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FINAL

CERCLA FIVE-YEAR REVIEW REPORT OPERABLE UNITS 1A, 1B NORTH, 1B SOUTH, 3, AND 4B

FORMER MARINE CORPS AIR STATION TUSTIN TUSTIN, CALIFORNIA

October 2016

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FINAL

CERCLA FIVE-YEAR REVIEW REPORT
OPERABLE UNITS 1A, 1B NORTH, 1B SOUTH, 3, AND 4B

For

FORMER MARINE CORPS AIR STATION TUSTIN
TUSTIN, CALIFORNIA

October 2016

REVIEW AND APPROVAL

James Sullivan
BRAC Environmental Coordinator
Former Marine Corps Air Station Tustin

10/31/2016
Date

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EXECUTIVE SUMMARY

This report presents the results of the five-year review for 10 Installation Restoration Program (IRP) sites located within various Operable Units (OUs) at former Marine Corps Air Station (MCAS) Tustin, in Tustin, California. The sites addressed in this five-year review are:

- OU-1A, composed of IRP-13S
- OU-1B North, composed of IRP-12
- OU-1B South, composed of IRP-3
- OU-3, composed of IRP-1
- OU-4B low concentration sites (composed of IRP-11 and IRP-13W)
- OU-4B moderate concentration sites (composed of IRP-5S[a], IRP-6, and the Mingled Plumes Area [MPA])

This is the third five-year review for OU-3, the second five-year review for OU-1A, OU-1B North, OU-1B South, and OU-4B low concentration sites, and the first five-year review for OU-4B moderate concentration sites.

The purpose of this five-year review is to evaluate whether the remedies implemented at OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B are functioning as intended by their respective Records of Decision (RODs)/Remedial Action Plans (RAPs) (United States Department of the Navy [Navy] 2001, 2004a, 2004b, 2010) and Revised Draft Final Explanations of Significant Differences (ESDs) to the Final Record of Decision(ROD)/Remedial Action Plan (RAP) for Operable Unit (OU)-1A/OU-1B (Navy, 2014a, 2014b) and remain protective of human health and the environment.

Authority for Conducting Five-Year Reviews

The Navy is the lead agency for conducting five-year reviews at Former MCAS Tustin under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The Navy has conducted this five-year review pursuant to CERCLA Section (§) 121(c), the National Oil and Hazardous Substances Pollution Control Contingency Plan (NCP), Navy/Marine Corps policy for conducting CERCLA five-year reviews (Navy, 2011a), and the United States Environmental Protection Agency's (USEPA's) five-year review guidance (USEPA, 2001).

In accordance with Navy policy, the first site on an installation that triggers the five-year review triggers the five-year review process for the entire installation. The Final ROD/RAP for OU-3 was published in December 2001 (Navy, 2001) and the selected remedy included remedial actions that were completed or already being implemented. As a result, the triggering date for beginning the first five-year review period for Former MCAS Tustin was the date of the OU-3 ROD/RAP (i.e., December 20, 2001). The first five-year review for OU-3 was issued in 2006 (Enviro Compliance Solutions, Inc. [ECS], 2006). The second five-year review for OU-3, OU-1A, OU-1B North, OU-1B South, and OU-4 low concentration sites was completed in October 2011 (Navy, 2011b). The trigger date for this five-year review is the signature date for the second five-year review of October 31, 2011. This third five-year review for Former MCAS Tustin OU-3 is due on October 31, 2016.

Remedial action has been implemented at OU-4B moderate concentration sites starting in February 2013, triggering their inclusion in the five-year review process. The current five-year review represents the first for the OU-4B moderate concentration sites.

This approach is consistent with the Federal Facility Site Remediation Agreement (FFSRA) between the Navy and the State of California Environmental Protection Agency Department of Toxic Substances Control (DTSC) (Navy, 1999), Navy policy, and USEPA guidance.

Status of the Sites Addressed in the Five-Year Review

Table ES–1 summarizes the current the status of OU-1A, OU-1B North, OU-1B South, OU-3, OU-4B low concentration sites, and OU-4B moderate concentration sites.

Table ES–1
Current Status of OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B

Site Identification	Current Status
Operable Unit (OU)-1A, OU-1B North, and OU-1B South (Installation Restoration Program [IRP]-13S, 12, and 3)	The selected remedy for groundwater for these three sites is hydraulic containment with hot spot mass removal (Navy, 2004a, 2004b). The Records of Decision (RODs)/Remedial Action Plans (RAPs) also documented no further action (NFA) for soil at these three sites. • Major remedy components include: - Soil hot spot excavation (OU-1A, OU-1B North, and OU-1B South) - Two groundwater extraction and treatment systems (OU-1A/OU-1B North, and OU-1B South) - Groundwater monitoring - Institutional controls (ICs) - CERCLA five-year reviews • Chemicals of concern (COCs) identified for groundwater at OU-1A are: - Trichloroethene (TCE) - 1,2,3-trichloropropane (TCP) • COCs identified for groundwater at OU-1B North (IRP-12) are: - TCE - 1,1,2-trichloroethane (1,1,2-TCA) - 1,2-dichloroethene (DCE) • COCs identified for groundwater at OU-1B South (IRP-3) are: - TCE - 1,1-dichloroethane (1,1-DCA) - 1,1-DCE - 1,2-DCE • Major documents/events include: - ROD (Navy, 2004a, 2004b) - Remedy implementation in 2007 - OU-1A/OU-1B North system startup December 2007 - OU-1B South system startup January 2008

Table ES–1 (continued)
Current Status of OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B

Site Identification	Current Status
OU-1A, OU-1B North, and OU-1B South (IRP-13S, 12, and 3) (continued)	- Performance monitoring beginning during the first quarter 2008 (Engineering/Remediation Resources Group [ERRG], 2008a, 2008b; ECS 2008, 2010b, 2010c, 2011b, 2012b, 2013b, 2014b, 2015c; Multimedia Environmental Compliance Group [MMEC Group], 2016b) - Operating Properly and Successfully (OPS) Demonstration (ECS, 2010a) - OPS Determination (USEPA, 2009) - State of California Environmental Protection Agency Department of Toxic Substances Control and California Regional Water Quality Control Board, Santa Ana Region Concurrence Letters (DTSC, 2010; RWQCB, 2010) - First Five-Year Review (Navy, 2011b) - Five-Year Review Report Addendum (Navy, 2013a) - Revised Draft Final Explanations of Significant Differences (ESDs) to the Final Record of Decision(ROD)/Remedial Action Plan (RAP) for Operable Unit (OU)-1A/OU-1B (Navy, 2014a, 2014b) - Revised Draft Final Land Use Controls Remedial Design (LUC RD) Amendment No. 1, Remedial Design Hydraulic Containment with Hot Spot Removal Operable Units 1A and 1B, Former Marine Corps Air Station Tustin, Tustin, California (Navy, 2014c) • Current ongoing activities include: - Operation and maintenance (O&M) of the remedy components - Groundwater monitoring and reporting - IC monitoring and reporting
OU-3 (IRP-1)	The selected remedy is containment (Navy, 2001). • Major remedy components include: - Containment of impacted groundwater utilizing the existing steel-reinforced concrete containment wall along the west bank of Peters Canyon Channel - Groundwater, surface water, and landfill gas (LFG) monitoring - ICs - CERCLA five-year reviews

Table ES–1 (continued)
Current Status of OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B

Site Identification	Current Status
OU-3 (IRP-1) (continued)	• COCs identified for groundwater are: - 1,1-DCA - 1,1-DCE - 1,2-dichlorobenzene - 1,4-dichlorobenzene - Benzene - Chlorobenzene - Ethylbenzene - TCE - Vinyl chloride (VC) - Antimony - Arsenic - Cadmium - Manganese - Molybdenum - Thallium • Major documents/events include: - Remedy implementation beginning in 1986 - Remedial Investigation/Feasibility Study (RI/FS) (Bechtel National, Inc. [BNI], 1996, 1997b) - ROD/RAP (Navy, 2001) - Operation and Maintenance Plan (OMP) (Bechtel Environmental, Inc. [BEI], 2003c) - OPS Demonstration (Pacific Treatment Environmental Services [PTES] and Tetra Tech, 2003) - OPS Determination (USEPA, 2004a) - DTSC and RWQCB concurrence with OPS (DTSC, 2004; RWQCB, 2003) - First Five-Year Review (Navy, 2006) - Second Five-Year Review (Navy, 2011b) - Annual Long-term Monitoring (ECS, 2012a, 2013a, 2014a, 2015b; MMEC Group, 2016a) • Current ongoing activities include: - O&M of the remedy components - Groundwater, surface water monitoring and reporting - IC monitoring and reporting

Table ES–1 (continued)
Current Status of OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B

Site Identification	Current Status
OU-4B low concentration sites (IRP-11, IRP-13W)	• The selected remedy is ICs (Navy, 2010). • Major remedy components include: - ICs - CERCLA five-year reviews • COCs identified for groundwater are: - TCE • Major documents/events include: - OU-4 Technical Memorandum (BEI, 2004) - Feasibility Study (FS) (BEI, 2008) - ROD/RAP (Navy, 2010) - Final Remedial Action Completion Report (RACR) for Miscellaneous, Major Spill (MMS)-04 (AIS-TN&A Joint Venture [AIS-TN&A JV], 2011) - LUC RD and Long-Term Monitoring (LTM)/OMP (AIS-TN&A JV, 2012) - Five-Year Review Report Addendum (Navy, 2013a) - OPS Request (Navy, 2013b) - Addendum 01 to LUC RD and LTM/OMP (RORE, 2015d) - OPS Determination (USEPA, 2015) - IC Compliance Reporting (AIS-TN&A JV, 2014b; RORE, 2015b, 2016b) • Current ongoing activities include: - O&M of the remedy components - Groundwater monitoring and reporting - IC monitoring and reporting

Table ES–1 (continued)
Current Status of OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B

Site Identification	Current Status
OU-4B moderate concentration sites (IRP-5S(a), IRP-6, and the Mingled Plumes Area [MPA])	The selected remedy is in-situ bioremediation (ISB)/monitored natural attenuation (MNA)/ICs (Navy, 2010). • Major remedy components include: - ISB performance, MNA groundwater monitoring, and well inspections - ICs - CERCLA five-year reviews • COCs identified for groundwater are: - 1,1-DCE (IRP-6 only) - TCE (All sites) • Major documents/events include: - OU-4 Technical Memorandum (BEI, 2004) - FS (BEI, 2008) - ROD/RAP (Navy, 2010) - Remedy implementation in 2013 - Annual Performance Groundwater Monitoring (AIS-TN&A JV, 2015c; RORE, 2016a) - Final Interim-Remedial Action Completion Report (I-RACR) (AIS-TN&A JV, 2014a) - Final LUC RD (AIS-TN&A JV, 2015a) - OMP (AIS-TN&A JV, 2015b) - OPS Demonstration (AIS-TN&A JV, 2016) - OPS Determination (USEPA, 2016) • Current ongoing activities include: - O&M of the remedy components - Groundwater monitoring and reporting - IC monitoring and reporting

Five-Year Review Process

In accordance with Navy policy and USEPA guidance, the five-year review process at the five OUs addressed in this report consists of the following components.

Community Notification and Involvement

In accordance with Navy policy, the primary vehicle for community participation is the Restoration Advisory Board (RAB), which consists of interested community members and stakeholders. The RAB for Former MCAS Tustin is co-chaired by the Navy's Base Realignment and Closure (BRAC) Environmental Coordinator (BEC) James Sullivan and Co-chair, Ms. Desiré Chandler. A Public Notice was posted on the BRAC Program Management Office (PMO) webpage informing the community that the five-year review process had started (Appendix F). In addition, the Five-Year Review was the main topic presented at the MCAS Tustin RAB Meeting held on March 24, 2016. The presentation provided a brief explanation of the IR Sites included in the Five-Year Review and the components involved in preparing a Five-Year Review. Additionally, a Site Tour was conducted for RAB members on April 14, 2016, in support of the Five-Year Review and to ensure that community members are aware of current site conditions.

Following completion of the five-year review, the Five-Year Review Report, including community input, will be made available to stakeholders.

Document Review

Numerous documents were reviewed for OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B as part of this five-year review (Appendix A). The objective of the document review was to obtain relevant information that could be used as the basis for evaluating the performance of the remedies implemented at these sites. Documents reviewed include remedial investigation/feasibility study (RI/FS) reports, RODs, RD/Remedial Action Work Plans (RAWPs), Remedial Action Completion Reports (RACRs) and as built drawings, operating properly and successfully (OPS) Demonstration Reports for OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B, and documents containing operation and maintenance (O&M) and groundwater monitoring data and information.

Data Review

Examples of data reviewed for OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B include inspection checklists to evaluate compliance with institutional controls (ICs), O&M data, surface water and landfill gas (LFG) monitoring data, and groundwater monitoring data.

Site Inspections

Site inspections were conducted for OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B to provide information on the status of these sites, and to visually confirm and document the condition of each site's remedies and surrounding areas. The site inspection was conducted on April 7, 2016 by a team consisting of representatives from the Navy, BRAC PMO West, DTSC, and the California Regional Water Quality Control Board, Santa Ana Region (RWQCB). A RAB Site Tour in support of the Five-Year Review was also conducted on April 14, 2016.

Interviews

Interviews were conducted with Regulatory Agency representatives (USEPA, RWQCB, and DTSC) and various stakeholders (City of Tustin, RAB members, and members of the community), to provide additional information regarding the status of OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B.

Protectiveness Determination

Technical assessments of the remedies for OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B were conducted and protectiveness statements were formulated for each site on the basis of the data and document reviews, site inspections, interviews, and technical assessment results.

Technical Assessment Summary

The technical assessment conducted as part of this five-year review focused on responses to the following three questions presented in the USEPA guidance (USEPA, 2001).

- Question A: Is the remedy functioning as intended by the decision documents?
- Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?
- Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Results of the technical assessments are summarized below.

OU-1A, OU-1B North, and OU-1B South

Based on the documents reviewed, site inspection, and interviews, the remedies for OU-1A, OU-1B North, and OU-1B South are functioning as intended by their RODs. The engineering components of the remedies are functioning as designed. Based on the documents reviewed and site inspections, there was no evidence of activity at OU-1A, OU-1B North, and OU-1B South that is inconsistent with the land use restrictions presented in the land use controls remedial design (LUC RD) (Engineering/Remediation Resources Group [ERRG], 2007). The evaluation of Applicable or Relevant and Appropriate Requirements (ARARs) documented in the RODs indicated that there have been no significant changes to the standards or requirements identified as ARARs that could affect the protectiveness of the remedies at the sites. No newly promulgated laws or regulations were identified that could negatively affect the protectiveness of the remedies.

With current land use, the remedies at OU-1A, OU-1B North, and OU-1B South are protective. The remedy at OU-1B North is protective in the long-term. The remedies at OU-1A and OU-1B South will be protective in the long-term with finalizing the Revised Draft Final LUC RD Amendment No. 1 (Navy, 2014c) to establish and implement additional vapor intrusion (VI)-specific ICs in accordance with the Revised Draft Final ESDs to the Final ROD/RAP for OU-1A/OU-1B (Navy, 2014a and 2014b).

There is no other information that calls into question the protectiveness of the remedies.

The responses to the three technical assessment questions for OU-1A, OU-1B North, and OU-1B South are summarized in the following table.

OU-1A, OU-1B North, and OU-1B South Technical Assessment Summary

Question	Answer	Comment
Question A: Is the remedy functioning as intended by the decision documents?	**Affirmative**	The hydraulic containment remedies for OU-1A, OU-1B North, and OU-1B South are functioning as intended by their respective ROD/RAPs. The remedy of ICs, proposed in the 2014 Revised Draft Final ESDs to the Final ROD/RAP for OU-1A/OU-1B and implemented in the Revised Draft Final LUC RD Amendment No. 1 (Navy 2014c), once finalized, will be effective in addressing potential vapor intrusion (VI) from VOC-impacted groundwater within the VI area requiring institutional controls (ARICs).
Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?	**Negative**	Cleanup levels, and RAOs used at the time of the remedy have not changed, however, certain exposure assumption and toxicity criteria for TCE have changed. The changes were evaluated in the Five-Year Review Addendum (Navy, 2013a).
Question C: Has any other information come to light that could call into question the protectiveness of the remedy?	**Negative**	No additional information has come to light that affects the protectiveness of the remedies.

OU-3

Based on the monitoring data and documents reviewed, site inspection, and interviews, the remedy for OU-3 is functioning as intended by the ROD. Groundwater, surface water, and LFG monitoring data indicate that COCs at the site are being effectively contained by the engineering components of the remedy, as designed. There was no evidence of any activities at the site that are inconsistent with the land use restrictions established in the Land Use Control Implementation and Compliance Plan (LUCICP). The evaluation of the ARARs that were documented in the ROD indicated revised state maximum contaminant levels in drinking water (MCLs) for arsenic and ethylbenzene; however, this change would not negatively affect the protectiveness of the remedy at OU-3 because the steel-reinforced wall is effective in containing impacted groundwater and existing ICs are effective in restricting exposure to contaminated media. Certain toxicity criteria for COCs have changed; however, these changes do not affect the protectiveness of the remedies at OU-3.

No methane has been reported in the LFG probes since the inception of LFG monitoring. As a result of numerous consecutive years of non-reported landfill gas chemical concentrations, the Navy discontinued landfill gas monitoring with concurrence from regulatory agencies, and the six LFG monitoring probes were destroyed in July 2014.

Pending developments, further assessment will be performed and reported in the next Five-Year Review (2021).The responses to the three technical assessment questions for OU-3 are summarized in the following table.

OU-3 Technical Assessment Summary

Question	Response	Comment
Question A: Is the remedy functioning as intended by the decision documents?	**Affirmative**	The remedy at OU-3 is functioning as intended by the ROD/RAP.
Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?	**Negative**	The state MCLs for arsenic and ethylbenzene were revised after remedy selection and certain toxicity criteria for COCs have changed. However, these changes do not negatively affect the protectiveness of the remedies at OU-3.
Question C: Has any other information come to light that could call into question the protectiveness of the remedy?	**Negative**	No additional information has come to light that affects the protectiveness of the remedy.

OU-4B Low Concentration Sites

Based on the monitoring data and documents reviewed, site inspection, and interviews, the remedy for OU-4B low concentration sites is functioning as intended by the ROD. Groundwater monitoring data indicate that the selected remedy of ICs has been implemented and operating successfully, as designed. There was no evidence of any activities at the sites that are inconsistent with the land use restrictions established in the LUC RD (AIS-TN&A Joint Venture [AIS-TN&A JV], 2015a).The evaluation of the ARARs that were documented in the ROD indicated that there were no significant changes to the standards or requirements identified as ARARs that could negatively affect the protectiveness of the remedy at OU-4B low concentration sites. No newly promulgated standards were identified that could negatively affect the protectiveness of the remedy.

Primary release sources at IRP-11 and IRP-13W included the following: drums of chemicals and various fluids. Primary release mechanisms to the environment at IRP-11 and IRP-13W included infiltration and percolation through the unsaturated zone to the groundwater table. No secondary sources or release mechanisms are known to exist. The exposure medium and potential exposure pathways for human and ecological receptors were refined in the conceptual site model (CSM) based on risk assessments (RAs) (Navy, 2013a).

The exposure assumptions considered during remedy selection for IRP-11 and IRP-13W are consistent with current site conditions and remain unchanged. No changes to site conditions have occurred that would negatively affect the remedy performance.

OU-4B Low Concentration Sites Technical Assessment Summary

Question	Response	Comment
Question A: Is the remedy functioning as intended by the decision documents?	**Affirmative**	The remedies for the OU-4B low concentration sites are functioning as intended by the ROD/RAP. OPS has been achieved for the low concentration sites (USEPA, 2015).
Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?	**Negative**	Cleanup levels, and RAOs used at the time of the remedy have not changed, however, certain exposure assumption and toxicity criteria for TCE have changed. The changes were evaluated for the OU-4B low concentration sites (IRP-11 and -13W) in the Five-Year Review Addendum (Navy, 2013a) and demonstrate that the remedy in place at the low concentration sites remains protective.
Question C: Has any other information come to light that could call into question the protectiveness of the remedy?	**Negative**	No additional information has come to light that affects the protectiveness of the remedies.

OU-4B Moderate Concentration Sites

Based on the monitoring data and documents reviewed, site inspection, and interviews, the remedy for OU-4B moderate concentration sites is functioning as intended by the ROD. Groundwater monitoring data indicate that the selected remedy of ISB, MNA, and ICs have been implemented and operating successfully, as designed. There was no evidence of any activities at the site that are inconsistent with the land use restrictions established in the LUC RD (AIS-TN&A JV, 2015a). The evaluation of the ARARs that were documented in the ROD indicated that there were no significant changes to the standards or requirements identified as ARARs that could negatively affect the protectiveness of the remedy at OU-4B moderate concentration sites. No newly promulgated standards were identified that could negatively affect the protectiveness of the remedy.

Per the ROD/RPA, ISB was used to treat key areas at each site, where COC concentrations historically were not decreasing (AIS-TN&A JV, 2015c). Currently, the sites are being monitored to document ISB performance and MNA progress as presented in the Final Operation and Maintenance Plan (OMP) (AIS-TN&A JV, 2015b). The OPS demonstration for remedy implementation to address COCs in groundwater at OU-4B moderate concentration sites has been achieved (USEPA, 2016).

Primary release mechanisms at IRP-5S(a), IRP-6, and the MPA to the environment are assumed to have included infiltration and percolation through the unsaturated zone to the groundwater table. No secondary sources or release mechanisms are known to exist. The exposure medium is groundwater and the complete exposure pathways include ingestion, inhalation of groundwater vapors (directly and via vapor intrusion), and dermal contact. For the inhalation pathway, human receptors include the construction worker, industrial worker, and hypothetical future resident.

IRP-6 and the southern portion of IRP-5S(a) have been redeveloped for commercial business uses and future residential land use is unlikely. The MPA and the northern portion of IRP-5S(a) are vacant and there are currently no direct exposure pathways. The exposure assumptions considered during remedy selection for IRP-5S(a), IRP-6, and the MPA are consistent with

current site conditions and remain unchanged. No changes to site conditions have occurred that would negatively affect the remedy performance.

As the result of the revised toxicity for trichloroethene (TCE), a groundwater COC at OU-4B, DTSC performed a specific inhalation and dermal exposure evaluation to estimate risk and hazard from COCs in groundwater wells within previously transferred property under hypothetical residential, commercial, and construction worker trench use scenarios (DTSC, 2015). The DTSC evaluation, using conservative input data, resulted in cancer risks and noncancer hazards associated with vapor intrusion to indoor air under both the residential and commercial scenarios that are less than the point of departure of 10^{-6} and hazard index of 1.0. Inhalation of and dermal contact with COCs in impacted groundwater by the hypothetical construction trench worker also had estimated cancer risks that were at or less than the point of departure. However, noncancer endpoints associated with a construction trench worker's potential inhalation of TCE vapors at several monitoring wells were above the hazard index threshold of 1.0. (The noncancer endpoints associated with a construction trench worker's potential dermal contact with impacted groundwater were all less than the hazard index threshold of 1.0) (RORE, 2016a).

Following the DTSC evaluation, the Navy recalculated the inhalation risk from COCs in groundwater using the same updated toxicity values and site-specific exposure assumptions for the construction trench worker scenario. The site-specific input parameters considered during the Navy's evaluation included depth of groundwater relative to bottom of trench and site-specific exposure frequency given the relatively small size of the existing plume and the rate of utility placement. The risk re-evaluation performed by the Navy resulted in hazard indices less than the threshold value of 1.0 for a construction trench worker for exposure to impacted groundwater in the previously transferred portions of OU-4B (RORE, 2016a).

While the re-assessment did not specifically address the MPA, a qualitative risk evaluation is presented based on reported TCE concentrations at the MPA, IRP-5S(a) and 6, and the revised risk estimates at IRP-5S(a) and 6. Maximum reported TCE concentration of 25 micrograms per liter (µg/L) at the MPA is significantly less than the concentration of 73 µg/L used to evaluate risk at IRP-5S(a). Furthermore, groundwater at the MPA occurs at greater depth (approximately 11 to 18 feet) than at IRP-5S(a) where groundwater occurs at approximately 9 to 13 feet above mean sea level (amsl), thus a greater vertical separation between groundwater COCs and receptors. The results of this qualitative assessment indicate that both the cancer risk and non-cancer hazard for the VI pathway using the maximum measured TCE concentration in groundwater and the updated TCE toxicity criteria are below regulatory levels.

OU-4B Moderate Concentration Sites Technical Assessment Summary

Question	Response	Comment
Question A: Is the remedy functioning as intended by the decision documents?	**Affirmative**	The remedies for the OU-4B moderate concentrations sites are functioning as intended by the ROD/RAP. OPS has been achieved for the moderate concentration sites (USEPA, 2016).
Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?	**Negative**	Cleanup levels, and RAOs used at the time of the remedy have not changed, however, certain exposure assumption and toxicity criteria for TCE have changed. Changes in exposure assumptions were addressed for IRP-5S(a) and IRP-6 in the 2015 Annual Performance Evaluation Report (RORE, 2016a) and demonstrate that the remedy in place at those moderate concentration sites remains protective. A qualitative assessment of VI pathway risk at the MPA indicates that the remedy in place remains protective.
Question C: Has any other information come to light that could call into question the protectiveness of the remedy?	**Negative**	No additional information has come to light that affects the protectiveness of the remedies.

Protectiveness Statements

Based on the technical assessments summarized above, the following protectiveness statements were made for the subject sites.

OU-1A, OU-1B North, OU-1B South

Based on the technical assessment, the remedies for OU-1A, OU-1B North, and OU-1B South are determined to be protective of human health and the environment under current site conditions. The remedy at OU-1B North is protective in the long-term. The remedies at OU-1A and OU-1B South will be protective in the long term by finalizing the Revised Draft Final LUC RD Amendment No. 1 (Navy, 2014c) to establish and implement additional VI-specific ICs in accordance with Revised Draft Final ESDs to the Final ROD/RAP for OU-1A/OU-1B (Navy, 2014a and 2014b).

OU-3

Based on the technical assessment, the remedy at OU-3 is being implemented in accordance with the ROD (Navy, 2001) and is protective of human health and the environment. Potential exposure to waste and groundwater contamination at OU-3 has been addressed through engineering controls that isolate and contain the waste, access restrictions and warning signs, and implementation of ICs. The long-term protectiveness of the remedy is ensured by ongoing O&M activities that include inspection and maintenance of the engineering controls, including the steel-reinforced concrete containment wall, groundwater monitoring, and ICs that run with the land.

OU-4B Low Concentration Sites

Based on the technical assessment, the remedies at the OU-4B low concentration sites are being implemented in accordance with the ROD (Navy, 2010) and are determined to be protective of human health and the environment.

OU-4B Moderate Concentration Sites

Based on the technical assessment, the remedies at the OU-4B moderate concentration sites are being implemented in accordance with the ROD (Navy, 2010) and are determined to be protective of human health and the environment.

SUMMARY FORM

FIVE-YEAR REVIEW

FORMER MARINE CORPS AIR STATION TUSTIN, CALIFORNIA

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: Tustin Marine Corps Air Station		
USEPA ID *(from WasteLAN)*: CA9170090022		
Site areas addressed in this five-year review: Operable Unit (OU)-1A (Installation Restoration Program [IRP]-13S), OU-1B North (IRP-12), OU-1B South (IRP-3), OU-3 (IRP-1), OU-4B low concentration sites, and OU-4B moderate concentration sites		
Region: 9	**State:** CA	**City/County:** Tustin/Orange
SITE STATUS		
National Priorities List (NPL) status: ☐ Final ☐ Deleted ☒ Other (specify) Former MCAS Tustin is not an NPL site		
Remediation status (choose all that apply): ☐ Under Construction ☒ Operating ☐ Complete		
Multiple OUs? ☒ YES ☐ NO	**Construction completion date:** N/A	
Has site been put into reuse? ☒ YES ☐ NO *(OU-3 has been transferred; a portion of OU-1A has been transferred; balance of areas remain under Navy control and/or Lease-in-Furtherance-of-Conveyance [LIFOC])*		
REVIEW STATUS		
Lead agency: ☐ USEPA ☐ State ☐ Tribe ☒ Other Federal Agency Department of the Navy (Navy)		
Author name: Navy Base Realignment and Closure (BRAC) Program Management Office (PMO) West		
Author title: BRAC Environmental Coordinator	**Author affiliation: BRAC PMO**	
Review period: October 31, 2011 to October 31, 2016		
Date(s) of inspection: April 7, 2016		
Type of review: ☒ Post-SARA ☒ Non-NPL Remedial Action Site ☐ Pre-SARA ☐ NPL State/Tribe-lead ☐ NPL-Removal only ☐ Regional Discretion		
Review number: ☒ 1 (first) ☒ 2 (second) ☒ 3 (third) ☐ Other (specify)__ first (OU-4B moderate concentration sites, second (OU-1A, OU-1B North, OU-1B South, and OU-4B low concentration sites), third (OU-3)		
REVIEW STATUS - CONTINUED		
Triggering action (for the entire Former MCAS Tustin): ☐ Actual Remedial Action Onsite Construction at OU #____ ☐ Construction Completion ☒ ROD for OU-3 (remedy in progress as of ROD date) ☒ Previous Five-Year Review Report ☐ Other		
Triggering action date *(for the entire Former MCAS Tustin)*: October 31, 2011 (signature date of second five-year review)		
Due date *(five years after triggering action date)*: October 31, 2016 (five years from signature date of second five-year review for OU-3)		

Five-Year Review Summary Form (continued)

Issues:

No issues have been identified for OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B that currently or in the future would prevent the respective remedies at these sites from being protective of human health and the environment.

With current land use, the remedies at OU-1A, OU-1B North, and OU-1B South are protective. The remedies at OU-1A, and OU-1B South will be protective in the long-term with finalizing the Revised Draft Final Land Use Control Remedial Design Amendment No. 1 (Navy, 2014c) to establish and implement additional VI-specific ICs in accordance with Revised Draft Final ESDs to the Final ROD/RAP for OU-1A/OU-1B (Navy 2014a and 2014b).

Recommendations and Follow-up Actions:

Because no issues have been identified for OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B that currently prevent the remedies at these sites from being protective, no recommendations or follow-up actions are required to ensure protectiveness of the remedies. However, consistent with USEPA Guidance (USEPA, 2001), recommendations are made that do not directly relate to achieving or maintaining the protectiveness of the remedies, but pertain to activities such as O&M of the remedies and coordination with other agencies.

Per- and polyfluoroalkyl substances (PFASs) have been identified as an emerging contaminant. The historical use of OU-3 as a fire fighting training area indicates the potential for release of compounds known to contain PFASs. The United States Department of the Navy (DON) is conducting installation-wide assessments to identify potential releases of PFASs, and will prioritize future site investigations and remediation (if required) based on potential risks. The DON will continue to closely monitor regulatory and technical developments related to PFASs, and will develop an appropriate approach for OU-3 in accordance with evolving regulations and policy.

Protectiveness Statements:

OU-1A, OU-1B North, and OU-1B South

Based on the technical assessment, the remedies for OU-1A, OU-1B North, and OU-1B South are determined to be protective of human health and the environment under current site conditions. The remedies at OU-1A and OU-1B South will be protective in the long-term with finalizing the Revised Draft Final LUC RD Amendment No. 1 (Navy, 2014c) and Revised Draft Final ESDs to the Final ROD/RAP for OU-1A/OU-1B (Navy, 2014a and 2014b).

OU-3

Based on the technical assessment, the remedy at OU-3 is being implemented in accordance with the ROD (Navy, 2001) and is protective of human health and the environment. Potential exposure to waste and groundwater contamination at OU-3 has been addressed through engineering controls that isolate and contain the waste, access restrictions and warning signs, and implementation of ICs. The long-term protectiveness of the remedy is ensured by ongoing O&M activities that include inspection and maintenance of the engineering controls, including the steel-reinforced concrete containment wall, groundwater monitoring, and ICs that run with the land.

OU-4B low concentration sites

Based on the technical assessment, the remedies at OU-4B low concentration sites are being implemented in accordance with the ROD (Navy, 2010) and are determined to be protective of human health and the environment.

OU-4B moderate concentration sites

Based on the technical assessment, the remedies at OU-4B moderate concentration sites are being implemented in accordance with the ROD (Navy, 2010) and are determined to be protective of human health and the environment.

