feet to 4 feet with the thickness from 1/8 inch thick for the 15-feet-long piles to 3/8 inch thick for the 18-feet-long piles. Ms. Sweeney asked if the piles were made of iron, and Dr. Cacciatore responded that the piles were made of carbon steel.

Slide 14 shows the piles after they have been connected to the wiring and backfilled with concrete. The primary voltage is then split to each of the four electrodes with the wiring. Ms. Konrad asked why the site is being cleaned to 15 or 18 feet when other sites are not being treated the same. Mr. Macchiarella responded that this depth includes the source area and it is being removed to avoid further contribution to groundwater contamination. Dr. Cacciatore explained the plume area at 10,000 ppb indicates the probability for DNAPL and a source area that will continually leach to groundwater. The 1,000 ppb contour extends even farther from the building, so attacking the source is the first step to remediation. The next step may involve another technology, such as bioremediation or chemical oxidation. The dissolved-phase plume, however, must be removed first. Ms. Sweeney asked about the concrete cover on the site. Dr. Cacciatore responded that the asphalt did not sufficiently contain the steam and the resulting vapors had to be covered to capture the contamination at Site 4, where a pilot study was performed.

The yellow hoses are installed at 5 feet to draw the vapors from the soil. The hoses are under a vacuum to draw the contaminated vapor stream, which is 180 degrees Fahrenheit. The vapor leads to a heat exchanger to remove the water for treatment. This equipment is presented in a photograph on Slide 15. The vapor- and aqueous-phase contaminants are treated in the units shown.

The full-scale treatment occurred from July through November 2004. A total of 1.5 million kilowatt hours of power were applied to remove more than 3,000 pounds of total chlorinated solvents (Slide 16). A total of 67,800 gallons of condensate was decontaminated with granular activated carbon and discharged. The initial site temperature was 22 degrees Celsius, and the average temperature within the 3 months of operation exceeded 90 degrees Celsius.

Slide 17 shows the five hexagons in the area that is treated. The animation shows the temperature range at 12 feet below ground surface in July. The area within the pilot test never cooled below 25 degrees Celsius; the progression is shown during heating the remainder of the site from 20 degrees Celsius to 90 degrees Celsius. Ms. Johnson requested the equivalent in degrees Fahrenheit for 90 degrees Celsius. Dr. Cacciatore responded that it is approximately 200 degrees Fahrenheit. Ms. Smith asked if the soils were emitting vapors between the pilot-scale and full-scale treatments. Dr. Cacciatore responded that the vacuum system was in operation until the temperature cooled to below 75 degrees Celsius. The soil is no longer emitting contaminated vapors at this temperature.

Total average chlorinated volatile compounds are presented on Slide 18 for before and after full-scale system operation. The initial two data points represent an average of the total COCs in late 2003, before the system was constructed, and another set data points represent the COCs in May 2004 before the system was in operation. The last three data points represent an average of the total COCs in October 2004 before the system was shut down, in November after the system was shut down, and about 90 days before this presentation.

Future work at Alameda Point includes additional action at Building 5 and at Building 360 (Slide 19). Ms. Sweeney asked when this future work is planned. Dr. Cacciatore responded that Shaw is waiting for funding for the work.

The six-phase heating technology can be applied to high-priority sites and is an expeditious approach (Slide 20). It is critical to obtain detailed field data before the treatment is designed to obtain a cost-effective design and operable system. This remedial application at Alameda Point is the largest to date.

Mr. Torrey asked to review Slide 15, which shows a sprinkler watering grass adjacent to the site. Mr. Torrey asked if the water being used was from treatment at Site 5. Dr. Cacciatore explained that the grass was being watered when the picture was taken of the system. Dr. Cacciatore further explained that the system produces boiling water that strips the contaminants and moves contaminated vapors through the soils. The 70 vacuum points draw the resulting saturated vapor into the system for treatment. Mr. Torrey asked if the water on the lawn and the water in the system were coming from two different sources. Dr. Cacciatore answered that they are not related.

Ms. Smith said that at Treasure Island Shaw has treated VOC plumes of this size using biotechnologies with hydrogen instead of the electrode system. Ms. Smith noted that Peter Bourgeois (Shaw) believes the technology is successful. Ms. Smith asked why the electrode system was used versus other technologies that appear to be effective. Dr. Cacciatore responded that the main contaminant at the Treasure Island site is tetrachloroethene (PCE) and that this system would not be effective for PCE because it boils at a much higher temperature (130 to 140 degrees Celsius) than the COCs of concern at Site 5 at Alameda. In addition, conditions at the Treasure Island site are favorable for the anaerobic treatment of the smaller area. There is a potential that the biotreatment may be a follow-on to this source area removal technology at Site 5.

Ms. Sweeney asked if the area at Site 5 is now cleaned up. Dr. Cacciatore answered that the source has been removed and that dissolved phase constituents now will need to be removed. The plume that contributed to the contamination has been removed, so the dissolved-phase contaminants can be treated with a less aggressive technology.

A community member asked if there are other monitoring wells where concentrations of COCs away from the site can be monitored. Dr. Cacciatore answered that samples from areas outside the pilot-test plume were sampled; however, the pilot test occurred fully within the treatment plume and DNAPL source, so the data beyond the full-scale system are not available. Additionally, these monitoring wells would not provide any additional information, as the technology does not transmit far away from the site.

VI. BCT Activities

Ms. Cook provided the June 2005 BRAC Cleanup Team (BCT) activity update. A handout was provided (Attachment B-4).

Ms. Cook said that there have been discussions over the course of the last 2 months on Site 35. Site 35 is slightly different from our other IR sites in that it encompasses more than 200 acres of property but only small areas of contamination within the 200 acres, so there will be many potential areas of contamination in Site 35. Ms. Cook said that the focus on Site 35 results from an interest for early transfer of the site. As a result, the potential contamination must be assessed; a risk assessment, a remedial investigation, and a feasibility study must be completed; and then remedial options must be identified before transfer can occur. These meetings should maintain an ongoing dialogue to assess any potential issues and move the site through the decision process.

Ms. Cook said that there are many different types of contamination issues, including oil/water separators, soil and groundwater contamination, the effect on housing of the soil removals, and polychlorinated biphenyl staining near grassy areas. The process has been an intensive effort, and Ms. Cook regards progress as good.

The BCT meeting was held on June 21, 2005, and the BCT discussed the upcoming proposed plans. This information has been supplied as a reminder of all the decisions that will be made within the next year. The Site 35 work plan strategy was also discussed, as was adhering to the aggressive schedule. The SMP update was discussed, and EPA has identified specific areas of concern, as noted. The last item was Building 397 and the catalytic oxidizing unit, and communication with the community members for this unit.

Ms. Smith asked why the SMP schedule combined the remedial investigation and feasibility study for Site 35 and why they would not be separated. Ms. Cook responded that completing a remedial investigation and feasibility study together is more the norm.

Ms. Sweeney asked if EPA could summarize any specific comments they have on the SMP update. Ms. Cook said that the Navy is submitting remedial action work plans ahead of design documents, which she personally does not like. Ms. Cook said that she wants to get an idea of the design for a remediation system before she reviews its implementation in the work plan. The request is that the design should be submitted ahead of the work plan for more complex sites; and the plans can be submitted together for simpler sites where the treatment is more straightforward (for example, soil excavation). Additionally, Ms. Cook said that she is requesting a site-specific approach to the length of time needed for implementing remedial actions. Some sites where the action will simply remove soil require a shorter implementation period of a few weeks to months to the time the record of decision (ROD) is signed and can begin implementation. The implementation time will probably require the full statutory 15-month limit that is allowed from the time the ROD is signed to the time field activity begins for sites such as Operable Unit 2B groundwater. These differences in sites are not reflected in the SMP, as the program assumes the same amount of time regardless of the complexity of the site. Ms. Cook said that the site schedules should be directed to be more realistic in terms of the site issues.

Ms. Sweeney asked if biosparging would be considered for the plume at Annex Site 02. Ms. Cook said that EPA understands that biosparging with nutrients will be the Navy's desired remedial action. Mr. Macchiarella said that the proposed plan for groundwater treatment at Site 25 and Annex Site 2 will include biosparging with some nutrient addition and that he believes the regulatory agencies support this.

Ms. Smith asked if hydrogen or any other gas would also be added. Mr. Macchiarella responded that biosparging will involve only air. Ms. Smith said that this process is slower. Ms. Huang agreed that it is slow; however, with the residential component at this site, the action must ensure that nothing escapes from the soil. Biosparging with air is a balance of action. The biosparging is estimated to be completed in 2 years.

Ms. Smith said that she had discussed this issue with the Department of Toxic Substances (David Rist) on July 6, 2005, the day before the meeting, and Mr. Rist commented that using hydrogen peroxide would create potentially significant gaseous releases to the atmosphere, but that hydrogen gas alone would not. Treasure Island was cautioned about using hydrogen peroxide near a workplace and chose to use hydrogen because it is more aggressive than air alone. Ms. Smith asked if there is a concern for adding hydrogen-peroxide as opposed to hydrogen gas injections. Ms. Cook replied that EPA is being cautious because of the residential nature of the site and to ensure the safety of the environment. Mr. Macchiarella said that these are non-chlorinated compounds at Site 25, and that they can be addressed using less aggressive remedial alternatives.

VII. Community and RAB Comment Period

Ms. Sweeney noted that Mr. Humphreys and Ms. Smith have comments they are prepared to discuss for the Site 1 Feasibility Study.

Mr. Humphreys said that although he has not been able to assemble a focus group, he has reviewed the Revised Draft Feasibility Study Report for Installation Restoration Site 1 and has prepared a list of comments on the document (Attachment B-5).

Mr. Humphreys said that the document is complex. An overall integrated picture of the site is difficult to obtain because of the many different studies at the site, including unexploded ordnance, radiation surveys, groundwater sampling, and a seismic stability analysis.

Mr. Humphreys referred to Exhibit 1 of his comments. He recommends a low-permeability clay cap over the waste cell area and that a slurry cut-off wall be placed around the perimeter of the area and tied into younger Bay Mud or older Bay Mud to enclose the entire plume. A potential problem that has not been addressed is the ground squirrel, which can burrow into the barrier. A fine mesh, stainless-steel grid or cobbles (3 inch) may need to be used to prevent ground squirrels from reaching the contaminated soils.

Mr. Humphreys referred to Exhibit 2 and the plastic membrane lining the site. The flow of water in this exhibit is toward the middle of the area, with electric sump pumps continuously operating to assist flow. This flow appears to be incompatible with the golf course operation, which will be required to operate the pumps. Additionally, the golf course design calls for the site to be contoured so that drainage is toward the estuary or the bay. This aspect is inconsistent between the golf course design and the report.

Mr. Humphreys continued with Exhibit 3 and 4 of his comments. Mr. Humphreys noted that Exhibit 3 presents the groundwater plume in this feasibility study by Bechtel, and Exhibit 4 presents the plume in an earlier feasibility study by Tetra Tech. Mr. Humphreys has provided directions of flow on these exhibits to show how the plume to the west appears to be bypassing the funnel and gate treatment system and how the other, larger, component of the plume is moving toward the southwest. The flow is crossing the treatment section of the funnel and gate system. Mr. Humphreys also noted that this same flow is suggested on Exhibit 4 and is bypassing the funnel and gate system, which he added to the figure for reference.

Mr. Humphreys said that the plume in this most recent feasibility report is of chlorinated volatile organic compounds while the plume in the previous feasibility study report was xylene and toluene. Xylene and toluene are not listed as contaminants of concern in this most recent feasibility study report.

Mr. Humphreys referred to Exhibit 5, a schematic drawing of the funnel and gate system as viewed from the top. The treatment section is on the left hand side and the gate is on the right. Apparently, and what was occurring 10 years ago, the plume is essentially bypassing the treatment section, and the presence of the system has presented resistance and forced the plume toward the southwest.

Mr. Humphreys referred to Exhibit 6 to show groundwater elevations at 5- and 4-foot elevation contours (feet above mean sea level). The surface of the site is about 8 feet above sea level, so groundwater is about 3 and 4 feet below grade. The flow in one instance is toward the estuary and in another case is toward the north and generally westward across the site. The immediate area of the funnel and gate system is working to the southwest.

Mr. Humphreys said that the report recommends to move away from the funnel and gate system and toward an in situ treatment in the middle of the plume area. Mr. Humphreys referred back to Exhibit 3 and the flow of water and showed that concentrations are reducing without treatment. Mr. Humphreys believes this reduction in concentration is caused by dilution through tidal influence. A significant assumption in this report is that the ecological impact will be assessed at the point of dilution; therefore, depending on the point selected, a factor of approximately 100-fold dilution could be applied to the concentrations, which is significant.

Mr. Humphreys referred to Exhibits 7 and 8, presenting the radiation surveys (scans) at Site 1. Exhibit 7 is the radiation survey that was conducted in 2004; this figure presents the results from a three-detector system that transversed the site and obtained thousands of measurements points. Exhibit 8 is the 2002 radiation scan. The hot spots from these scans are almost identical. The only difference is that the earlier scan shows hot spots adjacent to the runway and to several black rectangles drawn in the middle of the runway on Exhibit 8. The second rectangle does not appear in the current survey. Mr. Humphreys said that he believes that this rectangle is absent because the survey was not accurate. Mr. Humphreys concluded that the radium pit and the two locations in areas in Area 3A (Exhibit 7) are comparable in the amount of surface radiological activity. He considered the Navy should consider excavating those three areas, not only the top 20 inches, but as deep as necessary to remove any hot spots.

Mr. Humphreys said that the Site 1 feasibility study indicates that the barges are shown on the aerial surveys conducted in 1949 and 1957. Mr. Humphreys said that he cannot see the barges where they are "inferred" at the location of the other sunken barges protruding at the shoreline. Mr. Humphreys said that this point is critical in relation to possible interference with installation of a seismic stability wall. Mr. Humphreys recommends reviewing aerial photographs taken earlier than 1949 to show the barges and using a geophysical survey that might identify their actual locations. Mr. Humphreys further said that he does not believe the barges are deep enough to be effective as a retaining wall.

