



# **FINAL FORMER MARINE CORPS AIR STATION (MCAS) TUSTIN 89<sup>th</sup> Restoration Advisory Board (RAB) Meeting Minutes**

**Meeting Location:** Tustin Senior Center, Tustin, California

**Meeting Date/Time:** 19 May 2010/7:08 pm – 8:44 pm

**Minutes Prepared by:** Tony Guiang, CDM

## **Attachments:**

1. MCAS Tustin Environmental Program Status
2. Presentation Slides: “Operable Unit (OU)-4B, Remedial Design (RD)/Remedial Action (RA)”

## **WELCOME/INTRODUCTIONS/AGENDA REVIEW:**

Mr. Jim Callian, Base Realignment and Closure (BRAC) Environmental Coordinator (BEC) and Navy RAB Co-Chair, welcomed everyone to the 89<sup>th</sup> RAB meeting.

Mr. Callian introduced his community co-chair, Mr. Don Zweifel, and asked for self-introductions for those in attendance. A total of 21 people were in attendance. He asked all in attendance to sign the sign-in sheet which was one way to document the Navy’s requirement to provide information on the restoration activities to the public. He noted the absence of Mr. John Broderick (California Regional Water Quality Control Board, Santa Ana Region [RWQCB]) and Mr. James Ricks (U.S. Environmental Protection Agency [U.S. EPA]).

## **ANNOUNCEMENTS/REVIEW OF ACTION ITEMS**

Mr. Callian provided summary of the RAB agenda and presented a series of slides which included a brief summary of the agenda, points of contact information for key BRAC Cleanup Team (BCT) members including the regulatory agencies (U.S. EPA, Department of Toxic Substances Control [DTSC], and RWQCB). In addition, he presented the locations, hours of operation, and points of contact for the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Administrative Record (AR) File and CERCLA Information Repository (IR). Mr. Callian presented several slides on environmental websites and a slide on the remaining proposed RAB meeting dates for 2010.

At Ms. Sue Reynold’s (RAB member) request, Mr. Callian discussed the 2007 RAB guidance issued by the U.S. Department of Defense (DoD). In response to an action item from Ms. Reynolds, Mr. Callian explained the lifespan of the RAB depended on the period of time when all the remedies are in place; when no active remediation activities are occurring; or when there is no public interest. Mr. Callian explained the RAB guidance came out after the RAB process was established in CERCLA and there is no definitive time for RAB adjournment. However, Mr. Callian explained that since the Navy has just signed the last Record of Decision (ROD) for MCAS Tustin (the ROD for OU-4B) and all remedies will be in place shortly, he felt it was appropriate for the RAB to consider reducing the frequency of the RAB meetings to a semi-annual basis as a cost savings and practical measure. He noted some precedence had been

established at other bases where they conduct informational meetings on a yearly basis; and although he felt that it would be premature to follow that lead, he reiterated the Navy's intent to continue updating the RAB and the community on environmental issues by email. At this time, he asked for a show of hands for those in favor of meeting on a semi-annual basis and explained this was not a final vote, but a preliminary indication.

Mr. Zweifel asked Ms. Christina Fu (DTSC Public Affairs Specialist) what her opinion was on this matter. Ms. Fu replied she felt it was a good idea to conduct a preliminary survey as presented by Mr. Callian. This would allow the Navy and the RAB enough time to think and evaluate the pros and cons of the measure being presented before the next RAB convenes.

Mr. Matt Suarez (RAB member) asked the Navy to implement an email notification and response system in place and operating before the decision to convene on a semi-annual basis is considered. Mr. Callian gave an example of a Google program currently being implemented at the Naval Base Point Loma RAB where active participation by the Navy and RAB members takes place and information can be posted and retrieved. Mr. Suarez asked if the Navy could provide an example of this to the members at the next RAB meeting. Mr. Callian replied the Navy would consider this for the next RAB.

Mr. Robert Kopecky (RAB member) asked how many other RABs are currently convening at a semi-annual basis. Although he knew of none, Mr. Callian replied convening on a semi-annual basis appears to be a logical approach owing to the maturity of the MCAS Tustin program. Mr. Kopecky concurred with Mr. Suarez's idea to implement an effective email system prior to making the decision to lessen the frequency of meetings.

Mr. Chris Crompton (RAB member) reiterated the importance of dialog and explained meetings were driven by documents and the need for discussing environmental issues. He noted that although the Final ROD for MCAS Tustin is being finalized, there are still some on-going implementation issues, on-going monitoring, and report documentation updates the Navy should provide to the RAB. Therefore, Mr. Crompton noted it would be more beneficial to look at a calendar year and determine such upcoming milestones and then schedule the meetings on an as-needed basis rather than implementing a definitive schedule as suggested by meeting semi-annually.

Mr. Callian expressed his appreciation to the RAB for their comments and suggestions and noted they would be considered by the Navy. He mentioned the RAB Rule Handbook guidance can be found using Google. Mr. Callian explained the primary reason for establishing the RAB is to update the public on documents leading up to a ROD and for MCAS Tustin, the number of documents for the five remaining sites (OU-1A, OU-1B, OU-3, OU-4, and Underground Storage Tank [UST] Site 222) is dwindling. He noted on the current quarterly schedule the Navy is finding difficulty in finding new discussion topics for the RAB.

Mr. Suarez stated he was not in favor of convening the RAB to a semi-annual basis unless an effective communication method (email) has been demonstrated and in place.

Mr. Crompton noted that historically the RAB has functioned by taking small steps as opposed to making significant changes and therefore conducting meetings three times per year may be

the next step forward. However, he reiterated the meetings should be driven by the document and the workload the Navy anticipates will occur through the course of the year.

Mr. Zweifel asked whether the RAB function is proprietary and if so he noted a legal determination by NAVFAC Southwest should be made on down-sizing the frequency of the meetings. However, he stated if down-sizing the frequency of the meetings is in violation of any contractual stipulations, the measure being discussed cannot be implemented. He also asked the Navy to provide costs related to the RAB function. Mr. Suarez stated he would be interested in seeing a ball-park figure for the cost to run a RAB. For clarification, Mr. Crompton asked whether the RAB function is tied into the cost to conduct daily meetings with the regulatory agencies, adding that if this was the case the cost for the RAB function would likely be less than anticipated. Further if the RAB function were to stand alone, he asked whether this would undermine the efficiency of the RAB. Mr. Callian replied that currently the meetings with the agencies are held on the same day as the RABs.

In summary, Mr. Callian asked the RAB to think about the discussion on the table and explained the Navy would consult with the BRAC Cleanup Team. He favored the idea suggested during the discussion to disseminate information on the BRAC website. He reiterated the Navy's commitment to being cost efficient and to continue providing the RAB and community with environmental updates on MCAS Tustin environmental cleanup. Mr. Crompton suggested an email reminder notification be established, if the RAB dialog were to implement a website because he noted people would not typically visit a website. Ms. Mary Lynn Norby (RAB member) expressed her opinion in keeping the RAB structure as it is currently operating noting the RAB's role in initiating citizen input and representation on environmental issues at MCAS Tustin. Further she noted the Quarterly meeting was not so much of an imposition. Ms. Norby concurred with implementing an email notification system for documents available for review and the use of a professional website to supplement the current RAB structure.

## **APPROVAL OF 17 FEBRUARY 2010 RAB MEETING MINUTES**

Mr. Callian and Mr. Zweifel asked the RAB members if they had any comments or questions on the 17 February 2010 Meeting Minutes. Ms. Norby requested a change to the 3<sup>rd</sup> to the last line on Page 5 to read "in view" instead of "in lieu." No other comments were made and Mr. Zweifel approved the motion to finalize the meeting minutes upon incorporating Ms. Norby's comment.

## **MCAS TUSTIN ENVIRONMENTAL STATUS UPDATE**

Mr. Callian showed the overhead slide presentation of the Environmental Program Status and he noted although these were not included as part of the RAB handout, they would be provided in the meeting minutes. He presented the RAB with an update on the MCAS Tustin Environmental Program Status since the last RAB meeting held in February 2010.

Mr. Callian discussed the OU-1A and OU-1B simultaneously and pointed out their location on the poster display. He noted OU-1A comprises the 1,2,3-trichloropropane (TCP) plume and OU-1B (North and South) comprises the trichloroethene (TCE) plume. Mr. Callian provided a summary of the documents submitted since the February 2010 RAB which included the Final

2008 Annual OU-1A and -1B Performance Evaluation Report and a Final Operating Properly and Successfully (OPS) Report issued this month. He mentioned the Navy was currently conducting operations and maintenance (O&M) activities and conducting annual optimization evaluation for the hydraulic containment and treatment systems which involves changing the extraction rates to optimize the capture of the plumes. Mr. Callian noted the document deliverables scheduled for June and July 2010 which include the Draft 2009 Annual OU-1A and -1B Performance Evaluation Report and the First Quarter Groundwater 2010 Groundwater Progress Monitoring Report, respectively.

Mr. Callian provided an update on OU-3 (Site 1 – Moffett Trenches Landfill) and showed the RAB the site location on the poster display. No new documents have been issued since the last RAB in February 2010 and he provided a summary of the next steps associated with the site which include issuance of the Draft 2009 Annual Groundwater Monitoring Report next month and on-going O&M.

Mr. Callian provided a summary of OU-4B which he noted was the subject of the RAB presentation. He explained OU-4B comprises three moderate concentration sites (Installation Restoration Program [IRP]-5s[a], IRP-6, and the Mingled Plumes Area [MPA]) and three low concentration sites (Miscellaneous Major Spill [MMS-04], IRP-13W and IRP-11). He noted the Navy issued the Draft Pilot Study Work Plan which is currently with the Agencies for their review and the Navy expects to finalize the document in July 2010 and be in the field by July and August 2010.

Mr. Callian concluded the Environmental Program Status Update by providing a summary of the latest document issued for UST Site 222 (Third Quarter 2009 Groundwater Monitoring Data Summary), the next steps, activities which include on-going O & M and quarterly effluent sampling, and issuance of the Draft Petroleum Correction Action Plan Annual Report in June 2010 and First Quarter 2010 Groundwater Monitoring Data Summary scheduled in August 2010. Mr. Callian asked if there were any more questions in regard to the Environmental Program Status.

Mr. Nicholas Steenhaut (Environ) asked what the status was for the rebound sampling at UST Site 222 – Treatment Area 1 (Source Area). Mr. Callian replied the Navy has conducted five months of monitoring beginning in January 2010 and was completed in May 2010. He noted the maximum reported methyl tert-butyl ether (MTBE) concentration was 23 micrograms per liter ( $\mu\text{g/L}$ ). To augment Mr. Dhananjay Rawal (Enviro Compliance Solutions [ECS]) noted quarterly monitoring for a 1 year period is scheduled to start in July 2010.

Mr. Steenhaut asked if concentrations were to reach cleanup goals at the UST Site 222 Source Area whether the site would be closed. Mr. Callian replied there are still MTBE concentrations down gradient of the Source Area so closure of the site would not occur right away. To clarify Mr. Steenhaut asked if after 1 year of monitoring concentrations in the Source Area have reached cleanup goals would action be taken to shut down the air sparge system operating in the Source Area and would cleanup focus on the down gradient portion of the plume. Mr. Callian replied with BCT approval this would take place. When asked about the status at OU-4B, Mr. Callian informed the RAB of the evening's presentation, but he was happy to announce that after three groundwater monitoring rounds at MMS-04, the estimated maximum TCE

concentration was 0.51 µg/L, an order of magnitude below the maximum contaminant level (MCL) of 5 µg/L. He noted that if the concentrations remained below the MCL for one year, the site would be recommended for closure as documented in the Proposed Plan and in the ROD.