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ACRONYMS AND ABBREVIATIONS

µg/kg	micrograms per kilogram
µg/L	micrograms per liter
§	Section
AIS-TN&A JV	AIS-TN&A Joint Venture
Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure, Inc.
Amsl	above mean sea level
ANL	Argonne National Laboratory
AOC	area of concern
AOPC	area of potential concern
APGMR	Annual Performance Groundwater Monitoring Report
ARAR	applicable or relevant and appropriate requirement
ARIC	area requiring institutional controls
AS	Aerial Photograph, Storage or Possible Temporary Storage
AST	Aboveground Storage Tank
BCT	BRAC Cleanup Team
BEC	BRAC Environmental Coordinator
BEI	Bechtel Environmental, Inc.
bgs	below ground surface
BNI	Bechtel National, Inc.
BRAC	Base Realignment and Closure
Brown and Caldwell	Brown and Caldwell Consulting Engineers
CAO	Cleanup and Abatement Order
Cal/EPA	California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFC	chlorofluorocarbon
CFR	Code of Federal Regulations
CO	Carve-Out
COC	chemical of concern
COPC	chemical of potential concern
CRUP	Covenant to Restrict Use of Property
CSF	cancer slope factor
CSM	conceptual site model
DCA	dichloroethane
DCE	dichloroethene
DERP	Defense Environmental Restoration Program
DoD	United States Department of Defense
DON	United States Department of the Navy
DSD	Disposal, Storm Drain

ACRONYMS AND ABBREVIATIONS (continued)

DSS	Disposal, Sanitary Sewer
DTSC	California Department of Toxic Substances Control
EC	engineering control
ECS	Enviro Compliance Solutions, Inc.
EPC	exposure point concentration
ERA	Ecological Risk Assessment
ERRG	Engineering/Remediation Resources Group, Inc.
ESD	Explanation of Significant Differences
ESI	Expanded Site Inspection
FFSRA	Federal Facility Site Remediation Agreement
FOSET	Finding of Suitability for Early Transfer
FOSL	Finding of Suitability to Lease
FOST	Finding of Suitability for Transfer
Freon 112	1,1,2,2-tetrachloro-1,2-difluoroethane
Freon 113	1,1,2-trichloro-1,2,2-trifluoroethane
FS	Feasibility Study
GAC	granular activated carbon
GSE	ground support equipment
H	helicopter
HDPE	high density polyethylene
HHRA	Human-Health Risk Assessment
HI	hazard index
HQ	hazard quotient
HVAC	heating, ventilation, and air conditioning
IAS	Initial Assessment Study
IC	institutional control
I-RACR	Interim Remedial Action Completion Report
IRIS	Integrated Risk Information System
IRP	Installation Restoration Program
IRWD	Irvine Ranch Water District
ISB	in-situ bioremediation
IT	International Technologies, Inc.
JEG	Jacobs Engineering Group, Inc.
JMM	James M. Montgomery Consulting Engineers, Inc.
JP-5	jet propellant grade 5
LEA	Local Enforcement Agency
LFG	landfill gas

ACRONYMS AND ABBREVIATIONS (continued)

LIFOC	Lease-in-Furtherance-of-Conveyance
LTA	lighter than air
LTM	long-term monitoring
LUC	land use control
LUCICP	Land Use Control Implementation and Compliance Plan
LUCIP	Land Use Control Implementation Plan
LUC RD	Land Use Control Remedial Design
MAE	Miscellaneous Air Emissions
MCAF	Marine Corps Air Facility
MCAS	Marine Corps Air Station
MCL	maximum contaminant level in drinking water
MDA	Miscellaneous, Potential Disposal Area
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MMEC Group	Multimedia Environmental Compliance Group
MNA	monitored natural attenuation
MOA	Memorandum of Agreement
MPA	Mingled Plumes Area
MMS	Miscellaneous, Major Spill
MTBE	methyl *tert*-butyl ether
msl	mean sea level
MWA	Miscellaneous, Wash Area
Navy	United States Department of the Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	no further action
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NTCRA	Non-Time Critical Removal Action
O&M	operation and maintenance
OCHCA	Orange County Health Care Agency
OCSD	Orange County Sanitation District
OHM	OHM Remediation Services, Inc.
OMP	Operation and Maintenance Plan
OPS	operating properly and successfully
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
O/W	oil/water (as in oil/water separators)
PAH	polycyclic aromatic hydrocarbon

ACRONYMS AND ABBREVIATIONS (continued)

PCAP	Petroleum Corrective Action Program
PCB	polychlorinated biphenyl
PE	Licensed Professional Engineer
PER	Performance Evaluation Report
PERF	Project Environmental Review Form
PFAS	Per- and polyfluoroalkyl substance
PG	Registered Professional Geologist
PMO	Program Management Office
PRBB	Permeable Reactive Bio-Barrier
PTES	Pacific Treatment Environmental Services
QAPP	Quality Assurance Project Plan
RA	Risk Assessment
RA	Remedial Action
RAB	Restoration Advisory Board
RACR	Remedial Action Completion Report
RAO	Remedial Action Objective
RAP	Remedial Action Plan
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RFA	RCRA Facility Assessment
RG	remediation goal
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RME	reasonable maximum exposure
ROD	Record of Decision
RPM	Remedial Project Manager
RWQCB	California Regional Water Quality Control Board, Santa Ana Region
SAP	Sampling and Analysis Plan
Shaw	Shaw Environmental, Inc.
SI	Site Investigation
SPDP	Special Purpose Discharge Permit
SP/RP	Specific Plan/Reuse Plan
ST	Storage, Temporary
STD	Storage, Designated Hazardous Waste
TCA	trichloroethane
TCE	trichloroethene
TCP	trichloropropane

ACRONYMS AND ABBREVIATIONS (continued)

TCRA	Time-Critical Removal Action
TDS	total dissolved solids
TOW	Treatment, Oil/Water Separator
TPH	total petroleum hydrocarbons
TRPH	total recoverable petroleum hydrocarbons
UCL	upper confidence limit
USEPA	United States Environmental Protection Agency
UST	underground storage tank
VC	vinyl chloride
VI	vapor intrusion
VEE	vacuum-enhanced extraction
VOC	volatile organic compound
WBZ	water-bearing zone

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1 INTRODUCTION

This report presents the five-year review results for 10 Installation Restoration Program (IRP) Sites located within five Operable Units (OUs) at former Marine Corps Air Station (MCAS) Tustin, in Tustin, California. The OUs addressed in this five-year review are:

- OU-1A, composed of IRP-13S
- OU-1B North, composed of IRP-12
- OU-1B South, composed of IRP-3
- OU-3, composed of IRP-1
- OU-4B low concentration sites (composed of IRP-11 and IRP-13W)
- OU-4B moderate concentration sites (composed of IRP-5S[a], IRP-6, and the Mingled Plumes Area [MPA])

This is the third five-year review for OU-3, the second five-year review for OU-1A, OU-1B North, OU-1B South, and OU-4B (low concentration sites), and the first five-year review for OU-4B (moderate concentration sites).

The purpose of this five-year review is to evaluate whether the remedies implemented at OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B are performing as intended by their respective Records of Decision (RODs)/Remedial Action Plans (RAPs) (United States Department of the Navy [Navy], 2001, 2004a, 2004b, 2010, 2014a, 2014b) and remain protective of human health and the environment.

1.1 BACKGROUND

Former MCAS Tustin is located in southern California in Orange County, approximately 40 miles south of downtown Los Angeles and over 100 miles north of the California-Mexico border (Figure 1). Individual site layouts are shown on Figures 2 through 5.

MCAS Tustin was established during World War II as a Navy lighter than air (LTA) facility to support air patrols off the southern California coast. The station was commissioned in the fall of 1942 upon completion of two blimp hangars, currently national historic landmarks, and was decommissioned in 1949. The station was then used as an outlying field for other military operations in the area, primarily those of MCAS El Toro.

In 1951, MCAS Tustin was reactivated to support the Korean Conflict and was used solely for helicopter operations. The station was officially designated the Santa Ana Marine Corps Air Facility (MCAF). As the station's operations expanded, the name was changed in September 1969 to MCAS (Helicopter [H]) Santa Ana. In 1978, the station was renamed MCAS [H] Tustin to reflect its annexation by the City of Tustin. In 1986, the station was renamed to MCAS Tustin, and in October 1997, the station was renamed to MCAF Tustin. In 2000, the MCAF Tustin designation was dropped and the use of MCAS Tustin was officially reinstated.

To support its mission, operations at the station were expanded over the years to include more than 200 structures and various facilities, including a 3,000-foot runway, aircraft parking aprons, and numerous aircraft maintenance shops. Prior to its closure, MCAS Tustin occupied approximately 1,595 acres of land: 212 acres were used for station housing and 1,383 acres were used for non-housing purposes. Currently, all of the station property is developed, except

for approximately 674 acres that were previously used for commercial farming. The land surrounding MCAS Tustin has residential, commercial/business, industrial, and recreational uses.

MCAS Tustin was initially included on the Base Realignment and Closure (BRAC) II list in 1991. Further realignment and complete closure were ordered for the station under the BRAC III list (1993). Since 1993, the BRAC Clean Team (BCT) has coordinated cleanup and closure activities as Former MCAS Tustin. The BCT consists of representatives from the Navy, United States Environmental Protection Agency (USEPA), California Environmental Protection Agency Department of Toxic Substances Control (DTSC), and the California Regional Water Quality Control Board, Santa Ana Region (RWQCB).

1.2 FIVE-YEAR REVIEW AUTHORITY AND GENERAL APPROACH

The Navy prepared this five-year review according to Navy policy, and in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section (§) 121(c) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Navy and USEPA five-year review guidance documents (Navy, 2011a; USEPA, 2001) were followed in creation of this five-year review.

CERCLA §121 states:

> *"If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews."*

In addition, the NCP, Title 40, Code of Federal Regulations (CFR) §300.430(f)(4)(ii) states:

> *"If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action."*

Pursuant to CERCLA § 121(c) and the NCP, five-year reviews have been conducted at Former MCAS Tustin to evaluate whether the remedies at OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B are now, or will be, protective of human health and the environment at the completion of the remedial action.

In accordance with Navy policy for conducting CERCLA five-year reviews, the first site on an installation that triggers the five-year review sets the five-year review clock for the entire installation. The Final ROD for OU-3 was signed on December 20, 2001 (Navy, 2001). The first CERCLA five-year review for OU-3 was conducted in 2006 (Navy, 2006). At that time, remedial action implementation had not yet begun at other sites on the installation. The signature date for the first five-year review was October 31, 2006. Since that time, remedial action has been implemented and is ongoing at OU-1A, OU-1B North, OU-1B South, and OU-4B. The signature date for the second five-year review was October 31, 2011. Therefore, the third five-year review

for OU-3, and the second five-year reviews for OU-1A, OU-1B North, OU-1B South, and OU-4B, are due on October 31, 2016.

This Five-Year Review Report is organized in the following sections:

- Section 1, Introduction, introduces the sites, provides background information about the base, and describes the Five-Year Review in general terms.
- Section 2, Site Chronology, summarizes the sequence of events at each site.
- Section 3, Background, describes physical characteristics, land use, contamination history, actions taken before the ROD, and the basis for taking action.
- Section 4, Remedial Actions, presents the remedial actions implemented in accordance with the RODs.
- Section 5, Progress Since Last Review, summarizes the actions since the 2011 Five-Year Review.
- Section 6, Five-Year Review Process, describes the administrative process, community notification and involvement, document review, data review, site inspections, and interviews.
- Section 7, Technical Assessment, presents an analysis of whether the remedies are functioning as intended, whether exposure assumptions and cleanup levels used at the time of the RODs are still valid, and whether any new information suggests that the remedies may not be protective.
- Section 8, Issues, Recommendations, and Follow-up Actions, provides issues and recommended actions based on the technical assessment.
- Section 9, Protectiveness Statement, lists the protectiveness statement for each site.
- Section 10, Next Review, provides the schedule for the next five-year review.
- Section 11, References, lists the documents used to prepare this Five-Year Review Report.

Appendices containing supporting information follow the figures section.

- Appendix A, List of Documents Reviewed, contains the bibliography, listing documents reviewed in support of this five-year review.
- Appendix B, Land Use Controls Compliance Checklist, contains the land use controls compliance checklists reviewed for this five-year review.
- Appendix C, Site Inspection Checklists, contains the five-year review site inspection checklists.
- Appendix D, Site Inspection Photographs, contains the photographic log documenting observations made during the five-year review site inspection.
- Appendix E, Interview Documentation, contains the interviews conducted for this five-year review.

- Appendix F, Public Notice, contains the public notice of the initiation of the Five-Year Review at Former MCAS Tustin that was posted to the Navy BRAC webpage.
- Appendix G, Responses to Comments, contains the response to comments on the Draft Five-Year Review.

2 SITE CHRONOLOGY

Table 2-1 lists events and milestones relevant to environmental response actions completed by the Navy for Former MCAS Tustin. Tables 2–2 through 2–7 break out the events by site for OU-1A, OU-1B North, OU-1B South, OU-3, OU-4B low concentration sites, and OU-4B moderate concentration sites, respectively.

Table 2-1
Chronology of Basewide Site Events – Former MCAS Tustin

Date	Investigation/Activity	Objective	Summary of Findings
1983–1984 (Brown and Caldwell Consulting Engineers [Brown and Caldwell], 1985)	Initial Assessment Study (IAS)	Identify and evaluate sites posing a potential threat to human health or the environment due to contamination from past hazardous materials operations.	All sites were identified as potentially contaminated and recommended Installation Restoration Program [IRP]-1 through IRP-14 for a confirmation study.
1990–1993 (Jacobs Engineering Group [JEG], 1993a).	Site Investigation (SI)	Evaluate nine sites (IRP-2, 3, 5, 7, 8, 9, 12, 13, and 15) identified during the IAS.	Further evaluation of IRP-2 and IRP-8 was recommended. A Remedial Investigation/Feasibility Study (RI/FS) was recommended for IRP-3, 5, 7, 9, 12, and 13. No further action (NFA) was recommended at IRP-15. Removal actions *w*ere not recommended for any sites.
1994–1995 (Argonne National Laboratory [ANL], 1994)	Expanded site characterization	Determine background concentration of chemicals of potential concern (COPCs) in groundwater and establish baseline geochemistry at MCAS Tustin.	More than 20 wells were installed and sampled and more than 30 Hydropunch™ borings were made to establish baseline geochemistry.

Table 2-1 (continued)
Chronology of Basewide Site Events – Former MCAS Tustin

Date	Investigation/Activity	Objective	Summary of Findings
1994–1995 (Bechtel National, Inc. [BNI], 1997a)	Expanded Site Inspection (ESI)	Evaluate nine IRP sites and areas of concern (AOCs) (IRP-2, -6, -8, -9, -11, and -15, and Miscellaneous, Major Spill (MMS)-03, MMS-04, and MMS-05), including soil and groundwater sampling, fate and transport analysis, baseline risk assessment (RA), and screening risk assessment associated with future impacts on groundwater (due to potential leaching of COPCs in soil).	NFA was recommended for soil at IRP-8, -11, and -15, and MMS-03, MMS-04, and MMS-05. NFA was recommended for soil at IRP-2 and IRP-9. Further evaluation was recommended for soil at IRP-6. NFA was recommended for groundwater at IRP-9 and -15, and MMS-03. IRP-2, -6, --8, and -11, and MMS-04 and MMS-05 were recommended for further evaluation in the RI station-wide groundwater program, based on the risk assessment and evaluation of COPCs in groundwater.
1997 (BNI, 1997a)	Final Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) Report	Investigate 50 of the 258 AOCs.	Twenty-seven AOCs were recommended for further action, including Storage, Temporary (ST)-72 and Miscellaneous, Wash Area (MWA)-18.
1996 (OHM Remediation Services, Inc. [OHM], 1997a)	Removal action at IRP-16B	Execute a petroleum corrective action to excavate and treat petroleum-contaminated soil.	Approximately 15,000 tons of soil were excavated, of which 6,000 tons of contaminated soil were thermally remediated and re-used for backfill to restore the site. Activities were completed in August 1996.
1997 (OHM, 1997b)	Removal action at IRP-2	Excavate and treat polycyclic aromatic hydrocarbon (PAH)-contaminated soil.	Approximately 569 tons of PAH-contaminated soil were excavated and treated at an approved offsite facility. Activities were completed in June 1997.
1987–1988 (James. M. Montgomery Consulting Engineers, Inc. [JMM], 1988)	Former fuel farm investigation	Identify COPCs present in groundwater at IRP-16.	Three monitoring wells were installed and sampled. Several volatile organic compounds (VOCs), including trichloroethane (TCA), dichloroethane (DCA), and toluene, were reported in groundwater.

Table 2-1 (continued)
Chronology of Basewide Site Events – Former MCAS Tustin

Date	Investigation/Activity	Objective	Summary of Findings
1992 (JEG, 1993b)	Former fuel farm investigation	Identify COPCs present in soil and groundwater at IRP-16.	No VOCs were reported in groundwater. Elevated concentrations of total recoverable petroleum hydrocarbons (TRPH) were reported in soil.
1995–1997 (BNI, 1997c)	Operable Unit (OU)1-1/OU-2 RI	Evaluate seven sites (IRP-3, -5, -12, -13E, -13W, -13S, and -16). Also perform station-wide groundwater study to evaluate impact of sources of contamination at 29 areas of potential concern (AOPCs) identified in the RI, ESI, and RFA programs.	Non-time critical removal actions (NTCRAs) were recommended for 23 of the 29 AOPCs: (IRP-2, -5, -6, -8, -11, -13E, -13W, and -I6, and AOCs AD-04, Aerial Photograph, Storage, or Possible Temporary Storage [AS]-06, AS-08, Above Ground Storage Tank [AST] AST-02, AST-04, Disposal, Storm Drain [DSD]-01, DSD-02, Miscellaneous, Potential Disposal Area [MDA]-02, MDA-04, MDA-07, MMS-01, MWA-03, MMS-04, MMS-05, and Storage, Temporary (ST)-67). An FS was recommended for IRP-3 (which includes Treatment, Oil/Water Separator [TOW]-X3 and TOW-X4), IRP-12, and IRP-13S (ST-72 and MWA-18).
1999, 23 September	Base Realignment and Closure (BRAC) Cleanup Team (BCT) meeting	Modify recommended action for six IRP sites and six AOCs.	Recommendations included a focused FS for IRP-5, -6, -8, -11, -13W, and -16, and AOCs Disposal, Sanitary Sewer (DSS)-01, DSS-02, MDA-02, MMS-04, MMS-05, and ST-67 due to the presence of contaminants in shallow groundwater at concentrations exceeding regulatory limits. These sites/AOCs were included in newly designated OU-1A.

Table 2-1 (continued)
Chronology of Basewide Site Events – Former MCAS Tustin

Date	Investigation/Activity	Objective	Summary of Findings
1999	BCT meeting 23 September 1999	Modify recommended action for six IRP sites and six AOCs.	Recommendations included a focused FS for IRP-5, -6, -8, -11, -13W, and -16, and AOCs DSS-01, DSS-02, MDA-02, MMS-04, MMS-05, and ST-67 due to the presence of contaminants in shallow groundwater at concentrations exceeding regulatory limits. These sites/AOCs were included in newly designated OU-1A.
1999–2001 (BNI 1999a, 2000, 2001a; Bechtel Environmental, Inc. [BEI], 2003a)	Stationwide groundwater monitoring at IRP-1, -3, -6, -12, and -13S, the Mingled Plumes Area (MPA), and Underground Storage Tank (UST) Site 222	Evaluate groundwater contamination and plume movement through RIs and FSs, Remedial Design (RD), and remedial action phases for various OUs at MCAS Tustin.	Groundwater monitoring results supported interpretations of stationwide groundwater flow patterns, groundwater chemistry, and contaminant distributions developed from monitoring conducted during the RI and subsequent interim monitoring.
2000	Record of Decision (ROD)/Remedial Action Plan (RAP) for OU-2	Select remedy for OU-2 sites and AOCs.	The selected remedy for the three IRP sites and nine AOCs that comprise OU-2 was no action.
2004 (Navy, 2004c)	OU-4A NFA ROD/RAP	Select NFA for OU-4A sites.	An NFA ROD/RAP was issued to present the selected remedy of no action for the OU-4A sites.
2004 (Navy, 2004d)	Finding of Suitability to Transfer #6 (FOST#6) a portion of Carve-Out 5 (Parcel 20, and the Lansdowne Road Portion of Parcel 40) and Carve-Out 10 (portions of Parcels 28, 40, and 41)	Establish the suitability of designated parcels prior to transferring title from the government to the City of Tustin in accordance with CERCLA and Navy requirements.	IRP-1 (OU-3) in CO-10 was determined to be suitable for transfer.

Table 2-2
Chronology of Site Events – OU-1A

Date	Investigation/Activity	Objective	Summary of Findings
1995–1997 (BNI, 1997c)	OU-1/OU-2 RI	Evaluate seven sites (IRP-3, -5, -12, -13E, -13W, -13S, and -16). Also perform station-wide groundwater study to evaluate impact of sources of contamination at 29 AOPCs identified in the RI, ESI, and RFA programs.	NTCRAs were recommended for 23 of the 29 AOPCs: (IRP-2, -5, -6, -8, -11, -13E, -13W, and -I6, and AOCs AD-04, AS-06, AS-08, AST-02, AST-04, DSD-01, DSD-02, MDA-02, MDA-04, MDA-07, MMS-01, MWA-03, MMS-04, MMS-05, and ST-67). An FS was recommended for IRP-3 (which includes TOW-X3 and TOW-X4), IRP-12, and IRP-13S (ST-72 and MWA-18).
1997–1999 (OHM, 1999)	Removal action at IRP-9A and 9B	Excavate and treat PAH-contaminated soil.	Approximately 701 tons of soil from IRP-9A and 6,837 tons of soil from IRP-9B were excavated and treated at an approved offsite facility, for a total of 7,538 tons. Activities were completed at IRP-9A in September 1997 and at IRP-9B in December 1998.
1997 (BNI, 1997c)	Removal action at IRP-13W	Excavate and treat total petroleum hydrocarbons (TPH) and PAH-contaminated soil.	Approximately 4,000 tons of soil were removed and transported to an approved offsite facility, and site restoration activities (paving and fencing) were performed as part of a NTCRA at IRP-13W. Activities were completed in November 1997. Following this NTCRA, IRP-13W was recommended for NFA in the OU-1/OU-2 RI.

Table 2-2 (continued)
Chronology of Site Events – OU-1A

Date	Investigation/Activity	Objective	Summary of Findings
1998 (BNI, 1999a)	Vacuum-enhanced extraction (VEE) pilot-scale tests for OU-1	Evaluate the effectiveness of a VEE system for groundwater extraction and treatment at OU-1.	VEE was demonstrated to produce a slight increase in the effectiveness of trichloroethene (TCE) mass removal and to achieve a slightly wider radius of influence in comparison with conventional extraction technology. Based on this finding, it was recommended that VEE be considered as an alternative in the OU-1 FS.
1999 (BNI, 1999a)	OU-1 FS	Evaluate remedial alternatives for IRP-3, IRP-12, and IRP-13S.	Six remedial alternatives were evaluated: no action, natural attenuation, hydraulic containment, groundwater extraction, permeable iron wall, and VEE.

Table 2-2 (continued)
Chronology of Site Events – OU-1A

Date	Investigation/Activity	Objective	Summary of Findings
2001–2002 (BNI, 2001b)	Time critical removal action (TCRA) at IRP-13S	Coordinate with petroleum corrective action being conducted for methyl *tert*-butyl ether (MTBE) plume migration at adjacent UST Site 222. OU-1 was divided into OU-1A and OU-1B to facilitate remedial action at IRP-3 and -12.	In December 2001, installation of a groundwater extraction and treatment system, including 7 extraction wells and 10 monitoring wells, was completed at IRP-13S. The purpose of the treatment system was to hydraulically contain VOC contamination within the then-current plume boundary at IRP-13S and to prevent or minimize cross-gradient migration of contaminants from IRP-13S that might occur as a result of the petroleum corrective action plan (PCAP) remediation being conducted at adjacent UST Site 222. Interim removal at IRP-13S began in January 2002. The TCRA system was incorporated into the final groundwater remedy for OU-1A; performance monitoring used to evaluate the effectiveness of the removal action is ongoing.

Table 2-2 (continued)
Chronology of Site Events – OU-1A

Date	Investigation/Activity	Objective	Summary of Findings
2003 (BEI, 2003b)	OU-1A FS	Evaluate remedial alternatives for OU-1A (IRP-13S).	Nine remedial alternatives were evaluated: no action, monitored natural attenuation, hydraulic containment, aggressive groundwater extraction with offsite soil disposal, aggressive groundwater extraction with onsite soil treatment, permeable reaction wall, VEE with offsite disposal, VEE with onsite soil treatment, and hydraulic containment with hot spot removal.
2004 (Navy, 2004a)	OU-1A ROD/RAP	Prepare a ROD and Selected Remedial Action Plan for OU-1A (IRP-13S).	The preferred remedy documented in the OU-1A ROD/RAP was hydraulic containment with hot spot mass removal (Alternative 7).
2007 (Engineering/Remediation Resources Group [ERRG], 2007)	RD/Remedial Action Work Plan (RAWP) for OU-1A/OU-1B (IRP-3, IRP-12, and IRP-13S)	Establish a RD for a groundwater remedy at IRP-3, IRP-12, and IRP-13S; prescribe construction and startup procedures.	The design incorporated the operating TCRA system into the OU-1A groundwater remedy; the design also accounted for the presence of the adjacent UST Site 222 PCAP groundwater remedial system.
2007 (ERRG, 2007)	Land Use Control Remedial Design (LUC RD) for OU-1A/OU-1B (IRP-3, IRP-12, and IRP-13S).	Establish a RD of land use controls for the groundwater remedy at IRP-3, IRP-12, and IRP-13S.	Land use controls were incorporated in the RD document.
2007 (Navy, 2007)	Finding of Suitability for Early Transfer (FOSET) – portion of IRP-13S (OU-1A)	Enable early transfer of a portion of IRP-13S to the City of Tustin, and memorialize institutional controls (ICs).	Parcel 24-1 in IRP-13S is suitable for transfer.

Table 2-2 (continued)
Chronology of Site Events – OU-1A

Date	Investigation/Activity	Objective	Summary of Findings
2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 (ERRG, 2008a, 2008b; Enviro Compliance Solutions, Inc. [ECS] 2008, 2010b, 2010c, 2011b, 2012b, 2013b, 2014b, 2015c; Multimedia Environmental Compliance Group [MMEC Group], 2016b)	Groundwater monitoring for OU-1A/OU-1B (IRP-3, IRP-12, and IRP-13S) remedy	Perform routine groundwater monitoring in accordance with the RAWP.	The groundwater remedy performance monitoring with capture zone analysis was included in Annual Performance Evaluation Reports (PERs).
2008 (ERRG, 2008c)	Interim Remedial Action Completion Report (I-RACR) for OU-1A/OU-1B (IRP-3, IRP-12, and IRP-13S)	Document construction of the groundwater remedy as designed in the RD.	The groundwater remedy was constructed as designed.
2009 (ERRG, 2009)	Operation and Maintenance Plan (OMP) for OU-1A/OU-1B groundwater remedy (IRP-3, IRP-12, and IRP-13S)	Establish methods, procedures, and protocols for operating, maintaining, and monitoring the groundwater remedy for OU-1A/OU-1B.	System optimization procedures and decision logic were prescribed.
2010 (ECS 2010a, California Environmental Protection Agency Department of Toxic Substances Control [DTSC] 2010, California Regional Water Quality Control Board, Santa Ana Region [RWQCB], 2010)	Operating properly and successfully (OPS) determination for OU-1A/OU-1B groundwater remedy (IRP-3, IRP-12, and IRP-13S)	Establish whether the OU-1A/OU-1B groundwater remedy was constructed as designed, is functioning as intended, will eventually achieve Remediation Goals (RGs) with continued operation, and is protective of human health and the environment, in accordance with the CERCLA OPS process.	OPS demonstration; USEPA OPS designation (USEPA, 2009); DTSC and RWQCB concurrence with OPS.
2011 (Navy, 2011b)	CERCLA Five-Year Review for OU-1A, OU-1B North, OU-1B South, and OU-3	Determine whether the remedy for OU-1, OU-1B, OU-3, and OU-4B remains protective of human health and the environment in accordance with the CERCLA five-year review process.	The remedy was determined to be functioning properly and remains protective of human health and the environment. DTSC concurred with the Report (DTSC, 2011).

Table 2-2 (continued)
Chronology of Site Events – OU-1A

Date	Investigation/Activity	Objective	Summary of Findings
2013 (Navy, 2013a)	CERCLA Five-Year Review Addendum for OU-1A, OU-1B South, and OU-4B Low Concentration Sites	Re-evaluate the vapor intrusion (VI) risk for OU-1A, OU-1B South, and OU-4B low concentration sites to determine whether the remedy remains protective of human health and the environment in accordance with the CERCLA five-year review process.	The remedy was determined to be functioning properly and remains protective of human health and the environment. The long-term protectiveness of the remedies at OU-1A and OU-1B South will be addressed by establishing additional ICs for potential VI risk.
2014 (Navy, 2014a)	Revised Draft Final Explanation of Significant Differences (ESD)	Documentation of a significant change to the IC component of the groundwater remedy at OU-1A and OU-1B in order to address potential vapor intrusion risk.	Proposed notices to transferees of the potential for VI to occur within the area requiring ICs for VI (VI area requiring institutional control [ARIC]) and to prohibit occupancy of all enclosed structures within the VI ARIC.
2014 (Navy, 2014c)	Revised Draft Final LUC RD Amendment No. 1	Based on the Revised Draft Final ESDs to the Final ROD/RAP for OU-1A/OU-1B, adds provisions for ICs to address potential VI from VOC-impacted groundwater to indoor air for occupied structures.	VI ARICs proposed to cover the entire areas of CO-5 and CO-6.

Table 2-3
Chronology of Site Events – OU-1B North

Date	Investigation/Activity	Objective	Summary of Findings
1995–1997 (BNI, 1997c)	OU1-1/OU-2 RI	Evaluate seven sites (IRP-3, -5, -12, -13E, -13W, -13S, and -16). Also perform station-wide groundwater study to evaluate impact of sources of contamination at 29 AOPCs identified in the RI, ESI, and RFA programs.	NTCRAs were recommended for 23 of the 29 AOPCs: (IRP-2, -5, -6, -8, -11, -13E, -13W, and -I6, and AOCs AD-04, AS-06, AS-08, AST AST-02, AST-04, DSD-01, DSD-02, MDA-02, MDA-04, MDA-07, MMS-01, MWA-03, MMS-04, MMS-05, and ST-67). An FS was recommended for IRP-3 (which includes TOW-X3 and TOW-X4), IRP-12, and IRP-13S (ST-72 and MWA-18).
1997–1999 (OHM, 1999)	Removal action at IRP-9A and 9B	Excavate and treat PAH-contaminated soil.	Approximately 701 tons of soil from IRP-9A and 6,837 tons of soil from IRP-9B were excavated and treated at an approved offsite facility, for a total of 7,538 tons. Activities were completed at IRP-9A in September 1997 and at IRP-9B in December 1998.
1997 (BNI, 1997c)	Post-RI field program at IRP-12	Verify the distribution of TCE in soil at IRP-12.	Data interpretations presented in the RI Report were confirmed: additional TCE source areas were not identified at IRP-12, and the boundary of TCE-contaminated soil at IRP-12 was not modified.

Table 2-3 (continued)
Chronology of Site Events – OU-1B North

Date	Investigation/Activity	Objective	Summary of Findings
1998 (BNI, 1999a)	VEE pilot-scale tests for OU-1	Evaluate the effectiveness of a VEE system for groundwater extraction and treatment at OU-I.	VEE was demonstrated to produce a slight increase in the effectiveness of TCE mass removal and to achieve a slightly wider radius of influence in comparison with conventional extraction technology. Based on this finding, it was recommended that VEE be considered as an alternative in the OU-1 FS.
1999 (BNI, 1999a)	OU-1 FS	Evaluate remedial alternatives for IRP-3, IRP-12, and IRP-13S.	Six remedial alternatives were evaluated: no action, natural attenuation, hydraulic containment, groundwater extraction, permeable iron wall, and VEE.
2001–2002 (BNI, 2002)	OU-1B FS	Evaluate remedial alternatives for IRP-3 and IRP-12.	Nine remedial alternatives were evaluated: no action, monitored natural attenuation, hydraulic containment, aggressive groundwater extraction with offsite soil disposal, aggressive groundwater extraction with onsite soil treatment, permeable iron wall, VEE with offsite disposal, VEE with onsite soil treatment, and hydraulic containment with hot spot removal.
2004 (Navy, 2004b)	OU-1B ROD/RAP	Prepare a ROD and Selected Remedial Action Plan for OU-1B (IRP-3 and IRP-12).	The preferred remedy documented in the OU-1B ROD/RAP was hydraulic containment with hot spot removal (Alternative 7).

Table 2-3 (continued)
Chronology of Site Events – OU-1B North

Date	Investigation/Activity	Objective	Summary of Findings
2005 (ERRG, 2005)	RD/RAWP for soil hot spot removal at IRP-3 and IRP-12 (OU-1B)	Prepare a work plan for removing sources of contamination to groundwater.	Soil hot spot removal was part of the groundwater remedy selected in the ROD. The design consisted of excavation and removal of soil hot spots with offsite disposal. Excavations were to be backfilled with clean imported fill soil.
2006 (ERRG, 2006)	Soil hot spot removal at IRP-3 and IRP-12 (OU-1B)	Implement a RD/RAWP for soil hot spot removal.	Contaminated soil was removed per the RD/RAWP and replaced with clean backfill.
2007 (ERRG, 2007)	RD/RAWP for OU-1A/OU-1B (IRP-3, IRP-12, and IRP-13S)	Establish a RD for a groundwater remedy at IRP-3, IRP-12, and IRP-13S; prescribe construction and startup procedures.	The design incorporated the operating TCRA system into the OU-1A groundwater remedy; the design also accounted for the presence of the adjacent UST Site 222 PCAP groundwater remedial system.
2007 (ERRG, 2007)	LUC RD for OU-1A/OU-1B (IRP-3, IRP-12, and IRP-13S).	Establish a RD of land use controls for the groundwater remedy at IRP-3, IRP-12, and IRP-13S.	Land use controls were incorporated in the RD document.
2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 (ERRG, 2008a, 2008b; ECS 2008, 2010b, 2010c, 2011b, 2012b, 2013b, 2014b, 2015c; MMEC Group, 2016b)	Groundwater monitoring for OU-1A/OU-1B (IRP-3, IRP-12, and IRP-13S) remedy	Perform routine groundwater monitoring in accordance with the RAWP.	The groundwater remedy performance monitoring with capture zone analysis was included in Annual PERs.
2008 (ERRG, 2008c)	I-RACR for OU-1A/OU-1B (IRP-3, IRP-12, and IRP-13S)	Document construction of the groundwater remedy as designed in the RD.	The groundwater remedy was constructed as designed.
2009 (ERRG, 2009)	OMP for OU-1A/OU-1B groundwater remedy (IRP-3, IRP-12, and IRP-13S)	Establish methods, procedures, and protocols for operating, maintaining, and monitoring the groundwater remedy for OU-1A/OU-1B.	System optimization procedures and decision logic were prescribed.