Mr. Humphreys referred to the training wall, shown in Exhibit 9 along the north side of Site 1, adjacent to the estuary. Mr. Humphreys said that this wall, built around 1890, has withstood several earthquakes, and has probably demonstrated its ability to remain stable. Mr. Humphreys suggested that the stability wall in the western boundary remain in place because if no wall is assumed at this location each earthquake may result in a 20-foot slippage of the land that would eventually move the land back to buried debris in this area. Additionally, the Bay Conservation and Development Commission and the city would not be receptive if the real estate slides into the bay.

Ms. Smith said there are four factors in her comments. Ms. Smith said that her first focus is that the maps must be correct given the longevity of the projects. Specifically, the plate line must be correct. The sites must be discernable from the maps. Ms. Smith also said that she is concerned that the wetlands have not been fully considered in the cost of the cleanup or in the remediation process. There is no cost in this

document for remediation of wetlands. Costing must be shown to support the work because the agencies are requiring functioning wetlands. Mr. Humphreys said that this lack of costing is another inconsistency. Mr. Humphreys said that the report indicates that the amount of fill will be minimized in the wetlands; however, the city (based on the Environmental Impact Plan) is planning to fill all of the wetlands at Site 1. These inconsistencies with the city and the feasibility studies are in opposite directions. Ms. Johnson said that this comment also was raised by the city.

Ms. Smith said that the cleanup solutions suggest the runways will be maintained; however, the city has planned this area to include a golf course. Alternative S2-3 is incompatible with the city's reuse and the seasonal wetlands reuse alternatives. Mr. Leach said that the runways will remain at the site. Ms. Smith said that the intent was to maintain the runways free of cracks.

Ms. Smith said that another concern involves the radiation issue, specifically, two samples per acre for total characterization in an area such as Site 1 where it is known that hazardous waste was used to build the property. Ms. Smith suggested that hazardous waste was used to fill the bottom of Site 1 and that better soil is found at the top. She said that she believes that more hazardous waste will be found deeper within the site. She also said that the Navy does not indicate the type of radionuclides that are found at the site. Cesium, strontium, radium, and cobalt have been discussed in reports according to Ms. Smith but the reports have not provided information on how these nuclides are associated with practices at the base.. Ms. Smith said that she believes there maybe something else in the soil that the Navy is not informing the public about.

Mr. Humphreys said that radium 226 and 228 have been detected a well in the vicinity of the area where the plume emerges in the second water bearing zone. Radium 226 is obtained by extracting uranium ore, and radium 228 is a decay product of thorium, which suggests that thorium is the source. Mr. Humphreys said that he has researched the use of thorium in tracer shells but has not yet resolved this question.

Ms. Smith said that she recommends that all contaminants from other locations should not be consolidated into an area to be used as a golf course. Ms. Smith said that she will recommend using Alternative 4 for groundwater and for soil, and if necessary, Mr. Humphreys' cap alternative as opposed to a polymer cap. Ms. Smith continued with her recommendations at Section 2 to include hot spot removals instead of "movements" in the area. Section 3 should also include hot spot removal. Section 4 should be modified to include the entire berm and use this material to contour the slopes so that the area will not subside. Mr. Humphreys said that the subsidence is occurring because of liquefaction deep underground that will not be corrected by surface activity. Ms. Smith said that complete removal is the solution for Section 5 because she believes the two borings per acre are not sufficient to delineate thorium. The half-life on radium alone is 1,600 years. Ms. Smith said that all of the radiation must be removed.

Mr. Humphreys said that the radiation surveys are measuring only surface activity to 20 inches below the ground surface. Mr. Humphreys said this shallow depth supports his recommendation of containment in areas that would not be excavated to control the unknown deeper issues.

Mr. Coe said that he cannot understand the mystery of the barges. Barges are not small, and he questions the number and locations of barges present at the site. Mr. Coe asked if they extend to the proposed beach that was contaminated with lead.

Mr. Humphreys said that there are two ongoing investigations in the area, one in the sand and beach area, and the other in this berm area. Mr. Humphreys said that the efficiency of proposed remedies cannot be evaluated until all the information is available. Mr. Humphreys also said that the Site 1 feasibility study

is premature and that the berm area should be protected. Therefore, the seismic stability wall should include that area and the cutoff trench should extent around it.

Ms. Smith asked if a presentation could be provided to discuss these options. Mr. Macchiarella answered that he will ask how Ms. Domingo wishes to present the information.

VIII. RAB Meeting Adjournment

Ms. Sweeney adjourned the meeting at 9:15 pm.

ATTACHMENT A

NAVAL AIR STATION ALAMEDA
RESTORATION ADVISORY BOARD MEETING AGENDA
July 7, 2005

(One Page)

RESTORATION ADVISORY BOARD

NAVAL AIR STATION, ALAMEDA

AGENDA

JULY 7, 2005, 6:30 PM

ALAMEDA POINT – BUILDING 1 – SUITE 140
COMMUNITY CONFERENCE ROOM
(FROM PARKING LOT ON W MIDWAY AVE, ENTER THROUGH MIDDLE WING)

TIME	SUBJECT	PRESENTER
6:30 - 6:45	Approval of Minutes	Ms. Jean Sweeney
6:45 - 7:00	Co-Chair Announcements	Co-Chairs
7:00 – 7:10	Site Management Plan -- Opportunity for RAB Discussion and Comment	Mr. Thomas Macchiarella
7:10 – 7:30	Petroleum Program Overview and Update	Mr. Greg Lorton
7:30 – 8:00	Site 5 (Aircraft Rework Facility) Removal Action Update	Shaw Environmental
8:00 – 8:10	BCT Activities	Ms. Anna-Marie Cook
8:10 – 8:30	Community & RAB Comment Period	Community & RAB
8:30	RAB Meeting Adjournment	

ATTACHMENT B

NAVAL AIR STATION ALAMEDA
RESTORATION ADVISORY BOARD MEETING HANDOUT MATERIALS

B-1 List of significant Navy CERCLA program documents planned for July/August 2005, presented by Thomas Macchiarella (BRAC PMO West) July 7, 2005. (1 page)

B-2 Alameda Point Petroleum Program Update, presented by Greg Lorton, P.E. (BRAC PMO West), July 7, 2005. (9 pages)

B-3 Full Scale Six-Phase Heating for DNAPL Source Removal at Alameda Point, presented by Dr. David Cacciatore (Shaw Environmental & Infrastructure, Inc.). (11 pages)

B-4 June 2005 BCT Activities, presented by Anna-Marie Cook. (1 page)

B-5 RAB Member Review of Revised Draft Feasibility Study Report, IR Site 1, Alameda Point, Volume 1, Parts A and B, CTO 0068/0066, May 2005, presented by George Humphreys and Dale Smith, July 5, 2005. (18 pages)

ATTACHMENT B-1

LIST OF UPCOMING CERCLA DOCUMENTS FOR JULY/AUGUST 2005

(One Page)

Alameda Point Restoration Advisory Board Meeting
July 7, 2005

Significant Navy CERCLA program documents planned for <u>July/August 2005</u>

- Draft Final Amendment to the Site Management Plan
- Site 34 Draft Remedial Investigation Work plan
- OU-2C (Sites 5, 10, 12) Draft Remedial Investigation Report
- OU-2A (Sites 9, 13, 19, 22, 23) Draft Feasibility Study Report
- Site 14 (Former Fire Training Area) Final Feasibility Study Report
- OU-1 (Sites 6, 7, 8 and 16) Final Feasibility Study Report
- Site 17 (Seaplane Lagoon) Final Feasibility Study Report
- Site 27 (Dock Zone) Draft Final Remedial Investigation Report
- Site 30 (Miller School) Draft Final Remedial Investigation for Site 30
- Site 31 (Marina Village Housing) Draft Final Remedial Investigation Work Plan
- Site 35 (West Housing Area) Draft Remedial Investigation Work Plan
- EDC-3 (Economic Development Conveyance Parcel #3) Draft Site Inspection Report
- PBC-1A (Public Benefit Conveyance Parcel #1A) Draft Site Inspection Report

ATTACHMENT B-2

ALAMEDA POINT PETROLEUM PROGRAM UPDATE

(Nine Pages)

BRAC
PMO WEST

Alameda Point
Petroleum Program Update

Greg Lorton, P.E., and Michelle Hurst
Alameda Point BRAC Team

July 7, 2005

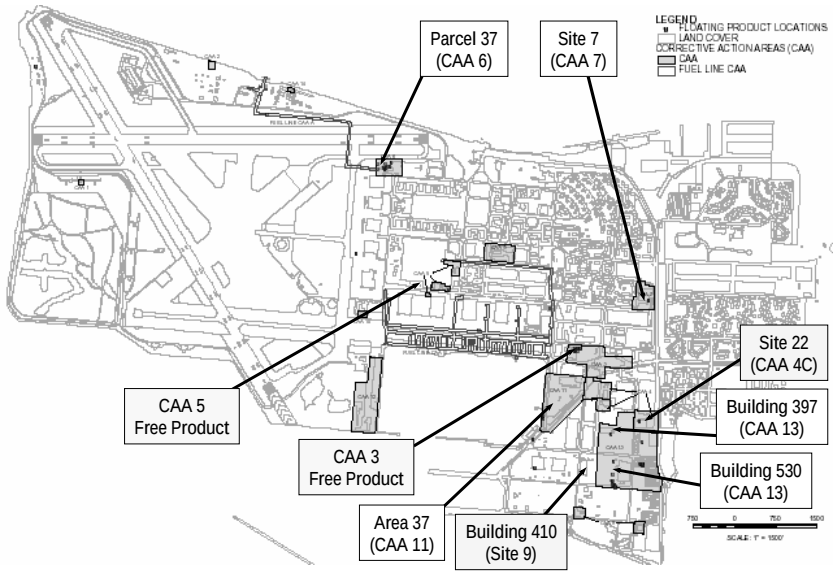
Corrective Action Update

BRAC
PMO WEST

- Free product removals currently in operation using Dual Vacuum Extraction (DVE)
  - Gasoline at Site 22 (CAA 4C)
  - Jet fuel at Building 410 (Site 9)
- Corrective actions for residual contamination underway
  - Jet fuel near Building 397 (in CAA 13)
  - Jet fuel at Parcel 37 (CAA 6)
  - Gasoline at Site 7 (CAA 7)
  - Jet fuel near Building 530 (in CAA 13)
  - Dissolved-phase fuel cleanup at Area 37 (in CAA 11)
- Free product investigations at CAA-3 and CAA-5.

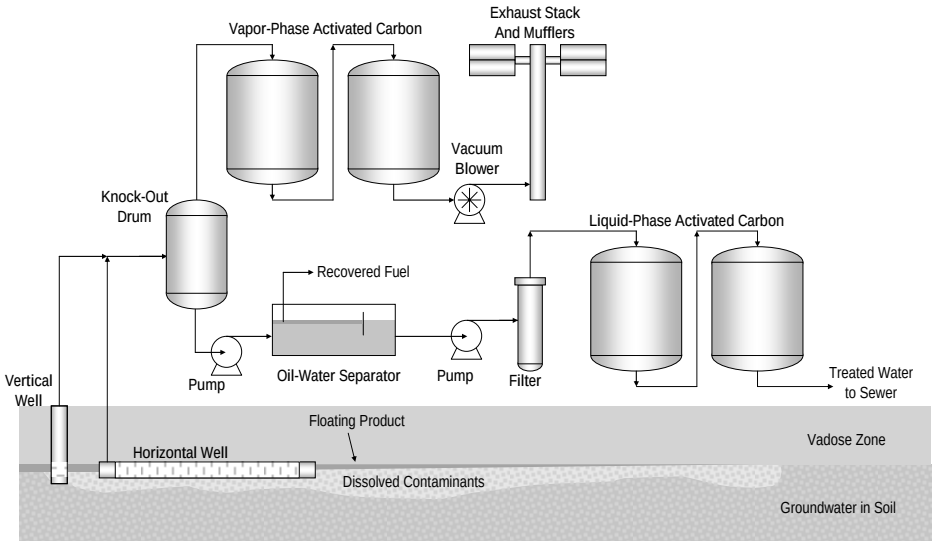
Active Corrective Action Areas

BRAC
PMO WEST



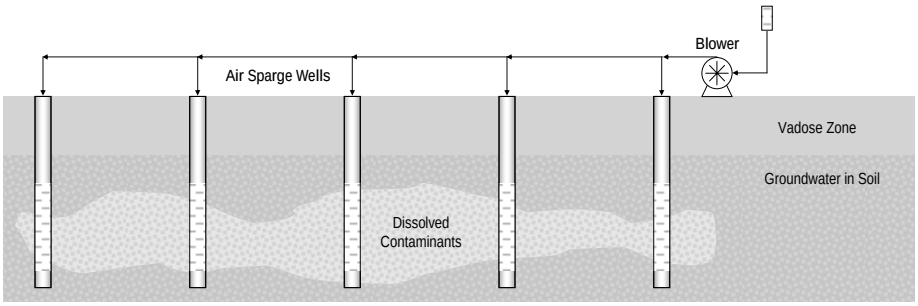
Original DVE Process
(Vapor-Phase Activated Carbon)

BRAC
PMO WEST



Biosparging Process

BRAC
PMO WEST



Building 397

Jet Engine Test Cells (in CAA 13)

BRAC
PMO WEST

- Original jet fuel spill in 1992. Several excavations and removal actions followed.
- Floating product was found near the building in 2000.
- A DVE system operated March 2002 to March 2004 at this site.
- During active free-product removal activities, approximately 1,250 pounds of jet fuel were removed.
- Elevated TPH concentration in groundwater remains in one well inside Building 397.
- The treatment system currently handles vapor and groundwater from the well fields at Building 410 and CAA 4C.