## **REGULATORY AGENCY UPDATE**

### **Mr. Ram Peddada, DTSC**

Mr. Peddada noted the DTSC has provided final approval for the OU-4B ROD (six sites). He provided the RAB a list of documents currently in review. One of the documents is a Draft Finding of Suitability to Transfer (FOST) #9 for Carve-Out (CO) Areas 5 and 6. He noted the Navy plans to transfer approximately 108 non-contiguous acres to the city of Tustin. He explained his agency has to review and make sure the remedies and land use controls (LUCs) are in place before allowing the transfer to take place. The other documents in review are the Project Environmental Review Form (PERF) #14 and the Draft Pilot Study Work Plan for OU-4B.

The following questions and comments followed Mr. Peddada's update.

Ms. Norby asked for clarification on the number of the FOST and asked the city of Tustin if they had any comments on the FOST and if they were willing to accept the responsibility for the COs once transferred. Mr. Peddada replied it was FOST #9 and Mr. Matt West (city of Tustin) replied the city of Tustin was interested in obtaining the COs but they had just received the FOST and are currently reviewing the document.

Ms. Reynolds asked if the city of Tustin carried any liability for any environmental issues which may remain at the site once the property was officially transferred to them. Mr. Callian replied the Navy would retain responsibility for any Navy derived or CERCLA contamination such as chlorinated compounds. Further he noted Congress established a petroleum exclusion which stipulates petroleum contamination discovered after transfer of property is not Navy responsibility. Mr. Callian added the Navy does their best to look at all potential areas which may have contamination before property is transferred. For clarification, Ms. Norby asked whether MTBE was included in the petroleum exclusion. Mr. Callian replied yes, MTBE is a petroleum constituent and a gasoline additive and is therefore included in this exclusion, unlike the chlorinated solvents (TCE, 1,1-dichloroethene [DCE], and 1,2,3-TCP). Further he explained petroleum contamination is easier to manage and remediate than chlorinated contaminants and they do not possess the same magnitude of health risks as chlorinated solvents.

Mr. Zweifel expressed his opinion that the Navy should be held responsible for any MTBE remaining at any site being transferred to the city of Tustin. Mr. Callian replied the Navy is cleaning up the MTBE and therefore does not believe the issues raised here would occur.

Ms. Norby asked that the RAB be involved in reviewing the FOST and noted this may be a topic for a future sub-committee meeting. Mr. Callian replied the public has an opportunity to review the FOST at the Draft Final stage after the Navy has received comments from the Agencies. He added the Draft FOST is available for public viewing at the AR (Building 307) and copies of documents can be provided to RAB members at their request. Ms. Norby, Mr. Suarez, and Mr. Zweifel requested and received a copy of the FOST.

## Operable Unit (OU)-4B, RD/ RA STATUS UPDATE

Before giving the floor to Mr. Sean McGoey (Navy RPM) and Ms. Leshner (OTIE), Mr. Callian asked the RAB to hold their comments and questions on the OU-4B RD/RA Update until the end of the presentation. He explained there was a lot of material to be covered and the Navy RPMs would be available after the meeting to address any comments and answer all questions.

Before introducing Ms. Leshner, Mr. McGoey provided a brief introduction on the topic of the evening's RAB presentation and explained the acronyms used during the presentation are found on the last page of the presentation handout. Ms. Leshner began the presentation by introducing herself, providing background on her career experience in the field of in-situ bioremediation (ISB), and giving an outline of the topics to be covered in the presentation. The general topics included an overview of the site locations, background, and the final ROD; the objectives, monitoring well network, and explanation of the remedial technologies proposed for the Pilot Study; and upcoming field activities. The bullets below provide a summary of the RAB presentation.

- A Site map showing the location of the three low concentration sites (IRP-11, IRP-13W, and MMS -04) and three moderate concentration sites (IRP-5S[a], IRP-6, and the MPA) that OU-4B comprises was shown (Slide 3). She noted the low concentration sites were defined as sites with concentrations less than approximately 20 µg/L of TCE and moderate concentration sites were defined as sites with concentrations exceeding approximately 20 µg/L of TCE and 1,1-DCE. Additionally the remedial goals (RGs) for the chemicals of concern (COCs) were shown on the figure.
- Background information for the low and moderate concentration sites (Slide 4) and an 11 x 17 figure showing the locations of all the sites in relation to one another was presented.
- Ms. Leshner provided background information for the low concentration sites including the maximum concentrations of TCE reported at IRP-11, IRP-13W, and MMS-04, and the extent of the contamination at each of the sites (Slide 5). Ms. Leshner explained the "J" laboratory qualifier assigned to the TCE concentration of 0.51 µg/L was detectable by the laboratory equipment, however, the low concentration was not quantifiable. As noted earlier by Mr. Callian, Ms. Leshner stated if after four quarters of sampling, data is below the MCL at MMS-04, the site would be recommended for closure. Ms. Leshner noted all the low concentration sites were within the capture zones of the OU-1A and OU-1B remediation systems.
- Ms. Leshner provided background information for the moderate concentration sites including the maximum concentrations of TCE reported at IRP-5S (a), IRP-6, and the MPA, 1,1-DCE reported at IRP-6, and the extent of the plume at each of the sites (Slide 6). She explained the geology at the MPA includes interbedded sand and clay and hydrogeology associated with the 1<sup>st</sup> water bearing zone (WBZ), which occurs from 8 to 30 feet below ground surface (bgs) and the 2<sup>nd</sup> WBZ which occurs from approximately 30 to 50 feet bgs (Slide 6).
- She summarized the established RGs, currently set at the state MCLs, for the COCs at the sites, and the Remedial Action Objectives (RAOs) identified in the Final ROD which was finalized in April 2010 (Slide 7).

- Ms. Leshar provided an explanation of the selected remedies identified in the Final ROD which was finalized in April 2010. She noted Alternative 2 was selected for the low concentration sites (Institutional Controls [ICs]) and Alternative 4 was selected for the moderate concentration sites (ISB, monitored natural attenuation [MNA], and ICs) (Slide 8).
- The objectives for conducting the Pre-Remedial Design Pilot Study, scheduled for July 2010, for the low and moderate concentration sites were presented (Slide 9).
- The existing monitoring well network for all six OU-4B sites was shown in figures found on Slides 10 through 16. The figures showed groundwater flow directions, the location of existing monitoring wells and the locations for proposed hydropunch samples and groundwater monitoring wells. She explained analytical data obtained from the hydropunch samples would help to further delineate the extent of the plumes at each of the sites adding the current extent of the plumes was based in part on older hydropunch data. Additionally in some instances, the hydropunch samples would be used to optimize the location for a new groundwater monitoring well as is the case at the MPA. Ms. Leshar explained additional hydropunch samples or wells were not being recommended for IRP Sites 13W or MMS-04 because either TCE concentrations have shown decreasing trends approaching the RG or TCE concentrations are below the RG. She further noted the Pilot Study would incorporate data from other wells at other sites in the monitoring network to delineate the plumes at the sites. Ms. Leshar summarized the scope of the ISB Pilot Study proposed for the moderate concentration sites. She explained the ISB Pilot Test areas at each site involved well installations, injection of substrates (sodium lactate or emulsified vegetable oil) with and without bioaugmentation (addition of bugs, or microbes), baseline and progress groundwater monitoring to evaluate geochemical conditions (Slide 17). Ms. Leshar explained the baseline monitoring for MNA parameters would occur at upgradient, in plume, and downgradient locations.
- Figures showing the locations for the ISB injections were on Slides 18, 19, 20, and 21. The figures showed the locations for the proposed groundwater monitoring wells and boreholes at each of the moderate concentration sites. Ms. Leshar explained the ISB at IRP-5S (a) and the MPA (Location 1) involves the injection of sodium lactate (food additive) mixed with water, bioaugmentation, followed by baseline and subsequent monthly groundwater monitoring. She noted the ISB at IRP-6 involves the injection of emulsified vegetable oil mixed with water, bioaugmentation, followed by baseline and subsequent monthly groundwater monitoring.
- Ms. Leshar explained the Pilot Test would take place at two locations at the MPA. One location would use sodium lactate and the other would use emulsified oil. She noted no bioaugmentation would be used at either location and explained that one of the goals was to evaluate and monitor the plume in the 1<sup>st</sup> and 2<sup>nd</sup> WBZ at this site. For the MPA (Location 2), Ms. Leshar explained that ISB involves the injection of emulsified vegetable oil mixed with water into five borings placed in a barrier type geometry (spaced at 5 feet), followed by a baseline and subsequent monthly groundwater monitoring. She mentioned the spacing of borings at the MPA Location 2 was different than the borehole spacing (15 to 20 feet) at the other sites proposed to measure the radius of influence.

- Several photographs showing the direct push rig used for hydropunch sampling and ISB general setup was shown (Slides 22 through 25).
- Ms. Leshar provided the BCT with a schedule for document submittal (Slide 26) and list of acronyms (Slide 27).

Ms. Leshar ended her presentation and the following comments and questions were addressed.

Mr. Callian asked Ms. Leshar to provide explanation on the “bugs” or microbes she mentioned would be used during bioaugmentation. Ms. Leshar explained microbes are most commonly present in the subsurface, however, in some areas they are not. Therefore bioaugmentation is needed and this is accomplished by adding the “bugs” or microbes like dehalococcoides (DHC) to jump start the biodegradation process. She noted the microbe most commonly used is DHC.

Ms. Reynolds asked what the differences were between the two substrates proposed and the reason why bioaugmentation would be used in some sites and not in others. Ms. Leshar replied that both substrates are food products and the reason why sodium lactate is used was to achieve quick biodegradation of the COCs within a very short time frame (3 months) adding that the nature of sodium lactate dissolves easily with water. Because vegetable oil is less soluble in water, the biodegradation process is slower and occurs over a long term. For this reason, she noted the oil does not need to be re-injected over and over. Ms. Leshar explained although results showing biodegradation using oils are slower, using this substrate would allow evaluation of the radius of influence and injection pattern geometries. Further, identifying these factors would help better design the full scale remediation for the site.

Mr. Crompton asked whether there was a difference in cost using sodium lactate versus the emulsified oil, noting he has known of other sites that have used molasses. Ms. Leshar replied although sodium lactate and molasses were similar, molasses tends to be short lasting. She noted a lot of the products in the market mixed sodium lactate with the oil to create fast-acting products. With regard to the cost difference between the two substrates proposed for the pilot study, she replied there was not a large cost difference.

Ms. Norby asked what type of surface areas comprises the locations for the proposed monitoring wells. Ms. Leshar referred to the 11 × 17 figure of a 2008 aerial photograph which shows the site locations along with the current surface area.

Mr. Todd Schneider (Tait and Associates) asked what activities were happening in June and July 2010. Ms. Leshar replied, the Draft Work Plan went to the regulatory agencies last week and they were currently awaiting comments which were requested by 14 June 2010. She noted upon review of those comments, and in collaboration with the regulatory agencies to make sure all the comments are addressed, field work is scheduled to take place in July 2010, soon after the Final Work Plan is issued.