Table 2-3 (continued)
Chronology of Site Events – OU-1B North

Date	Investigation/Activity	Objective	Summary of Findings
2010 (ECS 2010a)	OPS determination for OU-1A/OU-1B groundwater remedy (IRP-3, IRP-12, and IRP-13S)	Establish whether the OU-1A/OU-1B groundwater remedy was constructed as designed, is functioning as intended, will eventually achieve RGs with continued operation, and is protective of human health and the environment, in accordance with the CERCLA OPS process.	OPS demonstration, USEPA OPS designation (USEPA, 2009); DTSC and RWQCB concurrence with OPS (DTSC 2010; RWQCB, 2010).
2011 (ECS 2011a)	CERCLA Five-Year Review for OU-1A, OU-1B North, OU-1B South, and OU-3	Determine whether the remedy for OU-1, OU-1B, OU-3, and OU-4B remains protective of human health and the environment in accordance with the CERCLA five-year review process.	The remedy was determined to be functioning properly and remains protective of human health and the environment. DTSC concurred with the Report (DTSC, 2011).
2013 (Navy, 2013a)	CERCLA Five-Year Review Addendum for OU-1A, OU-1B South, and OU-4B Low Concentration Sites	Re-evaluate the VI risk for OU-1A, OU-1B South, and OU-4B low concentration sites to determine whether the remedy remains protective of human health and the environment in accordance with the CERCLA five-year review process.	The remedy was determined to be functioning properly and remains protective of human health and the environment. DTSC concurred with the Report (DTSC, 2012). The long-term protectiveness of the remedies at OU-1A and OU-1B South will be addressed by establishing additional ICs for potential VI risk.

Table 2-4
Chronology of Site Events – OU-1B South

Date	Investigation/Activity	Objective	Summary of Findings
1998 (BNI, 1999a)	VEE pilot-scale tests for OU-1	Evaluate the effectiveness of a VEE system for groundwater extraction and treatment at OU-I.	VEE was demonstrated to produce a slight increase in the effectiveness of TCE mass removal and to achieve a slightly wider radius of influence in comparison with conventional extraction technology. Based on this finding, it was recommended that VEE be considered as an alternative in the OU-1 FS.
1999 (BNI, 1999a)	OU-1 FS	Evaluate remedial alternatives for IRP-3, IRP-12, and IRP-13S.	Six remedial alternatives were evaluated: no action, natural attenuation, hydraulic containment, groundwater extraction, permeable iron wall, and VEE.
1999 (International Technologies, Inc. [IT], 2000; OHM 2001)	Removal of TOW-X3 and TOW-X4	Remove oil/water separators and TPH/TCE-contaminated soil.	Based on confirmation soil sampling results, TOW-X3 and TOW-X4 were considered potential sources of IRP-3 groundwater contamination. It was recommended that closure for these AOCs be conducted under the CERCLA program.
2001–2002 (BNI, 2002)	OU-1B FS	Evaluate remedial alternatives for IRP-3 and IRP-12.	Nine remedial alternatives were evaluated: no action, monitored natural attenuation, hydraulic containment, aggressive groundwater extraction with offsite soil disposal, aggressive groundwater extraction with onsite soil treatment, permeable iron wall, VEE with offsite disposal, VEE with onsite soil treatment, and hydraulic containment with hot spot removal.

Table 2-4 (continued)
Chronology of Site Events – OU-1B South

Date	Investigation/Activity	Objective	Summary of Findings
2004 (Navy, 2004b)	OU-1B ROD/RAP	Prepare a ROD and Selected Remedial Action Plan for OU-1B (IRP-3 and IRP-12).	The preferred remedy documented in the OU-1B ROD/RAP was hydraulic containment with hot spot removal (Alternative 7).
2005 (ERRG, 2005)	RD/RAWP for soil hot spot removal at IRP-3 and IRP-12 (OU-1B)	Prepare a work plan for removing sources of contamination to groundwater.	Soil hot spot removal was part of the groundwater remedy selected in the ROD. The design consisted of excavation and removal of soil hot spots with offsite disposal. Excavations were to be backfilled with clean imported fill soil.
2006 (ERRG, 2006)	Soil hot spot removal at IRP-3 and IRP-12 (OU-1B)	Implement a RD/RAWP for soil hot spot removal.	Contaminated soil was removed per the RD/RAWP and replaced with clean backfill.
2007 (ERRG, 2007)	RD/RAWP for OU-1A/OU-1B (IRP-3, IRP-12, and IRP-13S)	Establish a RD for a groundwater remedy at IRP-3, IRP-12, and IRP-13S; prescribe construction and startup procedures.	The design incorporated the operating TCRA system into the OU-1A groundwater remedy; the design also accounted for the presence of the adjacent UST Site 222 PCAP groundwater remedial system.
2007 (ERRG, 2007)	LUC RD for OU-1A/OU-1B (IRP-3, IRP-12, and IRP-13S).	Establish a RD of land use controls for the groundwater remedy at IRP-3, IRP-12, and IRP-13S.	Land use controls were incorporated in the RD document.
2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 (ERRG, 2008, 2008b; ECS 2008, 2010b, 2010c, 2011b, 2012b, 2013b, 2014b, 2015c; MMEC Group, 2016b)	Groundwater monitoring for OU-1A/OU-1B (IRP-3, IRP-12, and IRP-13S) remedy	Perform routine groundwater monitoring in accordance with the RAWP.	The groundwater remedy performance monitoring with capture zone analysis was included in Annual PERs.
2008 (ERRG, 2008c)	I-RACR for OU-1A/OU-1B (IRP-3, IRP-12, and IRP-13S)	Document construction of the groundwater remedy as designed in the RD.	The groundwater remedy was constructed as designed.

Table 2-4 (continued)
Chronology of Site Events – OU-1B South

Date	Investigation/Activity	Objective	Summary of Findings
2009 (ERRG, 2009)	OMP for OU-1A/OU-1B groundwater remedy (IRP-3, IRP-12, and IRP-13S)	Establish methods, procedures, and protocols for operating, maintaining, and monitoring the groundwater remedy for OU-1A/OU-1B.	System optimization procedures and decision logic were prescribed.
2010 (ECS 2010a, USEPA, 2009, DTSC 2010; RWQCB, 2010)	OPS determination for OU-1A/OU-1B groundwater remedy (IRP-3, IRP-12, and IRP-13S)	Establish whether the OU-1A/OU-1B groundwater remedy was constructed as designed, is functioning as intended, will eventually achieve RGs with continued operation, and is protective of human health and the environment, in accordance with the CERCLA OPS process.	OPS demonstration, USEPA OPS designation, DTSC and RWQCB concurrence with OPS.
2011 (Navy, 2011b)	CERCLA Five-Year Review for OU-1A, OU-1B North, OU-1B South, and OU-3	Determine whether the remedy for OU-1, OU-1B, OU-3, and OU-4B remains protective of human health and the environment in accordance with the CERCLA five-year review process.	The remedy was determined to be functioning properly and remains protective of human health and the environment. DTSC concurred with the Report (DTSC, 2011).
2013 (Navy, 2013a)	CERCLA Five-Year Review Addendum for OU-1A, OU-1B South, and OU-4B Low Concentration Sites	Re-evaluate the VI risk for OU-1A, OU-1B South, and OU-4B low concentration sites to determine whether the remedy remains protective of human health and the environment in accordance with the CERCLA five-year review process.	The remedy was determined to be functioning properly and remains protective of human health and the environment. The long-term protectiveness of the remedies at OU-1A and OU-1B South will be addressed by establishing additional ICs for potential VI risk.
2014 (Navy, 2014b)	Revised Draft Final Explanation of Significant Differences	Documentation of a significant change to the IC component of the groundwater remedy at OU-1A and OU-1B in order to address potential vapor intrusion risk.	Proposed notices to transferees of the potential for VI to occur within the VI ARIC and to prohibit occupancy of all enclosed structures within the VI ARIC.

Table 2-4 (continued)
Chronology of Site Events – OU-1B South

Date	Investigation/Activity	Objective	Summary of Findings
2014 (Navy, 2014c)	Revised Draft Final LUC RD Amendment No. 1	Based on the Revised Draft Final ESDs to the Final ROD/RAP for OU-1A/OU-1B, adds provisions for ICs to address potential VI from VOC-impacted groundwater to indoor air for occupied structures.	VI ARICs proposed to cover the entire areas of CO-5 and CO-6.

Table 2-5
Chronology of Site Events – OU-3

Date	Investigation/Activity	Objective	Summary of Findings
1985	RWQCB Cleanup and Abatement Order (CAO) for IRP-1	In May 1985, pursuant to California's Porter-Cologne Water Quality Control Act, the RWQCB issued CAO No. 85-74 in response to the seepage of petroleum (and other materials) into Peter's Canyon Channel. The CAO ordered the United States Marine Corps to perform specific actions, including: • Submit a plan for cleanup of all fuel and contaminated groundwater and soil resulting from discharge waste to the burn pits. • Submit a schedule for implementation of the necessary investigative remedial work. Submit monthly progress reports describing the status of work conducted to comply with the CAO.	The CAO was rescinded on May 31, 1996, after a determination by the RWQCB that MCAS Tustin had fulfilled the requirements of the CAO.
1986–1987	Construction of steel-reinforced concrete containment wall and French drain system along western side of Peters Canyon Channel at IRP-1.	Prevent migration of site groundwater contaminants to surface water within Peters Canyon Channel; provide a means of removing impacted groundwater from the area behind the containment wall, if needed (French drain).	Remedial action pursuant to CAO No. 85-74.
1996 (BNI, 1996, 1997b)	OU-3 RI/FS	Assess nature and extent of contamination at IRP-1 and evaluate remedial action.	Further action was recommended for IRP-1. The recommended remedial action was containment of waste left in place using an existing cover and containment wall for contaminated groundwater.

Table 2-5 (continued)
Chronology of Site Events – OU-3

Date	Investigation/Activity	Objective	Summary of Findings
2001 (Navy, 2001)	ROD/RAP for OU-3	Select remedy for IRP-1.	Selected remedial action consists of ICs; groundwater, surface water, and landfill gas monitoring; and inspection and maintenance of the existing containment wall and cover, French drain systems, monitoring wells, and security features.
2003 (BEI, 2003c)	OU-3 OMP	Establish detailed procedures and protocols for implementing the IRP-1 (OU-3) selected remedy.	Types and frequency of inspections and monitoring were specified.
2003 (Pacific Treatment Environmental Services [PTES] and Tetra Tech, 2003)	OPS Evaluation Report, OU-3 (IRP-1)	Establish whether the OU-3 remedy was constructed as designed, is functioning as intended, and is protective of human health and the environment in accordance with the CERCLA OPS process.	OPS was demonstrated, USEPA made the OPS determination (USEPA, 2004a), and DTSC and RWQCB concurred (DTSC, 2004; RWQCB, 2003).
2004 (Navy, 2004d)	FOST#6 a portion of CO-5 (Parcel 20, and the Lansdowne Road Portion of Parcel 40) and CO-10 (portions of Parcels 28, 40, and 41)	Establish the suitability of designated parcels prior to transferring title from the government to the City of Tustin in accordance with CERCLA and Navy requirements.	IRP-1 (OU-3) in Carve-Out (CO)-10 was determined to be suitable for transfer.
2006 (Navy, 2006)	CERCLA First Five-Year Review for IRP-1 (OU-3)	Determine whether the remedy for IRP-1 remains protective of human health and the environment in accordance with the CERCLA five-year review process.	The remedy was determined to be functioning properly and remains protective of human health and the environment. DTSC concurred with the Report (DTSC, 2006).
2011 (Navy, 2011b)	CERCLA Five-Year Review for OU-1A, OU-1B North, OU-1B South, and OU-3	Determine whether the remedy for OU-1, OU-1B, OU-3, and OU-4B remains protective of human health and the environment in accordance with the CERCLA five-year review process.	The remedy was determined to be functioning properly and remains protective of human health and the environment. DTSC concurred with the Report (DTSC, 2011).

Table 2-5 (continued)
Chronology of Site Events – OU-3

Date	Investigation/Activity	Objective	Summary of Findings
2011, 2012, 2013, 2014, 2015 (ECS, 2012a, 2013a, 2014a, 2015b; MMEC Group, 2016a)	Annual Long-Term Monitoring for OU-3	Perform routine monitoring in accordance with the OMP.	Based on the results of the 2011 landfill gas monitoring data, field inspections, and historical data, the OU-3 remedy continues to be protective of human health and the environment.

Table 2-6
Chronology of Site Events – OU-4B Low Concentration Sites

Date	Investigation/Activity	Objective	Summary of Findings
1999, 23 September	BCT meeting	Modify recommended action for six IRP sites and six AOCs.	Recommendations included a focused FS for IRP-5, -6, -8, -11, -13W, and -16, and AOCs DSS-01, DSS-02, MDA-02, MMS-04, MMS-05, and ST-67 due to the presence of contaminants in shallow groundwater at concentrations exceeding regulatory limits. These sites/AOCs were included in newly designated OU-1A.
2003–2004 (BEI, 2004)	OU-4 Technical Memorandum	Shallow groundwater investigation of selected sites.	IRP-5N, IRP-5S(b), IRP-8, IRP-11 (Area A), IRP-16, and MMS-04 (Areas A and C) were recommended for NFA; these sites became OU-4A. IRP-5S(a), IRP-6, IRP-11 (Area B), IRP-13W, MMS-04 (Area B), and the MPA were recommended for further action; these sites became OU-4B.
2008 (BEI, 2008)	OU-4B FS Report	Evaluate remedial alternatives; perform groundwater contaminant transport modeling for OU-4B groundwater plumes.	An NFA was recommended for soil, and ICs with groundwater monitoring were recommended for low concentration sites IRP-11, IRP-13W, and MMS-04.
2010 (Navy, 2010)	ROD/RAP for OU-4B	Prepare a ROD and Selected Remedial Action Plan for OU-4B (IRP-5S(a), IRP-6, IRP-11, IRP-13W, and MMS-04).	A remedy of ICs was established for low concentration sites IRP-11, IRP-13W, and MMS-04. A remedy of in-situ bioremediation with ICs was established for moderate concentration sites IRP-5S(a), and IRP-6.
2011 (AIS-TN&A Joint Venture [AIS-TN&A JV], 2011)	Final Remedial Action Completion Report (RACR), MMS-04	Document the MMS-04 Site closeout.	Following four consecutive quarters of groundwater monitoring with TCE concentrations below the RG, the response action is complete and no further action is warranted for groundwater.

Table 2-6 (continued)
Chronology of Site Events – OU-4B Low Concentration Sites

Date	Investigation/Activity	Objective	Summary of Findings
2012 (AIS-TN&A JV, 2012)	Land Use Control Remedial Design and Long-Term Monitoring (LTM)/OMP	To govern the implementation, monitoring, and enforcement of land-use controls for shallow groundwater beneath the low concentration sites and to protect the remedial action components in accordance with the ROD.	Site inspections and compliance reporting are required.
2013 (Navy, 2013a)	CERCLA Five-Year Review Addendum for OU-1A, OU-1B South, and OU-4B Low Concentration Sites	Re-evaluate the VI risk for OU-1A, OU-1B South, and OU-4B low concentration sites to determine whether the remedy remains protective of human health and the environment in accordance with the CERCLA five-year review process.	The remedy was determined to be functioning properly and remains protective of human health and the environment. The long-term protectiveness of the remedies at OU-1A and OU-1B South will be addressed by establishing additional ICs for potential VI risk.
2013, 2014, 2015 (AIS-TN&A JV, 2014b; RORE, 2015b, 2016b)	IC Compliance Reporting	Ensure effectiveness of ICs, provide TCE concentration data and extent of contamination, and evaluate monitoring plan and progress towards site closeout.	IC compliance inspections continue to occur and indicate that the remedy continues to be protective of human health and the environment.
2013 (Navy, 2013b)	OPS request	Request from U.S. Navy to U.S. USEPA for OPS Determination for the groundwater remedy at IRP-11 and -13W.	OPS request presented to USEPA with data supporting successful performance of the selected groundwater remedy.
2015 (RORE, 2015d)	Addendum 01 to the LUC RD and LTM/OMP	Update to the original LUC RD, LTM/OMP and Sampling and Analysis Plan (SAP) for IRP-11 and -13W.	Implements the requirements of the ROD/RAP at IRP-11 and -13W.
2015 (USEPA, 2015)	OPS determination	Determination by USEPA that the groundwater remedy at the low concentration sites is operating properly and successfully and satisfies CERCLA property transfer requirements.	Concurrence for OPS from the U.S. Navy request was received.

Table 2-7
Chronology of Site Events – OU-4B Moderate Concentration Sites

Date	Investigation/Activity	Objective	Summary of Findings
1999	BCT meeting 23 September 1999	Modify recommended action for six IRP sites and six AOCs.	Recommendations included a focused FS for IRP-5, -6, -8, -11, -13W, and -16, and AOCs DSS-01, DSS-02, MDA-02, MMS-04, MMS-05, and ST-67 due to the presence of contaminants in shallow groundwater at concentrations exceeding regulatory limits. These sites/AOCs were included in newly designated OU-1A.
2003–2004 (BEI, 2004)	OU-4 Technical Memorandum	Shallow groundwater investigation of selected sites.	IRP-5N, IRP-5S(b), IRP-8, IRP-11 (Area A), IRP-16, and MMS-04 (Areas A and C) were recommended for NFA; these sites became OU-4A. IRP-5S(a), IRP-6, IRP-11 (Area B), IRP-13W, MMS-04 (Area B), and the MPA were recommended for further action; these sites became OU-4B.
2008 (BEI, 2008)	OU-4B FS Report	Evaluate remedial alternatives; perform groundwater contaminant transport modeling for OU-4B groundwater plumes.	An NFA was recommended for soil, and ICs with groundwater monitoring were recommended for low concentration sites IRP-11, IRP-13W, and MMS-04.
2010 (Navy, 2010)	ROD/RAP for OU-4B	Prepare a ROD and Selected Remedial Action Plan for OU-4B (IRP-5S(a), IRP-6, IRP-11, IRP-13W, and MMS-04).	A remedy of ICs was established for low concentration sites IRP-11, IRP-13W, and MMS-04. A remedy of in-situ bioremediation with ICs was established for moderate concentration sites IRP-5S(a), and IRP-6.

Table 2-7 (continued)
Chronology of Site Events – OU-4B Moderate Concentration Sites

Date	Investigation/Activity	Objective	Summary of Findings
2013–2014, 2014-2015 (AIS-TN&A JV, 2015b, RORE, 2016a)	Annual Performance Groundwater Monitoring for OU-4B	Report results from performance groundwater monitoring.	Groundwater geochemical conditions are favorable for natural attenuation in the first water-bearing zone (WBZ) at IRP-5S(a) and IRP-6 and the MPA and the second WBZ at the MPA, with the exception of elevated sulfate concentrations. Evidence of dechlorination was observed at wells in IRP-5S(a) and -6, but not yet at the MPA. However, chemical of concern (COC) concentration trends do not appear to be increasing at the MPA.
2014 (AIS-TN&A JV, 2014a)	I-RACR	Describe the remedial action and field activities associated with the implementation of in-situ bioremediation (ISB) and monitored natural attenuation (MNA) for groundwater at IRP-5S(a), 6, and the MPA.	Installation of the ISB and MNA remedial components at IRP-5S(a), 6, and the MPA have been completed in accordance with the ROD/RAP.
2015 (AIS-TN&A JV, 2015a)	LUC RD for IRP-5S(a), -6, and the MPA	Establish a RD for land use controls for the groundwater remedy at OU-4B moderate concentration sites.	Land use controls were incorporated for the RD document.
2015 (AIS-TN&A JV, 2015b)	OMP for IRP-5S(a), -6, and the MPA	Establish methods, procedures, and protocols for operating, maintaining, and monitoring the groundwater remedy for OU-4B.	System optimization procedures and decision logic were prescribed.
2016 (USEPA, 2016, AIS-TN&A JV, 2016)	OPS determination for OU-4B groundwater remedy (IRP-5S[a], IRP 6, and the MPA)	Establish whether the OU-4B groundwater remedy was constructed as designed, is functioning as intended, will eventually achieve RGs with continued operation, and is protective of human health and the environment, in accordance with the CERCLA OPS process.	USEPA OPS designation with DTSC and RWQCB concurrence.

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3 BACKGROUND

3.1 ENVIRONMENTAL SETTING

Former MCAS Tustin is located in the eastern portion of a broad coastal plain that is bordered by the Santa Ana Mountains on the east and northeast and the San Joaquin Hills on the south (Engineering/Remediation Resources Group, Inc. [ERRG], 2007). The coastal plain slopes gently southwestward toward the Pacific Ocean. The ground surface within the Former MCAS Tustin ranges from approximately 75 feet above mean sea level (msl) in the north to approximately 45 feet above msl in the south. The average elevation at Former MCAS Tustin is approximately 54 feet above msl. The geology, hydrogeology, and surface water hydrology of Former MCAS Tustin are described in the following sections.

3.1.1 Geology and Hydrogeology

Former MCAS Tustin is within the San Diego Creek/Newport Bay Watershed and the Irvine Groundwater Management Zone. In this area, the coastal plain overlies approximately 1,300 feet of unconsolidated sediments. Sediments from the ground surface to approximately 90 to 150 feet below ground surface (bgs) predominantly consist of silt, clayey silt, clay, and silty clay deposits, with laterally discontinuous lenses of sand and gravel. Collectively, the permeable water-bearing sediments up to approximately 150 feet bgs constitute the shallow water-bearing zone (WBZ) at the base (Bechtel National, Inc. [BNI], 1997c). A highly permeable sand zone is encountered beginning at approximately 150 feet bgs, which constitutes the top of the Regional Aquifer. Three WBZs of lower permeability than the Regional Aquifer were identified within the shallow WBZ beneath Former MCAS Tustin:

- First WBZ – from approximately 5 to 30 feet bgs
- Second WBZ – from approximately 30 to 60 feet bgs
- Third WBZ – from approximately 60 to 90 feet bgs

The depths and thickness of WBZs vary from location to location beneath Former MCAS Tustin, reflecting a degree of heterogeneity. Hydraulic testing preformed and reported in the Remedial Investigation Report (BNI, 1997c) indicated that groundwater in the shallow WBZ is present under semi-confined conditions. A generalized geologic cross-section showing the shallow WBZs and underlying regional aquifer is shown on Figure 6.

Groundwater within the first WBZ contains total dissolved solids (TDS) at elevated concentrations, averaging approximately 6,000 milligrams per liter (mg/L) (Bechtel Environmental, Inc. [BEI], 2003b). Field data suggest that the first and second WBZs are in hydraulic communication. However, TDS concentrations in the second WBZ are typically lower than those in the first WBZ and average approximately 2,400 mg/L (BEI, 2003b). Data also suggest that the third WBZ is separated hydraulically from the second WBZ and that a transitional zone is present between the third WBZ and the underlying Regional Aquifer (BNI, 1997c).

Conceptual site models for OU-1A and OU-1B indicated that the first and second WBZs generally flow toward Peters Canyon Channel along the southeastern boundary of Former MCAS Tustin. The third WBZ and Regional Aquifer flow southwestward toward the Pacific Ocean (BNI, 1997c).

Former MCAS Tustin is located in the Irvine Groundwater Management Zone and the regional aquifer underlying it has the following beneficial use designations:

- Municipal and domestic supply (including drinking water supply)
- Agricultural supply
- Industrial service supply
- Industrial process supply

The Basin Plan (RWQCB, 2015) does not differentiate groundwater beneficial uses on the basis of depth. The Water Quality Objectives for the Irvine Groundwater Management Zone, as presented in the Basin Plan, are applicable requirements for remediation of OU-4B groundwater in the regional aquifer.

3.1.2 Surface Water Hydrology

Former MCAS Tustin is located within the Irvine Groundwater Management Zone. Surface waters consist of small streams, flood channels, and water storage reservoirs. Three manmade channels bound Former MCAS Tustin: Barranca Channel to the south, Santa Ana-Santa Fe Channel to the north, and Peters Canyon Channel to the east. These unlined channels are incised approximately 10 to 20 feet below the surrounding land surface and permit flow between groundwater and surface water. These channels typically contain water year-round as a result of recharge from shallow groundwater.

Data obtained during the Remedial Investigation (RI) indicate that both Barranca Channel and Peters Canyon Channel are “gaining” streams in the reach of Former MCAS Tustin, while Santa Ana-Santa Fe Channel loses water in its western reach and gains water in its eastern reach.

Surface drainage at the station is controlled by local topography and by various manmade drainages. Surface runoff at Former MCAS Tustin originates almost entirely from within the station, because surface runoff flowing toward the station from the north and northeast is intercepted by ditches running parallel to the Santa Fe Railroad tracks located along the northeastern side of the station. Surface runoff as excess precipitation leaves the former station in two ways: through the underground storm drainage system or through open ditches and channels. Peters Canyon Channel and Barranca Channel receive surface runoff and storm drain discharge from Former MCAS Tustin.

Surface water generally flows south and southwest, away from Former MCAS Tustin. However, along two station boundaries, the Santa Ana-Santa Fe Channel and Barranca Channel carry flow southeast toward Peters Canyon Channel. Short ditches running along the Santa Fe Railroad tracks and along Warner Avenue and a culvert beneath Edinger Avenue carry flow northwest toward Peters Canyon Channel. Peters Canyon Channel receives runoff from Santa Ana-Santa Fe Channel on the northeastern side of the former station, and merges with San Diego Creek approximately 1 mile southwest of the former station. Barranca Channel merges with San Diego Creek approximately 2 miles southwest of the former station. San Diego Creek empties into upper Newport Bay approximately 5 miles southwest of the former station.

3.2 OU-1A

OU-1A is also referred to as IRP-13S and includes Storage Temporary (ST)-72 and Miscellaneous, Wash Area (MWA)-18.

3.2.1 Physical Characteristics

OU-1A is located in the northwestern portion of the Former MCAS Tustin property, along Armstrong Avenue, north of Valencia Avenue (adjacent to the former Severyns Road). OU-1A occupies approximately 0.7 acre and is the source of the volatile organic compound (VOC)-contaminated groundwater plume originating from ST-72 and MWA-18. ST-72 and MWA-18 are separated by a distance of approximately 100 feet. ST-72 contained two buildings used for vehicle maintenance in the former Ground Support Equipment (GSE) Yard. MWA-18 was a former wash pad used for cleaning small generators and other field equipment.

3.2.2 Land and Resource Use

OU-1A boundaries and site layout are presented in Figure 2. OU-1A includes an early transfer parcel, constructed in 2008 on the site and adjoining areas, which consists of a multifamily residential development named Columbus Square. A Lease-in-Furtherance-of-Conveyance (LIFOC) has been established between the City of Tustin and the Navy for portions of Former MCAS Tustin (Navy, 2002a) and for Parcel 22 (includes IRP-13S, in OU-1A) only (Navy, 2004e) to expedite the transfer. Other than residential development, OU-1A is used only for the operation, maintenance, and monitoring of the groundwater remedy.

3.2.3 Reuse

OU-1A, located in Carve-Out (CO)-5, consists of undeveloped land. CO areas are those areas requiring further investigation and/or areas where response actions were retained by the Navy. According to the City of Tustin Specific Plan/Reuse Plan (SP/RP), the northern portion of OU-1A is designated for reuse as a community park (City of Tustin, 2012). The southern portion of OU-1A is designated for reuse by the South Orange County Community College District. The northeastern portion of OU-1A was transferred early under a Finding of Suitability for Early Transfer (FOSET) (Navy, 2007). This early transfer parcel has been developed as a multifamily residential development named Columbus Square. An Area Requiring Institutional Controls (ARIC) was designated for OU-1A that includes the entire footprint of the groundwater VOC plumes plus a surrounding buffer zone. The early transfer parcel lies partially within this groundwater ARIC. As a result, the Columbus Square development will be subject to institutional controls (ICs) and the Columbus Square Homeowners Association will be responsible for certifying compliance with ICs once the Revised Draft Final LUC RD Amendment No. 1 (Navy, 2014c) is finalized. Reuse of this area will thus comply with the LUC RD (ERRG, 2007) and the Revised Draft Final LUC RD Amendment No. 1 (Navy, 2014c) once finalized. The City of Tustin SP/RP indicates that no additional residences are planned within the OU-1A ARIC boundary (City of Tustin, 2012). The Revised Draft Final LUC RD Amendment No. 1 (Navy, 2014c) proposes a vapor intrusion (VI) ARIC that covers the entire area of CO-5. Groundwater and proposed VI ARICs for OU-1A are presented in Figure 2.

3.2.4 Site History

Vehicle maintenance activities were formerly conducted at ST-72, located in the northern portion of OU-1A. ST-72 consisted of the southern half of Building 16, the former Building 50, and the paved area surrounding the buildings. This area was part of the former GSE Yard constructed in 1942 (BNI, 1997c). The southern half of Building 16 operated as a GSE maintenance garage from 1942 through 1993. From then on it housed administrative functions (BNI, 1997c). A hoist lift with a below-grade waste oil collection sump was present at ST-72. Cleaning solvents were reportedly used at ST-72 as degreasers to wash down floors in the

buildings, and waste solvent was likely released to storm drains or to the ground outside the building (BNI, 1997c). By 1985, biodegradable soaps were being used for this purpose instead of solvents (BNI, 1997c).

Building 50, located south of Building 16, was used as a vehicle lubrication facility within the former GSE Yard from the mid-1960s until the mid-1970s. Building 50 was demolished in 1982, and the area was then used as a parking lot before the station's closure. A steam-cleaning wash rack reportedly existed on the south side of the building (BNI 1997c). Jacobs Engineering Group, Inc. (JEG) reported that the sumps below the former lift were filled with sediment and appeared to be stained (BNI, 1997c). However, no visible evidence of the sumps associated with former Building 50 was found in the RI, and no records were available to indicate whether the sumps had been excavated or left in place (BNI, 1997c).

MWA-18 was an inactive wash pad located west of Building 47 within the former GSE Yard that composed the southern portion of IRP-13S. Installed in the 1940s, MWA-18 was used for washing small generators and other field equipment, and consisted of a concrete pad (50 feet by 56 feet) sloped to a drain. No oil/water separator was connected to MWA-18. JEG reported numerous cracks in the concrete pad and stated that its overall integrity appeared to be poor (BNI 1997c). During the Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA), wash water from equipment-cleaning activities several hundred feet north of MWA-18 was observed to drain across an asphalt-covered parking lot toward MWA-18 (BNI, 1997a).

3.2.5 Initial Response

The Navy performed an Initial Assessment Study (IAS) during 1983 and 1984 to locate potentially contaminated sites at MCAS Tustin (Brown and Caldwell Consulting Engineers [Brown and Caldwell], 1985).The report identified 14 potentially contaminated sites (IRP-1 through -14) on the basis of record searches and employee interviews. The report recommended sampling locations and analytical parameters to confirm the suspected contamination at the sites.

The potential for subsurface contamination at ST-72, included as part of OU-1A, was first identified and named as an area to be investigated under the RFA (BNI, 1997a), The RFA indicated that hazardous substances may have been stored, handled, disposed of, or released at ST-72 (BNI, 1997a). Two RFA sampling visits were conducted at ST-72 in 1995 and 1996 that involved collection of limited field data to address the extent of soil and groundwater contamination. A screening-level risk assessment (RA) and a preliminary contaminant fate and transport analysis were also performed (BNI, l997a). The screening-level risk assessment for ST-72 indicated that chemicals of potential concern (COPCs) in groundwater presented unacceptable carcinogenic risk and adverse systemic effects (BNI, 1997a).

The RFA sampling activities identified an extensive 1,2,3-trichloropropane (TCP) groundwater plume originating from ST-72 (BNI, 1997a). On the basis of the RFA, the Navy determined that VOC contamination in the groundwater plume originating at ST-72 extended beyond the site boundaries and would therefore be more appropriately managed under the CERCLA program.

An RI was conducted from 1995 through 1997 to evaluate seven sites, including OU-1A (BNI, 1997c). The RI consisted of a field investigation followed by an evaluation of the nature and extent of contamination, a fate and transport analysis, and a baseline Human-Health Risk Assessment (HHRA). In addition, the RI included a station-wide groundwater study to evaluate the impact of COPCs present in soil and groundwater. The RI identified a trichloroethene (TCE) plume originating from MWA-18 co-located within the 1,2,3-TCP plume originating from ST-72.

ST-72 and MWA-18 were therefore included with IRP-13S for CERCLA response actions (BNI, 1997c).

In 1998, an investigation was conducted to evaluate potential mechanisms for migration of 1,2,3-TCP into the third WBZ at OU-1A (BNI, 1999b). Investigation results indicated that a localized lithologic zone containing relatively coarser-grained materials, along with seasonal reversals of the vertical hydraulic gradients evident over several years of monitoring, provided a potential mechanism for limited migration of VOCs from the second to the third WBZ at that location. The investigation also confirmed that groundwater flow in the third WBZ was to the southwest, compared to a more southerly flow direction in the second and first WBZs.

OHM Remediation Services, Inc. (OHM) excavated impacted soil at MWA-I8 and ST-72 on the basis of data from previous RFA sampling events. ST-72 was identified as the probable source of 1,2,3-TCP in groundwater on the basis of limited soil sampling performed adjacent to Building 16 during the RI. ST-72 was subsequently split into ST-72A (Building 16) and ST-72B (Building 50). ST-72A (Building 16) consisted of a 40-foot by 47-foot concrete pad with a hydraulic lift. The Navy recommended ST-72A for no further action (NFA) on the basis of further soil sampling results that indicated no reportable concentrations of 1,2,3-TCP in soil (BNI, 1997c).

In January 2002, a Time-Critical Removal Action (TCRA) for 1,2,3-TCP in groundwater was begun at OU-1A. The purpose of the TCRA was to establish hydraulic containment of groundwater contaminated with 1,2,3-TCP within the then-current plume boundaries in the first and second WBZs to prevent further vertical and/or horizontal migration until the final remedy was implemented, or until plume migration was stabilized (Navy, 2004a). Results from quarterly groundwater monitoring conducted during summer 2002 indicated that the TCRA system was effectively containing the VOC plumes (PTES, 2003). Operation of the TCRA groundwater treatment system was closely coordinated with remedial activities at the nearby Underground Storage Tank (UST) Site 222, managed by the Navy under the PCAP.