Site 7

Navy Exchange Gas Station (CAA 7)

BRAC
PMO WEST

- Gasoline free product and groundwater contamination was present at the site. MTBE was present in the groundwater.
- The tanks were removed in 1998.
- A DVE system operated from May 2002 to September 2003 for free product removal and air sparging of groundwater. Approximately 9,920 pounds of gasoline were removed.
- Underground fuel lines were found that were originally believed to have been removed in 1998. These lines were subsequently removed in November 2004.
- Residual TPH and MTBE remain in one well each at the site.

Parcel 37

Aircraft Fuel Storage Area (CAA 6)

BRAC
PMO WEST

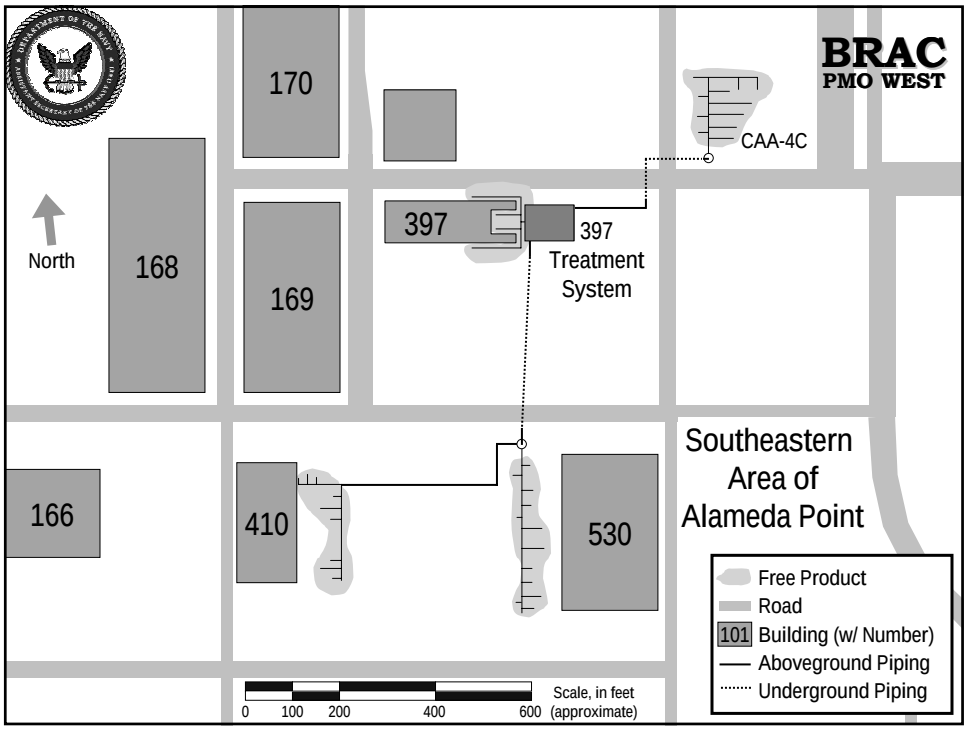
- Operated as a fuel storage area until 1997.
- Jet fuel free product remained (up to 1 foot), in spite of an excavation and tank/piping removal in 1998-1999.
- A DVE system operated from March 2002 to September 2003. Approximately 5,350 pounds of jet fuel were removed.
- Subsequent spot removals have targeted wells with sporadic free product.
- Biosparging is underway at the site.
- One well currently exhibits a petroleum sheen, and groundwater from several wells exceed 1.4 mg/L TPH.

Area 37

Fuel Storage Area (in CAA 11)

BRAC
PMO WEST

- 24 underground tanks were used to store a variety of petroleum products and wastes.
- The tanks were removed in 1998.
- Four separate groundwater plume areas have been identified.
- A biosparging treatment system began operation in mid-March 2003.
- Elevated TPH concentrations remain in one well in the south end of the site.
- A separate small free-product area was treated using vacuum extraction southwest of Building 14. Periodic sheens are still found in two wells in this area.



Building 530

Aircraft Defueling Area (in CAA 13)

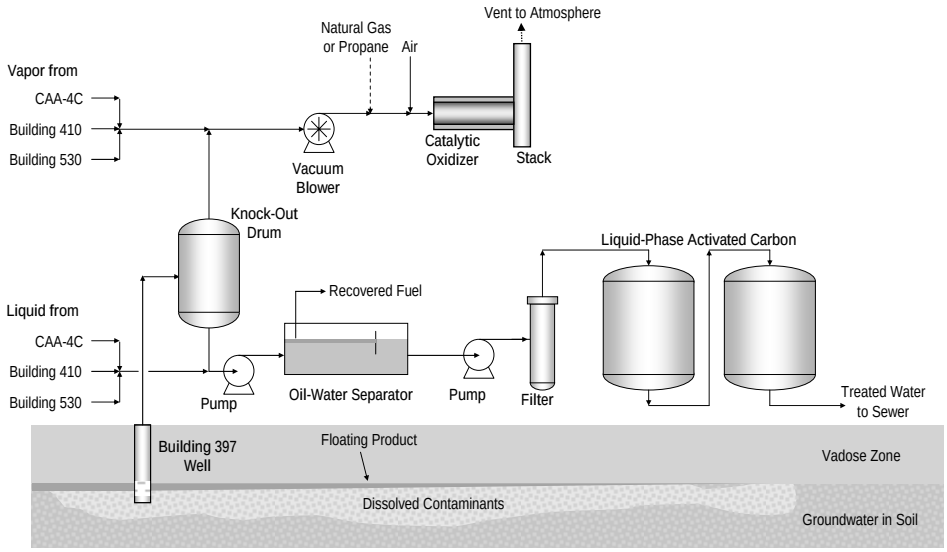
BRAC
PMO WEST

- The lot west of Building 530 was used as an area for draining fuel out of aircraft prior to maintenance. Fuel apparently leaked out of the collection system into the underlying soil.
- The well field was connected into the Building 397 DVE treatment system and operated from October 2002 to September 2004.
- During active free-product removal activities, approximately 55,800 pounds of fuel (primarily jet fuel) were removed, of which 39,600 pounds were recovered as free product.
- Biosparging of groundwater followed in selected wells.
- Sheens have recently been seen in several wells, and elevated TPH concentrations in groundwater remain at the northern area of the site.

Current DVE Process

(Catalytic Oxidizer at Building 397)

BRAC
PMO WEST



Site 22

Former Service Station (CAA 4C)

BRAC
PMO WEST

- The service station at Main Street and Pacific Avenue was operated before the NEX service station at Site 7 (CAA 7). The underground tanks were removed in 1994.
- Gasoline constituents were found in the soil, groundwater, and as free product.
- The DVE well field was constructed and connected to the Building 397 treatment system. Operation began in June 2004, and through June 2005, approximately 8,000 pounds of gasoline have been removed from the site.
- Because of high consumption of vapor-phase activated carbon, the treatment system replaced vapor-phase carbon with catalytic oxidation.
- Biosparging and air sparging are underway in selected wells.

Building 410

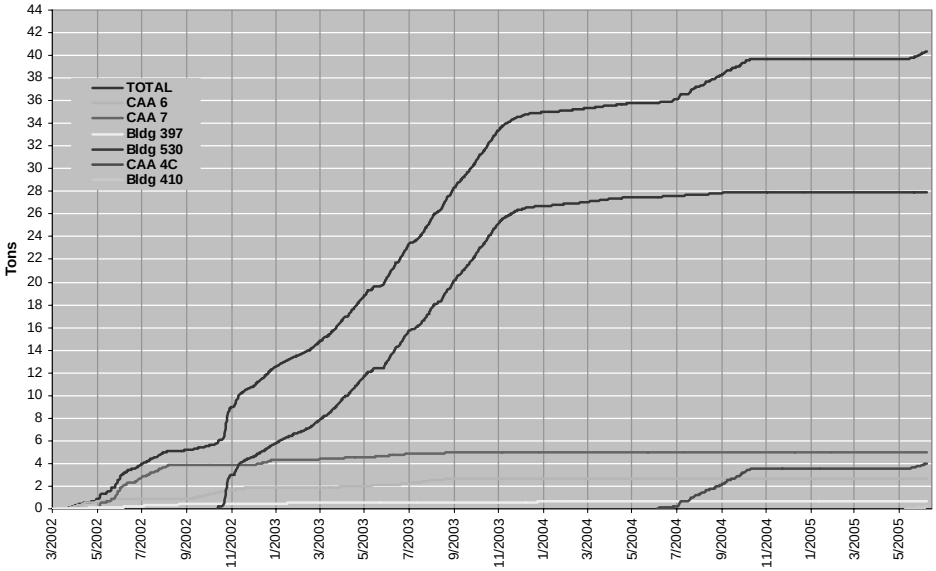
Possible Aircraft Defueling Activity

BRAC
PMO WEST

- Building 410 was used as a paint stripping facility. Paint stripping solvent contaminants are present in the groundwater beneath the site.
- Wells constructed to inject solvent oxidizers revealed unexpected jet fuel free product. (Aircraft were apparently defueled in the area immediately east of the building.)
- Free product recovery wells were installed and connected to the Building 397 treatment system. Operation of the system began in May. In the first month of operation, approximately 360 pounds of jet fuel have been removed from the site.

TPH Removed at DVE Sites

BRAC
PMO WEST



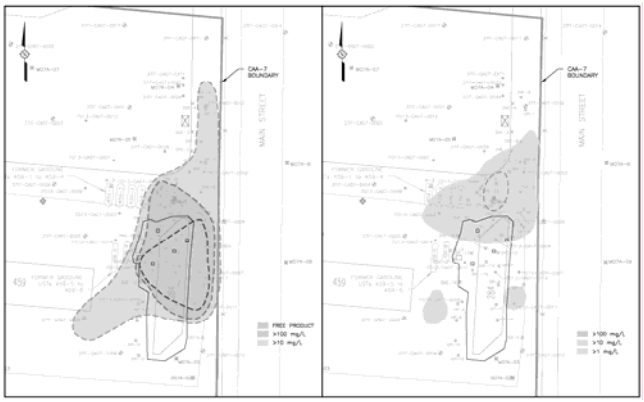
Building 530 Performance

BRAC
PMO WEST

July 2002 October 2004

CAA 7 Performance
(Total Petroleum Hydrocarbons)

BRAC
PMO WEST



July 2002 October 2004

CAA 7 Performance
(MTBE)

BRAC
PMO WEST

July 2002 October 2004

ATTACHMENT B-3

FULL SCALE SIX-PHASE HEATING FOR DNAPL SOURCE REMOVAL AT ALAMEDA POINT

(Eleven Pages)

Solutions.

THE SHAW GROUP INC.®

...a Single Source.

78W02230-4D

Shaw Shaw Environmental & Infrastructure, Inc.

Full Scale Six-Phase Heating for DNAPL Source Removal at Alameda Point

David A. Cacciatore, Ph.D., P.E., Rudolph R. Millan, P.E., John McGuire, PM
Shaw Environmental & Infrastructure, Inc., Concord, CA
Glenna M. Clark, RPM
Naval Facilities Engineering Command, Southwest Div, San Diego, CA

78W02230-4D

Shaw Shaw Environmental & Infrastructure, Inc.

Presentation Overview

- **Introduction/SPH technology**
- **IR Site 5, Alameda Point**
- **Full Scale SPH**
  - Application
  - System Installation
  - Results
- **Future Work**
- **Summary**
- **Questions**

Shaw Shaw Environmental & Infrastructure, Inc.

Introduction/SPH Technology

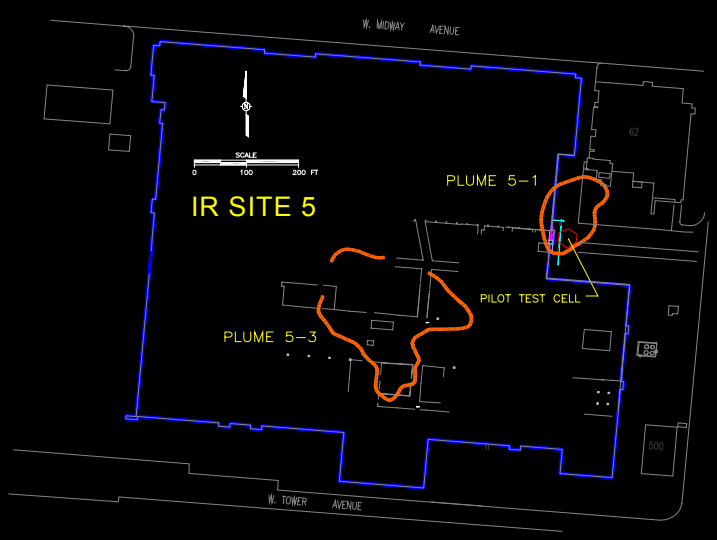
- **Power Dissipation in the subsurface through six electrodes**
  - AC Voltage 60º out of phase applied
  - 15 balanced conductance pathways through area
- **Resistivity of soil/water results in heating**
- **Heat volatilizes VOCs and generates steam**
- **Heated gases and vapors recovered by vacuum extraction**
- **Separation and collection with GAC**

Shaw Shaw Environmental & Infrastructure, Inc.

IR Site 5, Plume 5-1

- **IR Site 5, Alameda Point**
  - 18 acres, mainly Bldg 5
  - 1,000 feet from San Francisco Bay
- **Plume 5-1, 10,000 ppb contour**
  - 100 ft by 150 ft, to 30 ft bgs
  - Artificial fill and Bay Sediment Unit layers
  - Groundwater between 4 and 7 ft bgs, tidal influence up to 2”
  - Concrete surface, 6-8”

Shaw Shaw Environmental & Infrastructure, Inc.