Mr. Zweifel asked why the state RGs and MCLs were being used at this site. Ms. Leshar and Mr. Peddada replied the state RGs were being used because they were more stringent.

For point of clarification, Ms. Reynolds asked what remediation technology was selected in the PP. Mr. Callian replied the technology selected in the PP was Hydraulic

Containment/MNA/ICs for the MPA site. However, because of public comments the Navy took a more aggressive approach and selected ISB/MNA/ICs. He noted this was a perfect example where community input was considered in the decision process which resulted in the ROD.

Mr. Schneider asked how the activities proposed for OU-4B relate to the events associated with FOST #9, in particular the areas comprising CO 5. Ms. Arnold replied, the entire CO 5 is not being proposed for transfer at this time. Only portions of the CO are being proposed for transfer and none of the OU-4B sites will be proposed for transfer until the Operating Properly and Successfully (OPS) determination has been made or site closure (e.g., MMS-04) has been achieved. The areas that are being proposed for transfer (including CERCLA sites) meet the requirements for transfer and have obtained OPS. She explained the lengthy process involved before transfer of the OU-4B property occurs.

Ms. Norby asked Mr. West who the CO 5 sites were being transferred to. Mr. West explained the sites slated for transfer would be transferred to the South Orange County College, the city of Tustin community park site, and portions of the city of Tustin mass development footprint.

Mr. Zweifel asked for further clarification on the barrier application with regard to the proposed injection at the MPA site. Mr. Callian used a picket fence analogy to describe the five borings arranged to act like a barrier. He noted groundwater, which typically flows in a linear direction, is forced to pass through the barrier and is treated before it goes past the barrier.

## **FUTURE TOPICS/SCHEDULE NEXT RAB / MEETING EVALUATION AND CLOSING**

In closing, Mr. Zweifel asked for a meeting evaluation. A positive response was received. Mr. Zweifel asked the RAB if there were any new topics they would like discussed at the next meeting scheduled for 15 September 2010.

- Mr. Steenhaut asked if the Navy could provide an update on FOST 9.
- Mr. Suarez requested an update on the OU-4B RD/RA Work Plan.
- Mr. Suarez asked for a demonstration on the teleconferencing and email notification program being considered in lieu of holding quarterly meetings.
- Ms. Reynolds asked the RAB to invite members of the community to become RAB members.

Mr. Callian thanked the RAB and the meeting was adjourned.

## **LIST OF HANDOUTS PROVIDED AT THE MEETING**

- 19 May 2010 Former MCAS Tustin RAB Meeting Agenda
- RAB Meeting Schedule
- Former MCAS Tustin - Where to Get More Information
- Environmental Websites
- MCAS Tustin Environmental Program Status

- Presentation Slides: “Operable Unit (OU)-4B, Remedial Design (RD)/Remedial Action (RA)”
- Former MCAS Tustin RAB Mission Statement
- Former MCAS Tustin RAB Fact Sheet/Membership Application
- Former MCAS Tustin Mailing List Coupon

Copies of the meeting minutes and handouts provided at the 17 February 2010 RAB meeting are available at the CERCLA IR for former MCAS Tustin located at the University of California, Irvine, Main Library, Government Publications Section. Library hours are 8am to 7pm Monday through Thursday; 8am to 5pm Friday and Saturday; and 1pm to 5pm on Sunday. It is recommended that people call the library for confirmation of these hours as they may be modified during final exam and holiday periods. The Government Publications Section may be reached at (949) 824-7362. In addition, copies of the meeting minutes and handouts are also available at the CERCLA AR File maintained at Building 307 at former MCAS El Toro by Ms. Rawal. Documents can be viewed by appointment (call Ms. Rawal at [949] 859-6014) between 9am and 1pm Monday through Thursday.

Final minutes from previous RAB meetings can be found on the internet at the Navy BRAC website: [www.bracpmo.navy.mil](http://www.bracpmo.navy.mil)

## INTERNET SITES

### *Navy and Marine Corps Internet Access*

BRAC PMO Web Site (includes RAB meeting minutes): <http://www.bracpmo.navy.mil/>

For Tustin RAB information:

[http://www.bracpmo.navy.mil/bracbases/california/tustin/rab\\_information.aspx](http://www.bracpmo.navy.mil/bracbases/california/tustin/rab_information.aspx)

### *Department of Defense - Environmental Cleanup Home Page Web Site:*

<http://www.dtic.mil/envirodod/>

### *U.S. EPA:*

Homepage: [www.epa.gov](http://www.epa.gov)

Superfund information: [www.epa.gov/superfund](http://www.epa.gov/superfund)

National Center for Environmental Assessment: [www.epa.gov/ncea](http://www.epa.gov/ncea)

Federal Register Environmental Documents: [www.epa.gov/federalregister](http://www.epa.gov/federalregister)

Link to Envirostor via U.S. EPA: [www.epa.gov/region09/EnviroStor.html](http://www.epa.gov/region09/EnviroStor.html)

### *Cal/EPA:*

Homepage: [www.calepa.ca.gov](http://www.calepa.ca.gov)

Department of Toxic Substances Control: [www.dtsc.ca.gov](http://www.dtsc.ca.gov)

Department of Toxic Substances Control: [www.envirostor.dtsc.ca.gov/public](http://www.envirostor.dtsc.ca.gov/public)

Department of Health Services, reorganized into the Department of Health Care Services and the Department of Public Health: [www.dhs.ca.gov](http://www.dhs.ca.gov)

Santa Ana Regional Water Quality Control Board: [www.waterboards.ca.gov/santaana](http://www.waterboards.ca.gov/santaana)

Environmental data for regulated facilities in California: [www.geotracker.waterboards.ca.gov](http://www.geotracker.waterboards.ca.gov)

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May 2010

## FORMER MARINE CORPS AIR STATION TUSTIN ENVIRONMENTAL PROGRAM STATUS

### Operable Unit 1A (Installation Restoration Program [IRP] Site 13 South – 1,2,3- Trichloropropane [TCP] plume)

#### Carve-Out: CO-5

#### Brief Project History:

- 2002: Time Critical Removal Action (hydraulic containment)
- 2004: Final Record of Decision (ROD): Selected remedy includes:
  - Hydraulic containment of contaminated groundwater;
  - Construction, operation, and maintenance of hydraulic containment system;
  - Hot-spot soil removal to enhance groundwater remedy and;
  - Implementation of institutional controls.
- 2007: Final Remedial Design and Remedial Action Implementation
- December 2007: Treatment system operational
- July 2008: Issued 1<sup>st</sup> Quarter Groundwater 2008 Groundwater Progress Monitoring Report
- October 2008: Issued 2<sup>nd</sup> Quarter 2008 Groundwater Progress Monitoring Report
- December 2008: Issued Final Interim-Remedial Action Completion Report (I-RACR); the main purpose of the I-RACR is to document that the remedy has been constructed per the Final Remedial Design
- December 2008: Issued 3<sup>rd</sup> Quarter 2008 Groundwater Progress Monitoring Report
- July 2009: Issued 1<sup>st</sup> Quarter 2009 Groundwater Monitoring Data Summary
- September 2009: Issued Final Long-Term Operation and Maintenance Plan (OMP)
- October 2009: Issued 2<sup>nd</sup> Quarter 2009 Groundwater Monitoring Data Summary
- December 2009: Issued 3<sup>rd</sup> Quarter 2009 Groundwater Monitoring Data Summary
- February 2010: Issued Final 2008 Annual OU-1A and -1B Performance Evaluation Report
- February 2010: Issued Final OPS Report

#### Next steps:

- On-going operation and maintenance activities.
  - Biweekly, monthly and quarterly inspections;
  - Quarterly effluent sampling for compliance with Orange County Sanitation District discharge requirements; and
  - Quarterly groundwater monitoring and reporting
    - Data used to track system performance,
    - Annual evaluation for system optimization implementation
- Annual optimization evaluation to be included in the 2009 Annual Report
  
- **June 23, 2010:** Issue Draft 2009 Annual OU-1A and -1B Performance Evaluation Report
- **July 2010:** Issue 1<sup>st</sup> Quarter Groundwater 2010 Groundwater Progress Monitoring Report

May 2010

## FORMER MARINE CORPS AIR STATION TUSTIN ENVIRONMENTAL PROGRAM STATUS

### Operable Unit 1B (IRP Sites 3 and 12 – Trichloroethene [TCE] plumes)

#### Carve-Outs: CO-5 and CO-6

#### Brief Project History:

- 2004: Final ROD: Selected remedy includes:
  - Hydraulic containment of VOC-impacted groundwater;
  - Construction, operation, and maintenance of a hydraulic containment system;
  - Hot-spot soil removal to enhance groundwater remedy and;
  - Implementation of institutional controls.
- 2007: Final Remedial Design and Remedial Action Implementation
- January 2008: Treatment system operational
- July 2008: Issued 1<sup>st</sup> Quarter 2008 Groundwater Progress Monitoring Report
- October 2008: Issued 2<sup>nd</sup> Quarter 2008 Groundwater Progress Monitoring Report
- December 2008: Issued Final I-RACR. The main purpose of the I-RACR is to document that the remedy has been constructed per the Final Remedial Design
- December 2008: Issued 3<sup>rd</sup> Quarter 2008 Groundwater Progress Monitoring Report
- July 2009: Issued 1<sup>st</sup> Quarter 2009 Groundwater Progress Monitoring Report
- September 2009: Issued Final Long Term OMP
- October 2009: Issued 2<sup>nd</sup> Quarter 2009 Groundwater Progress Monitoring Report
- December 2009: Issued 3<sup>rd</sup> Quarter 2009 Groundwater Progress Monitoring Report
- February 2010: Issued Final 2008 Annual OU-1A and -1B Performance Evaluation Report
- February 2010: Issued Final OPS Report

#### Next steps:

- On-going operation and maintenance activities.
  - Biweekly, monthly, and quarterly inspections;
  - Quarterly effluent sampling for compliance with Orange County Sanitation District discharge requirements; and
  - Quarterly groundwater monitoring and reporting
    - Data used to track system performance and optimize system
    - Annual evaluation for system optimization implementation
  - Annual optimization evaluation to be included in the 2009 Annual Report
- **June 23, 2010:** Issue Draft 2009 Annual OU-1A and -1B Performance Evaluation Report
- **July 2010:** Issue 1<sup>st</sup> Quarter Groundwater 2010 Groundwater Progress Monitoring Report

May 2010

## FORMER MARINE CORPS AIR STATION TUSTIN ENVIRONMENTAL PROGRAM STATUS

### Operable Unit 3 (Site 1– Moffett Trenches landfill)

#### Carve-Out: CO-10 – PARCEL TRANSFERRED IN 2006

#### Brief Project History:

- December 2001: Final ROD
- May 2003: Final OMP
- November 2003: Final OPS Report
  - U.S. EPA approval obtained in March 2004
- October 2006: Final First Five-Year Review
- On-going operation and maintenance activities
- January 2010: Issued Final 2008 Annual Groundwater Monitoring Report

#### Next steps:

- Continue operation and maintenance activities
- June 10, 2010: Issue Draft 2009 Annual Groundwater Monitoring Report