The Final OU-1 Feasibility Study (FS) Report (BEI, 2003b) identified and screened nine remedial alternatives for OU-1A. During 2001, while the FS Report was in preparation, it was determined that the proposed PCAP for the methyl *tert*-butyl ether (MTBE) plume associated with adjacent UST Site 222 had the potential to cause westward or cross-gradient migration of the IRP-13S groundwater plume; therefore, OU-1 was separated into OU-1A (IRP-13S) and OU-1B (IRP-3 and -12). This separation allowed the Navy to coordinate the petroleum corrective action at UST Site 222 with the TCRA at IRP-13S, while proceeding to develop a separate remedy for IRP-3 and IRP-12.

3.2.6 Basis for Taking Action

3.2.6.1 Summary of Human Health Risk Assessment

Toxicity values used in the risk assessment for OU-1A were obtained from either USEPA or DTSC, and the risk assessment was conducted using a dual-tracking approach. The risk assessment was conducted following two parallel tracks, one that developed potential cancer risk estimates and noncancer hazard estimates using only toxicity values published by USEPA and a second that developed these estimates using only toxicity values published by DTSC. DTSC recommends use of the more conservative toxicity criteria.

Three residential health risk characterization scenarios were conducted for OU-1A as follows:

- Current conditions with beneficial use of groundwater (baseline case)
- Future conditions upon achievement of groundwater remediation goals (RGs) (with beneficial use of groundwater)
- Current conditions (with beneficial use of groundwater prevented by ICs)

These risk characterization scenarios are discussed in the following sections.

Residential Risk Under Current Conditions with Beneficial Use of Groundwater

In the baseline HHRA, total cancer and noncancer risk estimates (using USEPA criteria) for the OU-1A source area exceeded the upper limit of the NCP risk management range for cancer risk (10^{-6} to 10^{-4}) and the noncancer hazard index (HI) of 1.0. Total cancer risks at the source area were estimated to be 4.8×10^{-3} and were primarily associated with exposure to 1,2,3-TCP in groundwater using USEPA risk factors. Results from the risk assessment indicated that the calculated risk estimates within the source area using USEPA and California Environmental Protection Agency (Cal/EPA) slope factors were comparable. As a result, USEPA slope factors were used to calculate risk estimates. The noncancer HI calculated for a resident child at the source area was estimated to be 7.3 and was principally related to 1,2,3-TCP and selenium in groundwater.

Selenium was not identified as a site-related chemical at OU-1A. Furthermore, the background threshold concentration for selenium in the first WBZ at Former MCAS Tustin was 0.33 mg/L, while the exposure point concentration (EPC) for selenium in groundwater at OU-1A was 0.15 mg/L. This indicated that selenium concentrations in groundwater at OU-1A did not exceed background concentrations. Therefore, the risks were related to selenium as a naturally occurring chemical in groundwater at OU-1A.

Residential Risk under Future Conditions with Beneficial Use of Groundwater

The total future cancer risk estimated (using USEPA criteria) under the residential scenario at the source area was 4.0×10^{-4} once groundwater RGs are achieved. The principal cancer risk driver was 1,2,3-TCP in groundwater. This risk value represented an approximately 92 percent reduction of the risk estimate under baseline conditions. The noncancer threshold value (HI) for a resident child under future conditions at the source area was estimated to be 3.7 and was associated with selenium in groundwater and manganese in soil. This represented an approximately 49 percent reduction in noncancer risk from baseline conditions. The reduction in cancer and noncancer risk was principally related to the removal of 1,2,3-TCP from groundwater.

Baseline and future risk assessment results were based on groundwater modeling that used conservative assumptions and were prepared for conservative residential scenarios in which the domestic use of groundwater (e.g., drinking, bathing, and other domestic uses) was assumed to occur over a period of 30 years. Domestic use of groundwater from the shallow WBZs is, in reality, unlikely because of the poor quality of the water (e.g., elevated concentrations of TDS, nitrates, and salinity). The actual risks posed to residents under future conditions were expected to be less than those calculated because of factors such as the extent and effectiveness of natural attenuation.

Residential Risk with No Beneficial Use of Groundwater

An additional residential scenario using baseline chemical concentrations but assuming the existence of ICs to prevent beneficial use of groundwater was performed to evaluate the

effectiveness of ICs and/or restrictions for reducing human health risk associated with residential occupancy of newly-constructed buildings at OU-1A. This scenario used all reported VOCs with EPCs calculated at a 95 percent upper confidence limit (UCL) of the mean value of their respective reported concentrations.

Total cancer and noncancer risk estimates (using USEPA criteria) for the source area fell within the NCP risk management range (10^{-6} to 10^{-4}) and did not exceed the noncancer HI of 1.0. Total cancer risk at the source area was estimated to be 1.0×10^{-5} and was primarily associated with exposure to TCE and 1,2,3-TCP in soil vapor. The noncancer HI calculated for a resident child at the source area was estimated to be 1.0. These results indicated that with ICs in place to prevent domestic use of groundwater, cancer risk was reduced by more than two orders of magnitude.

Summary

Cancer risk estimates were primarily associated with exposures to groundwater. Inhalation of groundwater vapors during household water use was the dominant risk pathway in the baseline risk assessment. Over 95 percent of the USEPA cancer risk was attributable to the concentrations of 1,2,3-TCP in groundwater. Chemicals reported in soil contributed less than 1 percent of the total residential cancer risk.

Under a hypothetical residential scenario with baseline VOC concentrations and ICs to prevent beneficial use of groundwater, the maximum estimated total cancer risk was reduced by two orders of magnitude to 1×10^{-5}, within the NCP risk management range (10^{-6} to 10^{-4}). Therefore, ICs would be effective in protecting human health and would allow for the reuse of existing and newly constructed buildings within the OU-1A boundary.

The main exposure pathway under the scenario with ICs was indoor vapor inhalation of TCE emanating from groundwater (63 percent), because direct exposure to 1,2,3-TCP from beneficial groundwater use would be prevented through ICs.

The HI for a hypothetical resident child exposed to soil and groundwater under baseline and future conditions exceeded the systemic toxicity threshold of 1.0, indicating a potential for the development of adverse health effects. The baseline HI, estimated at 7.3, was primarily associated with groundwater exposures to 1,2,3-TCP (38 percent) and selenium (26 percent). However, the HI under baseline conditions with ICs to prevent beneficial use of groundwater did not exceed 1.0.

3.2.6.2 Summary of Ecological Risk

Habitat surveys performed for OU-1A concluded that no suitable wildlife habitats exist at the site (Navy, 2004a). As a result, no Ecological Risk Assessment (ERA) was performed for the site.

3.2.6.3 Conclusions

On the basis of results of the baseline HHRA, the Navy and BCT determined that remedial action was required to reduce concentrations of contaminants in groundwater at OU-1A. Remedial action was not required to reduce risks from soil, because risks due to soil contamination made up less than 1 percent of the total cancer risk, and were considered generally allowable per the NCP criteria. However, soil with elevated concentrations of VOCs was recommended for removal to prevent further contamination of groundwater.

Cancer risk estimates were primarily associated with exposures to groundwater. Inhalation of groundwater vapors during household water use was the dominant risk pathway. Over 95 percent of the USEPA cancer risk was attributable to the concentrations of 1,2,3-TCP in groundwater.

Estimates of risk under a residential scenario with no beneficial use of groundwater (i.e., ICs to prevent groundwater use) were shown to reduce the risk to within NCP risk management range (10^{-6} to 10^{-4}) and an HI of 1.0. Under this scenario, the total cancer risk in the source area (area with the highest concentrations) was reduced to 1.0×10^{-5}; therefore, ICs would be an effective component of the remedy for protecting human health, and would allow for the reuse of existing and newly constructed buildings within the site boundary prior to completion of other components of the remedy.

The main exposure pathway under the scenario with ICs was inhalation of 1,2,3-TCP vapors as a result of VI to indoor air from groundwater (63 percent), because direct exposure to 1,2,3-TCP from beneficial groundwater use would be prevented through ICs.

3.3 OU-1B NORTH

3.3.1 Physical Characteristics

OU-1B North, also known as IRP-12, occupies approximately 3.5 acres north of Building 28 in the northwestern portion of Former MCAS Tustin, south of Valencia Avenue and east of Armstrong Avenue (Figure 2). OU-1B North includes two former buildings (Buildings 90 and 20B) and several former drum storage areas once used to manage hazardous wastes, including assorted unidentified solvents, motor oil, and hydraulic fluids. OU-1B North is the site of former UST-90 as well as eight Areas of Concern (AOCs) (ST-21A, ST-21B, ST-21C, ST-21D, ST-21E, ST-21F, Storage, Designated Hazardous Waste [STD]-1, and Miscellaneous, Potential Disposal Area [MDA]-07) investigated during the RFA.

3.3.2 Land and Resource Use

OU-1B North boundaries and layout are presented on Figure 2. OU-1B North is located within CO-5, which is retained by the Navy. OU-1B North includes undeveloped land and Former MCAS Tustin buildings. To expedite the transfer process, a LIFOC (Navy, 2002a) has been established between the City of Tustin and the Navy. The Final Finding of Suitability to Lease (FOSL) (Navy, 2002d) provides provisions for use of buildings within CO-5.

3.3.3 Reuse

OU-1B North consists of undeveloped land. According to the City of Tustin SP/RP, OU-1B North is designated for reuse as park and open space (City of Tustin, 2012). No residences are planned at OU-1B North.

3.3.4 Site History

OU-1B North was used primarily for materials storage and warehouse functions (BNI, 1997c). Building 90, built in 1953 and renovated in 1989, was always a warehouse. Building 20B was built in 1943 and was used exclusively for storage. The following three subareas within OU-1B North were reportedly used for drum storage from the mid-1960s until 1975 and experienced leaks or releases, summarized as follows:

- Approximately 880 gallons of assorted organic liquids, including solvents, motor oil, and hydraulic fluids, reportedly leaked from drums within an approximately 250-square-foot area west of the northern corner of Building 90.
- Approximately 1,000 gallons of motor oil and hydraulic fluids reportedly leaked from storage containers within a 20,000-square-foot area northeast of Building 90.
- An estimated 660 to 800 gallons of motor oil and hydraulic fluids were released in a 500-square-foot area southeast of Building 20B.

A 500-gallon UST (UST-90), removed in 1993, was formerly located between Building 90 and Copeland Street. It was installed in 1953 and stored No. 2 fuel oil (similar to diesel fuel) for heating Building 90. Petroleum contamination was discovered both around the tank excavation zone and upgradient near Building 90 (BNI, 2000). The Navy removed contaminated soil associated with former UST-90 under a separate PCAP.

ST-21A and ST-21B were inactive hazardous waste storage units that formerly held materials such as mercury, jet fuel, other distilled petroleum products, and cleaning compounds. ST-21B, ST-21C, ST-21D, and ST-21F were used to store recyclable wastes such as oil, jet fuel, and batteries. STD-1 (Building 248) was used to store hazardous wastes, and MDA-07 was used as a wash pad for aircraft.

3.3.5 Initial Response

OU-1B North was recommended for a confirmation study on the basis of the results of an initial assessment in which OU-1B North was identified as a potentially contaminated area (BNI, 1997c). Results of the initial assessment indicated that limited surficial soil contamination was present. The contamination consisted primarily of total petroleum hydrocarbons (TPH) at concentrations ranging up to 730 milligrams per kilogram (mg/kg) in an area just north of Building 90, in drainage ditch sediments east of Building 90, and in the area south of Building 20B (BNI, 1997c). Pesticides reported in soil included the following chemicals:

- Dichlorodiphenyltrichloroethane
- Dichlorodiphenyldichloroethene
- Dichlorodiphenyldichloroethane

Other organic compounds reported in soils included methylene chloride, acetone, and bis(2-ethylhexyl)phthalate at maximum concentrations of 68, 39, and 600 micrograms per kilogram (µg/kg), respectively. Heavy metals (arsenic, chromium, copper, lead, mercury, nickel, and zinc) were reported in shallow soil samples at concentrations near expected background values (BNI, 1997c).

Selenium was reported in all groundwater samples collected during the Site Investigation (SI) at concentrations ranging from 80 to 380 micrograms per liter (µg/L). TCE was reported in one groundwater sample at a concentration of 1,000 µg/L (BNI, 1997c).

In 1995, an RI was performed to confirm the findings of the initial assessment and to determine the nature and extent of soil and groundwater contamination at OU-1B North (BNI, I997b). The major contaminants identified during the RI included TCE in soil and groundwater and total petroleum hydrocarbons (TPH) in soil. The presence of TCE in soil and groundwater was attributed to surface disposal of solvents as well as spills and leakage from solvent storage

containers situated on the ground surface. It is believed that these releases occurred before the early 1980s.

TCE contamination was not linked to either former UST-90 or to any of the AOCs. However, former UST-90 was shown to be the principal source of the TPH-contaminated soil discussed above (BNI, 1997c).

TCE, the most frequently reported VOC in soil samples, was reported in shallow vadose zone soils (generally above 7 feet bgs) and in deeper saturated zone soils to a depth of approximately 24 feet bgs (BNI, 1997c). The maximum areal extent of TCE and the greatest concentrations were reported in soil samples from 12 feet bgs. Common TCE degradation products, including 1,1-dichloroethane (DCA), 1,1-dichloroethene (DCE), 1,2-DCE, 1,2-DCA, and vinyl chloride (VC), were not reported in soil samples collected during the RI or during post-RI soil sampling programs.

Concentrations of TCE reported in soil were significantly lower in unsaturated vadose-zone soil samples (2 to 3 feet bgs) than in saturated zone samples (7 to 12 feet bgs) (BNI, 1997c). TCE was reported in shallow vadose-zone soils at concentrations up to 200 µg/kg, and in soil samples collected at and below the water table at concentrations up to 6,629 µg/kg. TCE was reported in deeper saturated soil samples (17 to 24 feet bgs) at concentrations varying up to 346 µg/kg. TCE was not reported in soil samples collected from between 25 and 90 feet bgs.

Other VOCs that have been used as industrial solvents (chloroform, acetone, methyl chloride, and chlorofluorocarbons [CFCs]) were reported in soils at trace concentrations. TPH was reported in approximately 10 percent of the soil samples analyzed during the RI at concentrations between 11 and 722 mg/kg. Constituents indicative of petroleum, notably aromatic hydrocarbons, aliphatic hydrocarbons, and polycyclic aromatic hydrocarbons (PAHs), were reported infrequently and at trace concentrations. The occurrence of TPH and related hydrocarbons at IRP-12 was generally restricted to the top 2 feet of soil. Two plasticizers, bis(2-ethylhexyl)phthalate and butyl benzyl phthalate, were reported in the upper 1 foot of soil. Polychlorinated biphenyls (PCBs) were not reported in soil at IRP-12 (BNI, 1997c).

Site-related metal contamination was also found generally in the upper portion of the vadose zone. Lead, selenium, and zinc at concentrations above background levels were reported at 1 to 2 feet bgs. The presence of elevated concentrations of TPH in these surficial soils, together with reported releases of used motor oil, suggests that these metals are related to waste oil. Mercury was reported in six soil samples at concentrations slightly above background levels. Because of the reported storage of wastes containing mercury, the RI Report concluded that this metal was also probably a site-related contaminant in IRP-12 soil (BNI, 1997c).

Based on data collected during the RI, VOCs (principally TCE) were reported in groundwater plumes in the first and second WBZs to a maximum depth of approximately 50 feet bgs (BNI, 1997c). The RI identified two groundwater plumes at OU-1B North; the western plume (Plume 12W) occurred only in the first WBZ, and the eastern plume (Plume 12E) occurred in both the first and second WBZs.

Plume 12W appeared to originate in the TCE source areas located north-northeast of Building 533 and to extend laterally approximately 450 feet in a south-southwest and north-northeast direction, following the predominant shallow groundwater flow direction in this area (BNI, 1997c). The maximum width of Plume 12W was about 150 feet in a west-northwest and east-southeast direction. The downgradient extent of this plume appeared to be located near the former Copeland Street across from the southwestern end of Building 90. During the RI, a maximum TCE concentration of 3,900 µg/L was reported in a water grab sample from 21 feet

bgs in a soil boring within the plume. Monitoring wells subsequently completed within the plume revealed maximum reported TCE concentrations in the range of 350 to 460 µg/L.

Plume 12E appeared to originate in TCE source areas located to the east and northeast of Building 20B and extended laterally approximately 1,800 feet in a north-south direction, with a maximum estimated width of approximately 400 feet (BNI, 1997c). Although Plume 12E covered a greater area than Plume 12W, reported TCE concentrations were generally lower than at Plume 12W. TCE was reported at a maximum concentration of 1,051 µg/L in groundwater samples from the source area of Plume 12E; however, the maximum TCE concentration measured in the downgradient portion of this plume in the first WBZ was in the range of 80 to 90 µg/L in a monitoring well located approximately 250 feet downgradient from the source area (BNI, 1997c). In the second WBZ, a single plume lay directly under the footprint of the first WBZ plume, extending approximately 650 feet southward from the IRP-12 source area. A maximum TCE concentration of 58 µg/L was reported in the second WBZ at a depth of approximately 38 feet bgs (BNI, 1997c). TCE was not reported in any groundwater samples collected below approximately 43 feet bgs at OU-1B North.

Other VOCs reported in groundwater samples from one or both of the plumes included 1,2-DCA, 1,2-DCE, and 1,1,2- trichloroethane (TCA). Two CFCs, 1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113) and 1,1,2,2-tetrachloro-1,2-difluoroethane (Freon 112), were reported at concentrations up to 900 µg/L. The distribution of the CFCs appears to coincide with Plume 12E, suggesting that these solvents were released with TCE (BNI, 1997c).

The heavy metals cadmium, chromium, and hexavalent chromium, were reported in groundwater samples at concentrations up to 5, 32, and 3 µg/L, respectively. The maximum reported concentration of each metal occurred in the first WBZ at approximately 25 feet bgs. Cadmium is a constituent of waste oils and paint pigment. Chromium (measured as either total or hexavalent chromium) can be found in waste oils, residuals from paint-stripping and metal-polishing operations, and chemicals used for industrial cleaning. The occurrence of cadmium and chromium in IRP-12 groundwater at depths coincident with TCE contamination suggested that both metals were related to waste releases from the drum storage areas (BNI, 1997c).

Based on data obtained during the RI, TCE, 1,2-DCE, and 1,1,2- TCA were identified as COPCs for groundwater at IRP-12 (BNI, I997c). A post-RI field program was performed in 1997 that verified the estimated distribution of TCE in soil, interpreted from data collected during the RI. No additional TCE source areas were identified (BNI, 1998).

An FS was conducted for OU-1B North that included developing and evaluating remedial action alternatives for groundwater (BNI, 2002). Computer modeling performed during this FS indicated that TCE remaining in soil at concentrations exceeding 400 µg/kg within the vadose zone and in the upper confining layers of the first WBZ would act as a continuing source of contamination to groundwater. Based on soil sampling results obtained during the RI and post-RI soil sampling programs, one area with TCE concentrations in soil exceeding 400 µg/kg was identified at OU-1B North.

3.3.6 Basis for Taking Action

3.3.6.1 Summary of Human Health Risk Assessment

COPC exposure pathways in soil at OU-1B North include ingestion, inhalation, and dermal contact. Exposure pathways were identified on the basis of site-specific information, physical

properties of COPCs, and human receptors corresponding to future land use planned by the City of Tustin (BNI, 1997c).

Toxicity values used in the risk assessment for IRP-12 were obtained from either USEPA or DTSC, because DTSC recommends use of the more conservative toxicity criteria when conducting risk assessments in California. The risk assessment was conducted following two parallel tracks (dual-tracking approach), one that developed potential cancer risk estimates and noncancer hazard estimates using only toxicity values published by USEPA and a second that developed these estimates using only toxicity values published by DTSC.

VOC contamination originating at or near the surface at Former MCAS Tustin entered groundwater through the vadose zone in dissolved form. Groundwater plumes containing TCE were shown to originate at OU-1B North (BNI, 1997c). All VOC contamination associated with OU-1B North was confined to the first and second WBZs (BNI, 1997c). There was no indication that VOCs from OU-1B North had impacted the third WBZ or the deeper regional aquifer (BNI, 1997c).

The baseline HHRA concluded that the then-current total residential cancer risk (from soil and groundwater contaminants) for OU-1B North, STD-1, and MDA-07, was 1.9×10^{-4}, 1.6×10^{-4}, and 2.0×10^{-4}, respectively. The cancer risks were primarily associated with exposure to hexavalent chromium, 1,2-DCA, chloroform, and 1,1,2-TCA in groundwater, and arsenic in soil. The noncancer HIs for each of these three areas were 29, 42, and 27 respectively. These HIs were principally associated with chloroform, selenium, antimony, and 1,2-DCA in groundwater, and manganese in soil at OU-1B North and thallium in soil at STD-1.

The HHRA also considered future risk estimates after cleanup of VOCs in groundwater, which was projected to be complete in 30 years following implementation of the selected groundwater remedy. In this future estimate, non-VOC contaminant concentrations were assumed to remain unchanged unless soil was removed as a part of the groundwater remedy. In this case, non-VOC concentrations in areas of planned soil removal were eliminated from the analysis. The HHRA projected total future cancer risk for OU-1B North, STD-1, and MDA-07, to be 8.9×10^{-5}, 6.2×10^{-5}, and 9.8×10^{-5}, respectively, for the residential scenario. The primary contributors to future risk included 1,2-DCA, chloroform, 1,1,2-TCA and hexavalent chromium in groundwater, and arsenic in soil. The HHRA projected total future noncancer HIs for OU-1B North, STD-1, and MDA-07, of 9.9, 23 and 8.2 respectively. These HIs were primarily the result of exposure to selenium, antimony, and chloroform in groundwater. Manganese in soil at OU-1B North, and thallium in soil at STD-1, also contributed to the HI for these sites.

Following remediation, cancer risks in groundwater at OU-1B North, STD-1, and MDA-07 were estimated to be 1.1×10^{-5} using USEPA toxicity values, and 6.2×10^{-5} using DTSC toxicity values. The primary contributor to the groundwater cancer risk was hexavalent chromium. This risk value was considered overly conservative on the basis of the following information presented in the RI Report (BNI, 1997c, Section 4.2.3.2).

The noncancer risk at OU-1B North site-wide, STD-1, and MDA-07 for current and future conditions was also believed to be overestimated because of the inclusion of selenium and antimony, two metals that occur naturally in both soil and groundwater. The risks due to these metals are considered to be overestimated (BNI, 1997c).

Finally, chloroform contributed to cancer risks and, in particular, noncancer risk estimates at IRP-12 under future conditions. Although chloroform could have been used as a cleaning solvent or as a component of cleaning solvents used and subsequently released at the site, it was infrequently reported in the onsite groundwater data (17 of 221 samples [less than

8 percent]). Also, chloroform was not reported at concentrations above detection limits in soil samples collected from IRP-12, STD-1, or MDA-07. Chloroform was not a primary contaminant in terms of occurrence in the overall groundwater plume at IRP-12. There was some question as to whether it was a site-related groundwater contaminant, or a sampling or laboratory analytical artifact.

3.3.6.2 Summary of Ecological Risk

Habitat surveys performed for IRP-12 concluded that no suitable wildlife habitats exist at the site (Navy, 2004b). As a result, no ERA was performed at IRP-12.

3.3.6.3 Conclusions

Based on the baseline HHRA results, the Navy and BCT determined that remedial action was required to reduce the concentration of contaminants in groundwater at IRP-12. Remedial action was not required to reduce risks from soil (soil with elevated concentrations of VOCs was recommended for removal to prevent future impact to groundwater).

3.4 OU-1B SOUTH

3.4.1 Physical Characteristics

OU-1 B South, also known as IRP-3, is located in the central portion of the Former MCAS Tustin property in CO-6, north of Building 29 (Hangar No. 2) (Figure 3). OU-1B South occupies approximately 1.4 acres and encompasses Building 29A, which was formerly used for chemical storage and painting operations that began in 1967. OU-1B South also includes the site of former UST-29A as well as eight AOCs (ST-48 through -52 and Treatment, Oil/Water Separator [TOW]-X3, TOW-X4, and TOW-X8).

3.4.2 Land and Resource Use

The OU-1B South site layout is illustrated on Figure 3. OU-1B South is currently in the process of being transferred to the City of Tustin and is not presently used other than for operation, maintenance, and monitoring of the groundwater remedy. To expedite the transfer process, a LIFOC (Navy, 2002a) has been established between the City of Tustin and the Navy.

3.4.3 Reuse

OU-1B South consists of undeveloped land and a portion of existing Hangar 2 (Building 29). According to the City of Tustin SP/RP (City of Tustin, 2012), OU-1B South is designated for reuse as "general office" (commercial) use. No residences are planned at OU-1B South. Reuse of this area will comply with the LUC RD (ERRG, 2007) and the Revised Draft Final LUC RD Amendment No. 1 (Navy, 2014c), once finalized. The Revised Draft Final LUC RD Amendment No. 1 (Navy 2014c) proposes a VI ARIC that covers the entire area of CO-6. The Navy is working with regulatory agencies to conduct a VI assessment in CO-6 to provide multiple lines of evidence to support VI ICs. Proposed VI ARICs for OU-1B South are presented in Figure 3.

3.4.4 Site History

The Marine Corps reportedly used four waste disposal areas, which are located within the boundaries of OU-1B South (BNI, 1997c). Other potential sources of subsurface contamination

include two oil/water (O/W) separators (O/W-29A and O/W-174) as well as a former fuel-oil UST (UST-29A).

Available information suggests that approximately 3,750 gallons of liquid wastes, such as solvents, paint strippers, and battery acids, were released directly onto the ground outside storage and painting operation Buildings 174 and 265, respectively (BNI, 1996). Wash water used to remove waste material from the paint-stripping dip tank was also reportedly released directly onto the ground.

Building 174, built in 1967, was used primarily for painting and welding operations and for providing storage for batteries, hazardous materials, and miscellaneous equipment. AOC TOW-X3 includes O/W-174, a separator formerly located adjacent to the southeastern corner of Building 174, which received solvent-contaminated discharges from a wash rack (BNI, 1997c). O/W-174 was removed in 1999.

Building 265, built in 1985, was used to store hazardous materials, including lubricating oil, propellant, epoxy paint, polyurethane-based paints, enamel, paint thinners, corrosion-prevention compounds, lacquers, and solvents.

Building 29A was used to store empty boxes, although it originally housed a boiler that provided heat to Building 29. Fuel oil for the boiler was stored in UST-29A, formerly located west of Building 29A. UST-29A was installed in 1942 and had a storage capacity of 7,000 gallons (BNI1997c), UST-29A was removed in August 1993. Residual petroleum hydrocarbon contaminated soil associated with UST-29A was removed in 2004 and 2009 under the oversight of the RWQCB (ECS, 2010a). The RWQCB granted regulatory NFA case closure for UST-29A in 2010.

AOC TOW-X4 included O/W-29A, a separator formerly located on the northern side of Building 29A. O/W-29A was removed in 1999. Residual TCE concentrations in soil were considered to be a potential continuing source of groundwater contamination, and were subsequently removed as a part of the CERCLA groundwater remedy for OU-1B (Navy, 2004b).

3.4.5 Initial Response

In 1991, a site inspection, including a soil gas survey and shallow soil and groundwater investigations, was performed at OU-1B South (JEG, 1993b). TCE and chloroform were reported in soil gas and groundwater samples collected across the site. TCE was reported in groundwater samples at concentrations ranging from 10 to approximately 3,000 µg/L. TCE, TPH, bis(2-ethylhexyl) phthalate, pesticides, and PCBs were reported in soils. Heavy metals, including lead, cadmium, chromium, and zinc, were also reported in soils but at concentrations near expected background values (JEG, 1993b).

In 1995, an RI was conducted to further evaluate the nature and extent of soil and groundwater contamination at OU-1B South (BNI, 1997c). TCE was the most frequently reported and widely distributed contaminant in soil and groundwater samples collected and analyzed. TCE contamination was attributed to sources such as historical surface spills and previous waste disposal practices as well as the inactive O/W separators at AOCs TOW-X3 (O/W-174) and TOW-X4 (O/W-29A).

TCE and three of its degradation products, 1,1-DCA, 1,1-DCE, and 1,2-DCE, were reported in shallow soils in several areas at OU-1B South (BNI, 1997c, 1998). Other VOCs reported in soils included methylene chloride, acetone, methyl ethyl ketone, ethylbenzene, and total xylenes.

Maximum reported TCE concentrations, and the largest areal extent of TCE-contaminated soil, were found at depths from 7 to 13 feet bgs within saturated silts and clays in the upper portion of the first WBZ (BNI, 1997c, 1998). Generally, concentrations of TCE reported in soil at OU-1B South decreased with depth. TCE was reported at a maximum concentration of 2,679 µg/kg in a soil sample collected from the saturated zone at 12 feet bgs in the vicinity of inactive separator O/W-29A. Reported TCE concentrations were less at 15 to 20 feet bgs, depths that are also generally within the saturated silts and silty sands of the first WBZ. TCE was reported in soil samples collected from 20 to 40 feet bgs, within the second WBZ, at concentrations of up to 1,539 µg/kg. Only trace concentrations of TCE were reported in soil samples taken from depths below about 40 feet bgs.

TPH-contaminated soils also containing elevated concentrations of metals and PAHs were reported in some areas at OU-1B South (BNI, 1997c). TPH contamination was reported in shallow vadose-zone soils (typically shallower than 3 feet bgs) at concentrations of approximately 10 to 30 mg/kg. PAHs were also reported in soil samples, with maximum concentrations reported in a sample collected at 7 feet bgs that was associated with a fuel-oil release from a pipeline connected to former UST-29A.

Other organic compounds reported in the upper one foot of soil included the solvent bis(2-chloroisopropyl) ether and two plasticizers, bis(2-ethylhexyl) phthalate and butyl benzyl phthalate. Three phenolic compounds (phenol, 2-methyl phenol, and 4-methyl phenol) were also reported in upper vadose-zone soil samples.

Site-related metal contamination was limited to the upper 2 feet of soil (BNI, 1997c). Lead, the most frequently reported metal, was reported in 25 percent of the shallow soil samples at concentrations exceeding the background concentration of 23.4 mg/kg. Lead was reported at a maximum concentration of 621 mg/kg. Other metals at concentrations exceeding background levels and, therefore, identified as COPCs for soil, included cadmium, chromium (total), hexavalent chromium, copper, silver, and zinc.

Based upon the RI sampling results, TCE and three of its degradation products (1,2-DCE, 1,1-DCA, and 1,1-DCE) were identified as the primary COPCs for groundwater (BNI, 1997b, 1997c).

Four co-mingled VOC plumes originating from several TCE-contaminated soil areas were interpreted to exist in the first WBZ at IRP-3 (BNI, 1997c, 1998). TCE was reported in groundwater samples from the first WBZ at concentrations ranging from 10 µg/L to 1,742 µg/L. TCE reported in groundwater at concentrations exceeding 5 µg/L was interpreted to extend approximately 1,000 feet in a south-southwest and north-northeast direction and approximately 600 feet in a west-northwest and south-southeast direction.

Two VOC plumes were interpreted to exist in the second WBZ, extending downgradient from separators O/W-29A and O/W-174 (BNI, 1997c, 1998). TCE was reported in groundwater samples from both plumes at concentrations in excess of 1,000 µg/L. Based on RI data, TCE in these plumes was interpreted to extend laterally approximately 600 to 800 feet in a south-southwest direction, approximately 100 to 125 feet in a northwest-southeast direction, and vertically to depths of approximately 40 feet bgs, respectively.

A post-RI soil sampling program was conducted in 1997 to further evaluate the extent of TCE-contaminated soil in the saturated zone at IRP-3 (BNI, 1997c). Two additional potential TCE source areas were identified in the uppermost saturated silts and clays of the first WBZ and extending approximately 50 and 75 feet south (downgradient) from O/W-174 and O/W-29A, respectively. Post-RI sampling results also indicated that TCE in the upper silts and clays of the

first WBZ was slightly more extensive south of Building 514 than originally determined during the RI (BNI,1997c). Overall, the occurrence of TCE in saturated-zone soils at IRP-3 was found to parallel the general direction of groundwater flow (i.e., toward the south and southwest).

An FS was conducted for OU-1B South that included development and evaluation of remedial action alternatives for groundwater (BNI, 2002). Computer modeling performed during the FS indicated that TCE remaining in soil at concentrations exceeding 400 µg/kg within the vadose zone could potentially act as a continuing source of groundwater contamination, resulting in concentrations of TCE exceeding the maximum contaminant level in drinking water (MCL). Based on soil sampling results obtained during the RI and post-RI soil sampling programs, four areas with TCE concentrations in soil exceeding 400 µg/kg were identified at OU-1B South.

3.4.6 Basis for Taking Action

3.4.6.1 Summary of Human Health Risk Assessment

Potential exposure pathways for COPCs in soil at OU-1B South included ingestion, inhalation, and dermal contact. Exposure pathways were identified on the basis of site-specific information, physical properties of COPCs, and human receptors corresponding to future land use planned by the City of Tustin (BNI, 1997c).

Toxicity values used in the risk assessment for OU-1B South were obtained from either USEPA or DTSC, because DTSC recommends use of the more conservative toxicity criteria when conducting risk assessments in California. The risk assessment was conducted following two parallel tracks (dual-tracking approach), one that developed potential cancer risk estimates and noncancer hazard estimates using only toxicity values published by USEPA and a second that developed these estimates using only toxicity values published by DTSC.

Human health risks were calculated for IRP-3 both under conditions at the time of the RI, and under future conditions (i.e., after 30 years, when remediation of groundwater is assumed to be complete). EPCs for VOCs in groundwater were developed by multiplying the current concentration (at the time of the RI) by a factor (a 90 percent reduction) that reflected the expected overall concentration decline within the plume at the completion of remediation. The factor was based on the reduction in the concentration of TCE predicted by groundwater modeling performed during the FS. TCE was considered to be a conservative cleanup indicator relative to other VOC risk drivers because it has a lower aqueous solubility and a greater tendency than other VOCs to adsorb to soil. Because groundwater cleanup was intended for VOCs, concentrations of other contaminants (e.g., semi-volatile organic compounds, pesticides, and metals) at the completion of groundwater cleanup were conservatively assumed to be the same as the initial concentrations used to evaluate current (RI) conditions in the baseline HHRA; i.e., no decline in non-VOC contamination concentrations was assumed.