Contaminants of Concern (COCs)

- TCE
- *cis* 1,2 DCE
- *trans* 1,2 DCE
- 1,1 DCA
- 1,1 DCE
- 1,1,1 TCA

Shaw Shaw Environmental & Infrastructure, Inc.

Full Scale SPH Application

- Target Temperature: 90ºC
- Design Scaled-Up Based on Pilot Test Results
- Newly Developed Compound Electrodes: Four Sheet-Piles Each
- Heating Cells of Various Sizes
- Three Power Control Units, Five heating cells, 35 compound electrodes
- Novel Parallel Operation for "Cross-Talk" Conductance Between Cell Pairs
- Power Application Rates up to 1,500,000 Watts
- Three-Month Active Heat Application Forecasted
- Remote Access through Computer Modem
- Laser Perimeter Security/Safety Shut-Down

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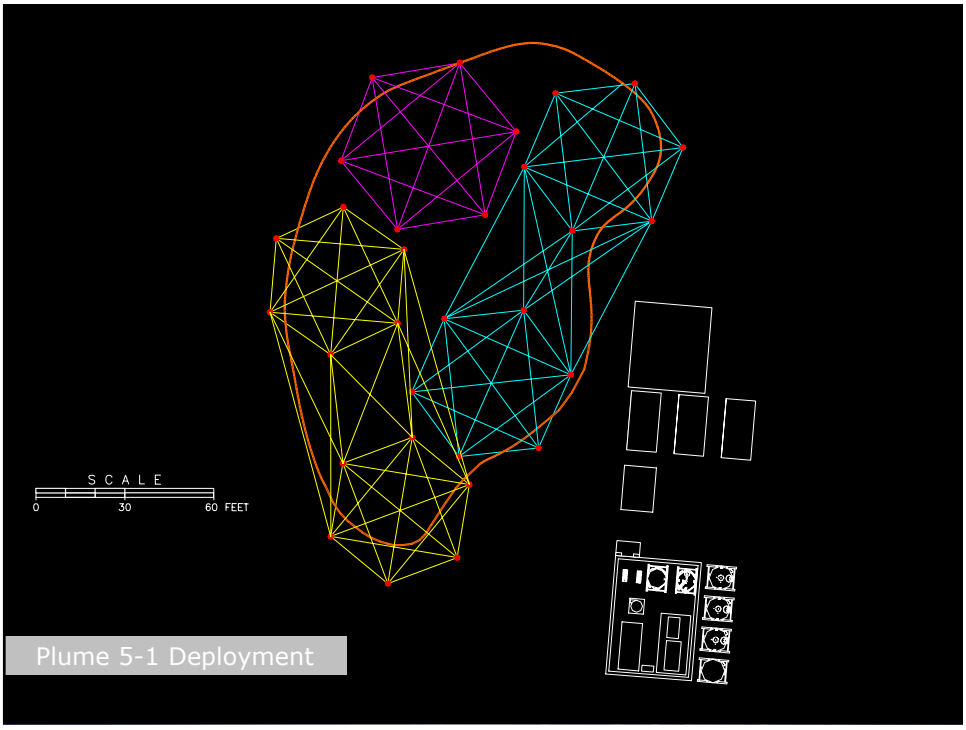


Plume 5-1 Deployment

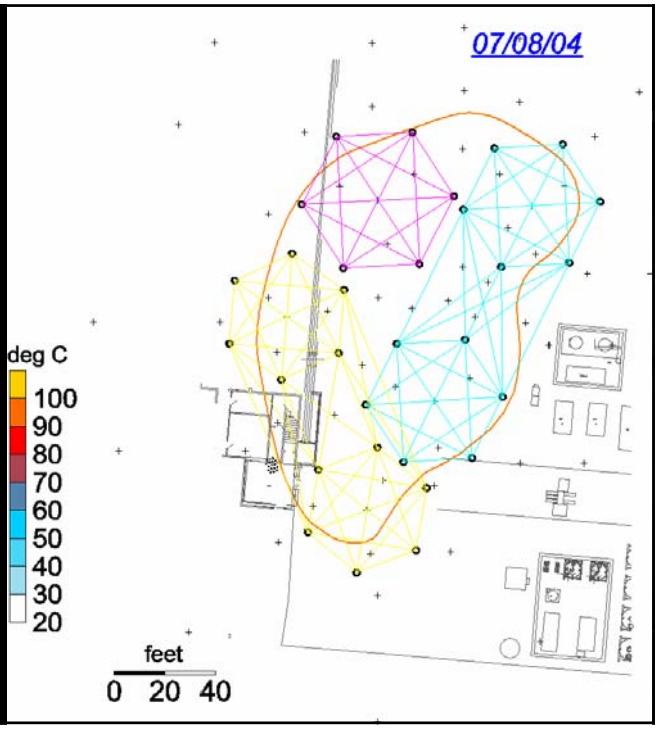
CAT

Full Scale SPH Results

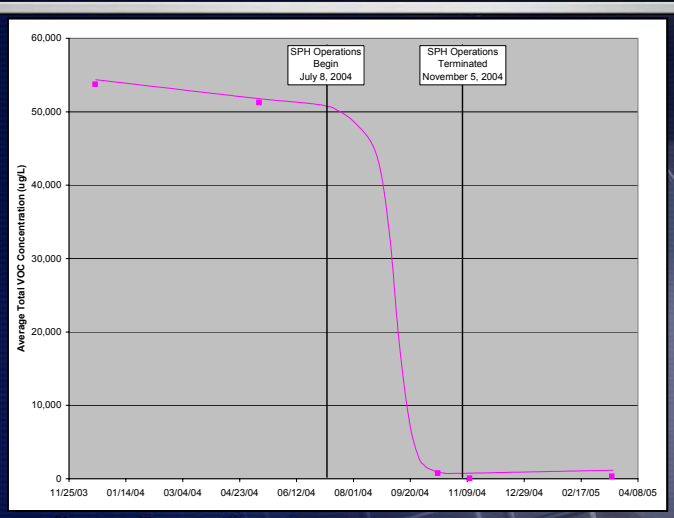
- Heat Application: 7/2004 to 11/2004
- 1,500,000 kWhr total power applied
- Applied Voltage up to 115V per Electrode
- Applied Current up to 700A per Electrode
- Total VOC removal greater than 3,000 lbs >99.9% reduction in concentrations
- 67,800 gallons of condensate decontaminated with GAC and discharged
- Initial Site Temperature of 22ºC
- Average temperature of 90ºC within 3 months

Shaw Shaw Environmental & Infrastructure, Inc.

Alameda Point
Plume 5-1 Heating



Total VOC Removal in Monitoring Wells



Shaw Shaw Environmental & Infrastructure, Inc.

Future Work at Alameda Point

- **Plume 5-3 within Building 5**
  - Three deployments
  - Approximately 13,000 square feet each
  - Total duration of 12 months
  - Depths to 20 feet
- **Plume 4-2 within Building 360**
  - Single deployment
  - Approximately 30,000 square feet
  - Three month duration
- **DNAPL Plumes defined to 30 ft resolution**

Shaw Shaw Environmental & Infrastructure, Inc.

DNAPL Removal by SPH Summary

- **Applicable to high-priority sites**
- **Most expeditious approach**
  - 3-month Duration for DNAPL Source Removal at Plume 5-1
- **Detailed field data are critical for cost-effective design**
- **Alameda Point - largest application of SPH to date (nearly 2 acres total)**
  - Multiple Cell SPH Successful at Plume 5-1

Shaw Shaw Environmental & Infrastructure, Inc.

Questions

Shaw® Shaw Environmental & Infrastructure, Inc.

ATTACHMENT B-4

JUNE 2005 BCT ACTIVITIES

(One Page)

June 2005 BCT Activities

I. **EDC-5/IR 35 Meetings:** The BCT and the City of Alameda met on June 7th and June 21st in a series of ongoing discussions aimed at developing a comprehensive sampling workplan to investigate any potential outstanding areas of contamination on EDC-5. The goal is to have the sampling workplan, field work, sampling results, Remedial Investigation/Feasibility Study and Record of Decision completed by December 2006. Such a tight schedule necessitates a collaborative and ongoing dialogue between all parties to address any and all concerns as they arise.

II. **Monthly BCT Meeting June 21, 2005**
The following items were covered during the meeting:

A. **Status of Upcoming Proposed Plans**: There are a number of Proposed Plans being developed for public review during the next year. These will include the preferred remedies for the OU 5 groundwater plume and the soil at Site 25, Site 15, Site 26 (Western Hanger Zone), Site 17 (Seaplane Lagoon), Site 28 (Todd Shipyards), Site 14, and OU 1 (Sites 6, 7, 8, and 16).

B. **Site 35 Workplan Development Strategy:** The Navy gave a brief presentation on their priorities for Site 35, and outlined a few options for moving the workplan forward to keep to the aggressive schedule set for EDC-5. Some areas of concern will be addressed in the course of remediating existing IR sites, some areas are small and lend themselves to a removal type action and some areas need to go through the whole RI/FS/ROD process for remedial action.

C. **Annual SMP Update**: We discussed the general approach to the Navy's development of the Fiscal Year (FY) 2006 Site Management Plan. Some milestones need to be revised before the SMP goes final. Specifically, EPA has requested that Remedial Design WorkPlans not be submitted prior to Preliminary Design Documents. At a minimum the documents should be issued together and in cases of more complex designs, the workplan should follow after review of the preliminary design document. EPA also asked that the Navy tailor Remedial Action Start and End dates to more realistically reflect the complexity of the specific sites. For example, the time needed before remedial action can start and end at Site 14 is expected to be shorter than for the OU 2B sites.

D. **Building 397 Discussion and Site Visit**: We had a discussion about the catalytic oxidizer that had been incorporated into the treatment system for TPH clean up at Building 397 and took a short tour of the site to see the system in operation.

ATTACHMENT B-5

RAB REVIEW OF REVISED DRAFT FEASIBILITY STUDY REPORT, IR SITE 1, ALAMEDA POINT, VOLUME 1, PARTS A AND B, CTO 0068/0066, MAY 2005

(Eighteen Pages)

George B Humphreys
From: George B. Humphreys
July 5, 2005

Subject: Review of Revised Draft Feasibility Study Report, IR Site 1, Alameda Point, Volume 1, Parts A and B, CTO - 0068/0066, May 2005 (1)

General

The report represents a complete revision of the previous Feasibility Study(FS) issued in December 2002(2). The subject report by Bechtel Environmental, Inc is well written, fairly comprehensive and technically complex. One weakness of the report is that it does not make specific recommendations. Nevertheless, by inference the report seems to be favorable toward certain remedial approaches and unfavorable toward others. Another shortcoming is that there are on-going investigations of the "burn area" and the "beach area" the results of which are not yet available.

In considering the appropriate remedies for Site 1, it is important to take a holistic approach. Thus, the "big picture" must be considered, including the site location, waste characteristics and quantities, and the interaction among the various proposed remedies. It also is imperative to coordinate the remedies with proposed future uses of the site such as the proposed golf course, beaches and parks and seasonal wetlands.

The quantities and types of wastes disposed of in the cells have not been well characterized. The landfill cells apparently contain a variety of industrial wastes, including chlorinated solvents, xylene, toluene, and other organics, probably dense non-aqueous phase liquids (DNAPL's), unexploded ordnance, refuse, aircraft engines and parts and radioactive wastes in the form of radium. Technically, this landfill would be categorized as a "mixed waste" landfill because it contains both chemical hazardous wastes and radioactive wastes. The estimated quantity of solid wastes ranges from 15,000 to 200,000 tons (Ref 1, page ES-1). There have been several surface surveys for unexploded ordnance and radioactivity. In addition, there has been considerable monitoring of groundwater and sampling of soil around the site perimeter. There has been a reticence to sample within the waste cells, probably engendered by misgivings about hitting buried obstructions and unexploded ordnance.

The location of the Site-1 hazardous waste dump along the margins of San Francisco Bay certainly would be unacceptable by today's standards. In fact, after years of siting and engineering studies, the State of California has been unable to establish a low-level radioactive waste disposal facility. Even if the contaminated groundwater plume is adequately treated, there are some types of wastes in Site-1, Radium 226 with a half-life of 1,600 years and unexploded ordnance, which should be contained for many years into the future.

Recommendations

The following general conclusions are offered:

1. The active in-situ treatment of the solvent plume is an improvement over, and preferable to, the previously proposed funnel and gate treatment system.

2. Elimination of the previously recommended soil-cement/rock column wall along the bay-side margins of the site is ill-advised, even if some of the wastes are moved away from the shoreline.
3. Based on the surface survey of radioactivity there appear to be at least two other areas, in addition to the radium disposal trench, which should be excavated for off-site disposal.
4. The hazardous waste cell area should be contained by using a low-permeability clay cap in conjunction with a slurry cut-off wall surrounding the cell area. The slurry cut-off wall should be keyed into the younger bay mud, utilizing that formation as an aquitard under the waste cells.(see Exhibit 1)
5. A barrier should be installed above the low-permeability cap to prevent ground squirrels from digging channels through the cap into the waste-containing areas and bringing contamination to the surface.

Fragmentation

One difficulty in attaining an overview of the site and the various remedial alternatives is "fragmentation". The various investigations have been divided into surveys of unexploded ordnance, surveys of radioactivity, separate studies of seismic stability, groundwater and soil sampling, and tests of the funnel and gate treatment system. This fragmentation has been carried even further by dividing the site into five areas, two media and a series of treatment alternatives. While subdividing the work facilitates the accomplishment of a large task, it tends to obscure an overall understanding of the site.

Need for Coordination

When the writer joined the Restoration Advisory Board over three years ago, it became immediately apparent that close cooperation would be needed between closure of the Site 1 hazardous waste dump and the City's plans for a new golf course. Despite many meetings between the Navy and the City's planners the following incompatibilities currently exist. The City's golf course designers were instructed to assume a clean, level site and the EIR(3) assumes that there will be no significant interaction between the golf course and the underlying wastes. This latest feasibility study by the Navy seems to be favoring a "cap" consisting of several feet of porous material placed on top of the waste cells. Such a porous, sandy cap would allow infiltration of 30,000 to 60,000 gal/day of irrigation water into the groundwater in the waste cell area. This would provide an additional hydraulic driving force tending to exacerbate the flow of the contaminated plume toward the Bay.