### Operable Unit 4B (IRP-5S[a], IRP-6, IRP-11, IRP-13W, MMS-04, and Mingled Plumes Area [MPA])

#### Carve-Outs: CO-2, CO-5, and CO-9

#### Brief Project History:

- 2000: Draft OU-4 Focused Feasibility Study (FS) Report
- 2003: OU-4 Shallow Groundwater Investigation
- 2004: OU-4 Technical Memorandum presents results of shallow groundwater investigation
- 2005-2006: Groundwater Monitoring
- 2007: IRP-6 and MPA Supplemental Investigation
- September 2008: Final Technical Memorandum Supplemental Investigation at IRP-6 and MPA
- October 2008: Final FS Report
- February 2009: Proposed Plan. Public comment period: February 04-March 06, 2009
- May 2009: Issued Final Work Plan for Groundwater Monitoring at OU-4B Sites (IRP-5S[a], IRP-6, IRP-11, IRP-13W, MMS-04, and MPA)
- June 2009: Issued Final Work Plan for Installation of Groundwater Monitoring Wells at MPA, MMS-04, IRP-11, and IRP-13W
- January 2010: Issued 3<sup>rd</sup> Quarter Groundwater Progress Monitoring Data Summary Report
- January 2010: Issued Final ROD
- April 2010: Issued Replacement Pages for the Final ROD, including completed signature sheet
- April 2010: Issued Draft 2009 Annual Groundwater Monitoring Report
- May 2010: Issued Draft Pre-Remedial Design Work Plan

May 2010

## FORMER MARINE CORPS AIR STATION TUSTIN ENVIRONMENTAL PROGRAM STATUS

### Next steps:

- **June 2010**: Issue Draft First Quarter 2010 Data Summary Report
- **August 2010**: Issue Final 2009 Annual Groundwater Monitoring Report
- **August 2010**: Issue Final Pre-Design Work Plan

### MTBE Plume (UST Site 222)

#### Carve-Outs: CO-5

#### Brief Project History:

- 2001: Interim-Petroleum Corrective Action Program (PCAP) plan implemented
- 2006: Final Soil Closure Report
- 2006: Interim PCAP Addendum No. 2 – Revised Cleanup Goals: 1<sup>st</sup> WBZ: 300 micrograms per liter (ug/L), 2<sup>nd</sup> WBZ: 44 ug/L, and 3<sup>rd</sup> WBZ: 13 ug/L.
- 2007: Final PCAP
- 2007/2008: Implement Final PCAP; Additional monitoring and extraction wells installed. Air Sparging/Soil Vapor Extraction (AS/SVE) initiated in March 2008.
- September 2008: AS/SVE system shut down for rebound monitoring per the Final PCAP requirements
- December 2008: Issued 1<sup>st</sup> and 2<sup>nd</sup> Quarter 2008 Groundwater Progress Monitoring Report
- April 2009: Issued 3<sup>rd</sup> Quarter 2008 Groundwater Progress Monitoring Report
- May 2009: Issued Draft Final Annual 2007 PCAP Progress Report
- July 2009: Issued Draft Annual 2008 PCAP Annual Report
- August 2009: Issued 1<sup>st</sup> Quarter 2009 Groundwater Monitoring Data Summary
- September 2009: Issued 2<sup>nd</sup> Quarter 2009 Groundwater Monitoring Data Summary
- September 2009: Issued Final Annual 2007 PCAP Annual Report
- October 2009: Issued Final/Replacement Pages for the Annual 2008 PCAP Annual Report
- January 2010: Issued 3<sup>rd</sup> Quarter 2009 Groundwater Monitoring Data Summary

#### Next steps:

- On-going operation and maintenance activities:
  - Quarterly Groundwater Monitoring and Reporting
  - Data used to track system performance, optimize system, and support Final PCAP Closure Report
- Quarterly effluent sampling for compliance with Orange County Sanitation District discharge permit requirements
- Annual optimization evaluation to be included in the 2009 Annual Report
  
- **June 16, 2010** – Issue Draft 2009 PCAP Annual Report
- **August 2010** – Issue 1<sup>st</sup> Quarter 2010 Groundwater Monitoring Data Summary

May 2010

## FORMER MARINE CORPS AIR STATION TUSTIN ENVIRONMENTAL PROGRAM STATUS

### FOST Summary

FOST #1 signed August 29, 2001	Parcels 3, 21, 38, 39 and portions of 40
FOST #2 signed September 28, 2001	Parcels 4-8, 10-12, 14, 25, 26, 30-33, 37, 42 and portions of 40 and 41
FOST #3 signed April 22, 2002	Parcels 23, 29, 34, 35 and 36, and portions of 1, 16, 17, 24, 27, 28, 40 and 41
FOST #4 signed September 26, 2002	Portions of 24 (PS clean area in CO-5)
FOST #5 signed December 17, 2002	COs 8 and 11
FOST #6 signed September 29, 2004	CO-10 and portion of CO-5
FOST #7 signed May 20, 2005	COs 3 and 7 and portion of CO-5
FOST #8 signed February 2006	COs 1 and 4

### FOSL Summary

FOSL #2 signed February 28, 2002	COs 1 thru 4
FOSL #3 signed April 26, 2002	COs 5 thru 11

### Acronyms

AST	Aboveground Storage Tank	MNA	Monitored Natural Attenuation	PS	Public Sale Parcel
AOC	Area of Concern	MPA	Mingled Plumes Area	RAP	Remedial Action Plan
BCT	BRAC Cleanup Team (Navy, EPA, Cal EPA)	MMS	Miscellaneous Major Spill	RCRA	Resource Conservation and Recovery Act
CO	Carve-Out area	NFA	No Further Action	ROD	Record of Decision
EE/CA	Engineering Evaluation/ Cost Analysis	OMP	Operations and Maintenance Plan	TCE	Trichloroethene
FOSL	Finding of Suitability to Lease	OPS	Operating Properly and Successfully	TCP	1,2,3-Trichloropropane
FOST	Finding of Suitability to Transfer	OU	Operable Unit	ug/L	Micrograms per liter
FS	Feasibility Study	PCAP	Petroleum Corrective Action Program	UST	Underground Storage Tank
I-RACR	Interim-Remedial Action Completion Report	MTBE	Methyl tert butyl ether	WBZ	Water-Bearing Zone



**Welcome**



# **Update on the Operable Unit (OU)-4B Remedial Design (RD) / Remedial Action (RA)**

**Former Marine Corps Air Station (MCAS)  
Tustin, California  
Restoration Advisory Board Meeting  
May 19, 2010**

**Rebecca Leshar, PG, AIS-TN&A JV**



# Presentation Outline



## ➤ Overview

- Site Locations
- Background
- Final Record of Decision

## ➤ Pre-Remedial Design Pilot Study

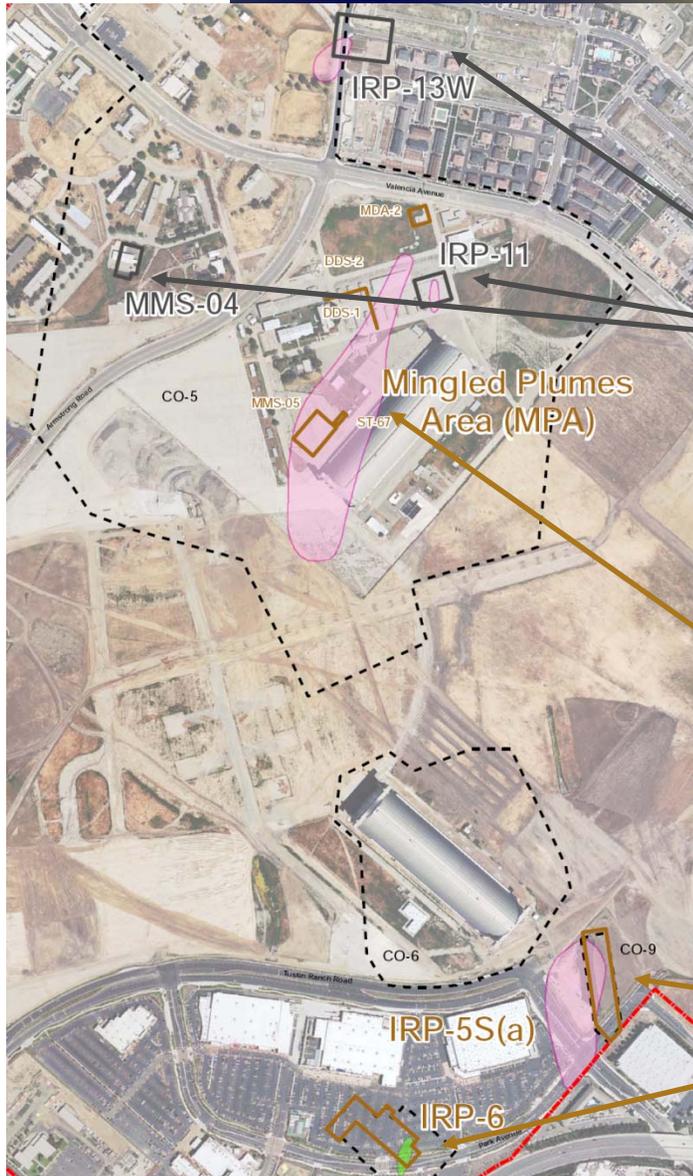
- Objectives
- Evaluate Sufficiency of Groundwater Monitoring Well Networks
- In-Situ Bioremediation (ISB) / Monitored Natural Attenuation (MNA) Pilot Study

## ➤ Upcoming Field Activities

- Description of Activities
- Schedule of Activities



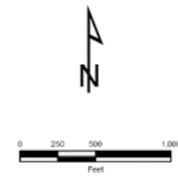
# Site Locations



**Low Concentration Sites**  
IRP-11  
IRP-13W  
MMS-04

**Moderate Concentration Sites**  
IRP-5S(a)  
IRP-6  
MPA

- Legend**
- Low Concentration IRP Sites
  - Moderate Concentration IRP Sites
  - - - Former MCAS Boundary
  - - - Navy Property
  - RG of 6 ug/l of 1,1-DCE
  - RG of 5 ug/l of TCE
  - ⊕ Monitoring Well
- 1,1-DCE - 1,1-dichloroethene  
RG - Remedial Goal  
TCE - Trichloroethene  
ug/l - micrograms per liter





# Background



- **Low Concentration Sites**
  - **Installation Restoration Program (IRP)-11: Drum Storage Area No. 1**
  - **IRP-13W: Drum Storage Area No. 3**
  - **Miscellaneous Major Spill (MMS)-04: Auto Hobby Shop**
- **Moderate Concentration Sites**
  - **IRP-5S(a): Ditch 5a South**
  - **IRP-6: Paint Locker and Drum Storage Area**
  - **Mingled Plumes Area (MPA):** includes collapsed sanitary sewer lines, paint stripper disposal area, and hazardous material storage yard





# Background



## Low Concentration Sites

- **IRP-11**
  - **Max. trichloroethene (TCE) concentration in 2009: 8 micrograms per liter ( $\mu\text{g}/\text{L}$ )**
  - **Plume size approximately 170 x 50 feet**
- **IRP-13W**
  - **Max. TCE concentration in 2009: 8.7  $\mu\text{g}/\text{L}$**
  - **Plume size approximately 270 x 150 feet**
- **MMS-04**
  - **Estimated Max. TCE concentration in 2009: 0.51J  $\mu\text{g}/\text{L}$**
- **IRP-11, IRP-13W, and MMS-04 are within the capture zones of the operating OU-1A/-1B North remediation systems**