In the RIs, VOCs were typically reported at low concentrations in the vadose zone. Maximum VOC concentrations were reported in soil samples collected from below the top of the water table beginning at approximately 12 feet bgs in a relatively thick, low-permeability, silty clay layer known as the upper confining layer. Reported concentrations of VOCs typically diminished within this upper confining layer upward toward the ground surface, and also downward within the saturated zone toward the bottom of the sand layer in the second WBZ. Direct exposure to chemicals in the subsurface, therefore, would not occur unless excavation activities exposed contaminated soils at the surface.

VOC contamination originating at or near the surface at OU-1B South entered groundwater through the vadose zone in dissolved form. All VOC contamination associated with OU-1B South is confined to the first and second WBZs (BNI, 1997c, 1998). There is no indication that VOCs from OU-1B South have impacted the third WBZ or the deeper regional aquifer (BNI, 1997c). Currently, there is no complete exposure pathway to contaminated groundwater at OU-1B South because ICs are in place to prevent exposure.

The baseline HHRA concluded that the then-current total residential cancer risk (from soil and groundwater contaminants) for OU-1B South, TOW-X3, and TOW-X4, was 1.5×10^{-4}, 1.5×10^{-4}, and 1.6×10^{-4}, respectively. The cancer risks were primarily associated with exposure to 1,1-DCE and hexavalent chromium in groundwater. The noncancer HIs for each of these three areas were 8.4, 6.0, and 6.4 respectively. These HIs were principally associated with thallium and chloroform in groundwater. For IRP-3, manganese in soil was identified as an additional contributor to the HI.

The HHRA estimated future risks assuming a complete cleanup of VOCs in groundwater (30 years following implementation of the groundwater remedy). In this future estimate, non-VOC contaminant concentrations were assumed to remain unchanged, unless soil was removed as a part of the groundwater remedy. In this case, non-VOC concentrations in areas of planned soil removal were eliminated from the analysis. The HHRA projected total future cancer risk of 4.0×10^{-5} for the residential scenario for IRP-3, TOW-X3, and TOW-X4. The reduction in risk was related principally to reduction of 1,1-DCE concentrations in groundwater. The HHRA projected total future noncancer HIs for OU-1B South, TOW-X3, and TOW-X4, of 7.5, 4.6, and 4.6, respectively. At OU-1B South, the principal risk drivers were thallium in groundwater and manganese in soil. At TOW-X3 and TOW-X4, the principal risk driver was thallium in groundwater.

Based on the ROD, remediation of the OU-1B South groundwater plumes will be considered complete when RGs, represented by state and federal drinking water standards, are achieved throughout the plume. At the time of the baseline HHRA, the cancer risk associated with IRP-3 site-wide groundwater was estimated at 1.3×10^{-4} using USEPA toxicity values, and 1.5×10^{-4} using DTSC toxicity values (Navy, 2004c).

Following remediation, cancer risks in groundwater at OU-1B South, including TOW-X3 and TOW-X4, were estimated to be reduced to 4.0×10^{-5}, within the NCP risk management range. Principal cancer risk drivers were related to 1,1-DCE and hexavalent chromium in groundwater. Note that cancer risk estimates that include 1,1-DCE and hexavalent chromium were considered overly conservative.

These projected risk estimates should not be taken as absolute indicators of risk because of inherent uncertainties associated with assumptions used in the analysis (BNI, 2002). Sources of uncertainty included:

- The assumption that groundwater VOCs degrade at the same rate as TCE.
- The use of a conservative model to quantify future TCE concentrations.
- The assumption that all other COPCs remain unchanged throughout groundwater cleanup.

Baseline noncancer risks in groundwater at OU-1B South following remediation were determined to be equal to 4.5 (Navy, 2004c). This HI was associated primarily with exposure to thallium in groundwater. Thallium was retained as a COPC in groundwater during the OU-1B

South risk assessment on the basis of a statistical comparison of onsite concentrations with background concentrations. However, the total noncancer risk at OU-1B South under current and future conditions was believed to be overly conservative because of the thallium contribution. The following reasons indicate why thallium in groundwater is not a site-related release:

- Thallium is a naturally occurring metal in both soil and groundwater. It is not a common environmental contaminant, and its use would primarily be limited to application of rodent pesticides.
- There is no documentation or historical information indicating that thallium was used at IRP-3, TOW-X3, or TOW-X4, or that pesticides containing thallium were applied at these locations.
- If concentrations of thallium in groundwater were due to a site-related release (i.e., not naturally occurring), then it would be expected that elevated thallium concentrations would be present in soil at OU-1B South and at the AOCs.
- Thallium was not reported in soil at OU-1B South; however, thallium was retained as a groundwater COPC in the risk assessment, based solely on statistical evaluation of onsite and background groundwater data.
- OU-1B South groundwater data reported thallium in 9 of 56 sampling points (16 percent).
- Concentrations of thallium (0.0073 mg/L) reported in background monitoring wells located at perimeter areas of Former MCAS Tustin were similar to the thallium groundwater EPC (0.0032 mg/L) used in the risk assessment.

3.4.6.2 Summary of Ecological Risk

Habitat surveys performed for OU-1B South concluded that no suitable wildlife habitats exist at the site (Navy, 2004b). As a result, no ERA was performed for OU-1B South.

3.4.6.3 Conclusions

Based on the results of the baseline HHRA, the Navy and BCT determined that remedial action was required to reduce the concentration of contaminants in groundwater at OU-1B South. However, remedial action was not required to reduce risks from soil (soil with elevated concentrations of VOCs was recommended for removal from OU-1B South to prevent future impact to groundwater).

3.5 OU-3

3.5.1 Physical Characteristics

OU-3, also known as IRP-1, consists of the former Moffett Trenches and Crash Crew Burn Pits Site. The site contains former unlined, shallow landfill trenches and pits constructed to contain refuse from the installation and to burn flammable liquids for firefighting training exercises. Between 1997 and 1999, extensive road construction occurred at the site. Prior to construction, a high density polyethylene (HDPE) liner was installed over the landfill to prevent surface water from infiltrating through the landfill and contaminating groundwater below the site. Up to 20 vertical feet of earthfill was placed on top of the liner over a majority of the site to support the

construction of the overlying Jamboree Road extension. Retaining walls, associated embankment slopes, and southbound/northbound off ramps were constructed on the site as part of the road project. Road improvements also included a surface water runoff collection system that collects and directs surface water to Peters Canyon Channel rather than allowing it to infiltrate the subsurface, and extensive slope landscaping on the eastern side of Jamboree Road.

3.5.2 Land and Resource Use

The boundaries of OU-3 are presented on Figure 4. Most of OU-3 is now covered by Jamboree Road, and the road's earthfill embankment slopes and retaining walls. The site is bordered by Peters Canyon Channel to the east, with a steel-reinforced concrete containment wall lining the western bank adjacent to the site. West of OU-3 is generally level undeveloped land.

3.5.3 Reuse

In 2004, OU-3 was transferred to the City of Tustin. The current designated land use is traffic circulation, and the majority of the site is occupied by Jamboree Road. Tustin's SP/RP indicated future development of currently vacant land adjoining OU-3 to the west as medium- to high-density residential use (City of Tustin, 2012).

3.5.4 Site History

The landfill trenches, which reportedly contained approximately 5,000 cubic yards of material, were used from the late 1940s or early 1950s until 1971. The trenches are suspected of containing a mixture of MCAS Tustin-generated municipal solid waste and industrial waste consisting of points, oils, solvents, and transformers. Boring and trench logs indicated that landfill materials consist of concrete, gravel, wood, glass, cobbles, metal, asphalt, and minor trash. The Crash Crew Burn Pits were used to burn flammable liquids for firefighting training exercises from 1971 until 1983. Flammable liquids burned in the Crash Crew Burn Pits consisted primarily of jet propellant grade 5 (JP-5), as well as oils, solvents, lacquers, primers, and various chemicals. An estimated 250,000 to 350,000 gallons of liquid wastes were used for firefighting training at the burn pits (Navy, 2001).

The exact size and number of trenches and pits are unknown because newer trenches and pits were constructed over older sections. The area encompassing the landfill trenches and burn pit has been estimated at approximately 600 feet by 250 feet based on aerial photographs and historical information.

In 1983, petroleum was reportedly observed seeping into Peters Canyon Channel. The petroleum was attributed to seepage from the landfill trenches and burn pits. Response actions were implemented beginning in 1983 to mitigate the petroleum impacts as discussed in Section 3.5.5.

In May 1985, pursuant to California's Porter-Cologne Water Quality Control Act, the RWQCB Santa Ana issued CAO No. 85-74 for MCAS Tustin in response to seepage of petroleum and other materials into Peters Canyon Channel. The CAO ordered the United States Marine Corps to perform the following specific actions:

- Submit a plan for cleanup of all fuels and contaminated groundwater and soil resulting from discharge of waste to the burn pits.
- Submit a schedule for implementation of the necessary investigative remedial work.

- Submit monthly progress reports describing the status of work conducted to comply with the CAO.

The CAO was rescinded on May 31, 1996, after the RWQCB Santa Ana determined that MCAS Tustin had fulfilled the requirements of the CAO.

3.5.5 Initial Response

The response actions for OU-3 included excavation and offsite disposal of contaminated soil in 1983. A steel-reinforced concrete containment wall was constructed along the western bank of the channel in 1986 to prevent seepage of contaminated groundwater into the channel. A French drain system and two associated sumps were installed in 1987, and periodic groundwater extraction was performed until 1992. In addition, landfill gas (LFG) monitoring probes and groundwater monitoring wells were installed in 2000.

The following major investigations were implemented:

- Initial site assessment during 1983 and 1984 (Brown and Caldwell, 1985)
- Final site inspections from 1990 to 1993 (JEG, 1993b)
- Remedial Investigation Report for OU-3 in 1996 (BNI, 1996)

Routine groundwater monitoring was implemented in 1997, which continued beyond the ROD milestone (Navy, 2001) and into the long-term monitoring phase. Currently, long-term monitoring is ongoing.

Construction of the Jamboree Road extension over the site occurred from 1997 to 1999. The construction included placement of up to 20 vertical feet of earthfill, associated retaining walls, elevated ramps, road pavement, and slope landscaping. The road design incorporated surface runoff collection and drainage features designed to prevent or minimize infiltration of surface water into the underlying subgrade. The surface water collection system drains into the adjacent Peters Canyon Channel.

Response actions taken at Former MCAS Tustin are summarized in Table 2-1 through Table 2-7.

3.5.6 Basis for Taking Action

3.5.6.1 Summary of Human Health Risk Assessment for OU-3

Exposure Assessment Summary

The HHRA conducted for OU-3 as part of the RI focused on COPCs identified in surface water and sediment in Peters Canyon Channel and shallow groundwater beneath the site. No viable exposure pathways were identified for the contaminated subsurface soil and buried landfill materials beneath the site.

For surface water and sediment, the receptor on which the risk estimates were based was an elementary to high school aged child (older child) who spends 4 hours per week (2 hours per day on Saturday and Sunday) playing in Peters Canyon Channel adjacent to the site for a period of 7 years. The estimates of groundwater risk assumed a residential scenario for children and adults. Residential adult risk estimates were based on exposure of a person from birth to 30 years of age. Residential child exposure was assumed to be 6 years.

The exposure routes used in the risk assessment for surface water and sediment included ingestion, dermal contact, and inhalation. It was considered unlikely that anyone would install a private well for potable use because of the high TDS content in excess of 10,000 mg/L, the low yield in the shallow WBZs, and the ready availability of public water. Nevertheless, the potential risk presented by the COPCs in groundwater was estimated using exposure conditions associated with residential use of the groundwater (potable water). The exposure routes used in the risk assessment for groundwater included ingestion, dermal contact, and inhalation. The chemicals evaluated in the risk assessment were identified as COPCs in the RI Report. Risks were calculated using exposure point concentrations based on the highest measured concentrations of COPCs.

Toxicity values used in the risk assessment were obtained from USEPA or DTSC because DTSC recommends using more conservative toxicity criteria when conducting risk assessments in California. Similarly, USEPA requires the use of a tiered toxicity developed by USEPA when conducting risk assessments at facilities that fall under the jurisdiction of the federal government (USEPA, 2003). Because OU-3 falls under the jurisdiction of both USEPA and DTSC, the risk assessment was conducted following two parallel tracks, one that developed potential cancer risk estimates and noncancer hazard estimates using only toxicity values published by USEPA and a second track that developed these estimates using only toxicity values published by DTSC. Cancer risk and noncancer hazard indices estimated using this parallel approach are presented in the following sections.

Summary of Sediment and Surface Water Site Risks

The estimated lifetime cancer risk presented by the COPCs in the sediment and surface water to a child playing in Peters Canyon Channel at the exposure conditions assumed in the risk assessment was estimated to be 4.4×10^{-6} when based on USEPA cancer slope factors (CSFs) and 5.1×10^{-6} when based on Cal/EPA CSFs substituted for benzo(a)pyrene, benzo(k)fluoranthene, cadmium, chrysene, hexavalent chromium, and nickel. The total cancer risk for surface water and sediment was within the generally acceptable range of 10^{-6} to 10^{-4} as defined in the NCP.

The total noncancer HI for the COPCs in sediment and surface water was 0.052, which indicated that the COPC concentrations were not high enough in both media to cause systemic toxicity to a child exposed in the manner assumed in the risk assessment.

The exposure conditions used for the estimate of risk for sediment and surface water potentially overestimated the actual risk. The risk estimate was based on the assumption that exposure could occur 2 hours per day, 104 days per year. In addition, because of similarities in both the type and magnitude of organic and inorganic contamination detected in sediment and surface water samples both from locations upstream of the OU-3 and from locations adjacent to and downstream of the site, it was concluded that there was significant uncertainty as to whether the COPCs identified in the channel actually came from OU-3.

Summary of Site Risks Associated with Groundwater

The total residential adult cancer risk for groundwater was estimated to be 2.5×10^{-3} using both USEPA CSFs, and a combination of USEPA and Cal/EPA CSFs. The groundwater cancer risk for a resident child was estimated at 9.1×10^{-4}. Naturally occurring arsenic accounted for 93 percent of the total cancer risk and 1,4-dichlorobenzene accounted for the remaining 7 percent. The total cancer risk estimate for groundwater exceeded the NCP-defined risk management range of 10^{-6} to 10^{-4}.

For the resident receptor, noncancer risk estimates were those corresponding to the child resident. The noncancer risk estimates for the child resident were higher than those for the adult resident. The HI for groundwater for a resident child was estimated to be 40. Arsenic and molybdenum accounted for 76 percent of the HI, and antimony, cadmium, chlorobenzene, 1,2-dichlorobenzene, manganese, and thallium (as thallic oxide) accounted for the remaining 24 percent. The estimated HI exceeded the NCP-defined threshold of 1, indicating that adverse effects could occur under the conditions assumed for the risk estimate.

The groundwater risks were examined again in November 1998 to assess possible changes because of more current toxicity factors or additional data from the groundwater monitoring program. Arsenic was the major risk and hazard driver, and was used to indicate changes. The CSF for cancer risk due to arsenic was not revised by USEPA between 1995 and 1998, but the hazard factor increased by approximately 5 percent. The exposure point concentration used for arsenic in the RI Report was 0.1 mg/L, but the July 1998 maximum report concentration was 0.02 mg/L. As a result, the incremental groundwater cancer risk (USEPA) was revised from 2.5×10^{-3} to 6×10^{-4}, and the revised HI was revised from 40 to 22.

The risk assessment indicated that antimony, arsenic, manganese, molybdenum, and thallium were present in groundwater at concentrations that presented a relatively high cancer risk (arsenic) or a high HI (all five metals). Because they are naturally occurring substances, when metals are present at concentrations presenting a relatively high cancer risk or hazard, it is considered important to determine whether the concentrations found in soil or groundwater at the site are typical of regional values outside the site. Available information suggested that the highest reported concentrations of arsenic and manganese in the groundwater were elevated. However, the highest reported concentrations of molybdenum and thallium in groundwater appeared to be within background range (i.e., the concentrations of molybdenum and thallium were equal to or below the highest reported concentrations in upgradient wells that had not been affected by Marine Corps activities). Antimony concentrations were concluded to be likely representative of background concentrations as well.

The probability of the contaminated groundwater being used as a potable water source was concluded to be extremely low for the following reasons:

- The shallow WBZs had naturally high TDS levels, which exceeded concentrations suitable for potable use, and yield was low.
- Tustin and other cities in the area do not use water from the shallow WBZs.
- If a drinking water well were to be installed to obtain water from that zone, it would be by a private property owner; however, there is no usable land left for any development because Jamboree Road and the off-ramps cover nearly the entire site.
- ICs such as the City of Tustin's well permit requirements and the Orange County Water District's well permit requirements preclude construction of water supply wells without written approval.

3.5.6.2 Summary of Ecological Risk Assessment

The objective of the ERA was to assess the hazards of COPCs in sediment and surface water of Peters Canyon Channel to wildlife receptors by performing a screening-level assessment. No special-status species were identified as directly exposed. However, it was concluded that the

American peregrine falcon (*Falco peregrinus anatum*) could be exposed indirectly by consuming waterfowl that might become contaminated by living on or near the channel.

The ERA considered the potential hazard presented by COPCs in sediment and surface water by ingestion. The COPC concentrations used for the ERA were based on the maximum values detected in the area. Ecological receptors at the site included adult great blue herons and mallard ducks. The receptors were assumed to consume all of their daily food and water from the channel adjacent to the site.

The hazard quotient (HQ) values for bis(2-ethylhexyl)phthalate (2), cadmium (2), cobalt (5), hexavalent chromium (54), and zinc (13) calculated for the mallard duck exceeded 1.0. The HQ values for bis(2-ethylhexyl)phthalate (3), cadmium (82), and cobalt (3) calculated for the great blue heron exceeded 1.0. These findings indicated a slight potential for an effect from sediments and surface water on mallard ducks and great blue herons under a worst-case exposure scenario. It was considered unlikely that any mallard spends all of its time at IRP-1, and given the small size of the site, it was considered highly unlikely that there is any effect on waterfowl at the population level. Similarly, it was considered unlikely that any great blue heron ingested all of its diet of fish from the short section of channel adjacent to OU-3. Therefore, given the conservative nature of the risk assessment, it was concluded that there was little to no threat to waterfowl when considered at the population or individual animal level.

3.5.6.3 Conclusions

The HHRA concluded that risks associated with exposures to surface water and sediment in Peters Canyon Channel were within the NCP risk management range for cancer risk of 10^{-6} to 10^{-4}, and below the threshold HI of 1, but exceeded these criteria for risks associated with exposures from beneficial use of groundwater. Therefore, remedial action to address groundwater risks was deemed warranted.

COCs identified in the risk assessment as risk drivers were limited to specific chemicals in groundwater that included antimony, arsenic, cadmium, chlorobenzene, manganese, molybdenum, thallium, 1,2-dichlorobenzene, and 1,4-dichlorobenzene. Remedial action to prevent exposure to these chemicals in groundwater was deemed warranted.

3.6 OU-4B

3.6.1 Physical Characteristics

OU-4B was separated into two groups as low and moderate concentration sites (Figure 5) to take advantage of common site characteristics. Such a grouping allowed for an efficient screening process and comparison of alternatives applicable to each group.

IRP-11 and IRP-13W are the low concentration sites, with VOCs present in groundwater at concentrations generally less than 20 µg/L and generally ranging from 7.4 to 16 µg/L. IRP-5S(a), IRP-6, and the MPA are the moderate concentration sites, with VOCs present in groundwater at concentrations exceeding 20 µg/L, and generally ranging from 23 to 430 µg/L.

3.6.1.1 Low Concentration Sites – IRP-11 and IRP-13W

IRP-11, Drum Storage Area No. 1, is located in the north-central portion of Former MCAS Tustin at the northwestern corner of Copeland Road and Calnan Street. Maximum reported TCE concentrations in groundwater decreased from 15 µg/L in 1996 to 8.5 µg/L in 2003. The

approximate areal extent of TCE in first WBZ groundwater at concentrations exceeding the MCL (5 µg/L) was 190 by 50 feet in 2010, with the long axis trending north-south. Groundwater modeling indicated that TCE could migrate approximately 150 feet downgradient and that TCE concentrations would decrease from 8.5 µg/L to below the MCL of 5 µg/L in less than 24 years under the baseline scenario. Assuming natural attenuation, maximum TCE concentrations would decrease below the MCL in approximately 18 years. TCE at concentrations exceeding the MCL at IRP-11 would attenuate and not migrate farther downgradient within this time frame.

IRP-13W, Drum Storage Area No. 3, includes AOCs Miscellaneous Air Emissions (MAE)-4, and TOW-X7, both located within former Building 98; and ST-14A, ST-14B, ST-14C, and ST-15 located at or near former Buildings 575 and 47T (Figure 5). Most of IRP-13W is undeveloped land within CO-5 and has been leased to the City of Tustin under a LIFOC (Navy, 2002a). The remaining portion of IRP-13W was conveyed as an early transfer pursuant to a FOSET and is currently developed as residential property.

Maximum reported TCE concentrations in groundwater decreased from 25 µg/L in 1996 to 16 µg/L in 2003. The approximate areal extent of TCE in first-WBZ groundwater at concentrations exceeding the MCL (5 µg/L) was 270 by 150 feet in 2010, with the long axis trending northeast-southwest. The downgradient portion of the TCE plume is comingled with the northern upgradient portion of a 1,2,3-TCP plume from IRP-13S (OU-1A).

Groundwater modeling indicated that maximum TCE concentrations would decrease from 16 to 6 µg/L within approximately 30 years, and would decrease below the MCL within approximately 36 years under the baseline scenario. The IRP-13W plume would attenuate more quickly (before 30 years) under natural attenuation. The plume at IRP-13W is in close proximity to OU-1A and would be completely contained and captured by its operating hydraulic containment system and remain entirely within the area of ICs established for OU-1A (BEI, 2008).

3.6.1.2 Moderate Concentration Sites – IRP-5S(a), IRP-6, and Mingled Plumes Area

IRP-5S(a), Drainage Area No. 1 – Ditch 5a South, encompasses two acres in the southern portion of Former MCAS Tustin, southeast of Aircraft Hangar No. 2. IRP-5S(a) formed a part of a culvert system that collected surface water runoff from most of the northwestern portion of the former station, with connections to several buildings (Figure 7). Figure 7 shows the location of monitoring wells and the 2015 groundwater elevations and contours. The maximum concentration of TCE reported was 193 µg/L from monitoring well I005MW05S in March 2005. The approximate areal extent of TCE at that time in first WBZ groundwater exceeding the MCL (5 µg/L) is approximately 850 by 330 feet trending north-south.

Maximum TCE concentrations would decrease from 193 to 94 µg/L within approximately 30 years and to 74 µg/L within approximately 100 years under no action. The plume was predicted to migrate downgradient approximately 180 feet in 30 years and approximately 560 feet within 100 years. Groundwater modeling indicated that maximum concentrations of TCE would decrease to 76 and 45 µg/L within approximately 30 and 100 years, respectively, under natural attenuation.

Under a hydraulic containment scenario, one well extracting groundwater at 3 gallons per minute would capture the plume and prevent any future downgradient migration; maximum TCE concentrations would be reduced to 91 and 19 µg/L within approximately 30 and 100 years, respectively (Navy, 2010).

IRP-6, Paint Locker and Drum Storage Area, located in the southern portion of Former MCAS Tustin, was formerly occupied by Building 250 (Figure 8). Figure 8 shows the location of

monitoring wells and the 2015 groundwater elevations and contours. 1,1-DCE and TCE concentrations at the main 1,1-DCE plume were as high as 179 and 12 µg/L, respectively, based on monitoring well data collected from 2006 to 2010. The approximate areal extent of 1,1-DCE in first WBZ groundwater exceeding the MCL (6 µg/L) was 230 by 70 feet trending north-south in June 2015 (see Figure 9).

The monitoring results from 1999 through 2006 at IRP-6 indicated relative stability in concentration trends for most VOCs and the lateral extent of the 1,1-DCE groundwater plume. Results of the 2007 Supplemental Investigation at IRP-6 indicated that 1,1-DCE and TCE concentrations exceeded their respective MCLs in the first WBZ within the main 1,1-DCE plume area; the eastern and western areas of newly constructed Park Avenue; and the area northwest of Jamboree Road. Results from groundwater samples collected during the Supplemental Investigation along Park Avenue, east and west of the main 1,1-DCE plume, indicated that the extent of VOCs in the first WBZ appeared to be limited to minor, isolated areas of suspected contamination only. Results from the first WBZ in the area immediately northwest of Jamboree Road from direct-push borings, temporary direct-push prepacked screen wells, and permanent monitoring wells indicated that VOCs appeared to be limited to a somewhat irregularly shaped area of suspected contamination (Navy, 2010).

The MPA consists of five AOCs (Disposal Sanitary Sewer [DSS]-01, DSS-02, MDA-02, Miscellaneous Major Spill [MMS]-05, and ST-67). DSS-01 and DSS-02 are collapsed sanitary sewer lines. MDA-02 is a small area of observed staining surrounding Building 19 (station armory). MMS-05, Paint Stripper Disposal Area No. 2, was used as a paint shop. ST-67, the Former Hazardous Materials Storage Yard, is the former location of Building 63/78, which was associated with the use, storage, and disposal of hazardous materials, and has been demolished.

The approximate areal extent of TCE in first and second WBZ groundwater impacted by TCE exceeding the MCL (5 µg/L), was approximately 2,130 by 340 feet trending north-south. Maximum concentrations of TCE reported in the first WBZ at the MPA decreased from 46 µg/L in 1999 to 23 µg/L in 2006. The maximum concentration of TCE reported in the second WBZ was 34 µg/L (estimated concentration) from monitoring well I0MPMW01D in 2007. The maximum concentration of TCE reported in the third WBZ was 1.1 µg/L in 2007.

3.6.2 Land and Resource Use

In May 2002, the Navy transferred the majority of Former MCAS Tustin property, including property surrounding OU-4B sites, to the City of Tustin. Property remaining under Navy control includes areas where environmental responses are underway and are designated as carve-out areas. CO areas have been leased in accordance with the FOSL (Navy, 2002d) and LIFOC (Navy, 2002a) pending completion of ongoing investigation/response actions. CO areas, their current use, and potential future site use at each of the OU-4B sites are described below.

3.6.3 Reuse

3.6.3.1 Low Concentration Sites – IRP-11 and IRP-13W

IRP-11 is located within CO-5 and consists of undeveloped land. According to the City of Tustin SP/RP, IRP-11 is located in an area designated for reuse as an urban regional park (City of Tustin, 2012).

The majority of IRP-13W is undeveloped land within CO-5 and has been leased to the City of Tustin under a LIFOC (Navy, 2002a). The remaining portion of IRP-13W was conveyed as an early transfer pursuant to a FOSET (Navy, 2007) and is currently developed as residential property. According to the City of Tustin SP/RP, the portion of IRP-13W within CO-5 is designated for reuse as a community park.

3.6.3.2 Moderate Concentration Sites – IRP-5S(a), IRP-6, and the MPA

A portion of IRP-5S(a) is located within CO-9 and has been leased to the City of Tustin under a LIFOC (Navy, 2002a). The remaining portion of the site is located outside of the CO and has already been transferred to the City of Tustin pursuant to a FOST (Navy, 2004d). Additional contamination was discovered after conveyance of this portion of transferred property. The Navy has notified the transferee and is responding to the contamination identified outside of the CO pursuant to CERCLA § 120 (h). IRP-5S(a) consists of undeveloped and developed property, including roadways and parking lots supporting commercial development. According to the City of Tustin SP/RP, IRP-5S(a) is in an area designated for reuse as commercial business. While various commercial business land uses would be permitted within proximity of IRP-5S(a), other types of uses, including residential, public/institutional, and recreational uses, could be developed on all or a portion of the property where IRP-5S(a) is located as permitted within Specific Plan Planning Area.

The main 1,1-DCE plume at IRP-6 is located within CO-2, which has been leased to the City of Tustin under a LIFOC (Navy, 2002a). Other areas associated with IRP-6 are located outside of CO-2 and have been transferred to the City of Tustin pursuant to a FOST with subsequent transfer to Costco Wholesale Corporation. Additional contamination was discovered after conveyance of this portion of transferred property. The Navy has notified the transferee, and is responding to the contamination identified outside of the CO pursuant to CERCLA § 120 (h). IRP-6 consists of commercial development, including parking lots, streets, and minor landscaping associated with adjacent business. The future use is consistent with the current use.

The MPA is located within CO-5 and consists of undeveloped property, including vacant buildings and Hangar No. 1 (Building 28). A portion of the MPA has been leased to the City of Tustin under a LIFOC (Navy, 2002a). The area under LIFOC is designated for reuse as commercial and the remaining portion is designated for reuse as a future urban park.

Hangar No. 1 and Building 28A (also known as the Hangar 28 Complex) are within the vicinity of the MPA and were included on the National Register of Historic Places in 1975.

3.6.4 Site History

Previous investigations at the low and moderate concentration sites evaluated potential contamination from metals, PAHs, and VOC in soils, and VOCs in groundwater. COCs in soil at IRP-13W were removed as part of a soil removal action (BNI, 1997c) and no longer pose an unacceptable risk at OU-4B. Based on the results from previous investigations and removal actions, VOCs were the only COCs identified for groundwater. No COCs were identified for soils. TCE was identified as a COC in first WBZ groundwater for all six OU-4B sites and second WBZ groundwater at the MPA. 1,1-DCE was also identified as a COC in first-WBZ groundwater at IRP-6.

3.6.5 Initial Response

3.6.5.1 Low Concentration Sites – IRP-11 and IRP-13W

The principal response actions for IRP-11, IRP-13W, and MMS-04 included:

- A removal action was performed at IRP-13W. In 1997, approximately 4,000 tons of soil were removed, and site restoration activities (paving and fencing) were performed as part of a Non-Time Critical Removal Action (NTCRA) at IRP-13W. Activities were completed in November 1997.
- A shallow groundwater investigation led to designation of IRP-5S(a), IRP-6, IRP-11, IRP-13W, MMS-04, and the MPA as OU-4B, with IRP-11, IRP-13W, and MMS-04 designated as low concentration sites (TCE groundwater concentrations generally less than 20 µg/L).
- The ROD/RAP (Navy, 2010) for OU-4B selected ICs as the remedy for IRP-11, IRP-13W, and MMS-04.
- Following four quarters of groundwater TCE concentrations below the RG, a Final Remedial Action Completion Report (RACR) was prepared for MMS-04 accomplishing an NFA for the site. BCT concurrence was received in 2011.
- IC compliance inspections and groundwater monitoring will continue at IRP-11 and IRP-13W until monitoring results indicate that the RG for TCE in groundwater has been achieved and the Federal Facility Site Remediation Agreement (FFSRA) signatories concur that monitoring and ICs are no longer necessary.

3.6.5.2 Moderate Concentration Sites – IRP-5S(a), IRP-6, and the MPA

The principal response actions for IRP-5S(a), IRP-6, and the MPA included:

- A ROD/RAP (Navy, 2010) for OU-4B selected *in situ* enhanced bioremediation, monitored natural attenuation, and ICs until monitoring results indicate that the RG for TCE in groundwater has been achieved and the FFSRA signatories concur that monitoring and ICs are no longer necessary.
- IC compliance inspections and groundwater monitoring will continue at IRP-5S(a), IRP-6, and the MPA until monitoring results indicate that the RG for TCE in groundwater has been achieved and the FFSRA signatories concur that monitoring and ICs are no longer necessary.

These response actions and their bases are discussed further in the following sections. In addition to these initial responses, the OU-4B ROD calls for Five-Year Reviews to evaluate the protectiveness of the remedies.

3.6.6 Basis for Taking Action

The conceptual site models (CSMs) for each of the OU-4B sites are similar. Primary release sources included the following:

- Drums of chemicals and various fluids at IRP-11 and IRP-13W

- Drainage of fuels, oils, lubricants, and solvents through building floor drains at IRP-5S(a)
- Possible spills, leaks, or unauthorized dumping at IRP-6
- AOCs that stored fuels, oils, and solvents at the MPA

Primary release mechanisms to the environment at all of the OU-4B sites are assumed to have included infiltration and percolation through the unsaturated zone to the groundwater table. No secondary sources or release mechanisms are known to exist. The exposure media and potential exposure pathways for human and ecological receptors were refined in the CSM on the basis of risk assessments.

3.6.6.1 Summary of Human Health Risk Assessment

OU-4B sites, as well as other sites and AOCs at Former MCAS Tustin, were initially investigated during the Expanded Site Inspection (ESI), the RFA, and the RI for OU-1 and OU-2 (see Table 2-1). Soil and groundwater risk at IRP-6 was determined during the ESI. A baseline HHRA was conducted for IRP-5S(a), IRP-11, IRP-13W, and the MPA during the OU-4 shallow groundwater investigation in 2003. These HHRAs performed a dual-calculation of risk based on USEPA and Cal/EPA, and Cal/EPA toxicity values.

A conservative-based hypothetical residential exposure scenario was evaluated during the HHRAs. Per this approach, sites that do not pose a risk under a residential exposure would not pose a risk under other lower exposure frequency and intensity land use scenarios such as industrial or recreational. Exposure conditions used in the estimation of risk were chosen to represent reasonable maximum exposure (RME) conditions. This estimation deliberately overestimates risk using conservative assumptions to provide a margin of safety when making risk management decisions. An example of a conservative exposure assumption is that a person would ingest soil for 350 days per year for 30 years.

The NCP requires the baseline risk assessment to provide risk managers with an understanding of the actual or potential risks to human health and the environment and uncertainties associated with the assessment. The total risk using all the potential exposure pathways represents the total lifetime cancer risk, which includes ingestion of soil; dermal contact with soil; inhalation of particulates released from soil; inhalation of chemical vapors released from soil to indoor air; inhalation of chemical vapors released from groundwater to indoor air during household water use (showering, laundering, dishwashing, etc.); ingestion of groundwater; and dermal contact with groundwater.