Another example of lack of coordination is with regard to the recently discovered seasonal wetlands. The City's revision(4) to the golf course EIR assumes that these wetlands will be filled in for construction of the golf course, with mitigation provided by replacement with new wetlands created outside the golf course area (3.39 acres by the City and 15.33 acres by the Navy). This revised feasibility study (ref. 1 page 5-6 and Table 5-5) states that only 2.1 acres of seasonal wetlands over the waste cells would be

filled for the cap. The destruction, loss or degradation of seasonal wetlands would be "minimized" in compliance with Executive Order No. 11990. Retention of seasonal wetlands within Site 1 may require a re-design of the proposed golf course. Has anyone contacted the Fish and Wildlife Service and/or the Veteran's Administration about whether the mitigating wetlands will be allowed within the Wildlife Refuge area?

Some of the alternatives involve excavating contaminated waste materials near the shoreline and relocating them to portions of Area-1 away from the shoreline. The Feasibility Study report suggests that this would possibly eliminate the need for a soil-cement/rock column seismic barrier in those areas. Coordination should be done with the Bay Conservation and Development Commission(BCDC) in regards to the acceptability of lateral displacements of the shoreline in the areas excavated. Also, who would pay for repairing portions of the shoreline which might slump or slip into the Bay during or following a major earthquake? One can envision a succession of earthquakes, occurring over time and causing a series of 20-ft lateral displacements which would eventually erode the present shoreline and expose waste materials to the Bay. Clearly physical degradation of the shoreline along beaches, shoreline parks or the golf course would be undesirable even if the seismic stability wall were not required to keep waste materials from entering the Bay.

Another area where coordination is needed is in regard to the drainage system for the synthetic plastic membrane cap (Exhibit 2). As can be seen, the synthetic membrane cap would be relatively flat and sloped toward a number of interior sumps. These sumps would use electric sump pumps which would require continual operation and maintenance. This appears inconsistent with the operation of an over-lying golf course. As discussed in the City's EIR, the golf course design contemplates contouring of the underlying cap and drainage toward the Bay and Estuary along the outer portion of the course.

The Contamination Plume

Exhibit 3 is a Figure from the most recent Feasibility Study (1)depicting fthe extent of the chlorinated solvent plume within the landfill. This can be compared with the shape of the contamination plume from the earlier 2002 Feasibility Study (2), shown as Exhibit 4. The 2002 FS contamination plume shows contours (1994-95 data) for xylene and toluene; whereas, the most recent plume is for the chlorinated volatile organic compounds. The two figures depict the same contamination plume, just for different constituents and reflect changes which have occurred over time (approx. 8 to 10 years). Another important feature to note is the "funnel and gate" treatment system as called out on Exhibit 3. The funnel and gate system is shown schematically in Exhibit 5. Note that the system is comprised of a "remedial gate" section and a "control gate" section. Groundwater flowing through the remedial gate passes successively through a sand bed containing granular iron (intended to remove chlorine from the chlorinated solvents) and then through a biosparging section (intended to oxidize and remove organic hydrocarbons, including those which have been stripped of chlorine).

By comparison of Exhibits 3 and 4 several conclusions can be reached:

1. In both cases the plume appears to be bypassing the treatment gate and flowing through the control gate.
2. The more recent picture of the plume shows that a large component of the flow has shifted and is flowing to the southwest in the general direction of the proposed public beach.

The flow of groundwater is influenced primarily by two factors; the driving force or "head" pushing the liquid , and the flow resistance of the media through which the liquid is passing. In this case, the funnel and gate system represents a resistance, but with the control gate presenting less resistance than the treatment section. Thus, the flow tends to bypass the treatment section. The whole funnel and gate system's resistance tends to divert the flow off to the southwest. What is the driving force? The groundwater elevation is shown in Exhibit 6 (1). The groundwater elevations are from September 2003 and represent the height above mean sea level. Thus, groundwater will tend to flow from the 5 ft elevation toward the 4 ft elevation, i.e. toward the west and north sides of the site. It is important to realize that these groundwater elevations change with the seasons. For example, during the winter, when the seasonal wetlands are present, the groundwater elevations are at the ground surface (approximately + 8 ft above mean sea level). The outlines of two of these seasonal wetlands are shown in Exhibit 3. The additional head or driving force provided by these seasonal wetlands should cause an accelerated flow toward the Bay, not reflected in Exhibit 3.

A pilot-scale demonstration of the funnel and gate treatment system was conducted from 1996 through 1999 (1). According to the Feasibility Study (1) the pilot scale test showed a 98 percent reduction in contaminants across the remediation gate. Surprisingly, from Exhibit 3, it appears that a considerable reduction also is occurring across the control gate and perhaps beyond the control gate. Note, however that concentration contours between the funnel and gate and the Bay are shown dotted or "inferred". These concentration reductions appear to be due to dilution by Bay waters and tidal influence over the approximately 100 ft distance.

The inferred dilution of contaminants near the shoreline is significant because "The point of compliance for these shoreline remediation goals is the receiving water (San Francisco Bay and the Oakland Inner Harbor) following initial dilution." (Ref. 1, page 3-8)

The funnel and gate treatment system (Referred to in the Feasibility Report as "Permeable Reactive Barriers") was eliminated by the screening evaluation on the basis that it can not treat upstream contaminants, requires scarification of the iron zones every 7 years, and is incompatible with capping. Also, the system is not applicable to the treatment of DNAPL's. (see Ref. 1, page 4-21).

The retained remedial process options for in-situ treatment of the contamination plume include enhanced aerobic bioremediation, enhanced anaerobic bioremediation, chemical oxidation (Fenton's reagent), and microscale iron injection (Zero Valent Iron).

(Ref 1, Table 4-1). The effectiveness of each of these process options would have to be demonstrated by pilot scale operations, which could take several years to complete. However, there is no guarantee that the effectiveness of these processes will be successfully demonstrated.

During the approximately 50 years since closure of the Site 1 dump, the Feasibility Study suggests that natural degradation of dense non-aqueous phase liquids (eg trichloroethene) has occurred under anaerobic conditions, as evidenced by the presence of degradation products. However, it may take at least another 100 years to complete the natural degradation process (ref. 1, page 2-38).

Because contaminants from the plume currently appear to be flowing into the Bay, it is suggested that a slurry cut-off wall be placed around the perimeter of the waste cell area. The Feasibility Study rejected the slurry cut-off wall because its effectiveness might be compromised by contaminants flowing around the end of the cut-off wall. However, that reasoning is invalid if the cut-off wall completely encircles the contaminated area. The further objection might be offered that a porous, sand cap would allow groundwater infiltration and eventually fill up the enclosed volume. However, that objection is also invalid if a low-permeability cap (as required by RCRA design standards) is used. Because it is important that the low permeability cap be joined to the vertical cut-off wall, a combination of a clay slurry cut-off wall and a clay cap should be utilized. It is difficult to envision how a low-permeability plastic cap material such as high-density polyethylene could be joined to a clay-soil cut-off wall. The Feasibility Study (ref. 1, page 5-2) ignored interactions between groundwater and soil remedies. However, as demonstrated by the above reasoning, the interactions between the low-permeability clay cap and the cut-off wall are indeed very significant.

Radium-impacted Waste

Exhibits 7 and 8 show the distribution of radiation from radium-impacted waste for Site 1. These locations are from the latest Feasibility Study (1) and the previous 2002 version (2), respectively. It is apparent that areas with the highest count rates correspond almost exactly for the two surveys. Radium is an emitter of low-energy gamma rays (X-rays), beta particles (electrons), and alpha particles (helium nuclei). Even with fairly sensitive instruments a surface survey such as this can only detect radiation sources at depths no greater than 20-in. It can be seen that the surface contamination has been spread beyond the waste cell area (Area 1). The surface distribution of radium-contaminated soil is not necessarily representative of radium occurring at greater depths. Certainly, in the case of radium pit in Area 1b, which reportedly measures 50 ft long by 11 ft wide by 8 ft deep (ref. 1, page 2-3), one would expect the radium-contaminated soil to continue down to the bottom of the pit. There are two other locations in Area 3a which exhibit surface radiation levels comparable to those from the radium disposal pit.

The major risk from radium is not direct radiation, but rather from ingestion and inhalation. It can cause bone cancer and cancer of nasal tissue. Thus, the most serious risk is that radium could become mobilized and leak into the environment

and food chain. There also could be an ingestion and inhalation risk for workers involved in sorting and handling of radium-contaminated soil. Although one would expect that the radium within dials and instruments would be difficult to mobilize, the previous Feasibility Study (2) mentioned that radioactivity was detected in every monitoring well at Site 1.

This latest FS (1) pays little heed to radioactive contamination in groundwater, nor does it address any remedies. It does discuss the detection of both Ra-226 and Ra-228 in the Second Water Bearing Zone at well Mo 28-C. The presence of Ra-226 is expected as it is extracted from Uranium ores. However Ra-228 is a decay product of Thorium. This suggests the presence of Thorium in the landfill.

This latest FS (1) screened the remedial alternatives for radium-impacted waste to the following:

1. No action (S-6-1)
2. Removal of radium impacted soil in Areas 3 and 5, and in one located in Area 1 (i.e. the pit) and cover/cap of the remaining radium-impacted waste in Area 1. (S-6-4)
3. Removal of all radium-impacted waste (S-6-5)

Presumably, what is meant by removal of "all" radium-impacted waste is removal of all radium wastes <u>on the surface</u> (down to 20-in). It is suggested that an intermediate alternative be considered, namely excavation of the radium disposal pit in Area 1; plus, excavation of the two hot spots in Area 3a which appear to have surface radiation levels as high as that from the disposal pit. In each instance, where excavation of radium waste is undertaken, removal should be taken down to a depth where high radiation levels are no longer detected (i.e. not just the top 20-in.).

Where radium and chemical hazardous waste are intimately intermixed it probably is not feasible or practical to separate them for disposal and it will be necessary to depend on isolation of those areas from the surrounding environs. It should be noted that the remedy suggested herein for containing the contaminated ground water plume, namely a slurry cut-off wall surrounding Area-1 and an low-permeability cap, would also be effective for containing subsurface radium-impacted waste within Area-1.

There are two other potential mechanisms by which radium-impacted and other hazardous wastes could be brought to the surface. These are <u>burrowing rodents</u> and <u>sand boils</u> resulting from earthquake-induced liquefaction. The ground squirrel problem could be circumvented by incorporating a barrier into the cover. This barrier could consist of either a heavy-gage stainless steel mesh of appropriate spacing, or a gravel/rock barrier. If a rock barrier is used, the stones would have to be large enough so they could not be moved by the rodents and small enough so the rodents could not fit through gaps between the stones. Something in the 3-in. to 4-in. size range might be effective.

Neither the clay or synthetic plastic caps appear capable of preventing sand boils resulting from liquefaction The clay material, however, should be more capable of self-repair, following a rupture due to a pressure upsurge.

Seismic Stability Wall/Buried Barges

The previous Feasibility Study (2) recommended the construction of a 24-ft wide soil-cement gravity wall with rock columns along the Bay and Estuary sides of Site 1 (see Exhibit 9). A seismic stability analysis had indicated that, during a major earthquake, horizontal slippage of up to 20 ft could occur along the shoreline. The proposed soil-cement/rock column gravity wall was intended to stabilize the slope against such slope failure.

The current Feasibility Study (1) states that archived drawings and aerial photographs indicate the presence of sunken barges along the western side of the site next to the Bay. Further, the report suggests that the alignment of the barges can be seen in aerial photographs taken between 1949 and 1957. A slide presented by Jim French of Bechtel Environmental at the June 2, 2005 RAB meeting showed portions of two barges protruding from the shoreline. Figure 2-1 of reference 1 shows by dotted lines the "inferred" location of the sunken barges. Inspection of the aerial photographs from 1947 through 1988 (Figures 2-2 through 2-7 of reference 1) does not clearly show the location the barges. The report states that these barges would interfere with the installation of the seismic stability wall. The report also includes alternatives that involve excavating contaminated materials near the shoreline and relocating the wastes to portions of Area-1 away from the shoreline. The report says that this might eliminate the need for the soil-cement/rock column seismic barriers. As discussed earlier, elimination of the seismic stability wall appears unwise because a succession of earthquakes could cause a series of 20-ft lateral slippages and eventually erode the shoreline so that hazardous materials are exposed to the Bay. Probably the BCDC would not be receptive to the prospect that the proposed public beach and parks could be destroyed because of shoreline slippage, or that unexploded ordnance or radium-contaminated wastes could become exposed.

The following recommendations are made:

1. Review earlier aerial photos which might actually show the barge locations.
2. Determine the location of the barges by using some geophysical survey technique like ground-penetrating radar or a magnetometer.
3. Determine the dimensions and mass of the barges, so that a seismic stability analysis of the barges capabilities to prevent lateral slippage can be assessed. (The barges probably are not deep enough to be effective).
4. If the barges are not adequate to provide seismic stability, install the previously proposed soil-cement/rock column wall (or equivalent) along the western shore of the site.
5. Because the historic "training wall" along the estuary was constructed pre-1900, assume that it will be an adequate substitute for the soil-cement/rock column barrier along that shoreline. Note that the existing training wall presumably has withstood both the 1906 San Francisco earthquake and the 1989 Loma Prieta quake.