# Background



## Moderate Concentration Sites

- **IRP-5S(a)**
  - **Max. TCE concentration in 2009: 85 µg/L**
  - **Plume size approximately 850 x 350 feet**
- **IRP-6**
  - **Max. TCE concentration in 2009: 10 µg/L**
  - **Max. 1,1-dichloroethene (DCE) concentration in 2009: 160 µg/L**
  - **1,1-DCE plume size approximately 120 x 50 feet**
- **MPA**
  - **Max. TCE concentration in 1<sup>st</sup> Water Bearing Zone (WBZ) in 2009: 20 µg/L**
  - **Plume size in 1<sup>st</sup> WBZ approximately 1,850 x 340 feet**
  - **Max. TCE concentration in 2<sup>nd</sup> WBZ in 2009: 24 µg/L**
  - **Plume size in 2<sup>nd</sup> WBZ approximately 550 x 150 feet**



# Final Record of Decision



- **Issued January 15, 2010; Finalized April 2010**

## **Remedial Action Objectives (RAOs):**

- **Protect human health by limiting the use of shallow groundwater containing chemicals of concern (COCs) at concentrations exceeding health-protective levels, and**
- **Reduce concentrations of COCs in shallow groundwater at areas of attainment for OU-4B sites to health-protective levels.**

## **Remediation Goals (RGs):**

- **TCE – 5 µg/L**
- **1,1-DCE – 6 µg/L (for IRP-6)**



# Final Record of Decision



## Selected Remedies

- **Low Concentration Sites (IRP-11, IRP-13W, MMS-04)**
  - **Alternative 2: Institutional Controls (ICs)**
    - **Used to prevent extraction and use of groundwater**
    - **Monitoring and 5-year reviews to evaluate the continued effectiveness of the remedy and to evaluate whether ICs are still needed**
  
- **Moderate Concentration Sites (IRP-5, IRP-6, the MPA)**
  - **Alternative 4: ISB/MNA/ICs**
    - **ISB used to lower concentrations to below remediation goals (RGs) / maximum contaminant levels (MCLs)**
    - **If necessary, MNA would be used to track reductions in contaminants until the RGs are met.**
    - **ICs used to prevent extraction and use of groundwater**



# Pre-Remedial Design Pilot Study



## Objectives

- **Low and Moderate Concentration Sites**
  - **Evaluate sufficiency of the current monitoring well networks**
  
- **Moderate Concentration Sites**
  - **Evaluate design parameters for ISB**
  - **Obtain supplemental / baseline parameters for MNA**



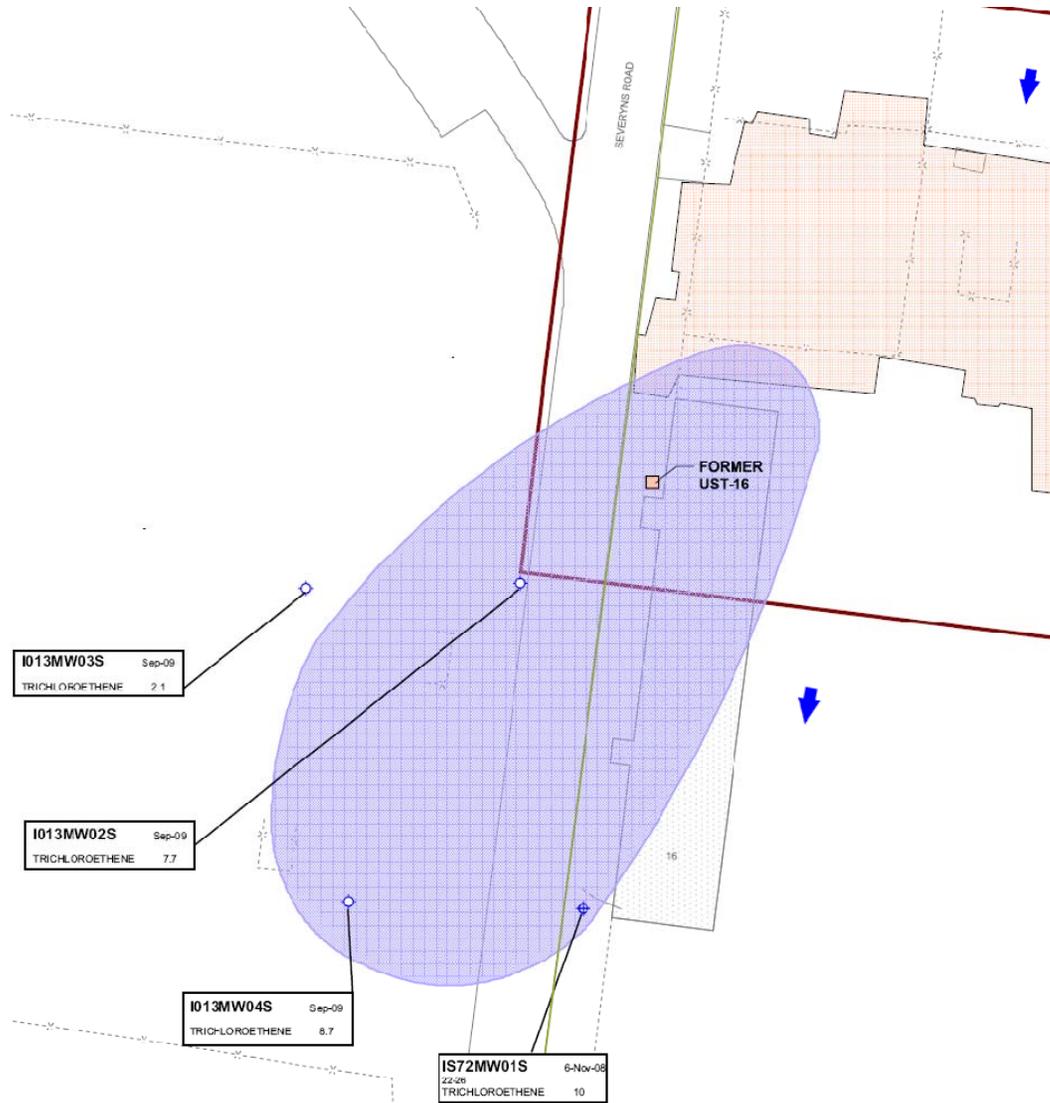
# IRP-11 Monitoring Well Network



- Network includes 3 groundwater monitoring wells
- Two wells installed in August 2009
- Monitoring wells from adjacent sites will be used to determine groundwater flow direction
- Monitoring well network is sufficient
- Two Hydropunch™ samples are recommended to update extent of plume



# IRP-13W Monitoring Well Network



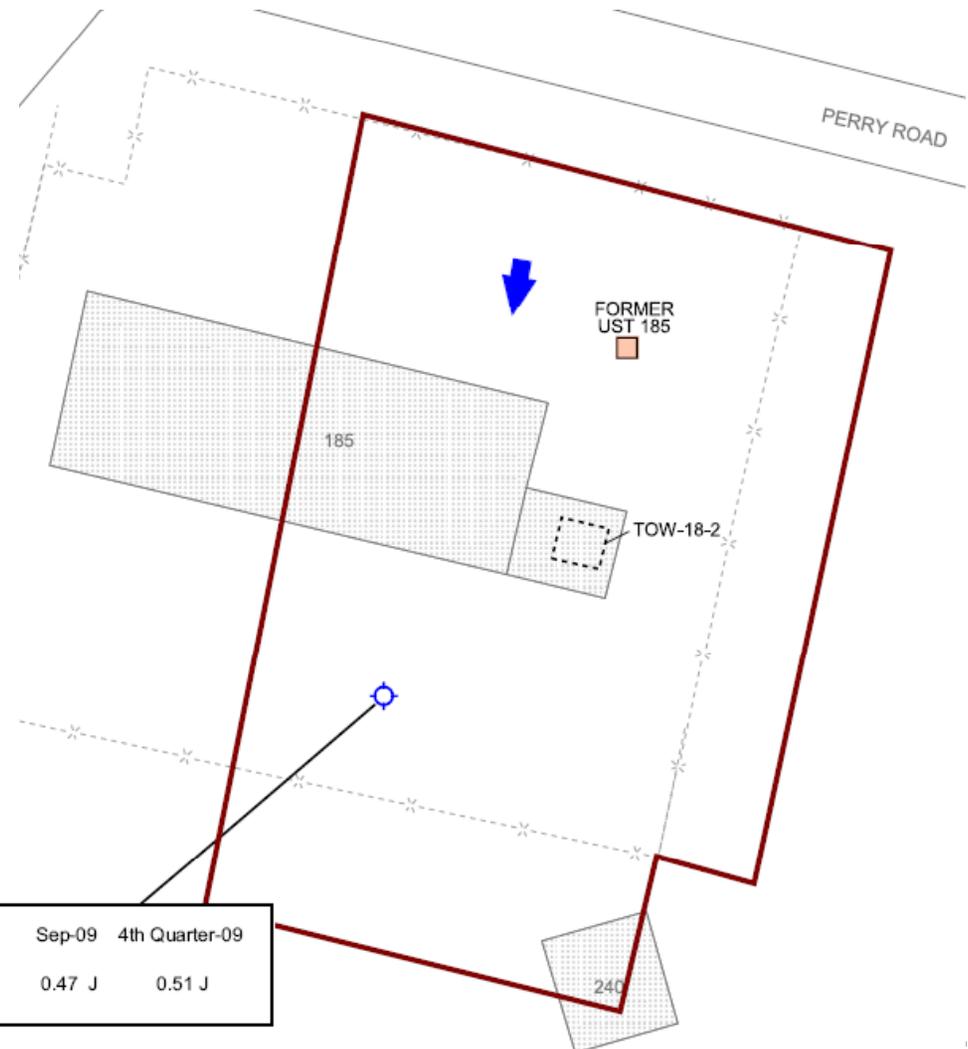
- Network includes 4 groundwater monitoring wells
- Three wells installed in August 2009
- TCE concentrations show decreasing trends that are approaching the MCL/RG of 5  $\mu\text{g/L}$
- Monitoring well network is sufficient