The NCP states that, for known or suspected carcinogens, acceptable exposure levels are those that represent an excess upper-bound lifetime cancer risk to an individual of between 1 in 10,000 (10^{-4}) and 1 in 1,000,000 (10^{-6}). The role of the USEPA Office of Solid Waste and Emergency Response (OSWER) Directive (9355.0-30) is to clarify risk management decisions. It points out that the upper boundary of the risk range (1×10^{-4}) is not a discrete line and risk estimates around this value may be considered acceptable on the basis of site-specific conditions. The 10^{-6} value is used as the point of departure for determining remediation goals when Applicable or Relevant and Appropriate Requirements (ARARs) are not available or are not sufficiently protective because of the presence of multiple contaminants at a site or multiple exposure pathways. The maximum acceptable exposure for noncancer risk has been interpreted as one that is equal to the maximum estimated nontoxic exposure level. All HI equal to or less than 1 is acceptable.

Total USEPA lifetime cancer risks for all OU-4B sites exceed the generally acceptable cancer risk range of between 10^{-4} and 10^{-6}:

- IRP-11: 3×10^{-4}
- IRP-13W: 5×10^{-4}
- IRP-5S(a): 1×10^{-3}
- IRP-6: 3×10^{-3}
- MPA: 6×10^{-4}

Noncancer HIs for all six OU-4B sites exceed the threshold value of 1:

- IRP-11: 4
- IRP-13W: 6
- IRP-5S(a): 8
- IRP-6: 71
- MPA: 6.

Medium-specific cancer risks and HIs were considered separately for soil and groundwater at each of the OU-4B sites to evaluate if further action was warranted.

Soil

IRP-11. The total USEPA lifetime cancer risk for soil was estimated at 3×10^{-6}, which is within the NCP generally acceptable range (10^{-6} to 10^{-4}); the noncancer HI was estimated to be 2. The only principal noncancer risk driver in soil is manganese, a naturally occurring mineral in soil; it occurs within background concentrations at the site and is not site-related. On this basis, the Navy and BCT regulatory partners determined that soil at IRP-11 required NFA.

IRP-13W. The total USEPA lifetime cancer risk for soil was estimated at 3×10^{-5}, which is within the NCP generally acceptable range (10^{-6} to 10^{-4}); the noncancer HI was estimated to be 3. The only principal noncancer risk driver in soil is manganese, a naturally occurring mineral in soil; it occurs within background concentrations at the site and is not site-related. On this basis, the Navy and BCT regulatory partners determined that soil at IRP-13W required NFA.

IRP-5S(a). The total USEPA lifetime cancer risk for soil was estimated at 7×10^{-5}, which is within the NCP generally acceptable range (10^{-6} to 10^{-4}); the noncancer HI did not exceed the threshold value of 1. On this basis, the Navy and BCT regulatory partners determined that soil at IRP-5S(a) required NFA.

IRP-6. The total USEPA lifetime cancer risk for soil was estimated at 5×10^{-5}. After subtracting the contribution of metals at their background concentrations, the incremental cancer risk was estimated to be 2×10^{-5}. These estimated risks are within the NCP generally acceptable range (10^{-6} to 10^{-4}). The noncancer HI from exposure to soil was estimated to be 3. Although the HI exceeds the threshold value of 1, the principal risk drivers are manganese and arsenic. Data presented in the ESI indicated that manganese and arsenic are naturally occurring and did not result from site-related activities. On this basis, the Navy and BCT regulatory partners determined that soil at IRP-6 required NFA.

MPA. The total USEPA lifetime cancer risk for soil was estimated at 3×10^{-5}, which is within the NCP generally acceptable range (10^{-6} to 10^{-4}). The noncancer HI from exposure to soil was estimated to be 2. Although the HI exceeds the threshold value of 1, the only principal risk driver is manganese. Data presented in the ESI and RFA Reports indicated that manganese is naturally occurring and did not result from site-related activities. On this basis, the Navy and BCT regulatory partners determined that soil at the MPA required NFA.

Groundwater

The total USEPA lifetime cancer risk for groundwater at all OU-4B sites exceeds the generally acceptable cancer risk range (IRP-11: 3×10^{-4}; IRP-13W: 5×10^{-4}; IRP-5S(a): 1×10^{-3}; IRP-6: 3×10^{-3}; and the MPA: 6×10^{-4}). The groundwater risks are essentially the same as the total risks because the soil risks are at least one order of magnitude lower.

All six OU-4B sites have HIs over the threshold value of 1 (IRP-11: 2; IRP-13W: 3; IRP-5S(a): 8; IRP-6: 68; and the MPA: 4).

Groundwater cancer risk at all the OU-4B sites except IRP-6 is driven by TCE. Groundwater risk at IRP-6 is driven by 1,1-DCE.

On this basis, further action was recommended for groundwater at all six OU-4B sites.

Indoor Air Inhalation Pathway

As part of the FS, the HHRA was updated to exclusively evaluate indoor air inhalation risk under a scenario that assumes no residential consumption of groundwater. Consequently, there would be no pathways associated with inhalation of vapors volatilizing from groundwater during bathing, laundering, etc. under this scenario. This represents a more reasonable approach, given that shallow groundwater at Former MCAS Tustin is of poor quality and yield and is unlikely to be used as a future domestic water supply. Moreover, the selected remedies for all OU-4B sites include ICs, which would prevent exposure to contaminated groundwater.

The indoor air inhalation exposure pathway consists of volatilization of VOCs from both soil and groundwater, followed by vertical migration of the soil vapor from the subsurface through building slab/concrete (especially seams and cracks), and intrusion into the hypothetical future residential building space. Indoor air concentrations were estimated using USEPA's Johnson and Ettinger vapor intrusion model. Risks calculated from the 2004 HHRA were used to evaluate migration from subsurface soil. Maximum concentrations of volatile COPCs in groundwater were used to calculate risks for groundwater.

The total USEPA lifetime cancer risks for soil and groundwater combined for a potential indoor air inhalation pathway assuming no domestic groundwater use are either acceptable (less than 10^{-6}) or within the NCP generally acceptable range (10^{-6} to 10^{-4}) for all OU-4B sites (IRP-11: 3×10^{-6}; IRP-13W: 2×10^{-6}; IRP-5S(a): 4×10^{-6}; IRP-6: 2×10^{-6}; and the MPA: 2×10^{-6}). Estimated noncancer HIs for all six OU-4B sites were well below the threshold value of 1.

These estimated risk values are primarily driven by the use of a provisional USEPA toxicity factor for TCE. Soil gas data (not available) are generally preferred by USEPA for estimating vapor migration, and usually result in lower estimated risks than when groundwater data are used because the groundwater model does not incorporate any factors for attenuation of VOC concentrations in soil during upward migration. USEPA cancer risks for IRP-11 and IRP-13W that exceed 1×10^{-6} are associated with TCE in soil; note that soil data were collected in 1995-1996, and VOC concentrations in soil are expected to be lower than those reported at that time.

3.6.6.2 Ecological Risk Assessment

Field surveys conducted during the RI at OU-1 and OU-2 noted the lack of significant wildlife and the degraded habitat at most of the station, but did identify the potential for ecological receptors at the drainage ditches at IRP-5. On this basis, an ecological risk assessment was conducted during the RI at the three drainage ditches at IRP-5 (IRP-5S(a), IRP-5S(b), and IRP-5N). Contaminant concentrations reported in soil, sediment, and surface water samples collected from the ditches were used in the assessment. Hazard quotients were found to exceed 1 for some chemicals for the mallard duck and least sandpiper. However, given the limited size of the ditches and realistically low potential exposure to avian receptors, it was concluded in the RI that the ditches, including IRP-5S(a), do not appear to pose a significant ecological risk to wildlife. Recent redevelopment at Former MCAS Tustin has included infilling of San Joaquin ditch and its tributary ditches (south ditch and downstream portion of north ditch) in the vicinity of OU-4B sites IRP-5S(a) and IRP-6. Consequently, there is no longer surface water and related habitat at these particular locations. Therefore, no impact to ecological receptors would be expected via this potential pathway.

3.6.6.3 Conclusions

The HHRA and the Navy, in partnership with USEPA, DTSC, and the RWQCB, determined that remedial action is necessary to reduce COCs in groundwater at OU-4B. This determination was made because (1) TCE and 1,1-DCE concentrations in groundwater exceeded MCLs, and (2) HHRA results for groundwater indicated that estimated cancer risks exceeded 10^{-4} at OU-4B sites.

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4 REMEDIAL ACTIONS

This section summarizes the remedial actions for OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B and includes discussions on remedy selection, implementation, operation and maintenance (O&M) and monitoring.

OU-1A and OU-1B were originally grouped together as OU-1 and included the following sites: IRP-3, IRP-12, and IRP-13S. OU-1 was divided into OU-1A and OU-1B in 2001 to accommodate implementation of a TCRA at IRP-13S (designated OU-1A) while work progressed separately on the Risk Assessment (RA) for IRP-3 and IRP-12 (designated OU-1B) (ERRG, 2007).

OU-1A includes the groundwater contaminant plume originating from IRP-13S within the northeastern portion of CO-5. OU-1B includes two separate contaminant plumes originating from IRP-12 (OU-1B North) within CO-5 and IRP-3 (OU-1B South) within CO-6.

The remedy selection process for the response actions at OU-1A, OU-1B North, and OU-1B South was documented in the RODs for OU-1A and OU-1B (Navy, 2004a, 2004b). The selected remedy was the same for all three sites. As a result, their remedies are discussed together in this report.

4.1 OU-1A AND OU-1B

4.1.1 Remedy Selection

The selected remedy for groundwater at OU-1A and OU-1B was hydraulic containment with hot spot mass removal in soil (Navy, 2004a, 2004b). This selection was based on comparative analysis of the CERCLA criteria, the data and analyses in the RI and FS Reports, the administrative record for these sites, and an evaluation of comments submitted by interested parties during the public comment period. The ROD/RAP also documented that no further action was necessary for soil at OU-1A. The major components of the selected remedy for OU-1A and OU-1B include:

- Soil hot spot excavation (OU-1A, OU-1B North, and OU-1B South)
- Two groundwater extraction and treatment systems (OU-1A/OU-1B North, OU-1B South)
- Groundwater monitoring
- ICs

The COCs identified for groundwater at OU-1A are:

- TCE
- 1, 2, 3-TCP

The COCs identified for groundwater at OU-1B North (IRP-12) are (italics denote contaminants at concentrations less than RGs):

- TCE
- *1,2-DCE*

- *1,1,2- TCA*

The COCs identified for groundwater at OU-1B South (IRP-3) are (italics denote contaminants at concentrations less than RGs):

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

On September 28, 2011, USEPA published revised toxicity criteria for TCE. In response, the Navy prepared an addendum to the Final CERCLA Five-Year Review Report (Navy, 2011b) that included a revised VI risk assessment using the new TCE toxicity criteria. Based on the revised risk assessment, the Final Five-Year Review Report Addendum (Navy, 2013a) recommended providing notice of potential VI risk. However, the evaluation was unable to address the uncertainties associated with redevelopment activities or future building parameters/use and potential vapor migration. Because of these uncertainties, VI-specific ICs were established to protect human health and the environment (Navy, 2014a, 2014b, 2014c).

4.1.2 Remedy Implementation

4.1.2.1 Soil Hot Spot Excavation

Soils with TCE concentrations greater than 400 µg/kg were removed from the vadose zone and upper confining layer of the first WBZ at OU-1A, OU-1B North, and OU-1B South and disposed of offsite in 2004 and 2005. The goal of this action was to remove TCE in soil above the groundwater interface that had the potential to act as a continuing source of TCE resulting in groundwater concentrations above site remediation goals. This soil removal was also intended to reduce the time needed to achieve remediation goals or stabilize the groundwater plumes.

OU-1A

The overall excavation dimensions at OU-1A were approximately 140 feet long by 50 feet wide to a depth of 17 feet bgs (1 to 2 feet below the groundwater table). Approximately 4,420 tons of TCE contaminated soil (concentrations exceeding 400 µg/kg) were removed and transported offsite to the Clean Harbors – Buttonwillow disposal facility located in Buttonwillow, California, and disposed of as non-RCRA, California hazardous waste. Approximately 5,200 tons of soil were imported for backfill. Following final excavation activities, all final soil confirmation results at OU-1A were below 400 µg/kg (Shaw Environmental, Inc. [Shaw], 2005). After backfill and compaction activities, the site was restored to near pre-excavation conditions.

Approximately, 228,000 gallons of excavation groundwater from OU-1A were removed and treated through the nearby UST Site 222 PCAP groundwater treatment system, and discharged to the storm drain under the National Pollutant Discharge Elimination System (NPDES) discharge permit for that system (Shaw, 2005).

OU-1B

A total of 3,356 cubic yards of TCE-contaminated soil (concentrations of TCE exceeding 400 µg/kg) were excavated at OU-1B. A total of 684 cubic yards of excavated soil with TCE concentrations greater than or equal to 100 µg/kg were transported as a non-regulated waste

solid to Waste Management Kettleman Hills, in Kettleman City, California, a permitted CERCLA disposal facility. Excavated soil with TCE concentrations less than 100 µg/kg was used to backfill the excavated areas and to restore and grade the final site. This action completed the soil hot spot excavation portion of the OU-1B remedy (ERRG, 2006).

Approximately 157,000 gallons of excavation groundwater from OU-1A were removed and treated at the onsite PCRA and PCAP treatment systems and discharged to the storm drain under the NPDES discharge permit for that system (ERRG, 2006).

4.1.2.2 Groundwater Extraction

Detailed design information on the OU-1A/OU-1B groundwater extraction systems is presented in the combined OU-1A/OU-1B RD (ERRG, 2007). Details of the as-constructed extraction system installations are presented in the combined OU-1A/OU-1B Interim Remedial Action Completion Report (I-RACR) (ERRG, 2008c). Schematic drawings of both OU-1A/OU-1B North and OU-1B South Treatment Plan Layout are presented in the Final Operation and Maintenance Plan (OMP) (ERRG, 2009). Groundwater extraction wells associated with each OU are summarized in the following paragraphs.

OU-1A incorporates two extraction wells (IS72EX08S and IS72EX09S) completed in the first WBZ, five extraction wells (IS72EX01D, IS72EX02D, IS72EX03D, IS72EX05D, and IS72EX07D) completed in both the first and second WBZs, and two extraction wells (IS72EX10D and IS72EX11D) completed in the second WBZ. Wells IS72EX08S, IS72EX01D, and IS72EX10D are hot spot extraction wells and the remaining wells are hydraulic containment extraction wells. Wells IS72EX02D and IS72EX03D were placed on standby in 2011, but were returned to service in 2014. Well IS72EX10D was placed on standby because it has redundancy of capture with other operating wells.

OU-1B North incorporates three extraction wells (I012EW01S, I012EW02S, and I012EW03S) completed in the first WBZ. Well I012EW03S is a hot spot extraction well and the remaining wells are hydraulic containment extraction wells. One additional extraction well (I012EW01D), completed in the second WBZ, has been on standby since 2009 because COC concentrations in groundwater have been consistently below RGs.

OU-1B South incorporates six extraction wells (I003EW01S, I003EW02S, I003EW03S, I003EW04S, I003EW05S, and I003EW06S) completed in the first WBZ and two extraction wells (I003EW02D and I003EW03D) completed in the second WBZ (I003EW04S and I003EW06S were placed on standby on October 15, 2010). Well I003EW03D was placed on standby in 2010, but was returned to service as an optimization measure in 2011. Extraction wells I003EW02S and I003EW03S are used for hot spot extraction and the remaining extraction wells are used for hydraulic containment.

4.1.2.3 Groundwater Treatment

Detailed information on the combined OU-1A and OU-1B North groundwater treatment system, and the separate OU-1B South treatment system, is presented in the OU-1A/OU-1B RD (ERRG, 2007). Details of the as-constructed treatment system installations are presented in the OU-1A/OU-1B I-RACR (ERRG, 2008c).

Extracted groundwater from OU-1A and OU-1B North is conveyed to a single treatment system located at 15650-1/2 Armstrong Avenue (OU-1A/OU-1B North treatment facility). Extracted groundwater from OU-1B South is conveyed to a treatment facility at 15951-1/2 Tustin Ranch Road (OU-1B South treatment facility). Each treatment facility is built on concrete containment

pads and is enclosed within a steel building. Photographs of the treatment system can be found in Appendix D.

At each facility, the subsurface piping conveys the extracted groundwater to a 2,400-gallon polyethylene influent equalization tank prior to treatment. A pressure transducer is installed within each influent equalization tank prior to treatment. A transfer pump routes water from the influent tank through a cartridge filter to separate out any fine sediment or biological material suspended in the water. The water then passes through three 2,000-pound granular activated carbon (GAC) vessels in series before flowing through a totalizing meter and being discharged into the sanitary sewer system.

4.1.2.4 Treated Groundwater Discharge

The OU-1A/OU-1B treatment systems discharge to the Irvine Ranch Water District (IRWD) sanitary sewer laterals, which flow into a main trunk line operated by the Orange County Sanitation District (OCSD). The OU-1A and OU-1B North treated effluent flows through a calibrated totalizing flow meter before discharging to an IRWD sewer lateral under Special Purpose Discharge Permit (SPDP) No. 57-256. The OU-1B South treated effluent flows through a separate calibrated totalizing flow meter to a separate IRWD sewer lateral under SPDP No. 57-270. Documentation that the treated groundwater discharge systems were installed as designed is presented in the I-RACR (ERRG, 2008c).

4.1.2.5 Performance Monitoring

Performance monitoring is used to optimize extraction system operation, track mass removal, verify containment of the OU-1A and OU-1B VOC plumes, and demonstrate successful treatment of the extracted groundwater before discharge. Monitoring includes water-level measurements as well as collection and analysis of samples from wells within and outside the plume areas. Monitoring includes water level measurements and collection and analysis of samples from wells within and outside the plume areas. Groundwater monitoring will continue until the shutdown criteria are met. Process streams within the treatment plant are also monitored to measure treatment efficiency and to demonstrate compliance with the discharge permit.

4.1.2.6 Land Use Controls

ICs are a component of the groundwater remedies documented in the RODs and Revised Draft Final ESDs to the Final ROD/RAP for OU-1A/OU-1B (Navy, 2014a, 2014b). The LUC performance objectives are intended to maintain the integrity of the remedy until remedial action objectives are met. The LUC performance objectives provide the basis for land use restrictions to be incorporated into the following two legal mechanisms provided in the ROD:

(1) Covenant to Restrict Use of Property (CRUP) entered into with DTSC

(2) Restrictive covenants in a Quitclaim Deed from the Navy to the property recipient

The OU-1A and OU-1B RODs specify the following LUC performance objectives:

- Prohibit the installation of new groundwater wells of any type and prevent exposure to VOC-contaminated groundwater without prior review and written approval from the Navy, DTSC, USEPA, and RWQCB until remediation objectives have been achieved.

- Prohibit the installation of any well or other structure that has the potential to affect plume migration.
- Prohibit the alteration, disturbance, or removal of groundwater extraction and monitoring wells and associated piping and equipment (e.g., treatment system) without prior review and written approval from the Navy, DTSC, RWQCB, and USEPA.

Groundwater ICs (in the form of lease restrictions and security measures) are currently in place under a LIFOC (Navy, 2002a) for all parcels within CO-5 and CO-6 (except for Parcels 2 and 18 in CO-5 that are being retained by the Navy). ICs are also incorporated in the CRUP and Quitclaim Deed for the early transfer parcel (portion of IRP-13S).

These ICs are as follows:

- Provisions preserving access to the property for Navy and regulatory personnel to conduct investigations, surveys, sampling, monitoring, and remedial actions.
- Provisions protecting the groundwater extraction and monitoring wells and associated piping and equipment. To prevent lessee personnel from mistaking remediation equipment for utilities infrastructure, all the system pull boxes and vaults are clearly marked as “US Navy Property” with appropriate contact signs.
- As described in the LIFOC, the lessee must complete a Project Environmental Review Form (PERF) for certain work proposed in the leased portion of the property. A PERF is submitted to the Navy for prior approval, and as appropriate to the rest of the BCT for concurrence.
- The treatment system buildings are locked, secured, and alarmed when the sites are not manned.
- The extraction well vault covers and high voltage pull boxes are protected with security locks (specialized locking bolts). Monitoring well caps are tagged and locked.
- No new water wells have been installed within any of the areas containing VOC plumes. No permit applications have been received or any permits issued by the Orange County Health Care Agency (OCHCA) or by IRWD for water supply wells or monitoring wells within CO-5 or CO-6.

The Navy is responsible for implementing, inspecting, reporting and enforcing the LUC objectives in accordance with the LUC RD (ERRG, 2007) and the Revised Draft Final LUC RD Addendum No. 1 (Navy, 2014c). Although the Navy may transfer some of these responsibilities to another party by contract, property transfer agreement, or other means, the Navy retains the ultimate responsibility for remedy integrity. Should any of the LUC objectives fail, the Navy must ensure that appropriate actions are taken to re-establish the protectiveness of the remedy, and may initiate legal action to either compel action by a third party and/or recover costs to the Navy for mitigating any discovered LUC violations. The LUC will be maintained until the concentrations of hazardous substances in groundwater have been reduced to levels that allow for unlimited exposure and unrestricted reuse.

The Navy and DTSC have entered or will enter into CRUPs as provided in the Memorandum of Agreement (MOA) between the Navy and DTSC prior to the transfer of property impacted by remaining groundwater contamination at OU-1A, OU-1B North, and OU-1B South. The CRUP

incorporates land use restrictions identified in the Final LUC RD (ERRG, 2007) and addresses the real property containing the groundwater plumes and associated buffer zones. The CRUP is recorded with the Orange County Recorder and runs with the land, continuing in perpetuity unless modified or terminated in accordance with applicable law.

In response to revised toxicity criteria for TCE the Five-Year Review Addendum (Navy, 2013a), recommended the development of VI ICs is required to protect human health and the environment based on the following:

- To accommodate uncertainty associated with future redevelopment activities (e.g. building reuse and restoration/renovation activities, utility infrastructure, grading, landscaping, heating, ventilation, and air conditioning [HVAC] systems, etc.) and the potential creation of preferential pathways in the subsurface which could exacerbate vapor migration;
- To meet United States Department of Defense (DoD) policy notification requirements; and
- To meet regulatory agency preferences for multiple lines of evidence in addressing potential VI risks.

The inclusion of additional VI ICs is consistent with the LUC RD (Section 3.9 of the Final RD/Remedial Action Work Plan [RAWP] [ERRG, 2007]) and the LIFOC (Navy, 2002a) and LIFOC Modification No. 1 (Navy, 2014d) with the City of Tustin, which addresses indoor air quality requirements and building occupancy restrictions. The following VI LUC objectives are described in the Revised Draft Final ESDs to the Final ROD/RAP for OU-1A/OU-1B (Navy, 2014a, 2014b) and are established to maintain the integrity of the remedial action until remediation is complete and the RGs have been achieved:

- Notice to transferees from the United States Department of the Navy (DON) of the potential for VI to occur within a specified area requiring ICs for VI (VI ARIC). The proposed VI ARICs, shown on Figures 2 and 3, will be finalized in consultation with the FFSRA signatories following the completion of the VI assessment at CO-5 and CO-6.The VI ICs will be documented in the Final LUC RD Amendment No. 1.
- Prohibit occupancy of all enclosed structures within the VI ARIC.

4.1.2.7 Operations and Maintenance

An OMP (ERRG, 2009; ECS, 2015a) was developed that acknowledged the number and location of monitoring wells. Also, the OMP outlined sampling and analysis methods, periods and sampling frequency for each well, decision logic for optimizing the remedy (e.g., adding or removing wells, adjusting extraction well operation, and changing sampling frequency or analytical parameters). The criteria for assessing the effectiveness of the remedial action and for eventual shutdown were included in the OMP Extraction Well Shutdown Criteria.

Remedial Action Objectives (RAOs) include reducing concentrations of VOCs in groundwater to levels consistent with RGs, or until the plumes have stabilized, and preventing VOC migration beyond the current plume boundaries. The Navy is operating hot spot groundwater extraction wells and hydraulic containment wells to meet the RAOs of the selected remedy. The Navy is evaluating groundwater monitoring and system performance data to:

(1) Optimize the performance of the hot spot wells in reducing VOC contaminant mass in the central portion of the plumes and to determine when they may be shut down.

(2) Optimize and verify the performance of the hydraulic containment wells in containing VOCs within their present boundaries and determine when they may be shut down (i.e., when the VOC plumes are stable or shrinking without active remediation).

Groundwater monitoring and system performance data are evaluated by the Navy and are reported to the BCT.

Hot Spot Extraction Wells

An evaluation of hot spot extraction wells is completed periodically to determine whether monitoring data indicate that these wells are no longer removing VOC mass efficiently. In these cases, the wells can be temporarily placed on standby and monitored for rebound in VOC concentrations. After hot spot extraction wells are placed on standby, subsequent monitoring data will be evaluated and reported to the BCT. If monitoring data indicate a significant rebound in VOC concentrations in the hot spot portion of the plumes, the hot spot extraction wells will be restarted. Once asymptotic conditions for VOC mass removal are reached, the hot spot wells will be permanently shut down, subject to BCT concurrence. An "asymptotic condition" is defined as the point where the quantity of VOC mass removed over time has been reduced to a level at which continued reduction of VOCs is considered no longer technologically and/or economically feasible.

Hydraulic Containment Wells

For hydraulic containment system evaluation, the Navy can propose a temporary shutdown of the system if monitoring data indicate that either of the following conditions have been met:

- VOC concentrations in groundwater throughout the OU-1A/OU-1B plumes attain RGs.
- VOC plume boundaries have stabilized or are shrinking.

Well shutdowns are subject to BCT concurrence. The groundwater monitoring program will continue for up to two years following a temporary shutdown. If VOCs in groundwater attain RGs, the system operation may be shut down permanently.

If data from monitoring wells within the boundaries of the plumes indicate that VOC concentrations are rebounding to levels exceeding RGs during a temporary hydraulic containment system shutdown, or that plume boundaries are expanding, the containment system will be restarted.

The Navy may demonstrate through groundwater modeling that the boundaries of the plume are stable or shrinking without active remediation. If so, the Navy can then propose a permanent shutdown of the hydraulic containment system, subject to BCT concurrence. Groundwater monitoring would continue to confirm that VOCs are approaching RGs and that the remedy is still effective.

If the conditions stated above cannot be achieved, the Navy may choose to demonstrate that VOCs in groundwater have been removed to the extent technically and economically feasible by analyzing:

- Whether the total mass removal is approaching asymptotic levels after temporary shutdown periods and appropriate system optimization

- The additional cost of continuing to operate the system at concentrations approaching asymptotic mass levels
- Whether discontinuing the system would significantly prolong the time to achieve RGs for groundwater

4.1.3 Problems Encountered

Operating Properly and Successfully (OPS) was demonstrated in 2010 (ECS, 2010a). The OPS Determination was made by USEPA (USEPA, 2009), and the BCT concurred with OPS (RWQCB, 2010; DTSC, 2010). No problems have been reported to date for the implemented remedy at OU-1A, OU-1B North, and OU-1B South, with the following exceptions:

- Anomalous COC concentrations in first WBZ source area well IS72MW17S in 2015 may be best explained by ongoing drought conditions causing declining groundwater elevations, in turn causing temporary leaching of partially submerged pockets of residual source area contamination. Despite this recent spike in COCs, the Mann-Kendall trend analysis for well IS72MW17S indicates an overall decreasing trend of COCs in the well. Elevated COC concentrations currently present in the well are anticipated to slowly decline as groundwater elevations eventually recover and geochemical equilibrium is restored. COC concentrations in well IS72MW17S will continue to be closely monitored. Results from samples taken after December 2015, the end of the evaluation timeframe for this report, will be included in the Semiannual Groundwater Monitoring Data Summary and the Annual Performance Evaluation Reports.
- TCE concentrations in groundwater at first WBZ well I003MW14S continued to show an increasing trend in 2015 which was concluded to be the result of declining groundwater levels and consequent lowered pump rates at extraction wells I003EW01S and I003EW05S. Installation of an additional extraction well in the vicinity of well I003MW14S was approved in 2015 and will be implemented in 2016. This additional extraction well is expected to arrest the increasing TCE concentrations in I003MW14S.

4.2 OU-3

4.2.1 Remedy Selection

The primary threats at OU-3, including contaminated soil from the burn pits and nonaqueous phase liquid petroleum products, were addressed by previous response actions at the site. These previous response actions included excavation and offsite disposal of contaminated soil in 1983, operation of a groundwater extraction well in 1983, and periodic operation of a French drain system for groundwater extraction from 1989 to 1992. A steel-reinforced concrete containment wall was constructed in 1986 to contain contaminated groundwater. The selected remedy for OU-3 utilizes existing remedy components to contain contaminated groundwater and restrict access to contaminated media (Navy, 2001). The major components of the selected remedy include:

- ICs to prevent future onsite activities that could result in exposures to buried waste, contaminated subsurface soil, or contaminated groundwater
- Land use controls requiring landowner(s) or user(s) to obtain Navy and regulatory agency approval prior to undertaking activities that would impact components of the containment system

- Continued containment of contaminated groundwater through inspection and maintenance of the steel-reinforced concrete containment wall and channel bed, surface cover, and vegetation
- Groundwater and surface water monitoring to track containment migration (if any) and document any changes in groundwater quality
- Landfill gas monitoring to detect potential landfill gas migration from the site
- Maintenance of the integrity and accessibility of the French drain system and associated sumps, monitoring wells, and security features
- CERCLA five-year reviews

4.2.2 Remedy Implementation

The selected remedy was designed to stabilize or decrease COC concentrations and prevent migration of COCs and other chemicals beyond OU-3 boundaries at concentrations exceeding RGs. To evaluate the effectiveness of the selected remedy, specific monitoring, inspection, and reporting programs were adopted at OU-3 (BEI, 2003c; ECS, 2015a). These programs are discussed in the following sections.

4.2.2.1 Monitoring

Landfill gas, surface water, and groundwater are monitored periodically according to an approved Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) contained in the OMP (BEI, 2003c; ECS, 2015a). These monitoring programs are summarized in the following sections.

Landfill Gas Monitoring

Monitoring of three landfill gas probes began in 2000 with three additional landfill gas probes installed later for a total of six probes. The purpose of the landfill gas probes was to enable detection of landfill gases such as methane and carbon dioxide. In addition, landfill gas monitoring provides an indication of the organic material decomposition in the landfill. The probes were located west of, and adjacent to, the landfill area associated with the historical disposal trenches and pits. Landfill gas monitoring was discontinued and the six LFG monitoring probes were properly sealed and destroyed in July 2014 with the concurrence of the BCT, Local Enforcement Agency (LEA), OCHCA, and CalRecycle (ECS, 2015b).

Groundwater Monitoring

The groundwater monitoring program was designed to meet the following objectives (BEI, 2003a):

- Monitor the lateral and vertical extent of the contamination.
- Determine the impact of beneficial uses and the threat to nearby receptors.
- Monitor the rate and direction of horizontal and vertical plume movement.
- Validate and optimize the effectiveness of groundwater remedial measures.
- Initiate long-term performance monitoring to meet the OU-3 ROD monitoring requirements.

- Determine when remedial objectives have been met.

The groundwater monitoring network consists of 11 wells, 6 in the first WBZ (Figure 10) and 5 in the second WBZ (Figure 11). Groundwater elevations for 2015 are shown for the first WBZ and second WBZ in Figures 10 and 11, respectively. The monitoring wells are located upgradient, cross-gradient, downgradient, and within the delineated impacted groundwater areas of the two WBZs.

Surface Water Monitoring

The Long-Term Monitoring (LTM) Plan also includes sampling surface water at four locations within Peters Canyon Channel (1SW03, 1SW04, 1SW06, and 1SW07) (Figure 4). Surface water monitoring is performed to assess whether the remedy is operating properly and successfully and as an added level of protection for potential ecological receptors. Surface water samples are collected in Peters Canyon Channel upstream and downstream of OU-3. Surface water sampling has been conducted concurrently with groundwater sampling. No COCs have been detected in surface water samples (ECS, 2015b).

Engineering Controls

Engineering controls (ECs) at OU-3 are designed to prevent public exposure to buried waste, contaminated subsurface soil, and contaminated groundwater. The ECs at OU-3 were implemented by design and construction of the selected remedy components. These components include a steel-reinforced concrete containment wall, landfill liner, French drain groundwater interceptor system, surface drainage system, and groundwater monitoring wells. Routine inspections and maintenance safeguard the integrity of the remedy components (ECS, 2015b).

Institutional Controls

The current ICs consist of land-use restrictions intended to limit public exposure and protect the containment and monitoring systems, as described in the ROD/RAP (Navy, 2001) and in the Land Use Control Implementation Plan (LUCIP) (OMP, Attachment F [BEI, 2003c]). Annual site inspections are being conducted by the City of Tustin, and ICs are verified by annual field inspections. ICs continue to be implemented in accordance with the LUCIP.

4.2.3 Problems Encountered

The OU-3 remedy continues to be protective of human health and the environment. OPS was demonstrated in 2003 (Pacific Treatment Environmental Services [PTES] and Tetra Tech, 2003), CERCLA Five-Year Reviews (Navy, 2006, 2011b), and Annual LTM Reports (ECS, 2012a, 2013a, 2014a, 2015b). The OPS determination was made by USEPA, and the BCT concurred with OPS in 2004 (USEPA 2004a; DTSC 2004; RWQCB, 2003).

No significant problems have been reported to date for the remedy implementation at OU-3.

4.3 OU-4B LOW CONCENTRATION SITES

4.3.1 Remedy Selection

The selected remedy for OU-4B is documented in the agency-concurred ROD/RAP (Navy, 2010). The selected remedial action for OU-4B addresses VOCs in groundwater in the shallow WBZs. Soil at each of the six OU-4B sites required NFA. The OU-4B low concentration

sites are the OU-4B sites with VOCs in the groundwater at concentrations less than 20 µg/L and generally ranging from 7.4 to 16 µg/L.