Containment

RCRA design standards require a double liner system on the top, sides and bottom of a landfill. The double liner consists of two liners (clay layer and synthetic membrane). The double-liner system allows monitoring for leakage between the liners. Because this is an existing dump constructed and operated before the RCRA standards came into existence, the argument is made that current standards don't apply. This is a situation analogous to seismic retrofit of old buildings or bridges, which don't meet current earthquake safety standards. The Site 1 dump, even though no longer operating, must continue to function to prevent infiltration of surface water into the cells and the flow of contaminants out of the landfill to the groundwater and environs.

What is proposed herein (see Exhibit 1) is a slurry cut-off wall surrounding the waste cell area keyed into the younger bay mud, and a top cap comprised of clay, (probably bentonite), both structures meeting RCRA permeability standards. The bottom of the "containment" would consist of the younger bay mud layer underlying the site. The report (ref. 1, page 2-9 and 2-19) indicates that the highest contaminant levels occur in the first water-bearing zone and that the chemical plume has not yet dispersed into the second water-bearing zone. Therefore, the younger bay mud may form an adequate "bottom" for the containment. If this is not true, then the cut-off wall could be taken down to the older bay mud stratum. The younger bay mud layer would have to be at least 5 ft thick to provide a sufficiently thick base into which the cut-of wall could be keyed.

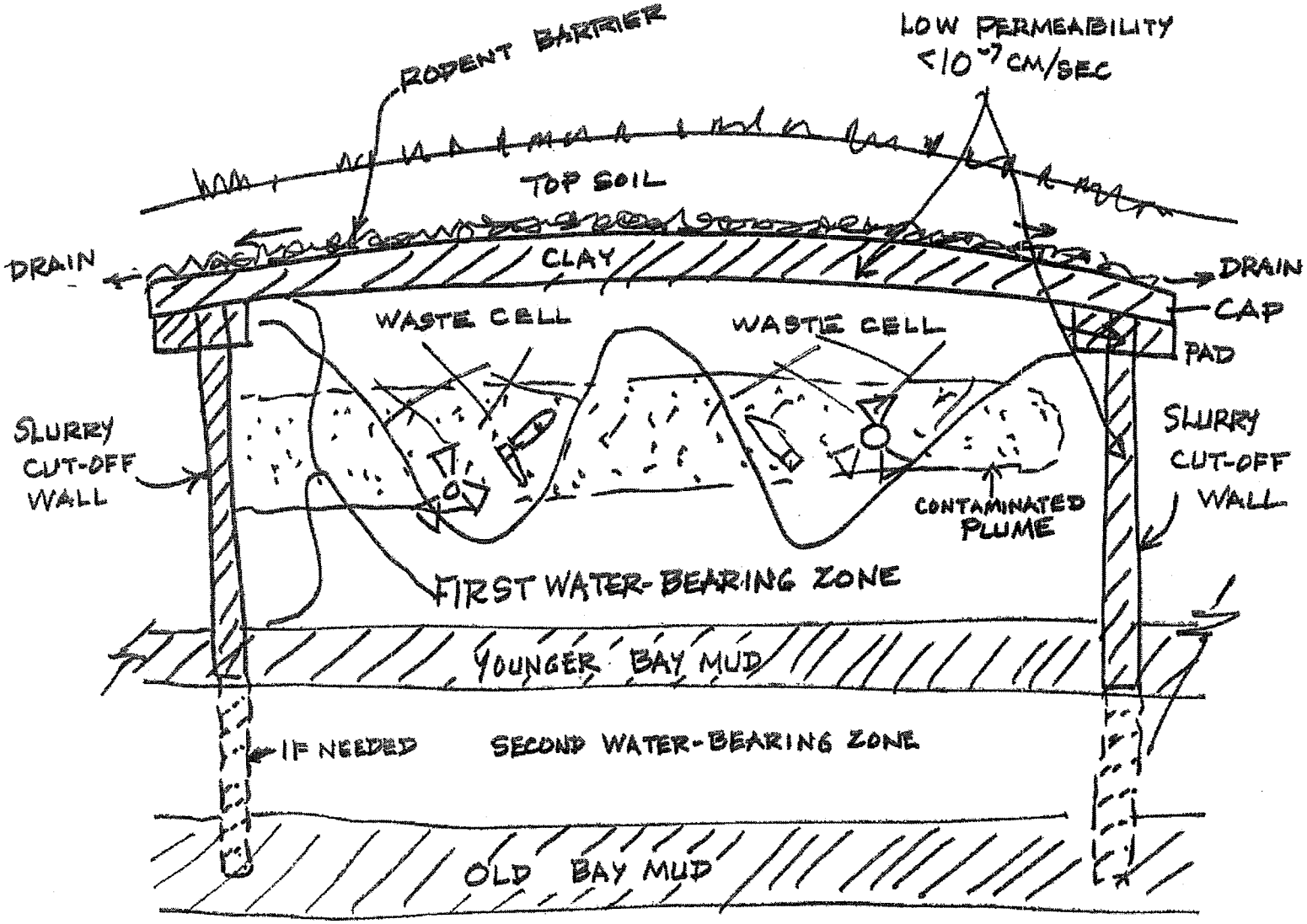
The Feasibility Study states (ref. 1, page 3-6) that RCRA requirements are assumed to be potentially applicable federal "Applicable Relevant and Appropriate Regulations" (ARAR's). However, some of the proposed remedial alternatives such as the porous soil cap and the lack of lateral containment of the contaminant plume are inconsistent with RCRA requirements. Reliance seems to be placed instead on natural degradation and dilution of the contamination plume at or near the Bay.

Other Specific Comments

1. Why isn't soil gas (containing vinyl chloride and methane) a media of concern? (page 3-1)
2. What interest rate is used for present value calculations? Previously, RAB commented that 7% seemed too high as this would mean money for future costs would have to be invested at 10% (assuming a 3% inflation rate). Appendix I (page D-4) says the interest rate is in accordance with O& M Circular 94, but what is the actual figure used?
3. What is the effectiveness of zero-valent iron in treating DNAPL's?
4. In the mechanical screening of the firing range berm to remove spent projectiles and brass casings, will the below grade material also be processed?

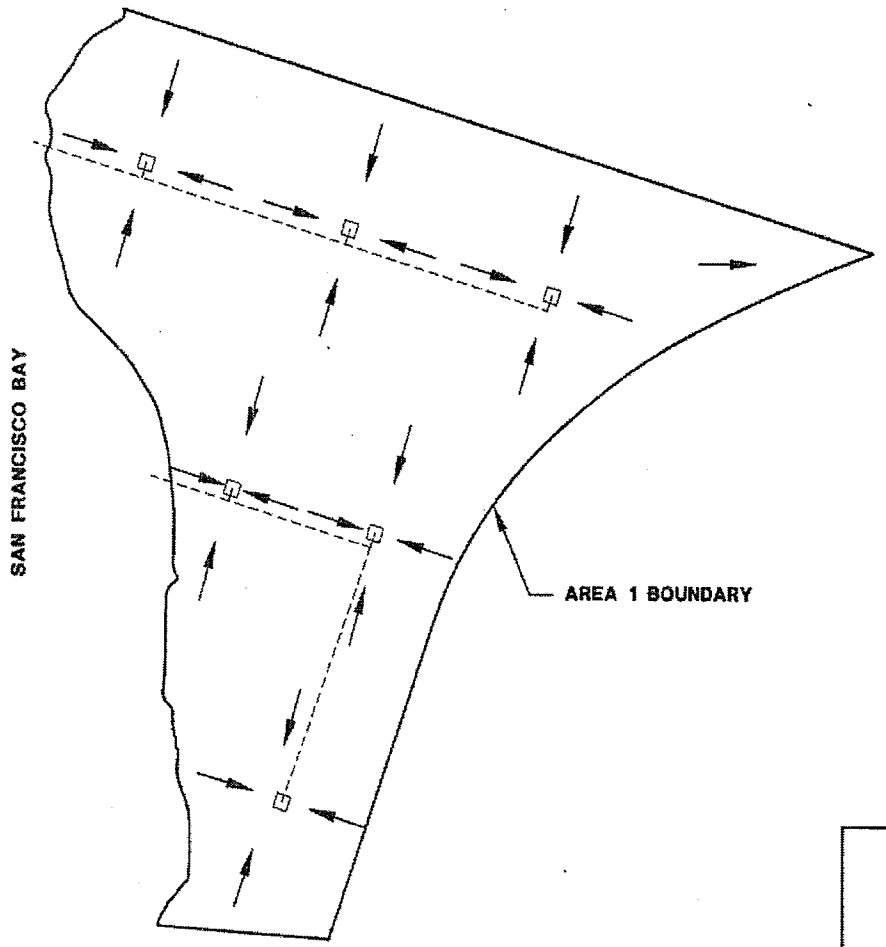
References

1. "Revised Draft Feasibility Study Report, IR Site-1, 1943-1956 Disposal Area, Alameda Point, Alameda, California", Volume 1, Part A, CTO-0068/0066, May 2005.
2. "Revised Draft Feasibility Study Report, Operable Unit-3, Site-1-1943-1956 Disposal Area", DS A029-10145, Contract No. N 08711-00-D-005, Delivery order 29, Dec.12, 2002.
3. "Draft Environmental Impact Report, Alameda Point Golf Course", July 2004.
4. "Revisions to Draft Environmental Impact Report, Alameda Point Golf Course", March 2005.



SKETCH OF CONTAINMENT CONCEPT

EXHIBIT 1

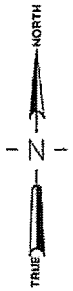


LEGEND

- INFERRED LIMITS OF FORMER WASTE DISPOSAL AREA
- WATER FLOW DIRECTION
- WATER COLLECTION PIPING
- INTERIOR SUMP WITH PUMP

CONCEPT:

GRAVITY FLOW OFF OF DRAINAGE LAYER TO A SERIES OF INTERIOR SUMPS. WATER IS PUMPED FROM SUMPS TO COLLECTION PIPING OUTSIDE OF DEBRIS AREA FOR DISCHARGE.



NOT TO SCALE

Revised Feasibility Study for IR Site 1

Figure 6-10

Conceptual Layout of Engineered Alternative Cap for Alternative S1-3

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 5/3/05
File No: 068S13618
Job No: 23818-068
Rev No: C

EXHIBIT 2

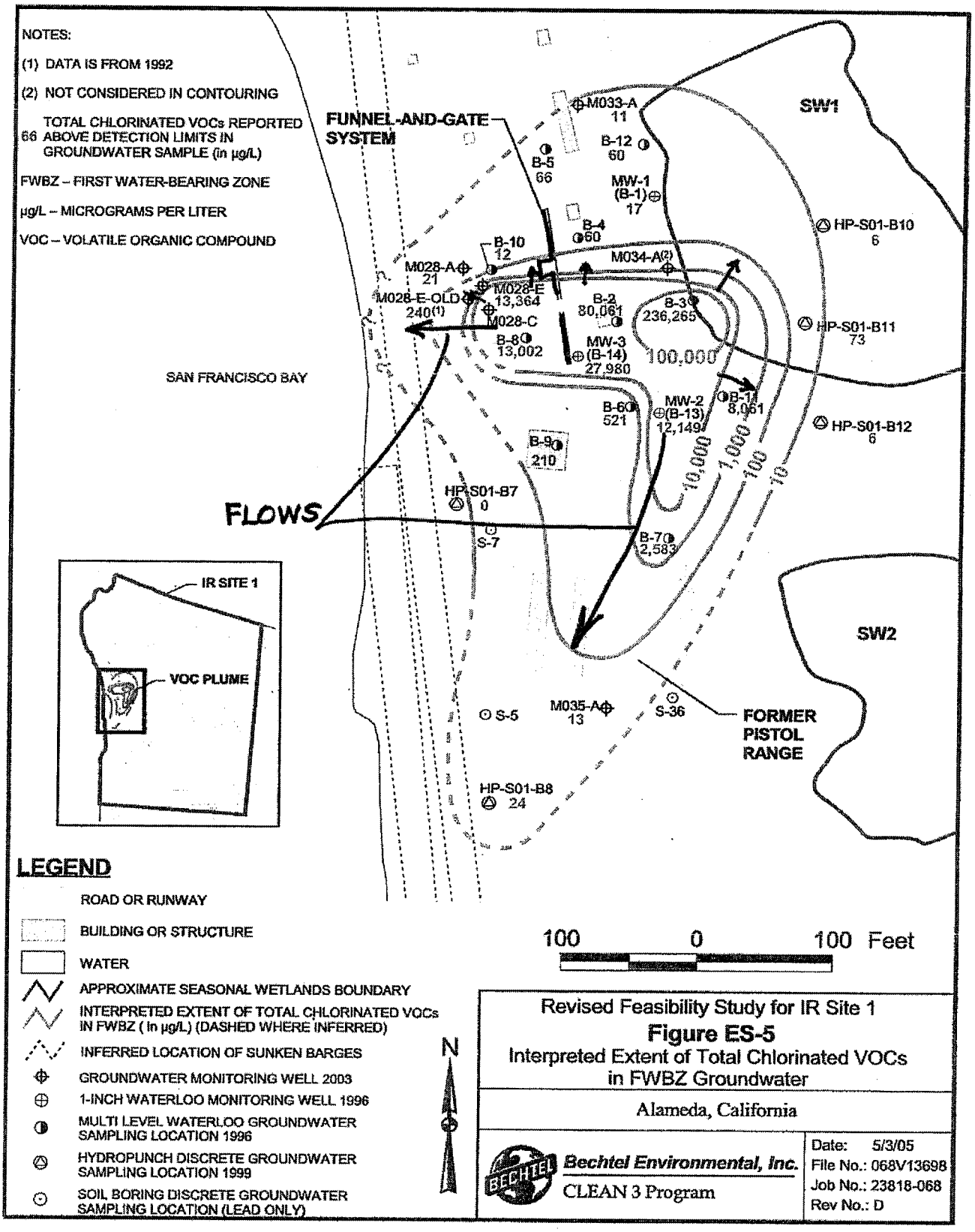
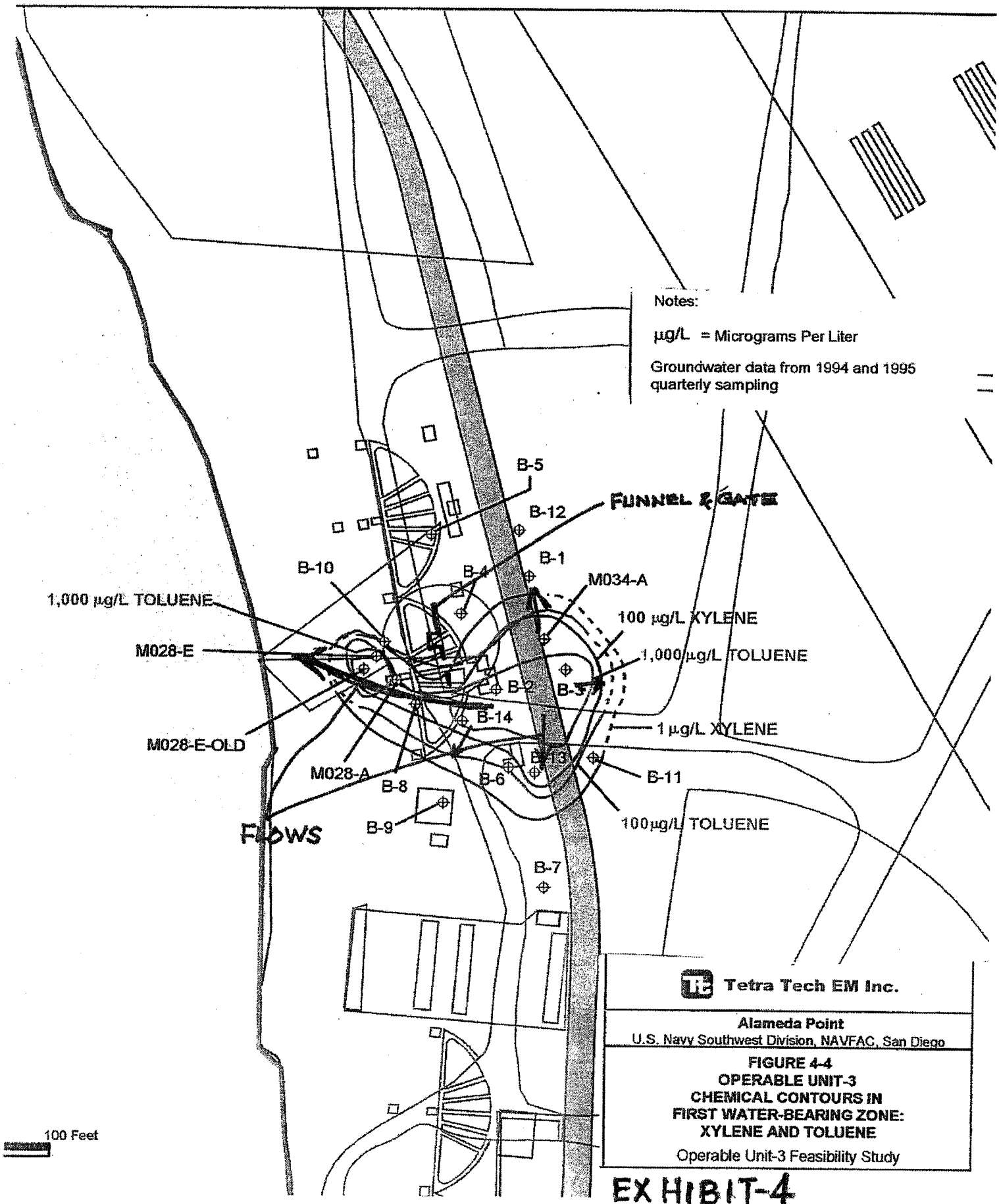