# MMS-04 Monitoring Well Network

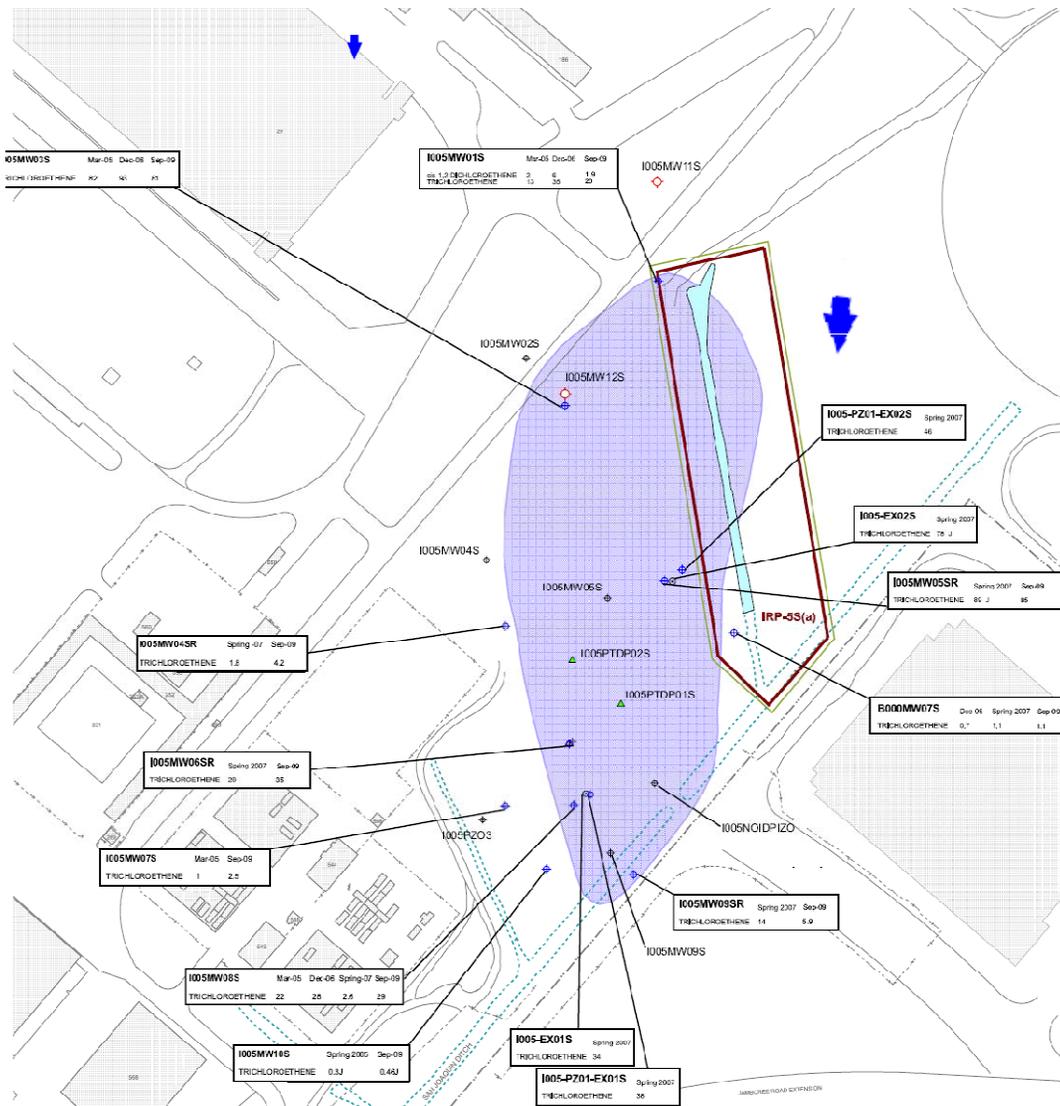


- Network includes 1 groundwater monitoring well installed in August 2009
- Monitoring well was installed to confirm previous Hydropunch™ data
- Subsequent monitoring indicates TCE concentrations are below the MCL/RG of 5 µg/L
- Estimated concentrations range from 0.47 to 0.51 µg/L
- Monitoring well is sufficient





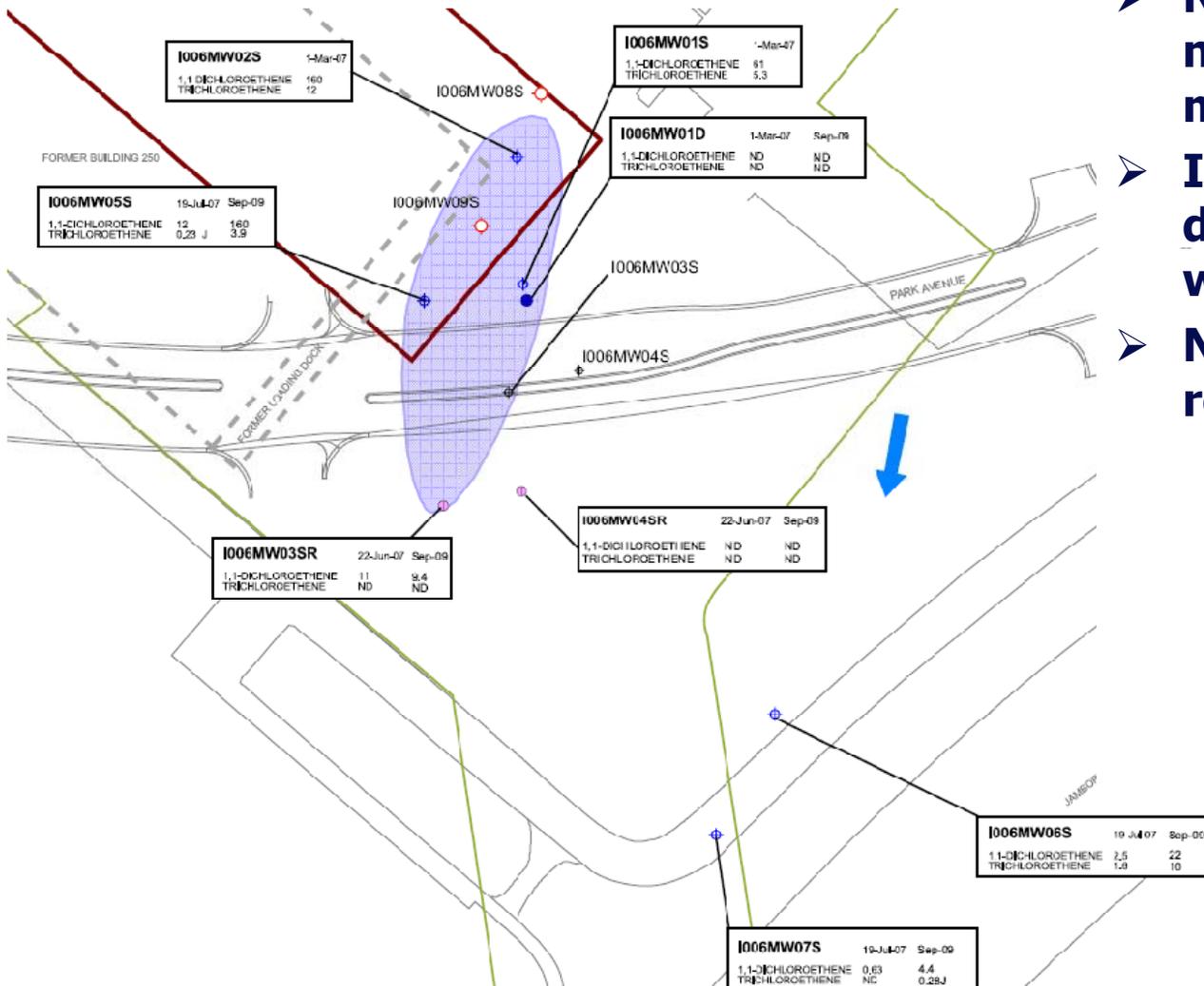
# IRP-5S(a) Monitoring Well Network



- Network includes numerous groundwater monitoring wells and piezometers
- Downgradient monitoring is provided by I005MW09SR, I005MW10S, and I005MW07S
- In-plume and downgradient monitoring well network is sufficient
- New upgradient well is recommended



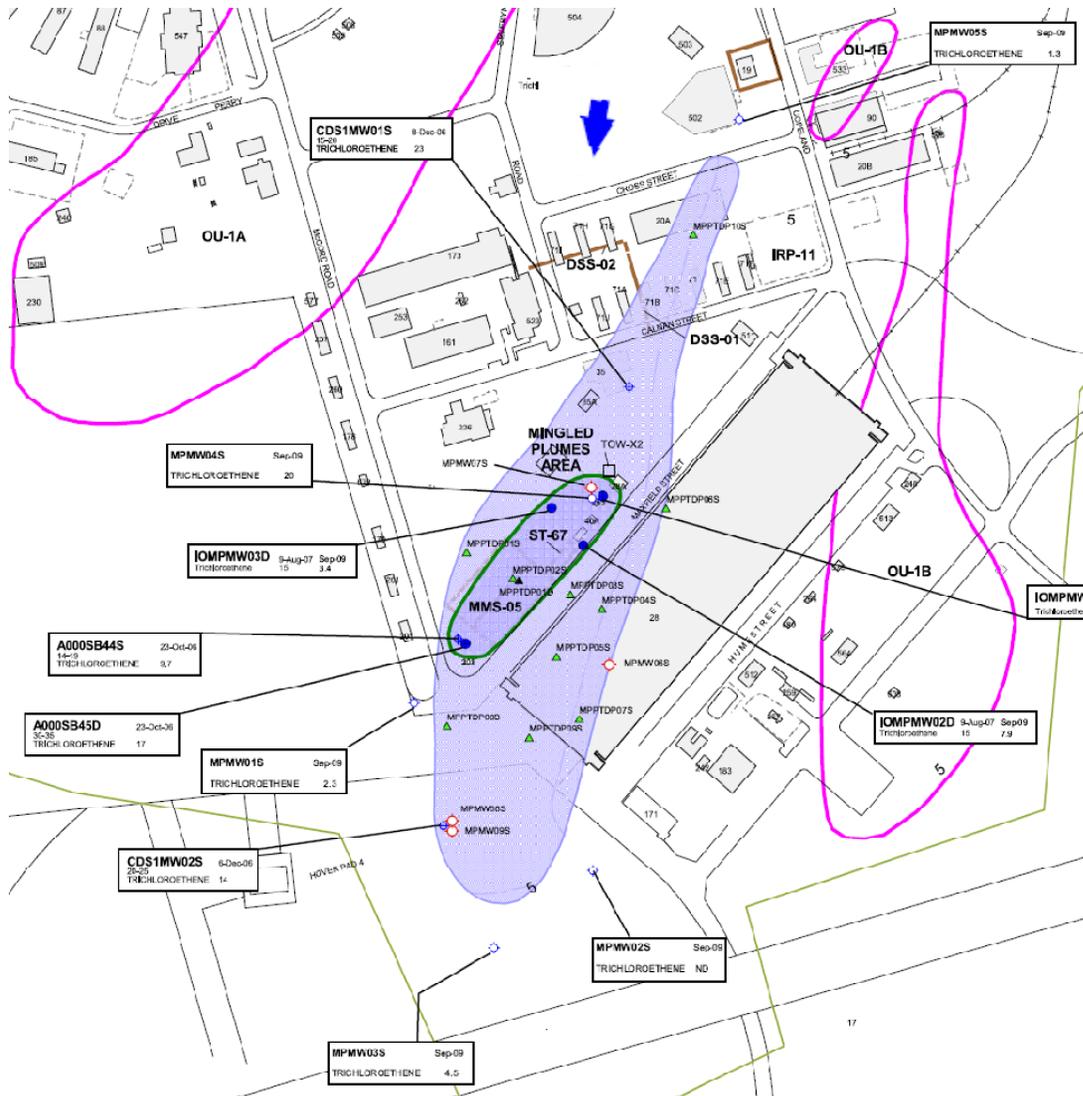
# IRP-6 Monitoring Well Network



- Network includes numerous groundwater monitoring wells
- In-plume and downgradient monitoring well network is sufficient
- New upgradient well is recommended