The OU-4B low concentration sites are IRP-11 and IRP-13W. The selected remedies for these sites include:

- ICs to prohibit or restrict groundwater use or other activities that could result in unacceptable exposure to VOCs
- Periodic groundwater monitoring is also conducted to ensure the protectiveness of the remedy and to assess whether ICs are still necessary at each of the low concentration sites

4.3.2 Remedy Implementation

The IC component of the remedy for the low concentration sites will follow the Final LUC RD (AIS-TN&A Joint Venture [AIS-TN&A JV], 2012). ICs will remain in place until groundwater concentrations have decreased to at or below the RGs.

The following have been completed and are in progress at IRP-11 and IRP-13W:

- OPS was determined in 2015 (USEPA, 2015)
- Annual IC Compliance Monitoring Reports are ongoing (AIS-TN&A JV, 2013, 2014b; RORE, 2015b, 2016b)

Groundwater monitoring is conducted to document the reduction in the areal and vertical extents of dissolved TCE plumes at IRP-11 and IRP-13W as well as flow directions and gradients. Groundwater sampling results are used to evaluate if the monitoring plan is optimized and to achieve adequate data collection to evaluate TCE concentrations at the sites (RORE, 2016b).

4.3.2.1 Land Use Controls

LUCs, in the form of ICs, are implemented to protect human health by preventing exposure to shallow groundwater containing COCs at concentrations exceeding health-protective levels. ICs will be implemented and maintained until groundwater concentrations are reduced to health protective levels.

The IC objectives were developed and presented in the Final ROD/RAP (Navy, 2010) and are intended to maintain the integrity of the remedy until concentrations of hazardous substances in affected media are at such levels as to allow for unrestricted land use. The IC objectives provide the basis for land use restrictions to be incorporated into the three following legal mechanisms:

(1) CRUPs entered into by the Navy and DTSC

(2) Federal Quitclaim Deeds executed by the Navy and property recipients

(3) Covenants entered into by DTSC and the property owner(s)

IC objectives for the OU-4B low concentration sites are as follows (AIS-TN&A JV, 2012):

- Allow the Navy and its contractors access to site(s) and components of the remedy;

- Ensure no groundwater extraction, use, or exposure or disturbance of the groundwater plume unless approved in writing by the Navy and regulatory agencies;
- Prohibit the alteration, disturbance, or removal of groundwater monitoring and remediation systems (as applicable) without prior written approval from the Navy and regulatory agencies.

Interim ICs apply to the western portion of IRP-13W that is leased to the City under a LIFOC (Navy, 2002a). Final ICs apply to the eastern portion of IRP-13W, which was conveyed as an early transfer pursuant to a Finding of Suitability for Early Transfer (Navy, 2007). The IRP-11 ARIC is contained within CO-5 and is currently not leased. The responsibility for compliance with IC objectives at IRP-11 remains with the Navy (RORE, 2016b).

The site inspections include physical inspections of the properties, completed by traversing each ARIC and noting current conditions to verify compliance with the ICs. The inspections include but are not limited to:

- Noting the presence of new groundwater wells, structures, excavations, construction projects, and parcel use if they have the potential to affect plume migration, interfere with ongoing remediation, or expose groundwater

- Inspecting the presence and condition of existing groundwater monitoring wells

Compliance or non-compliance with the ICs is noted on LUC Compliance Certificates (Appendix B).

4.3.3 Problems Encountered

No significant problems have been reported to date for the remedy implementation at the OU-4B low concentration sites.

4.4 OU-4B MODERATE CONCENTRATION SITES

4.4.1 Remedy Selection

The selected remedy for OU-4B is documented in the agency-concurred ROD/RAP (Navy, 2010). The selected remedial action for OU-4B addresses VOCs in groundwater in the shallow WBZs. Soil at each of the six OU-4B sites required NFA. The OU-4B moderate concentration sites are those OU-4B sites with VOCs in the groundwater at concentrations exceeding 20 µg/L and generally ranging from 23 to 430 µg/L.

The OU-4B moderate concentration sites are IRP-5S(a), IRP-6, and the MPA. The selected remedies for groundwater at these moderate concentration sites include:

- ISB
- MNA
- ICs
- Five Year Reviews

The following RAOs have been established for groundwater at IRP-5S(a), IRP-6, and the MPA:

(1) Protect human health by limiting the use of shallow groundwater containing COCs at concentrations exceeding health protective levels.

(2) Reduce concentrations of COCs in shallow groundwater at areas of attainment for OU-4B sites to health-protective levels.

The remediation goals for TCE and 1,1-DCE in groundwater are 5 µg/L (state and federal MCL) and 6 µg/L (state MCL), respectively.

4.4.2 Remedy Implementation

ISB and MNA are being implemented to reduce COC concentrations in groundwater, as described in the RD/RAWP (AIS-TN&A JV, 2013). Fieldwork to implement ISB was completed in March 2013. The ISB performance and MNA monitoring program is ongoing and conducted per the SAP in the Final RD/RAWP (AIS-TN&A JV, 2013) as updated in the SAP Addendum 01 (RORE, 2015c), and is optimized annually per agency-approved recommendations in final Annual Performance Evaluation Reports (APERs), such as those outlined in the Final Annual Performance Groundwater Monitoring Report (APGMR) (June 2013 through February 2014) (AIS-TN&A JV, 2015c) and the Final APGMR (March 2014 through February 2015) (RORE, 2016a).

The IC component of the remedy for the moderate concentration sites will follow the Final LUC RD (AIS-TN&A JV, 2015a). ICs will remain in place until groundwater concentrations have decreased to at or below the RGs. Progress toward RGs is tracked by comparing COC concentrations at individual monitoring wells with the site-specific predicted degradation trends for COCs originally presented in Appendix B of the Final RD/RAWP (AIS-TN&A JV, 2013) and revised in the APGMRs.

The OU-4B remedy continues to be protective of human health and the environment. For IRP-5S(a), IRP-6, and the MPA:

- OPS was demonstrated in 2015 (AIS-TN&A JV, 2016)

The OPS Report establishing that RA selected to address COCs in groundwater at IRP-5S(a), -6, and the MPA within OU-4B has been implemented and is OPS in accordance with USEPA guidelines.

4.4.2.1 In-Situ Bioremediation

ISB is being used to treat key areas at each OU-4B moderate concentration site, where COC concentrations historically were not decreasing (AIS-TN&A JV, 2015c). ISB is being used to enhance anaerobic dechlorination and reduce in-plume COC concentrations toward RGs. In other plume areas, MNA is being used to track COC concentrations until RGs are met (AIS-TN&A JV, 2013).

Groundwater monitoring is conducted to assess the concentrations of COCs, MNA parameters, and ISB parameters in groundwater and evaluate progress toward achieving the site-specific RAOs. Groundwater monitoring results are used to evaluate optimization measures and determine when concentrations of COCs in groundwater are at or below the RGs so that the sites no longer require ICs (RORE, 2016a).

All wells included in the ISB performance monitoring are also included in the MNA progress monitoring component of the current groundwater monitoring program. Analytical parameters for monitoring of ISB and MNA are presented in the Final OMP (AIS-TN&A JV, 2015b).

4.4.2.2 Monitored Natural Attenuation

MNA refers to the use of groundwater monitoring to confirm the effectiveness of natural attenuation processes to achieve site-specific remedial objectives (USEPA, 2004b). MNA integrates well with ISB, as it continues monitoring of ongoing biodegradation due to natural processes that were stimulated by ISB injections. MNA performance objectives are generally established on the basis of multiple lines of evidence, including:

- Reduction of COC concentrations in groundwater
- Presence of geochemical and biochemical indicators of natural attenuation
- Direct microbiological evidence of potential COC degradation

MNA groundwater monitoring complements the performance monitoring for ISB to track geochemical parameters, reductions in COC concentrations, and plume characteristics to ensure protection of human health and the environment until RGs are achieved (AIS-TN&A JV, 2013). The MNA groundwater monitoring began in June 2013 per the Final RD/RAWP, will continue under the Final OMP (AIS-TN&A JV, 2015b), and will eventually extend into the LTM program.

To provide a more complete understanding of plume dynamics, the MNA portion of the remedy targets zones within the source area or area of highest concentrations, along plume fringes and boundaries, and in upgradient and downgradient areas of the plumes (USEPA, 2004b). Monitoring of these zones allows for tracking of changes in COC concentrations and natural attenuation processes. It will also provide evidence to evaluate when natural attenuation is occurring at the site according to expectations, allow for identification and tracking of the transformation products, and verify that the plume is not expanding (USEPA, 2004b; AIS-TN&A JV, 2013).

Bioremediation processes are being evaluated using groundwater monitoring results for COCs, general chemistry, and MNA parameters. MNA groundwater monitoring analytical parameters are presented in the Final OMP (AIS-TN&A JV, 2015b).

4.4.2.3 Land Use Controls

LUCs, in the form of ICs, are implemented to protect human health by preventing exposure to shallow groundwater containing COCs at concentrations exceeding health-protective levels. ICs will be implemented and maintained until groundwater concentrations are reduced to health protective levels.

The IC objectives were developed and presented in the Final ROD/RAP (Navy, 2010) and are intended to maintain the integrity of the remedy until concentrations of hazardous substances in affected media are at such levels as to allow for unrestricted land use. The IC objectives provide the basis for land use restrictions to be incorporated into the three following legal mechanisms:

(1) CRUPs entered into by the Navy and DTSC

(2) Federal Quitclaim Deeds executed by the Navy and property recipients

(3) Covenants entered into by DTSC and the property owner(s)

IC objectives for the moderate concentration sites (IRP-5S(a), IRP-6, and the MPA) are as follows (AIS-TN&A JV, 2015a):

- Prohibit the installation of new groundwater supply wells and extraction of groundwater unless approved in writing by the Navy and/or regulatory agencies.
- Prohibit the alteration, disturbance, or removal of groundwater monitoring and remediation system components without prior written approval from the Navy and regulatory agencies.
- Allow the Navy and contractors access to site(s) and components of the remedy.

Because additional contamination was discovered after conveyance of property at both IRP-5S(a) and IRP-6, the following sections separately describe ICs for onsite ARICs on property retained by the Navy and for offsite ARICs (Figure 12) on property previously transferred by the Navy.

Institutional Controls for Property Owned by the Navy

The Navy has determined that interim ICs for property owned by the Navy will be proprietary ICs in the form of lease restrictions contained in the LIFOC (Navy, 2002a) for the leased portions of IRP-5S(a), IPR-6, and the MPA. The proprietary controls (lease restrictions) will continue in effect until the leased properties are conveyed with environmental restrictive covenants (final ICs) as provided in the Navy/DTSC MOA (Navy, 2000) and attached covenant models.

CO-9 and CO-2 have been leased to the City of Tustin pursuant to the LIFOC (Navy, 2002a). The majority of the groundwater plume associated with IRP-5S(a) lies beneath land previously transferred by the Navy in May 2002 (Navy, 2002a, 2002c). Most of the groundwater plume associated with IRP-6 lies within CO-2.

The MPA is located primarily on property owned by the Navy (Figure 5). A portion of the MPA has also been leased to the City of Tustin pursuant to a LIFOC (Navy, 2002a). If the Navy leases additional MPA property prior to property transfer, the Navy will include interim restrictions in the lease that are no less restrictive than the land-use restrictions described in the Final ROD/RAP (Navy, 2010) and Final LUC RD (AIS-TN&A JV, 2015a).

The LIFOC includes provisions that guarantee continued access to leased property by the Navy, USEPA, DTSC, the State of California, and their officers, agents, employees, and contractors for purposes consistent with the environmental investigation and cleanup program. As provided in the LIFOC, on the portions of IRP-5S(a) and IRP-6 owned by the Navy as of date of this document, the following land uses and activities are prohibited until IRP-5S(a) and IRP-6 are transferred from the Navy by deed to a new owner:

- The lessee shall not conduct or permit its sublessees to excavate, dig, drill, or otherwise disturb soil or extract, use, or access groundwater beneath the CO areas without obtaining prior approval from the Navy.
- Lessee and sublessees shall not use or access groundwater and shall not disturb or cause to be disturbed monitoring wells and equipment without prior approval from the Navy.

The Navy has determined that it will rely on proprietary controls in the form of environmental restrictive covenants as final ICs as provided in the Navy/DTSC MOA (Navy, 2000) when

property is conveyed. IC objectives will be achieved through land use restrictions incorporated into the following two legal instruments:

(1) Restrictive covenants included in one or more Quitclaim Deeds from the Navy to the property recipient

(2) Restrictive covenants included in one or more CRUPs entered into by the Navy and DTSC as provided in the Navy/DTSC MOA and consistent with the substantive provisions of California Code of Regulations, Title 22, Section 67391.1

The Quitclaim Deed(s) will include the land use restrictions in environmental restrictive covenants that run with the land and will be enforceable by the Navy against future transferees.

The CRUP(s) will incorporate the land use restrictions into environmental restrictive covenants that run with the land and are enforceable by DTSC against future transferees.

The following land use restrictions will apply within the ARICs to ensure that any necessary measures to protect human health and the environment and the integrity of the remedy have been implemented.

The following activities will be prohibited in accordance with the CRUP(s) and Quitclaim Deed(s), unless prior review and written approval is obtained from the FFSRA signatories (Navy and DTSC):

- Installation of new groundwater wells of any type within the ARICs
- Performance of activities that could expose receptors to groundwater within the ARICs
- Use of groundwater for any purpose within the ARICs
- Alteration, disturbance, or removal of any component of the response action, including, but not limited to, groundwater monitoring wells and associated equipment
- Installation of any structure or improvement or conducting any activity that may affect a groundwater contaminant plume. Note: If review by a duly licensed third-party engineer or registered professional, as appropriate, determines that a structure, improvement, or activity will not affect the plume, the Navy and DTSC must be notified prior to conducting these activities by the transferee, but prior review and approval by the Navy and DTSC is not required. In those circumstances where prior review and written approval by the Navy and DTSC is required, the agencies will make a good faith effort to respond within 30 days of receipt of the request for approval, if practicable.
- Construction or operations that interfere with ongoing monitoring or assessment work or the final remedy within the ARICs

The CRUP(s) and Quitclaim Deed(s) will specifically include the restrictions above. They will also specify that DTSC will consult, as appropriate, with USEPA and the RWQCB during its review of proposed land use restriction variances.

The Quitclaim Deed(s) will provide the Navy access in accordance with CERCLA (42 United States Code § 9620(h)(3)(A)(iii)) for response or corrective action found to be necessary on or adjoining the property. The Quitclaim Deed(s) and CRUP(s) will also provide that the FFSRA

signatories and RWQCB and their authorized agents, employees, contractors, and subcontractors will have the right to enter upon OU-4B sites to conduct investigations, tests, or surveys; inspect field activities; or construct, operate, maintain, or undertake any response or remedial action necessary under the cleanup program.

Institutional Controls for Property Previously Transferred by the Navy

This section describes interim ICs that apply to the offsite ARICs of IRP-5S(a) and IRP-6 that were previously transferred by the Navy (Figure 12). The ICs will be governmental controls to prevent groundwater use, via the local well permit program.

The Navy will continue to coordinate with local well permitting agencies to obtain and review copies of any well permit applications and to provide updated environmental information such as updated copies of maps delineating the plumes and offsite ARICs while the ICs are in place. These same local permitting agencies will provide, upon request, an annual statement listing any permit applications received and the disposition of the applications.

For the portions of IRP-5S(a) and IRP-6 that were previously transferred by the Navy, the proposed final ICs will be proprietary land use restrictions to be implemented through a land use covenant recorded by current property owners pursuant to DTSC's regulatory authority. The Navy will also continue to rely upon governmental ICs, specifically the local well permitting program maintained by Orange County Health Care Agency, as additional final ICs. However, the Navy retains the ultimate responsibility for remedy integrity.

For property previously transferred by the Navy, the Quitclaim Deeds (Navy, 2002b, 2002c, 2002d) provide the Navy access in accordance with CERCLA (42 United States Code § 9620(h)(3)(A)(iii)) for response or corrective action found to be necessary on or adjoining the property. The deeds provide the Navy the right to conduct tests, investigations, and surveys, including, where necessary, drilling, test-pitting, boring and other similar activities, and such rights also include the right to construct, operate, maintain, or undertake any other response or corrective action as required or necessary, including, but not limited to, actions involving monitoring wells, pumping wells, treatment facilities, and the installation of associated utilities.

4.4.3 Problems Encountered

No significant problems have been reported to date for the remedy implementation at OU-4B moderate concentration sites.

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5 PROGRESS SINCE LAST REVIEW

5.1 OU-1A, OU-1B NORTH, AND OU-1B SOUTH

The first five-year review for OU-1A, OU-1B North, and OU-1B South was conducted in 2011 (Navy, 2011b). A Five-Year Review Addendum (Navy, 2013a) re-evaluated estimated VI risks at OU-1A and OU-1B South to account for updated toxicity criteria for TCE, published in USEPA's Integrated Risk Information System (IRIS) on September 28, 2011.The following subsections provide a summary of the findings and recommendations from the previous five-year review reports and developments since those reviews were completed.

5.1.1 Previous Five-Year Review Summary

The RAOs established for OU-1A/OU-1B are to:

- Reduce the concentrations of VOCs in groundwater to those consistent with site RGs, or until the plumes have stabilized, and to prevent or limit VOC migration.
- Protect human health by preventing extraction of VOC-impacted shallow groundwater for domestic use until site RGs are achieved.
- Protect potential ecological receptors in Peters Canyon Channel and Barranca Channel along the southern boundary of Former MCAS Tustin by preventing the offstation migration of groundwater that contains VOCs at concentrations exceeding site RGs.
- Implement appropriate Remedial Action (RA), as necessary, to facilitate transfer and reuse of the portions of the Former MCAS Tustin property that are actually or potentially affected by the OU-1A/OU-1B plumes.

The following conclusions and recommendations were reported in the Five-Year Review report (Navy, 2011b) and the Five-Year Review Addendum (Navy, 2013a):

- No follow-up actions were required to ensure the protectiveness of the remedies for sites at OU-1A, OU-1B, however the following recommendations were alternatives for follow-up action that could be considered to address the well vault inundation issue:
    - Constructing a berm to direct concentrated surface runoff falling from the hangar roof away from well vaults.
    - Constructing local berms surrounding each well vault subject to inundation.
    - Extending the heights of the well vaults that are subject to inundation.
    - Installing automated or semi-automated sump pumps in well vaults subject to inundation.
- For OU-1A and OU-1B South, the recommendation was given to provide notice of potential VI risk consistent with the Defense Environmental Restoration Program (DERP) Manual (Navy, 2012a).

- For OU-1A and OU-1B South, the recommendation was given to prepare ROD ESDs to document ICs for potential VI risk for residential and sensitive use scenarios. Sensitive use scenarios, as defined by DTSC, include schools (K-12), day care facilities, hospitals, and college housing. A LUC Remedial Design (RD) Amendment was recommended to be prepared to address and describe IC implementation and associated maintenance actions, including reporting requirements. Both the Revised Draft Final ESDs to the Final ROD/RAP for OU-1A/OU-1B and the Revised Draft Final LUC RD Amendment No. 1 were submitted to the regulatory agencies for review and concurrence. The ARICs for potential VI risk for CO Areas 5 and 6 were to be determined in consultation with the FFSRA signatories and documented in the ROD ESDs.

5.1.2 Progress Since the Previous Five-Year Review

For the well vault inundation issue identified in the last Five-Year Review, the following measures were put in place:

- The City of Tustin placed sand bag berms around the hangar roof line area to ensure that rain water flows away from the I003EW03D and I003EW02D areas. These preventive measures are verified at the start of the rainy season each year.
- Sand bag berms were placed around wells I003EW03D, I003EW02D, and I003EW05S. These berms are maintained each year before the start of the rainy season and sand bag berms have since been installed for the remainder of the extraction wells in OU-1B South.
- The City of Tustin performed grading around the south hangar (Hangar No. 2) so that there was free board around the Navy extraction wells and rain water can flow away from the extraction well vaults.
- Sump pumps are installed during rainy events in the extraction wells I003EW03D and I003EW02D vaults as they tend to flood during heavy rain storms. Any rain water that enters the vault is immediately pumped out.

Based on USEPA revised toxicity criteria for TCE published on September 28, 2011, the Navy-prepared a Five-Year Review Report Addendum, which included a revised VI risk evaluation using the new TCE toxicity criteria. This evaluation used methodology approved by the DTSC and recommended providing notice of potential VI risk to transferees and preparation of a ROD ESD to document additional ICs that address potential VI risk. The ROD ESD evaluation estimated incremental cancer and noncancer risks for residential and industrial use scenarios using current site-specific and default input parameters, but was unable to address the uncertainties associated with redevelopment activities, future building parameters/use, and potential vapor migration. Because of these uncertainties, the VI ICs were established conservatively to protect human health and the environment.

The proposed VI ICs (discussed in Section 4.1.2.6) will be applied to the VI ARIC to ensure protection of human health and the environment until the RGs for groundwater are achieved; ultimately allowing for unrestricted use. VI ARICs for OU-1A and OU-1B North are shown in

Figure 2 and VI ARICs for OU-1B South are shown in Figure 3. VI ICs are required to protect human health and the environment based on the following:

- To accommodate uncertainty associated with future redevelopment activities (e.g., building reuse and restoration/renovation activities, utility infrastructure, grading, landscaping, HVAC systems, etc.) and the potential creation of preferential pathways in the subsurface which could exacerbate vapor migration.
- To meet DoD policy notification requirements.
- To meet regulatory agency preferences for multiple lines of evidence in addressing potential VI risks.

The proposed VI ICs are stipulated in the Revised Draft Final LUC RD Amendment No. 1 (Navy, 2014c). When detailing LUC RD Section 3.9.4 modifications, Amendment No. 1 states that "The transferee shall not occupy new or existing enclosed structures within the VI ARIC(s), with exception of Building 29 hangar bay unless and until:

- The transferee or prospective landowner/developer conducts, at its sole cost and expense, an evaluation of potential VI risk in conformance with the Navy and/or DTSC guidelines and requirements that demonstrates to the satisfaction of the Navy and DTSC that potential VI risk (including risks of vapor migration within the VI ARIC) is acceptable without the need for mitigation measures; or
- The transferee or prospective landowner/developer demonstrates, at its sole cost and expense, that a reduction in potential VI risk to acceptable levels is achievable through mitigation measures that meet the requirements of the Navy and DTSC for each project within the VI ARIC property; the transferee receives approval by the Navy and DTSC prior to construction of the mitigation measures; and the transferee provides documentation that the mitigation measures were properly constructed and is operating as designed prior to occupancy. Mitigation measures shall also include monitoring as required by the Navy and DTSC."

The LUC RD contained in Section 3.9 of the Final RD/RAWP for OU-1A/OU-1B (ERRG, 2007) is being amended in the Revised Draft Final LUC RD Amendment No. 1 (Navy, 2014c) to include provisions for ICs to address potential VI from VOC-impacted groundwater to indoor air for occupied structures. The Navy is working with regulatory agencies to conduct a VI assessment in CO Areas 5 and 6 that will assist in the completion of the Revised Draft Final ESDs and Revised Draft Final LUC RD Amendment No. 1.

5.2 OU-3

The second five-year review for OU-3 was conducted in 2011 (Navy, 2011b). The following sections provide a summary of the findings and recommendations from the second five-year review report and developments since that review was completed.

5.2.1 Second Five-Year Review Summary

The RAOs for OU-3 are to:

- Control or eliminate the discharge of contaminated groundwater into Peters Canyon Channel that potentially impacts human health or the environment, and preserve existing high-quality surface water.

- Prevent or mitigate the downward migration of contamination into deeper groundwater zones to preserve existing high-quality groundwater.
- Prevent or minimize exposures to onsite groundwater, buried wastes, and subsurface soils that have contamination above health-based levels.
- Implement appropriate remedial actions as necessary to facilitate rapid transfer and reuse of the OU-3 property.

The following conclusions were reported in the second Five-Year Review Report (Navy, 2011b):

- The steel-reinforced concrete containment wall was in good condition, but the condition of the adjoining older wall at the north shows moderate concrete deterioration. Regular O&M inspections should include surveillance of the northern end of the containment wall to confirm that the deterioration of the adjoining older wall does not affect the integrity of the containment wall over time.
- The discrepancy in the depiction of the containment wall as including a short section of the older pre-existing wall in site documents, including the RI and FS Reports, the ROD, and the OMP, should be corrected as a "non-significant" or "minor" post-ROD change by documenting it in a memorandum to the file as prescribed in the USEPA ROD Guidance (USEPA, 2011).

The following recommendation addressed the LFG monitoring probes that are no longer needed:

- Monitoring should be discontinued and the probes should be properly sealed and destroyed in accordance with the State of California Well Standard Bulletins 74-81 and 74-90.

5.2.2 Progress since the Second Five-Year Review

The following progress occurred at OU-3 since the second five-year review:

- Groundwater and surface water monitoring have continued.
- Surface water contaminants have not been reported since the last review.
- O&M has continued.
- Inspection, maintenance, and monitoring of ICs have continued.
- LFG monitoring was discontinued and the LFG probes were properly sealed and destroyed in July 2014 with the concurrence of the BCT, LEA, OCHCA, and CalRecycle (ECS, 2015b).

The bulleted items above have been documented in Annual Long-term Monitoring Reports (ECS, 2012a, 2013a, 2014a, 2015b; Multimedia Environmental Compliance Group [MMEC Group], 2016a).

5.3 OU-4B LOW CONCENTRATION SITES

The protectiveness for OU-4B low concentration sites was acknowledged but not completed in the Final CERCLA Five-Year Review Report (Navy, 2011b). As a result, a Five-Year Review Addendum (Navy, 2013a) presented technical assessments, issues, recommendations, and protectiveness determinations for the three low concentration sites at OU-4B (IRP-11, IRP-13W, and MMS-04).

5.3.1 First Five-Year Review Summary

The RAOs for OU-4B are to:

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

5.3.2 Progress since the First Five-Year Review

Since the Five-Year Review Addendum, MMS-04 has been closed NFA (AIS-TN&A JV, 2011). In accordance with the IRP-11 and IRP-13W LUC RD (AIS-TN&A JV, 2012), the annual IC inspections (AIS-TN&A JV, 2014b; RORE, 2015b, 2016a) have reported the following:

- Groundwater monitoring
- O&M
- Inspection, maintenance, and monitoring of ICs

No issues have been identified for IRP-11 and IRP-13W that currently or in the future would prevent the respective remedies at these sites from being protective of human health and/or the environment; therefore, no follow-up actions are required to ensure protectiveness of the remedies for these sites.

5.4 OU-4B MODERATE CONCENTRATION SITES

This is the first Five-Year Review for OU-4B moderate concentration sites.

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6 FIVE-YEAR REVIEW PROCESS

This section discusses the activities performed during the five-year review process for OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B. The Navy conducted five-year reviews at these sites in accordance with the following guidance documents:

- Comprehensive Five-Year Review Guidance (USEPA, 2001)
- Department of Navy Policy for Conducting Five-Year Reviews Under Installation Restoration Program (Navy, 2011a).

The five-year review process at each of the sites addressed in this report consisted of the following:

- Administrative components
- Community notification and involvement
- Data reviews
- Document reviews
- Interviews
- Site inspections
- Protectiveness determinations

6.1 ADMINISTRATIVE COMPONENTS

The Navy is the lead agency for this five-year review. The five-year review team is led by Mr. Alejandro Bollweg, the Navy's Remedial Project Manager (RPM), and Mr. James Sullivan, Licensed Professional Engineer (PE), the BRAC Environmental Coordinator (BEC). Other members of the five-year review include personnel from MMEC Group. This five-year review report was prepared by the MMEC Group, a joint venture consisting of KMEA, Inc. and Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler), for the Navy BRAC Program Management Office (PMO), PMO, West. The work was authorized by the Navy under Contract No. N62473-12-D-2012, Task Order 0087.

During November 2015, the five-year review team established the review schedule for each of the sites addressed in this report. The schedule for the five-year review of OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B includes issuance of the Draft Five-Year Review Report for comment on May 6, 2016, and submittal of the Final Five-Year Review Report on October 31, 2016.

6.2 COMMUNITY NOTIFICATION AND INVOLVEMENT

In 1994, the Restoration Advisory Board (RAB) was established to provide interested parties from local communities a channel for participation in the environmental restoration process at Former MCAS Tustin. Since 1994, there have been 101 RAB meetings. These RAB meetings occur on a routine basis and are scheduled in the evenings after normal working hours (7:00 to 8:30 p.m.) at the Tustin Senior Center. RAB meetings are open to the public and include representatives from the Navy, City of Tustin, regulatory agencies, and other interested parties. By sharing information from the regular meetings with the groups they represent, RAB members

help increase awareness of the installation restoration program process. Furthermore, members of the public can contact RAB members to obtain information or to express concerns to be discussed at subsequent meetings.

A Public Notice was posted on the BRAC PMO webpage informing the community that the five-year process has started (Appendix F). Following completion of the five-year review, the Five-Year Review Report, including community input, will be placed in the information repository. A summary of the Five-Year Review Report will be made available to stakeholders. This summary will include descriptions of remedial actions at OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B; the results of the five-year review; and an assessment of whether the remedies at the sites are protective of human health and the environment, or will be protective upon completion of the remedial actions. The summary will also provide the location of the information repository where the complete copy of the Five-Year Review Report can be obtained, and will provide the date of the next five-year review.

In support of the Five-Year Review, a RAB meeting on March 24, 2016, focused on the Five-Year Review process and a RAB member Site Tour was conducted on April 14, 2016.

6.3 DOCUMENT REVIEW

As part of the five-year review process, documents were reviewed for OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B to gather relevant information and data to be used as the basis for a performance assessment of the remedies implemented at OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B. The following types of documents were reviewed:

- Documents containing the basis for the response actions, including remedy decision documents, such as RODs, Remedial Investigation/Feasibility Study (RI/FS) reports, toxicological and chemical characteristics databases, and federal and state regulatory requirements identified as ARARs in the remedy decision documents.
- Documents containing information about design and implementation of the remedy, such as RD/RAWPs and I-RACRs.
- Documents containing monitoring data and information that can be used to assess whether the remedial action continues to operate and function as designed. These documents include routine monitoring reports and the OPS Report for OU-1A/OU-1B, and for OU-4B.

Documents cited in this report are listed in Section 11. A separate document review list organized by site for each OU is presented in Appendix A.

6.4 DATA REVIEW

6.4.1 OU-1A, OU-1B North, and OU-1B South

Data for OU-1A, OU-1B North, and OU-1B South were reviewed as a group because the remedies for these sites are identical and address groundwater as the only medium. The RD and OMP for the three sites are common documents (ERRG 2007, 2009). Data generated by operation and monitoring of the remedies are reported in quarterly data summary reports and annual Performance Evaluation Reports (PERs) (ECS, 2012b, 2013b, 2014b, 2015b). The LUC RD for the three sites is presented in the RD; therefore, the data review concerning compliance with the LUC RD for the three sites is also discussed for the sites as a group.

6.4.1.1 Conceptual Site Model

The data review for OU-1A, OU-1B North, and OU-1B South showed that the current conceptual site model is protective as intended in the RODs (Navy, 2004a, 2004b).

6.4.1.2 Groundwater Level Data

Water level data have been obtained in site monitoring wells dating back to the RI, and are routinely obtained as part of the ongoing long-term groundwater monitoring program. Results have been published in quarterly data summary reports and in annual PERs (ECS, 2012b, 2013b, 2014b, 2015c, MMEC Group, 2016b). Reviews of these data indicate that the first and second WBZs experience seasonal fluctuations, with the third WBZ experiencing water level fluctuations to a lesser extent.

Groundwater levels at OU-1A/1B North and OU-1B South were measured during the 2015 semiannual (June 2015) and annual (November 2015) sampling events. Groundwater levels are measured semiannually at all wells in OU-1A and OU-1 B North and South. Groundwater levels and contours for OU-1A/1B North are shown in Figures 13, 14, and 15 for the first, second, and third WBZs, respectively. Groundwater levels and contours for OU-1B South are shown in Figures 16 and 17 for the first and second WBZs, respectively. Groundwater elevations from extraction wells were not used to create contour lines.

Based on an evaluation of water level elevations, the following observations were made:

- In general, groundwater levels have been in a long-term declining trend as a result of ongoing drought.
- The dominant flow direction in the first and second WBZs within OU-1A is southwest (Figures 13 and 14), with deviations toward extraction wells. The dominant flow direction in the third WBZ within OU-1A is also southwest (Figure 15).
- The dominant flow direction in the first WBZ within OU-1B North is toward the south, with deviations toward extraction wells (Figure 13). Based on limited groundwater elevation data from the second WBZ, flow direction in the second WBZ at OU-1B North appears to be toward the southwest (Figure 14).
- The dominant flow direction in the first and second WBZs within OU-1B South is generally south, with deviations toward extraction wells (Figures 16 and 17). Groundwater flow at OU-1B South has been significantly affected by groundwater extraction from the extraction wells in both the first and second WBZs.

6.4.1.3 Hydraulic Containment and Hot Spot Mass Removal

The term “hot spot” is defined in the RD/RAWP as the portion of a plume in which COC concentrations exceed the geometric mean plus two standard deviations. This statistical hot spot is determined using groundwater COC concentrations in all monitoring wells within the plume boundaries in the most recent quarter (ERRG, 2007). Based on the 2015 annual sampling event data presented in the PER (MMEC Group, 2016b), the statistical hot spot criteria were as follows:

HOT SPOT STATISTICS

Plume Area	1,2,3-TCP			TCE		
	Geometric Mean	Standard Deviation	Hot Spot Concentration	Geometric Mean	Standard Deviation	Hot Spot Concentration
OU-1A – 1st WBZ	7.07	15.82	38.72	Not applicable – only one well exceeds RG		
OU-1A – 2nd WBZ	12.45	10.13	32.70	5.66	0.99	7.64
OU-1B North – 1st WBZ	--	--	--	15.23	23.58	62.40
OU-1B North – 2nd WBZ	--	--	--	--	--	--
OU-1B South – 1st WBZ	--	--	--	317.82	1008.10	2334.03
OU-1B South – 2nd WBZ	--	--	--	60.50	858.48	1777.45

Notes:

Hot spots calculated using 2015 annual sampling event analytical data from monitoring wells.