NOTES:
(1) DATA IS FROM 1992
(2) NOT CONSIDERED IN CONTOURING
66 TOTAL CHLORINATED VOCs REPORTED ABOVE DETECTION LIMITS IN GROUNDWATER SAMPLE (in µg/L)
FWBZ – FIRST WATER-BEARING ZONE
µg/L – MICROGRAMS PER LITER
VOC – VOLATILE ORGANIC COMPOUND
FUNNEL-AND-GATE SYSTEM
SW1
SW2
M033-A 11
B-12 60
B-5 66
MW-1 (B-1) 17
B-4 60
HP-S01-B10 6
B-10 12
M034-A(2)
M028-A 21
M028-E-OLD 240(1)
M028-E 13,364
M028-C
B-2 80,061
B-3 236,265
HP-S01-B11 73
B-8 13,002
MW-3 (B-14) 27,980
100,000
SAN FRANCISCO BAY
B-6 521
MW-2 (B-13) 12,149
B-1 8,061
HP-S01-B12 6
B-9 210
10,000
1,000
100
10
HP-S01-B7 0
FLOWS
S-7
B-7 2,583
IR SITE 1
VOC PLUME
S-5
M035-A 13
S-36
FORMER PISTOL RANGE
HP-S01-B8 24
LEGEND
ROAD OR RUNWAY
BUILDING OR STRUCTURE
WATER
APPROXIMATE SEASONAL WETLANDS BOUNDARY
INTERPRETED EXTENT OF TOTAL CHLORINATED VOCs IN FWBZ (in µg/L) (DASHED WHERE INFERRED)
INFERRED LOCATION OF SUNKEN BARGES
GROUNDWATER MONITORING WELL 2003
1-INCH WATERLOO MONITORING WELL 1996
MULTI LEVEL WATERLOO GROUNDWATER SAMPLING LOCATION 1996
HYDROPUNCH DISCRETE GROUNDWATER SAMPLING LOCATION 1999
SOIL BORING DISCRETE GROUNDWATER SAMPLING LOCATION (LEAD ONLY)
100 0 100 Feet
N
Revised Feasibility Study for IR Site 1
Figure ES-5
Interpreted Extent of Total Chlorinated VOCs in FWBZ Groundwater
Alameda, California
Bechtel Environmental, Inc.
CLEAN 3 Program
Date: 5/3/05
File No.: 068V13698
Job No.: 23818-068
Rev No.: D

EXHIBIT-3



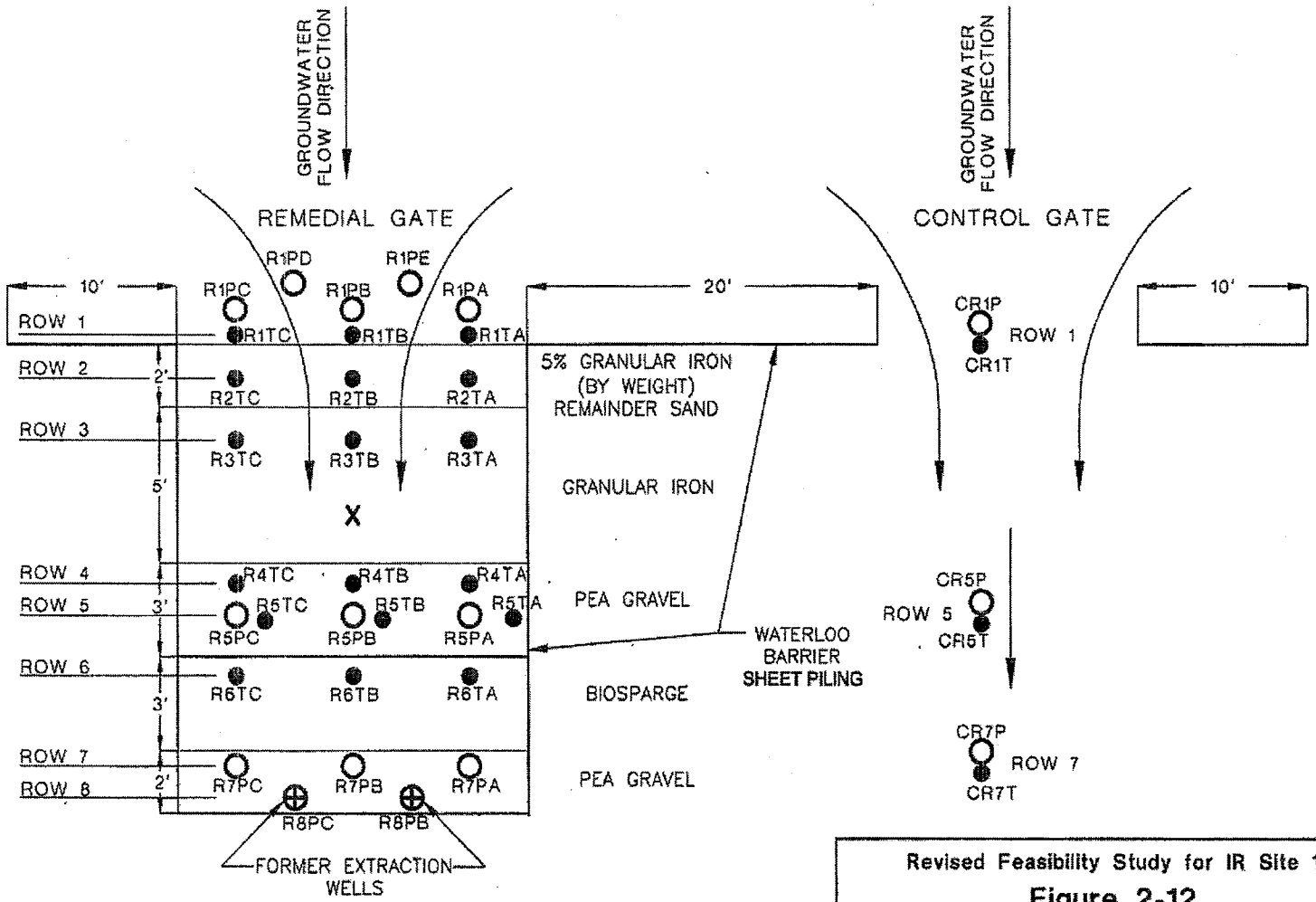
Tetra Tech EM Inc.

Alameda Point
U.S. Navy Southwest Division, NAVFAC, San Diego

FIGURE 4-4
OPERABLE UNIT-3
CHEMICAL CONTOURS IN
FIRST WATER-BEARING ZONE:
XYLENE AND TOLUENE

Operable Unit-3 Feasibility Study

EXHIBIT-4



LEGEND

- ○ PERFORMANCE WELL
- ● MULTI LEVEL TREATMENT WELL
- X IN-SITU PERMEABLE FLOW SENSORS
- A SOUTHERN EDGE OF GATE
- B MIDDLE OF GATE
- C NORTHERN EDGE OF GATE

SOURCE:

TETRA TECH EM INC. 1999. FUNNEL-AND-GATE DEMONSTRATION SUMMARY REPORT, FOURTH QUARTER, FINAL. MAY 19.

Revised Feasibility Study for IR Site 1

Figure 2-12

Schematic Diagram of Groundwater Funnel-and-Gate System

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 5/2/05
File No: 068S13597
Job No: 23818-068
Rev No: C