# MPA Monitoring Well Network

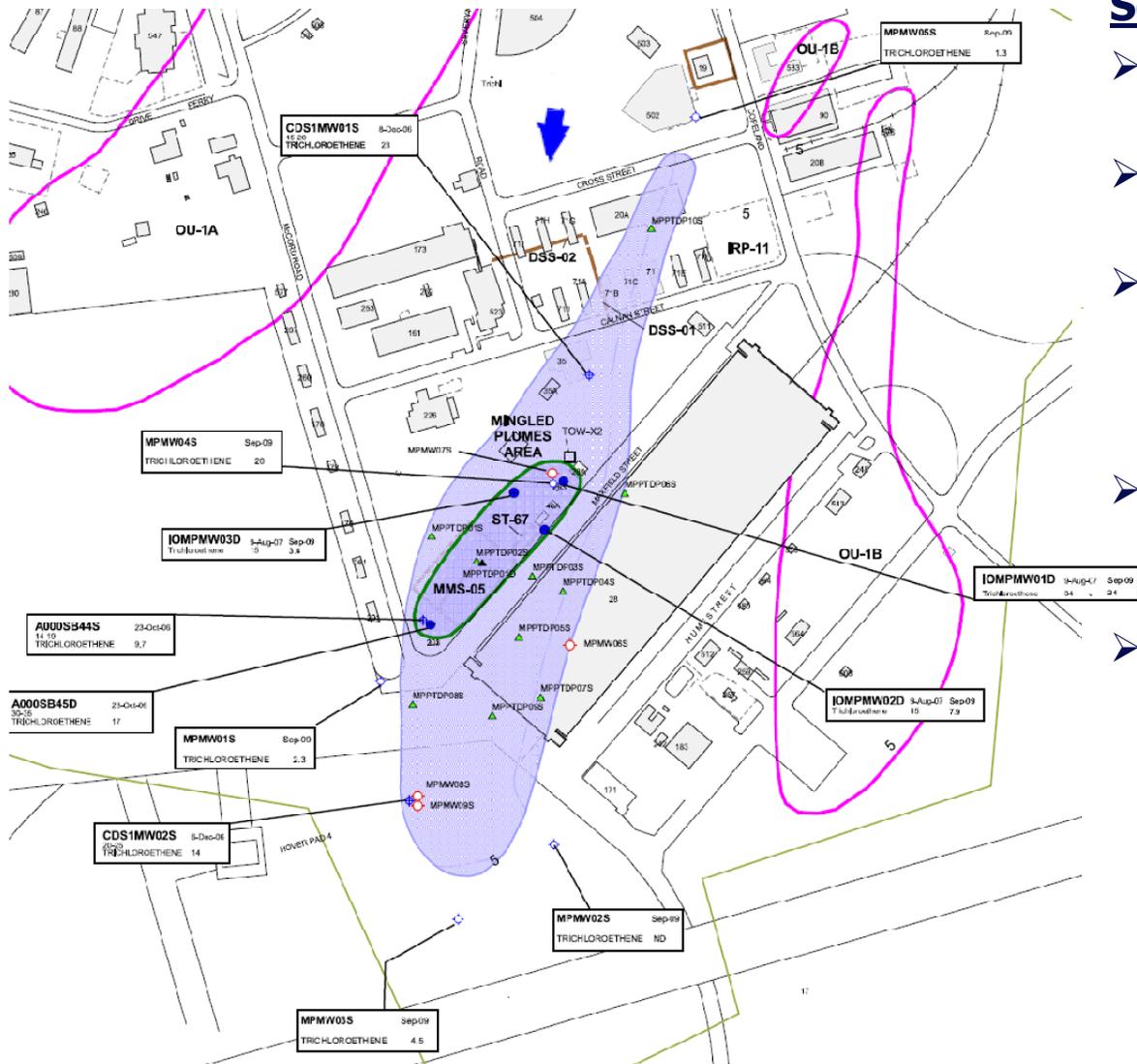


## First WBZ:

- Network includes numerous groundwater monitoring wells
- Five monitoring wells installed in August 2009
- Sufficient upgradient and downgradient monitoring well network
- One additional cross-gradient well along eastern flank is recommended, located based on Hydropunch™ data
- 10 Hydropunch™ samples to update plume delineation and assist in well location



# MPA Monitoring Well Network



## Second WBZ:

- Network includes four monitoring wells
- Three of the four wells were monitored in September 2009
- TCE concentrations decreased significantly compared with previous monitoring event in August 2007
- Based on observed decreases in TCE concentrations, the network is sufficient
- It is recommended that A000SB45D is monitored to confirm that TCE concentrations have decreased at the toe of the plume and confirm network sufficiency in the 2<sup>nd</sup> WBZ



# ISB/MNA Pilot Study



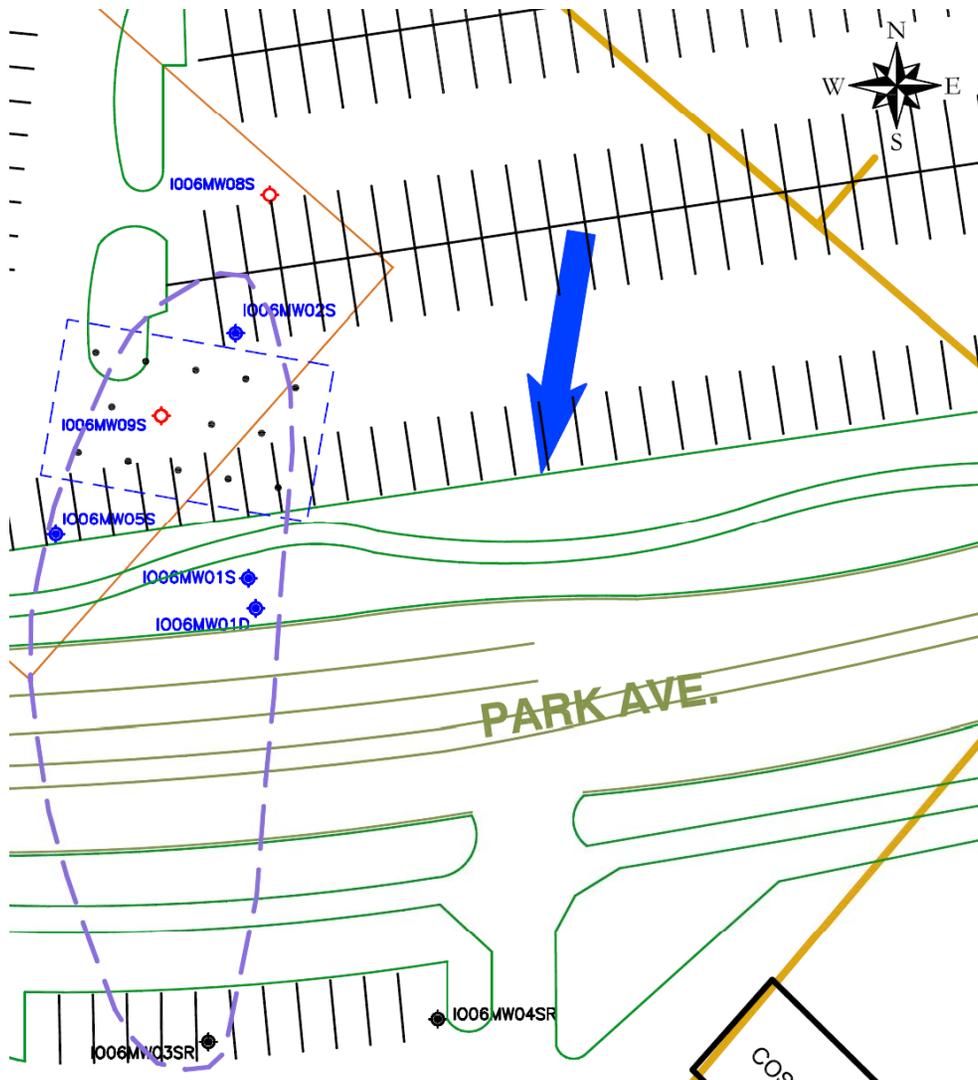
## Scope

- **Evaluate the following RD parameters**
  - **Radius of influence**
  - **Need for bioaugmentation**
  - **Effectiveness of different injection pattern geometries**
- **ISB Pilot Test Areas at each Site**
  - **Well installations to provide pilot test monitoring networks**
  - **Injection of substrates with and without bioaugmentation using different spacings and geometries**
  - **Baseline and progress groundwater monitoring**
- **Baseline monitoring for MNA parameters at upgradient, in-plume, and downgradient locations to evaluate current geochemical conditions**





# IRP-6 ISB/MNA Pilot Study



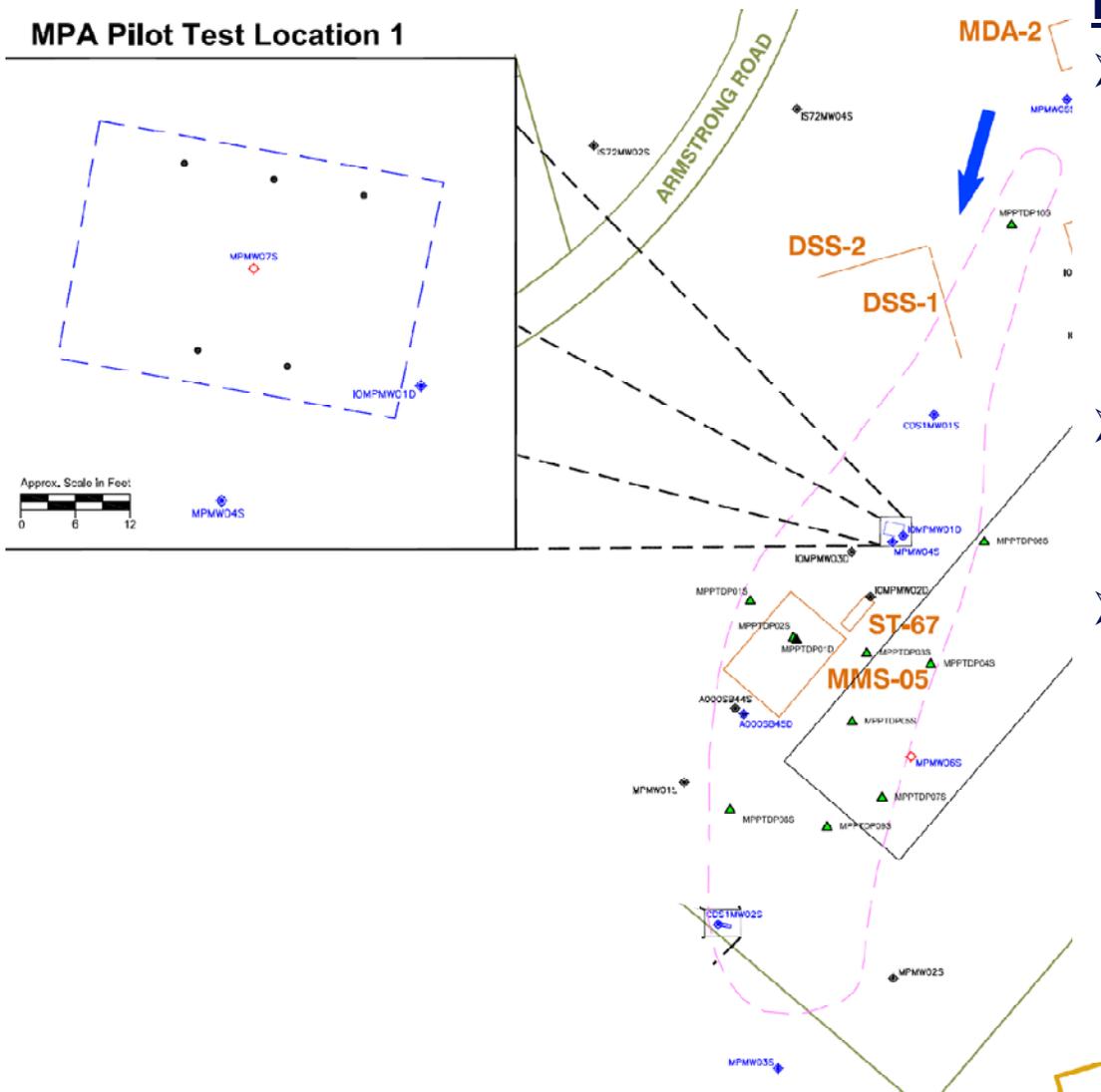
- **One proposed monitoring well (I006MW09S) in the pilot test area**
- **Emulsified vegetable oil will be mixed with water, bioaugmented, and injected into 13 borings**
- **Wells will be monitored prior to injection and 1, 2, and 3 months post injection**



# MPA ISB/MNA Pilot Study



MPA Pilot Test Location 1

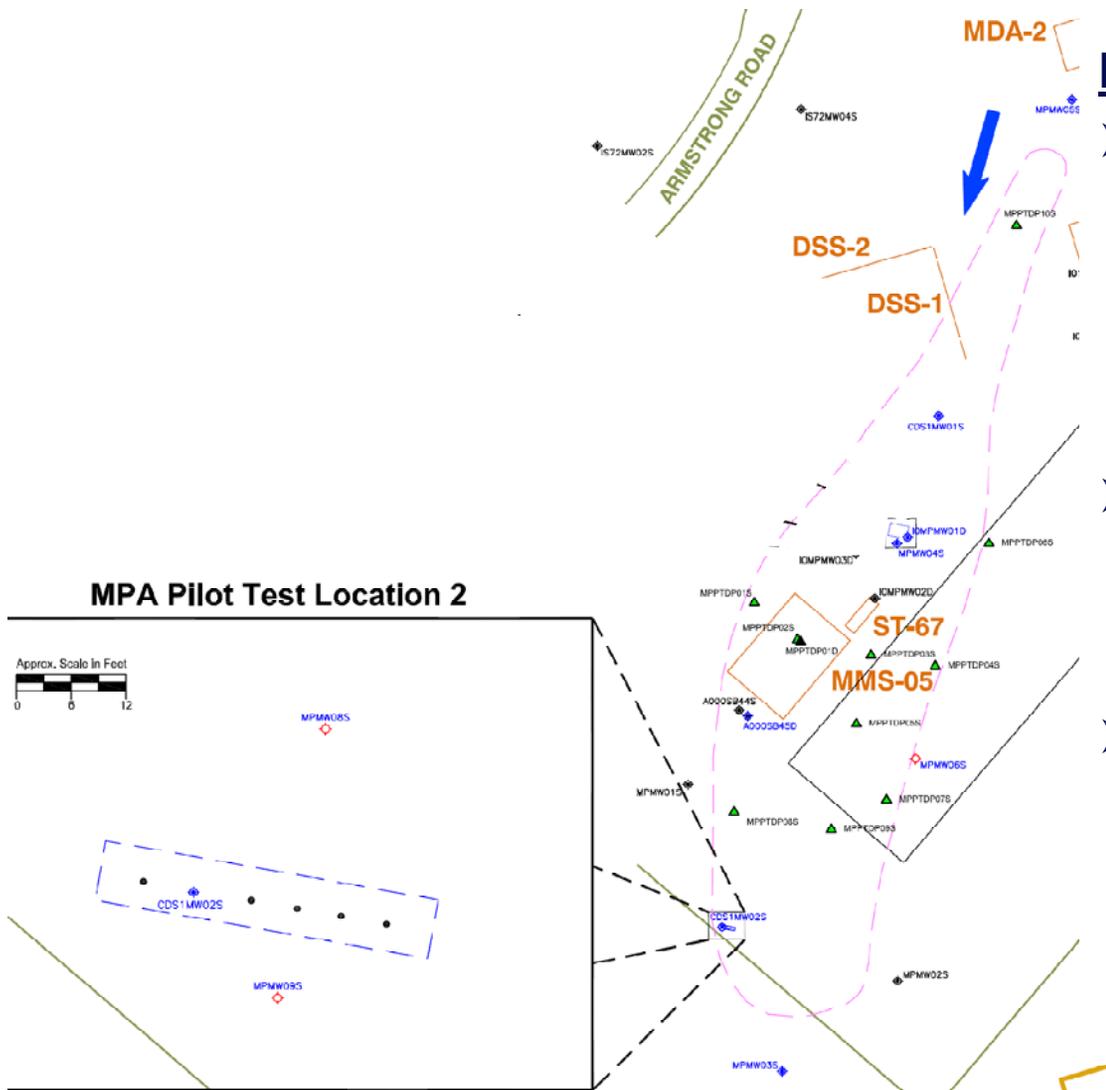


## Pilot Test Location 1:

- Pilot test monitoring network will consist of upgradient well CDS1MW01S, in-plume well MPMW07S, and downgradient wells MPMW04S and IOMPW01D
- Sodium lactate will be mixed with water and injected into 5 borings
- Wells will be monitored prior to injection and 1, 2, and 3 months post injection



# MPA ISB/MNA Pilot Study



## Pilot Test Location 2:

- Pilot test monitoring network will consist of upgradient well MPMW08S, in-plume well CDS1MW02S, and downgradient well MPMW09S
- Emulsified vegetable oil will be mixed with water and injected into 5 borings in a barrier-type application
- Wells will be monitored prior to injection and 1, 2, and 3 months post injection



# Upcoming Activities



- Typical truck-mounted direct push rig:
- Hydropunch-type groundwater sampling
  - Well installation



# Upcoming Field Activities



- Typical truck-mounted direct push rig:
- Hydropunch-type groundwater sampling
  - Well installation



# Upcoming Field Activities



- Typical ISB Pilot Study:
  - Mixing and injection of emulsified vegetable oil



# Upcoming Field Activities



- Typical ISB Pilot Study:
  - Mixing and injection of emulsified vegetable oil
  - Direct injection through the drill pipe to the target depth and location



# Schedule



➤ **Final Work Plan**

**July - August 2010**

➤ **Field Work**

➤ **Well installation, baseline monitoring and injections**

**July - August 2010**

➤ **Post injection monitoring**

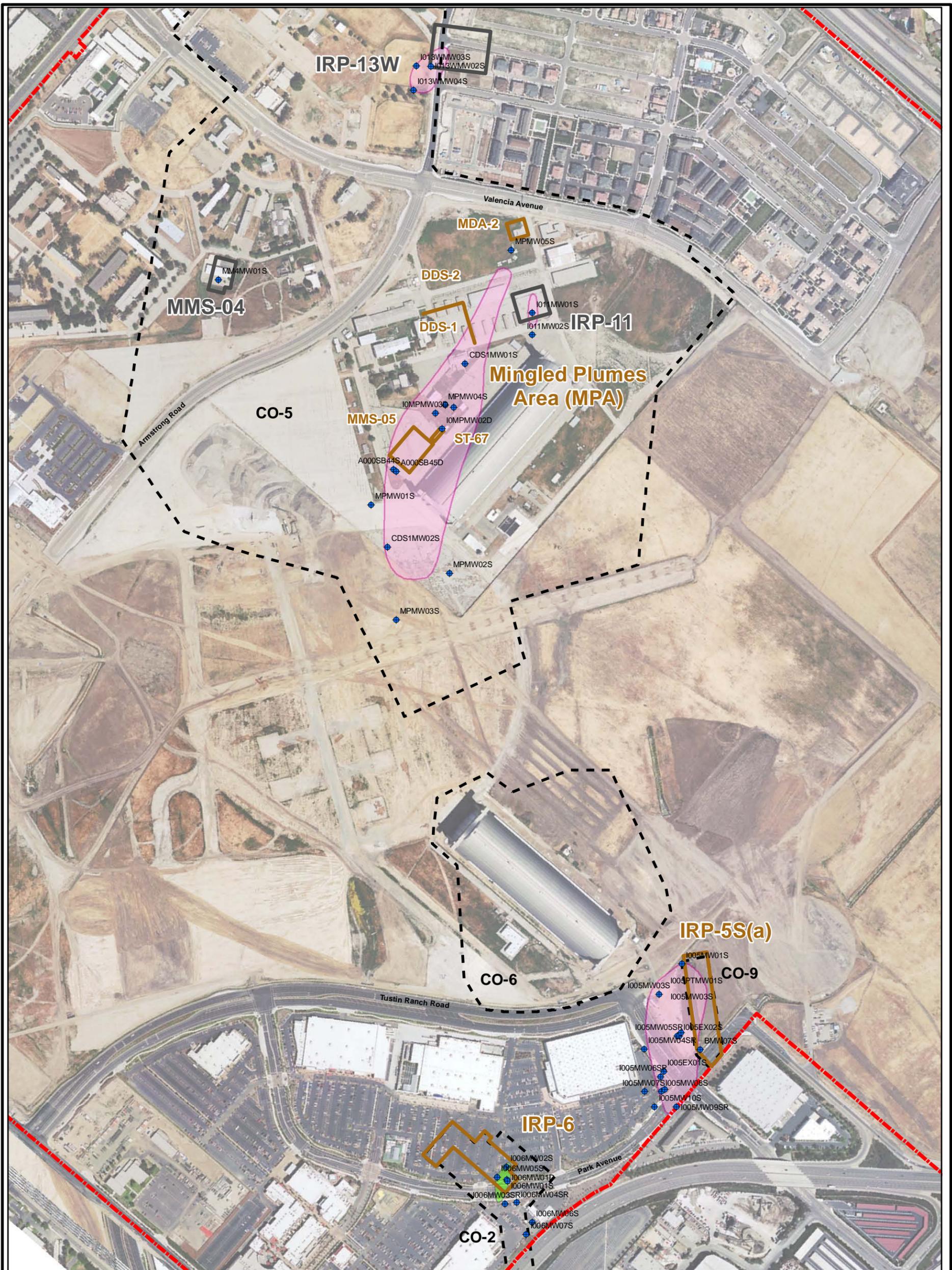
**December 2010**



# Acronyms



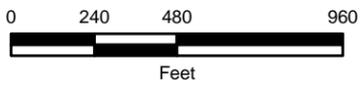
1,1-DCE – 1,1-dichloroethene  
COC – chemical of concern  
ICs – institutional controls  
IRP – installation restoration program  
ISB – In-situ bioremediation  
MCAS – Marine Corps Air Station  
MCL – maximum contaminant level  
MMS – miscellaneous major spill  
MNA – monitored natural attenuation  
MPA – mingled plumes area  
OU – Operable Unit  
RA – Remedial action  
RAO – remedial action objective  
RD – Remedial design  
RG – remediation goal  
TCE - trichloroethene  
µg/L – micrograms per liter  
WBZ – water bearing zone



**Legend**

- Low Concentration IRP Sites
- Moderate Concentration IRP Sites
- Former MCAS Boundary
- Navy Property
- RG of 6 ug/l of 1,1-DCE
- RG of 5 ug/l of TCE
- ◆ Monitoring Well

Notes:  
 1,1-DCE - 1,1-dichloroethene  
 RG - Remedial Goal  
 TCE - Trichloroethene  
 ug/l - micrograms per liter



Date of aerial photograph June 2008.

FIGURE 2 OU-4B LOCATION MAP	
FORMER MCAS TUSTIN, CALIFORNIA	
	Date: April 8, 2010
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