EXHIBIT-5

Revised Feasibility Study for IR Site 1

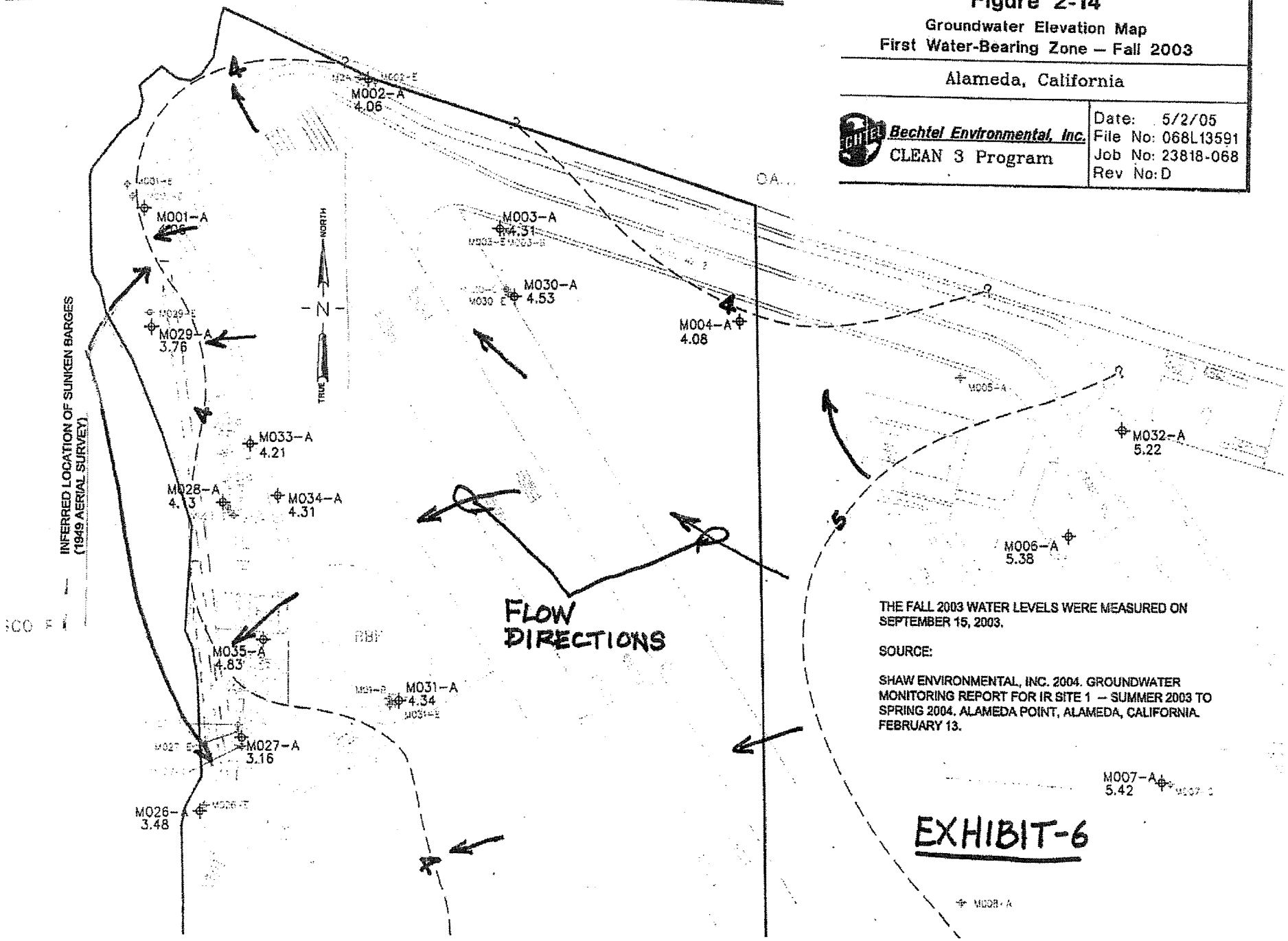
Figure 2-14

Groundwater Elevation Map
First Water-Bearing Zone – Fall 2003

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

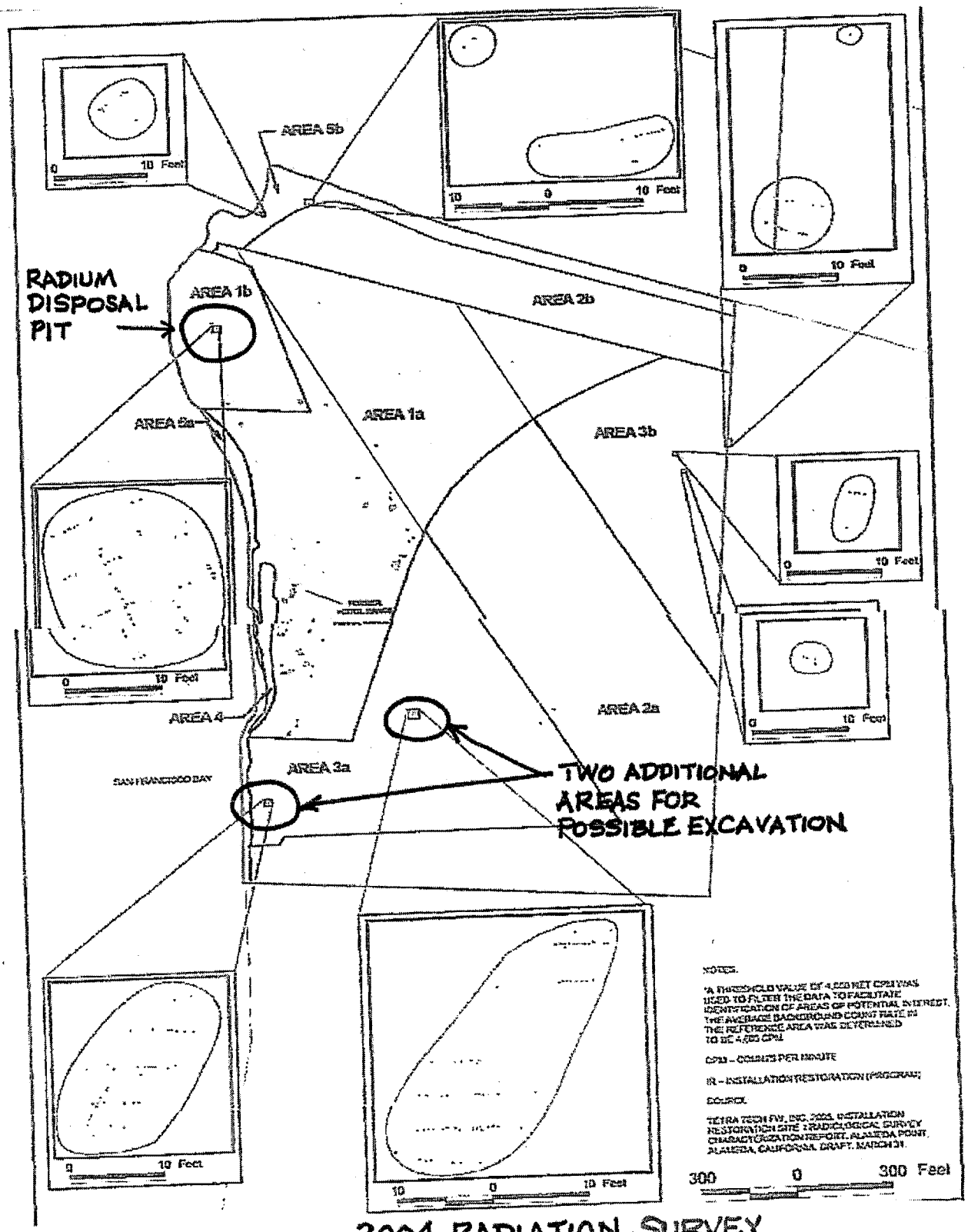
Date: 5/2/05
File No: 068L13591
Job No: 23818-068
Rev No: D



THE FALL 2003 WATER LEVELS WERE MEASURED ON SEPTEMBER 15, 2003.

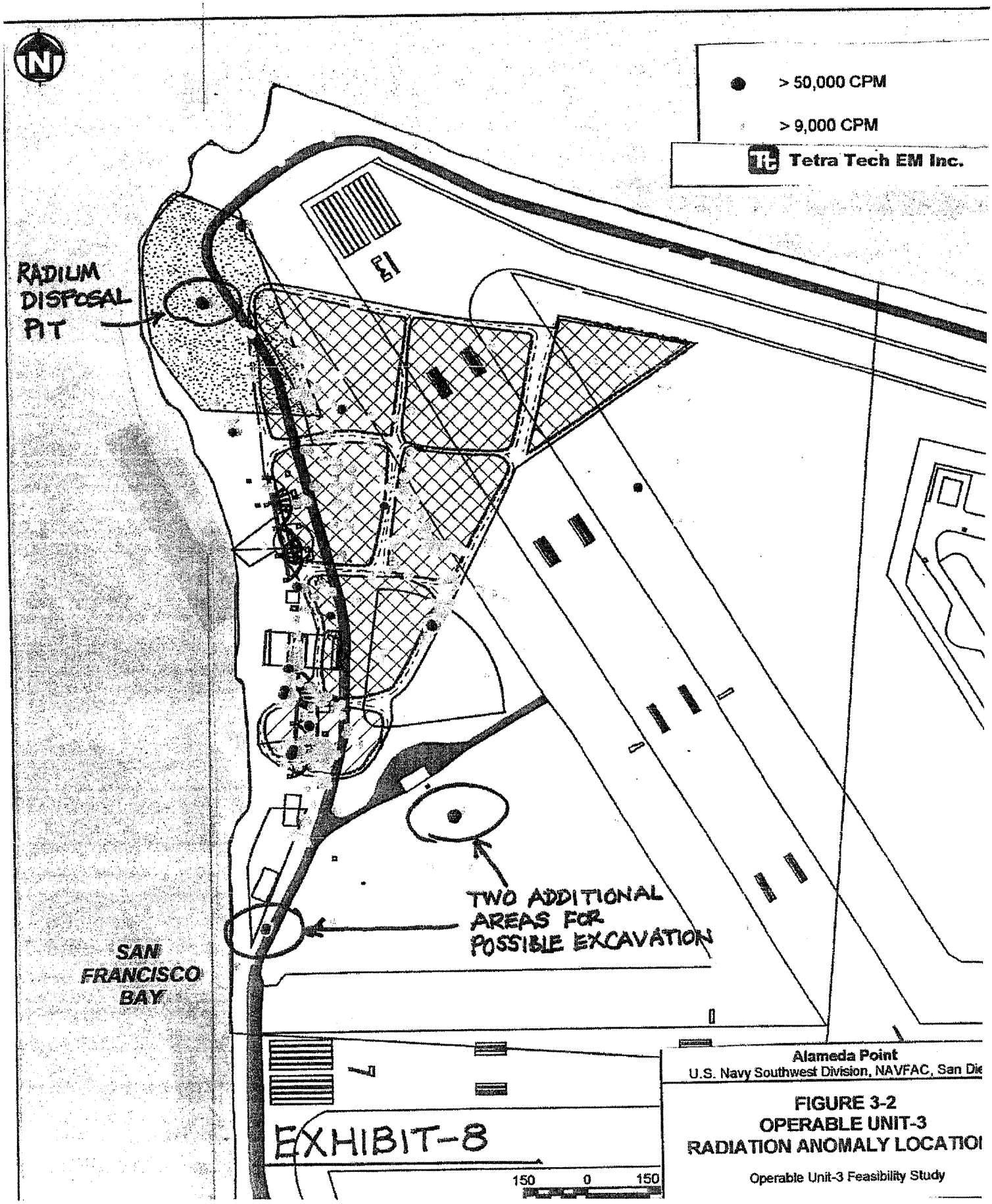
SOURCE:

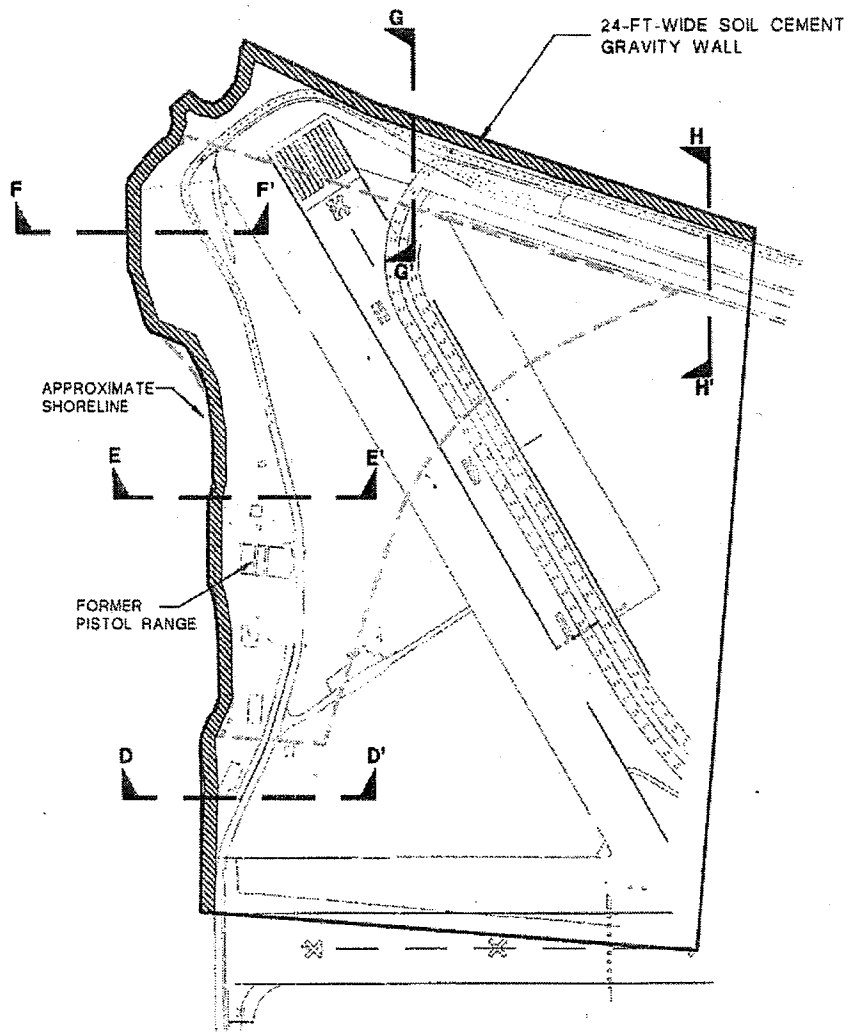
SHAW ENVIRONMENTAL, INC. 2004. GROUNDWATER MONITORING REPORT FOR IR SITE 1 – SUMMER 2003 TO SPRING 2004. ALAMEDA POINT, ALAMEDA, CALIFORNIA. FEBRUARY 13.



2004 RADIATION SURVEY

EXHIBIT – 7


> 50,000 CPM
> 9,000 CPM
Tetra Tech EM Inc.
RADIUM DISPOSAL PIT
TWO ADDITIONAL AREAS FOR POSSIBLE EXCAVATION
SAN FRANCISCO BAY
EXHIBIT-8
150 0 150
Alameda Point
U.S. Navy Southwest Division, NAVFAC, San Die
FIGURE 3-2
OPERABLE UNIT-3
RADIATION ANOMALY LOCATIO
Operable Unit-3 Feasibility Study

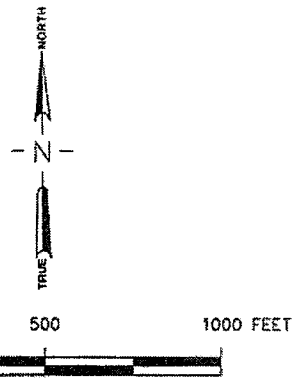


LEGEND

- IR SITE 1 BOUNDARY
- INFERRED LIMITS OF FORMER WASTE DISPOSAL AREA
- STONE COLUMNS AREA
- CROSS SECTION

SOURCE:

FOSTER WHEELER ENVIRONMENTAL CORPORATION. 2003. FINAL FEASIBILITY STUDY REPORT, OPERABLE UNIT 3, INSTALLATION RESTORATION SITE 1, 1943 – 1956 DISPOSAL AREA, ALAMEDA POINT, ALAMEDA, CALIFORNIA. VOLUME 2 GEOTECHNICAL AND SEISMIC. DECEMBER 12.



Revised Feasibility Study for IR Site 1

Figure 2-30

2003 Geotechnical Feasibility Study
Recommended Alternative 5

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 5/2/05
File No: 068L13595
Job No: 23818-068
Rev No: E

EXHIBIT-9