-- = Compound is not a COC for the OU.

All results are presented in µg/L.

In the 2015 annual sampling event, statistical hot spots were identified in the following groundwater contaminant plumes:

- OU-1A second WBZ

In the 2015 annual sampling event, COC concentrations did not exceed concentrations identifying hot spots in the following groundwater contaminant plumes:

- OU-1A first WBZ
- OU-1B North first WBZ
- OU-1B South first WBZ
- OU-1B South second WBZ

It should be noted that the existence or absence of statistically determined hot spots depends upon the overall distribution of contaminant concentrations within a plume; however, the continued statistical absence of a hot spot is a general indication that contaminant concentrations are declining within the former hot spot area.

At OU-1A, no hot spot has been present in the first WBZ since 2010. In the second WBZ, a statistical hot spot disappeared in 2011 and then re-appeared in the 2013 annual sampling event. The statistical hot spot in the second WBZ was again present in 2015. This is concluded to be a result of the calculation being performed on fewer wells rather than due to increasing COC concentrations, since concentrations are actually decreasing, albeit at different rates.

At OU-1B North, there has been no statistical hot spot since 2012.

At OU-1B South, a statistical hot spot has been present in the first WBZ every year since system start-up, but there was no statistical hot spot in the first WBZ for the first time in 2015. This is interpreted to be due to the effects of on-going remediation. There has been no statistical hot spot in the second WBZ since 2010.

6.4.1.4 Groundwater Treatment System Performance Data

OU-1A, OU-1B North, and OU-1B South utilize two separate groundwater treatment systems. Extracted groundwater from OU-1A and OU-1B North is combined and treated in a common treatment system because of the proximity of these sites. Extracted groundwater from OU-1B South is treated by a separate dedicated system because of its distance from the other two sites.

Groundwater treatment system performance data are routinely collected as a part of O&M. These data include VOC concentrations in system influent and effluent, as well as VOC concentrations among individual GAC vessels in the treatment process. Other system parameters that are routinely measured include flow rates and fluid pressures at various points in the system. These data are used to optimize the efficiency of the systems, and to schedule replacement of spent GAC. The data have been reported in the annual PERs.

Also reported in the 2015 PER were increasing TCE concentrations at well I003MW14S, suggesting that plume capture may be locally compromised by the existence of a preferred lithologic pathway resulting from natural heterogeneity of the site lithology near the leading edge of the groundwater TCE plume. Because of this, the installation of an additional extraction well (I003EW07S) was approved in 2015 and installed in February 2016 in the vicinity of monitoring well I003MW14S to increase the capture of TCE in groundwater at this area.

Treatment system performance data were reviewed for both systems. The review indicates that both treatment systems operated as designed during the review period, and that routine maintenance, repairs, and modifications, as noted above, have been conducted as necessary during the review period.

6.4.1.5 Treated Groundwater Discharge Data

Each treatment system discharges through a separate flow totalizing meter to separate IRWD sanitary sewers that discharge into the OCSD regional sewer system.

Treated discharge data include chemical concentration data and flow rate data that are required for comparison with discharge limits in the following SPDPs:

- SPDP No. 57-256 – OU-1A/OU-1B North treatment system
- SPDP No. 57-270 – OU-1B South treatment system

Review of these data indicates that there have been no exceedances of the discharge limits.

There were no instances of non-compliance with OCSD discharge limits for total toxic organics (TTOs) during 2014 or 2015 for the OU-1A/-1B treatment systems.

6.4.1.6 IC Compliance Data

Monitoring for compliance with ICs has been conducted annually at OU-1A, OU-1B North, and OU-1B South (CO-5 and CO-6) in accordance with the LUC RD (ERRG, 2007) and OMP (ERRG, 2009). The evaluation of compliance with the ICs based on this monitoring is presented in the sections below.

The groundwater ARICs at OU-1A and OU-1B North are shown in Figure 2, and the groundwater ARICs at OU-1B South are shown on Figure 3. The data review conducted as part of this five-year review indicated that site inspection checklists have been completed during the review period for the three sites in accordance with the requirements of the LUC RD (ERRG,

2007) and OMP (ERRG, 2009). These inspection checklists are maintained at the O&M contractor's offices and included as Appendices in the PERs. A review of completed checklists indicates that no activities were conducted that are inconsistent with the land use restrictions documented in the LUC RD and OMP. The data also indicate that routine maintenance and repairs have been conducted as necessary during the review period.

A residential development known as Columbus Square was constructed in 2005 within a portion of OU-1A (Early Transfer Parcel 24-1B). In accordance with the LUC RD, LUC Compliance Certificates have been completed by the Columbus Square Homeowners Association on an annual basis since that time. These documents were reviewed and indicated that there were no LUC violations recorded during this five year period.

The proposed vapor intrusion ARICs at OU-1A and OU-1B are shown on Figures 2 and 3 (Navy, 2014c). The Navy is working with the regulatory agencies to conduct a VI assessment in Carve Out (CO) Areas 5 and 6 that will assist in the completion of the Revised Draft Final ESDs to the Final ROD/RAP and Revised Draft Final LUC RD Amendment No. 1. The final VI ICs, ARICS, and implementation and maintenance thereof will be presented in the Final ESDs to the Final ROD/RAP and Final LUC RD Amendment No. 1, as appropriate.

Copies of all LUC Compliance Certificates are provided in Appendix B.

6.4.2 OU-3

6.4.2.1 Conceptual Site Model

The data review for OU-3 showed that the current conceptual site model is protective as intended in the RODs (Navy, 2001).

6.4.2.2 Inspections

Engineering and institutional controls at OU-3 are inspected, maintained, and documented to ensure the integrity of the remedy components and compliance with the LUCIP (BEI, 2003c). The effectiveness of these controls was verified through quarterly field inspections. The inspections and the monitoring of the ECs and ICs have prevented public exposure to buried waste, contaminated subsurface soil, and contaminated groundwater. Inspections of the ECs and ICs conducted at OU-3 in 2011, 2012, 2013, and 2014 have verified that the remedy remains effective (ECS, 2012a, 2013a, 2014a, 2015b).

6.4.2.3 LFG Data

Annual landfill gas monitoring was conducted in 2011, 2012, 2013, and 2014. Methane gas was not detected during any of the landfill gas monitoring events. The 2013 Annual PER (ECS, 2014b) recommended termination of landfill gas monitoring and proper sealing and destruction of the six landfill gas probes. The BCT, LEA, OCHCA, and CalRecycle concurred with this recommendation and the six landfill gas probes (I001LFG1, -2, -3, and I001LFS1, -2, and -3) were sealed and destroyed in accordance with the OCHCA Permit dated July 24, 2014 (ECS, 2015b).

6.4.2.4 Surface Water Concentration Data

During the five-year review period, surface water samples were collected during the 2011 and 2015 annual monitoring events from four locations within Peters Canyon Channel (Figure 22). The surface water samples were analyzed for VOCs using USEPA Method 8260B. No VOCs were reported in any of the surface water samples collected during 2011, with the exception of acetone, which was reported at estimated concentrations of 5.5J µg/L (ISW03), 5.3J µg/L (ISW04), and 5.5J µg/L (ISW07). No acetone was reported in OU-3 monitoring wells and is a common laboratory contaminant. No VOCs were reported in any of the surface water samples collected during 2015, with the exception of chloroform and toluene. Chloroform was reported at estimated concentrations of 0.15J µg/L (ISW03), 0.17J µg/L (ISW04), and 0.13J µg/L (ISW07) Toluene was reported at estimated concentrations of 0.31J µg/L (ISW03), 0.21J µg/L (ISW04), 0.12J µg/L (ISW06), and 0.12J µg/L (ISW07). This, and the similarity of the results from widely separate surface water sampling locations, suggests that the reported results are not site-related. Historically, no OU-3 COCs have been reported at surface water sampling locations since the inception of routine monitoring in 1997 (ECS, 2012a).

6.4.2.5 Groundwater Level Data

In 2011, the frequency of groundwater and surface water monitoring was decreased to every five years, in support of Five-Year Reviews. Contoured groundwater elevations based on water level data obtained during the 2015 groundwater monitoring event for the first and second WBZs are provided on Figures 10 and 11, respectively. Water level data from 2015 is summarized as follows (MMEC Group, 2016a):

Parameter	First WBZ	Second WBZ
Depth to Water (feet below top of casing)	13.02–20.05	11.56–19.84
Water Level Elevation	36.53–40.54	37.81–40.29
Horizontal Hydraulic Gradient	Variable (0.011–0.029)	0.024
General Groundwater Flow Direction	Variable (northeast to southeast)	Southeast

6.4.2.6 Groundwater Concentration Data

In 2011, the frequency of groundwater and surface water monitoring was decreased to every five years, in support of Five-Year Reviews. During this five year-year review period, groundwater samples were collected during 2011 and 2015. Results for each sampling event are discussed in Sections 6.4.2.7and 6.4.2.8.

6.4.2.7 Groundwater Monitoring Event, 2011

Groundwater samples were collected from 11 wells at OU-3 in 2011. Four monitoring wells in the first WBZ were sampled and analyzed for VOCs: I001BC49S, I001BC50S, I001MW52S, and I001MW53S (Figure 22). Per the OMP, well I001BC50S was also analyzed for TPH. VOCs were reported in groundwater samples from only one of the four monitoring wells (I001BC50S) sampled in the first WBZ during 2011. Of these VOCs, only 1,1-DCA and benzene concentrations exceeded their respective RGs of 5 µg/L and 1 µg/L.

During the 2011 annual monitoring event, only the groundwater samples obtained from I001BC50S were analyzed for TPH by USEPA Modified Method 8015M per the OMP. TPH-g as

gasoline-range organics was not reported in this sample; TPH-d as diesel range organics was reported at a concentration of 190 µg/L.

Three monitoring wells (I00IMW50D, I00IMW53D, and I00IMW52D) were sampled and analyzed for VOCs and TPH (Figures 23). No VOCs or TPH were detected above the RGs in the second WBZ during the 2011 annual monitoring event. Various metals were reported in all wells in the first WBZ during the 2011 annual monitoring event (Figures 24 and 25). In 2011, in the first WBZ, cadmium was reported at an estimated concentration of 5.33J µg/L in well I001MW52S, essentially equal to the RG of 5 µg/L. No other metals were reported at concentrations that exceeded their respective RGs.

6.4.2.8 Groundwater Monitoring Event, 2015

During the 2015 monitoring activities, groundwater samples were collected from eight wells at the site. During the 2015 monitoring event, two wells in the first WBZ were sampled and analyzed for VOCs: I001BC50S and I001MW52S (Figure 22). Per the OMP, well I001BC50S and well I001BC50D were also analyzed for TPH.

VOCs were reported in only well I001BC50S in the first WBZ during the 2015 monitoring event. The reported VOCs include:

VOC	Concentration
1,1-DCA	45 µg/L
cis-1,2-DCE	0.81 µg/L
VC	0.75 µg/L

Concentrations of 1,1-DCA and VC exceeded their respective RGs of 5 µg/L and 0.5 µg/L, respectively.

During the 2015 monitoring event, only the groundwater samples obtained from well I001BC50S and well I001BC50D were analyzed for TPH by USEPA Modified Method 8015M per the OMP. Only TPH-g as gasoline-range organics was reported at 92 µg/L in well I001BC50S.

Three monitoring wells (I00IMW50D, I00IMW53D, and I00MW52D) were sampled and analyzed for VOCs. Well I00IMW50D was also sampled for TPH (Figure 23). No VOCs or TPH were detected above the RGs in the second WBZ during the 2015 annual monitoring event. In 2015, no metals were reported at concentrations exceeding their respective RGs. The distribution of metals in first WBZ groundwater during the 2011 and 2015 monitoring events are presented on Figure 25. The distribution of metals in the second WBZ during the 2011 and 2015 annual monitoring events is presented on Figure 24.

Groundwater samples were analyzed for general chemistry parameters during the 2011 and 2015 annual monitoring events. General chemistry parameters for the first and second WBZs are presented on Figures 25 and 24, respectively. The general water quality results indicate that groundwater in both WBZs ranges from brackish to saline. TDS concentrations exceeding 1,000 mg/L indicate brackish conditions, and concentrations exceeding 10,000 mg/L generally indicate saline conditions (Todd, 1980).

In general, the water quality in the first WBZ is poorer than in the underlying second WBZ. Chloride, sulfate, sodium, potassium, and magnesium have substantially higher concentrations in the first WBZ than in the second WBZ.

During the 2015 monitoring event, monitoring wells I001BC43S and I001MW52S had the highest reported concentrations of TDS (8,400 mg/L and 21,000 mg/L, respectively). However, historical data indicate that the highest concentrations of TDS were consistently reported in monitoring wells I001BC49S, I001BC50S, and I001MW52S. These wells are located along the containment wall and downgradient from the source location.

In summary, the following conclusions can be made:

- The OU-3 remedy continues to be protective of human health and the environment.
- The EC components of the remedy are in good condition and functioning as intended.
- LUCs or other ICs specified in the Land Use Control Implementation and Compliance Plan (LUCICP) (Appendix F of the OMP [BNI, 2003c]) are in compliance.
- All RAOs continue to be achieved.

6.4.3 OU-4B Low Concentration Sites

6.4.3.1 Conceptual Site Model

The data review showed that the current conceptual site model is protective as intended in the ROD (Navy, 2010).

6.4.3.2 Groundwater Elevation and Flow Data

Groundwater levels are measured annually at IRP-11 and IRP-13W. Groundwater depths were approximately 13 to 19 feet bgs in September 2015 (RORE, 2016b). Groundwater flow was to the south under an approximate horizontal gradient of 0.00123 foot/foot at IRP-11 and south-southwest under an approximate horizontal gradient of 0.00259 foot/foot at IRP-13W (RORE, 2016b). Despite the approximate 2-foot drop in groundwater elevations since 2014 (Figures 29 and 30), flow directions and gradients were generally consistent with previous results (RORE, 2016b).

6.4.3.3 Groundwater Concentration Data

Groundwater monitoring occurs at an annual frequency in accordance with the LUC RD and LTM/OMP (AIS-TN&A JV, 2012) and Addendum 01 to the LUC RD and LTM/OMP (RORE, 2015d). Concentrations of TCE in groundwater at IRP-11 have decreased from 15 µg/L in 1996 (Navy, 2010) to 11 µg/L at well I0MW01S in 2015 (RORE, 2016b) and at IRP-13W have decreased from 25 µg/L in 1996 (Navy, 2010) to 7 µg/L at well I0WMW04S in 2015 (RORE, 2016b).

Groundwater analytical results for both IRP-11 and IRP-13W indicate the areal extents (Figure 26 and Figure 27, respectively) of groundwater impacted by TCE at concentrations exceeding the RG (RORE, 2016b).

Trend analyses using the Mann-Kendall test indicated stable trends for TCE concentrations at monitoring wells I011MW02S, I013WMW03S, and I013WMW04S. I013WMW02S has a probable decreasing trend. Although an increasing trend in TCE concentrations was indicated for monitoring well I011MW01S, the last three data points suggest recent concentrations are more stable at approximately twice the RG (RORE, 2016b).

6.4.3.4 IC Compliance Data

IC inspections were completed by the Navy, the City of Tustin, and the Columbus Square Community Association (Appendix B).

The site inspections include physical inspections of the properties, completed by traversing each ARIC and noting current conditions to verify compliance with the ICs. IC inspections included reporting the following IC components:

- Noting the presence of new groundwater wells, structures, excavations, construction projects, and parcel use if they have the potential to affect plume migration, interfere with ongoing remediation, or expose groundwater
- Inspecting the presence and condition of existing groundwater monitoring wells

No noncompliance issues were noted (AIS-TN&A JV, 2014b; RORE, 2015b, 2016b).

6.4.4 OU-4B Moderate Concentration Sites

6.4.4.1 Conceptual Site Model

The data review showed that the current conceptual site model is protective as intended in the ROD (Navy, 2010).

6.4.4.2 Groundwater Elevation and Flow Data

Groundwater levels are measured semiannually at IRP-5S(a), IRP-6, and the MPA. Depths to groundwater were measured in 31 program and 12 non-program monitoring wells on May 26, 2015, with resulting groundwater elevations ranging from approximately 36.93 to 49.38 feet above msl (RORE, 2015a). Horizontal groundwater gradients were calculated for each site. During this monitoring event, groundwater was flowing south-southwesterly under an approximate gradient of 0.002 foot/foot at all sites. Groundwater flow directions and gradients were generally consistent with previous results (RORE, 2015a). Groundwater elevations and flow for OU-4B sites are presented in Figures 7 and 8 and Figures 28 through 30.

6.4.4.3 Groundwater Concentration Data

Depending on the well and in accordance with the SAP (RORE, 2015c), COC monitoring frequency ranges from semiannually to every five years. Prior to ISB injections in 2013, concentrations of TCE in groundwater within the upgradient portions of the plume generally were decreasing, and concentrations of TCE in the downgradient areas were not decreasing (AIS-TN&A JV, 2013). The following are observations from the ISB/MNA monitoring trends with a focus on trends following injections (RORE, 2016a):

IRP-5S(a) First WBZ

- Decreases in TCE concentrations at wells I005MW03S and I005MW04SR exceeded the ISB predicted model trend, indicating ISB injections were successful in stimulating reductive dechlorination. TCE concentrations in wells I005MW05SR, I005MW06SR, I005MW08S, and I005MW09SR, although appearing to meet ISB model trends, cannot yet be compared to such trends due to the appreciable distance between the wells and injections and the slow groundwater flow rate. ISB effects are not anticipated to be seen in these wells until late 2015 at the earliest.

  For example, based on the location of the southernmost Permeable Reactive Bio-Barrier (PRBB) near well I005MW09SR and a TCE migration rate of 6 feet per year, it is anticipated that effects of the injections on TCE concentrations will be observed at well I005MW09SR in September 2015; however, COC concentrations at I005MW09SR appear to be following ISB predicted model trends for the February 2015 monitoring event. Well I005MW09SR will continue to be monitored until TCE concentration trends can be shown to be decreasing at a statistically significant rate.

- Decreases in TCE concentrations in wells I005MW03S, I005MW04SR, and I005MW06SR were statistically significant with a confidence factor of 95.8 percent, with all other wells having trend analysis results of stable, no trend, or inconclusive (insufficient data).

- The presence of ethene is indicative of complete anaerobic dechlorination, through destruction of VC. Ethene was not detected in any wells during the monitoring period; however, the molar ratio plot for concentrations of TCE and daughter products at well I005MW03S shows declining molar concentrations of total chlorinated VOCs, indicating reductive dechlorination is progressing to completion and that unacceptable buildup of daughter products is not occurring.

- Favorable conditions for reductive dechlorination (relatively low NO_3^-, Mn^{2+}, Fe^{2+}, and SO_4^{2-} concentrations; elevated methane concentrations), which support effectiveness of natural attenuation, were evident at well I005MW04SR. For wells I005MW03S, I005MW05SR, I005MW06SR, I005MW08S, and I005MR09SR, the evidence for reductive dechlorination is somewhat ambiguous. Relatively low NO_3^-, Mn^{2+}, Fe^{2+} concentrations and elevated methane concentrations favor dechlorination, but relatively high SO_4^{2-} concentrations and low proportions of daughter products relative to TCE indicate that dechlorination is not proceeding rapidly.

IRP-6 First WBZ

- The presence of TCE degradation products, such as cis-1,2-DCE, trans-1,2-DCE, and VC, indicates that reductive dechlorination is occurring. Degradation products were present in all wells except I006MW01D.

- ISB and MNA predictive model trends were met at several locations, but not at well I006MW03SR, where concentrations remained relatively stable, nor at well I006MW06S, where 1,1-DCE concentrations are fluctuating, did not decrease by the May 2014 monitoring event, but did decrease by the February 2015 monitoring event.

- The presence of ethene is indicative of complete anaerobic dechlorination, through destruction of VC. Ethene was present in wells I006MW02S, I006MW03SR, I006MW05S, and I006MW09S, indicating complete anaerobic dechlorination was occurring at all ISB wells except I006MW01S, I006MW01D, and I006MW08S. The molar ratio plots for concentrations of 1,1-DCE and daughter products at wells I006MW02S, I006MW05S, and I006MW09S show an overall decreasing molar count, indicating reductive dechlorination is progressing to completion and that unacceptable buildup of daughter products is not occurring.

MPA First WBZ

- There is little evidence to support that reductive dechlorination is occurring. However, the presence of TCE degradation products, such as cis-1,2-DCE, even though detected in trace amounts (less than 10% of the parent compound TCE), indicates that reductive dechlorination is occurring. Degradation products were present in wells A000SB44S, CDS1MW02S, MPMW03S, and MPMW04S.
- ISB and MNA predictive model trends were met at all locations, except for well CDS1MW02S where concentration decreases appear to be lagging behind the ISB model trend, but following the predictive model trend. ISB effects have not yet been observed in well MPMW03S.
- The presence of ethene is indicative of complete anaerobic dechlorination, through destruction of VC. Ethene was not detected in any wells during the monitoring period; however, the molar ratio plot for concentrations of TCE and daughter products at well MPMW04S shows an overall decreasing molar count, indicating that limited dechlorination is occurring and that unacceptable buildup of daughter products is not occurring.

MPA Second WBZ

- There were little to no detections of TCE degradation products, such as cis-1,2-DCE, trans-1,2-DCE, and VC, indicating that reductive dechlorination is not occurring at significant rates. Degradation products were not detected in wells with detectable TCE, with the exception of a trace cis-1,2-DCE concentration detected in well A000SB45D.
- ISB and MNA predictive model trends were met at all locations, except for well I0MPMW01D where concentration decreases appear to be lagging behind the ISB model trend, but following the predictive model trend. ISB effects have not yet been observed in well A000SB45D.
- The presence of ethene is indicative of complete anaerobic dechlorination, through destruction of VC. Ethene was not detected in any wells; no buildup of daughter products was observed.

6.4.4.4 IC Compliance Data

IC inspections certificates are included in Appendix B. The Navy ensures that site inspections are conducted for property retained by the Navy and conducted by the City of Tustin for property leased to the City. IC inspections included reporting the following IC components:

- Installation of new groundwater wells of any type within the ARICs.

- Activities that could expose groundwater within the ARICs.
- Groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling and other industrial processes).
- Alteration, disturbance, or removal of groundwater monitoring wells and associated equipment within the ARICs.
- Installation of structures or improvements that have the potential to affect TCE plume migration within the ARICs.
- Construction and/or operations within the ARICs that interfere with ongoing monitoring and assessment work or the final remedy.

No noncompliance issues were noted (AIS-TN&A JV 2015c; RORE, 2016a).

6.5 INTERVIEWS

As a component of the five-year review, interviews were conducted with Regulatory Agency representatives, stakeholders, and members of the community, to gather additional information about the status of OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B.

Table 6-1 lists the persons interviewed during this five-year review. Interview forms are included in Appendix E, Interview Documentation.

Table 6-1
List of Interviewees

Name	Title	Affiliation
Mary Aycock	RPM	USEPA
Patricia Hannon	RPM	RWQCB
Rafat Abbasi	RPM	DTSC
Matt West	Assistant to the City Manager	City of Tustin
Arian Maher	Property Manager	Vestar Property Management
Paula Jewell	OU-4B, O&M/MNA, Staff Scientist	AIS-TN&A JV
Stephen Siefert, PE	OU-4B, O&M/MNA, Site Manager, Project Manager	RORE, Inc.
Dhananjay Rawal	OU-1A/B and OU-3, O&M/LTM, Lead Site Manager, Project Manager	ECS
Zoila Finch	Administrative Manager	Orange County Executive Office, Land Development
Desire' Chandler	RAB Co-Chair	Tustin Community
Susan Reynolds	RAB Member	Tustin Community
Robert Kopecky	RAB Member	Tustin Community
Don Zweifel	RAB Member	Tustin Community
John Edwards	Campus Coordinator, RAB Member	South Orange County College District

The documentation includes the name of the interviewee, relevant site(s), interview date and time, contact information, and responses to interview questions. Specific interview results are discussed below.

Overall Performance/Impression of the Remedy

The MCAS Tustin RAB Community Co-Chair, Ms. Chandler including members of the RAB (Ms. Reynolds, Mr. Kopecky, Mr. Edwards, and Mr. Zweifel) provided a favorable impression of the Navy's remedial activities at Former MCAS Tustin. Ms. Chandler noted the remedies in place are protective of human health and the environment and appear to be properly maintained. To augment, Mr. Kopecky provided his overall impression that the remedies are operating successfully at all the sites and expressed his appreciation to the Navy for their responsiveness in addressing community concerns on all environmental matters. Mr. Zweifel expressed his approval of the remedies provided they continue to prevent COC migration to the second or third WBZs.

Other interviewees including, Mr. West (City of Tustin), Mr. Rawal (ECS), Mr. Seifert (RORE, Inc.), Ms. Maher (Vestar Property Management), and Ms. Jewel (AIS-TN&A JV) also provided favorable impressions that the remedies in place at OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B are functioning as intended and continue to provide hydraulic containment of the existing plumes. Mr. West indicated that the remedial activities are continuing to show positive results by reducing contaminants in groundwater. Further, Mr. Rawal and Mr. Seifert noted the remedies are operating exceptionally well and in accordance with the ROD and OMP.

Community Concerns/Effects

The following community concerns were provided by several RAB members including Ms. Chandler who noted she had heard of past concerns from potential homeowners regarding the construction of swimming pools and their concern for potentially encountering contamination. Ms. Reynolds noted that the community is impacted by the current remedial activities at MCAS Tustin which are preventing transfer of the carve-out areas. Mr. Kopecky noted that although he knows of no major community concerns, he is hopeful that the remediation of the sites will eventually come to a conclusion and no other contaminant source areas are discovered.

Mr. Siefert expressed concern over the health and safety risks when sampling from the monitoring well inside Hangar No. 1 since its partial collapse.

Regulatory Agency representatives (Ms. Aycock [USEPA], Ms. Hannon [RWQCB], and Mr. Abbassi [DTSC]) stated they were not aware of any community concerns regarding the protectiveness of the remedies at OU-1A/1B, OU-3, and OU-4B.

Problems Encountered During O&M

Mr. Kopecky witnessed trespassing onto the Advanced Technology and Education Park of South Orange County Community College District parcel of property by individuals stealing copper pipes and wires from the old military buildings. He also noted that the City of Tustin police responded and the trespassing was greatly reduced.

Mr. Zweifel expressed concern over the partial roof collapse of the northernmost hangar adding the incident was prime example of gross negligence and lack of maintenance. He expressed interest in receiving more information about what is being implemented to address this issue.

Mr. Rawal described a vandalism incident which occurred in April 2016 at OU-1A/1B in which copper wires were cut and stolen. The vandalism incident compromised the electrical power to one extraction well at OU-1A/1B North. The extraction well was placed back online within 24 hours after the vandalism was discovered. The O&M contractors worked closely with the City of Tustin Police to secure the area and the extraction well network.

Mr. West described an incident in September of 2013 at IRP-13S in which three monitoring wells were damaged by the City of Tustin's sub-lessee (South Orange County Community College District) during demolition of former military improvements. The Navy was promptly notified of the damaged wells (IS72MW02S, IS72MW02D, and IS72MW02D2), and the sub-lessee immediately arranged for repair of the wells. Proper protection measures (concrete construction barriers) were installed and remain to this day.

Communication of Site Activities and Progress

All the RAB members felt well-informed about the Navy's remedial activities and progress at Former MCAS Tustin and progress. Ms. Chandler was pleased to learn that Carve-Out Areas 6 and 9 were soon to be candidates for transfer. Mr. Edwards noted that although he felt well-informed about the current work underway, he is still looking for an update about the progress of FOST #9.

Mr. West noted that while efforts continue towards an OPS determination at all the Sites, the City of Tustin was disappointed that the original projection identified in the 2002 Economic Development Conveyance to convey the balance of the site by 2008 has not been met, although efforts continue to meet a new conveyance date of 2018. The City of Tustin also recognizes that the property will be received as soon as it is safe to do so, and that the objectives of the City and the Navy are in alignment.

Other Comments/Suggestions/Recommendations

Mr. Abbasi, commented that OU-1A, OU-1B North, and OU-1B South still need to be evaluated for vapor intrusion. He also mentioned that issues associated with the land use covenant for OU-4B are still pending. He believes that the time to achieve the cleanup goal for TCE using bioremediation is too long and that he would like the Navy to consider other viable alternatives that can potentially achieve cleanup goals sooner.

Ms. Reynolds mentioned that the RAB Site Tour on April 14, 2016, provided reassurance that the remedies in place are operating as intended.

Mr. Zweifel expressed concerns about land-use transfers and deed restrictions and believes that the Irvine groundwater subbasin should become suitable for potable water extraction.

Mr. West expressed an interest in the City of Tustin participating, when possible, in the BCT Core meetings that occur prior to the regular BCT meetings, in order to gain even greater insight. Additionally, Mr. West expressed continued concern from the City of Tustin about the leading edge of the IRP-5S(a) plume. It is of the highest importance to the City of Tustin that they have been properly notified by the Navy, have access to all information, and remain apprised of the developing situation. Furthermore, the City of Tustin remains unconvinced that the plume will stop short of the building or will only migrate southerly away from the building.

Ms. Maher stated that because Vestar leases tenant space, they request advance notification regarding remedial operations/activities that may affect day-to-day operations at these tenant spaces so that the information could be forwarded to their tenants.

6.6 SITE INSPECTIONS

On April 7, 2016, representatives from the DON, BRAC PMO West, DTSC, and RWQCB conducted site inspections at OU-1A, OU-1B North and South, OU-3, and OU-4B. During the site inspection, photographs were taken of both treatment systems, fencing and gates isolating OUs, signage limiting access to sites, and monitoring and extraction wells (Appendix D). In addition to photographs, the inspection included noting any discrepancies that could impact the integrity of site access restrictions, groundwater monitoring and extraction wells, and groundwater treatment systems (Appendix C). Evidence of vandalism, trespassing, and other factors affecting the implementation of ICs, monitoring activities, and O&M was also documented.

The following observations were made during the site inspection:

- In general, the treatment systems were in excellent condition.
- Fencing and gates in all areas appeared to prevent inappropriate access to sites.
- Groundwater monitoring wells were in good condition.
- Extraction wells appeared to be in good condition.

An additional site tour was conducted for RAB members the following week on April 14, 2016, in support of the Five-Year Review and to ensure that community members are aware of current site conditions.

7 TECHNICAL ASSESSMENT

In accordance with Navy policy (Navy, 2011a) and USEPA guidance (USEPA, 2001) on five-year reviews, the technical assessments conducted for this five-year review focused on responses to the following three questions for each of the OUs:

(1) Question A: Is the remedy functioning as intended by the decision documents?

(2) Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?

(3) Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

The responses to these questions are discussed for each OU in the following sections.

7.1 OU-1A, OU-1B NORTH, AND OU-1B SOUTH

7.1.1 Question A: Is the Remedy Functioning as Intended by the Decision Documents?

The hydraulic containment remedies for OU-1A, OU-1B North, and OU-1B South are functioning as intended by their respective RODs, as evidenced by results of groundwater monitoring data, capture zone analyses, document reviews, interviews, and ongoing O&M activities.

The first and second WBZs are currently impacted by groundwater contaminant plumes containing COCs at concentrations exceeding RGs at OU-1A and OU-1B South. Only the first WBZ is currently impacted by COCs at concentrations above RGs at OU-1B North. Initially, both WBZs were impacted at OU-1B North, but COCs in the second WBZ have been reduced to concentrations below RGs since system startup.

The remedy at OU-1A, OU-1B North, and OU-1B South is hydraulic containment with hot spot mass removal. Revised Draft Final ESDs to the Final ROD/RAP for OU-1A/OU-1B and a Revised Draft Final LUC RD Amendment No. 1 were initiated for the sites in 2014 in response to the recommendations of the Final CERCLA Five-Year Review Report Addendum (Navy, 2013a) and to provide notice of potential vapor intrusion risk to transferees because of the impacted groundwater at the sites. As a result, this five-year review focused on evaluating the sufficiency of hydraulic capture of the VOC plumes and on the sufficiency of hot spot extraction wells to address hot spot mass removal. A site inspection and interviews were conducted to determine the performance of ICs in preventing contact with contaminated groundwater. Relevant data and evaluations are presented in quarterly data summary reports and in annual performance evaluation reports for these sites. A complete list of these documents is provided in Appendix A. The following sections discuss capture analysis, hot spot mass removal, and performance of ICs for each site.

7.1.1.1 Capture Zone Analysis

Capture zone analyses have been performed as part of the annual performance evaluations since the start of the remediation and are presented in the annual PERs for OU-1A/OU-1B for 2011, 2012, 2013, 2014, and 2015 (ECS, 2012b, 2013b, 2014b, 2015c, MMEC Group, 2016b).

7.1.1.2 Hot Spot Mass Removal

The groundwater remedies for OU-1A, OU-1B North, and OU-1B South were designed to hydraulically contain the VOC plumes while removing mass from the hot spot areas and decrease time to achieve plume stabilization and shrinkage. In this way, natural attenuation would effectively reduce VOC concentrations to RGs everywhere within the plumes while active hydraulic containment prevented overall enlargement of the plume boundaries.

It should be noted that the existence or absence of statistically determined hot spots depends upon the overall distribution of contaminant concentrations within a plume; however, the continued statistical absence of a hot spot is a general indication that contaminant concentrations are declining within the former hot spot area.

At OU-1A, no hot spot has been present in the first WBZ since 2010. In the second WBZ, a statistical hot spot disappeared in 2011 and then reappeared in the 2013 annual sampling event. The statistical hot spot in the second WBZ was again present in 2015. This is concluded to be a result of the calculation being performed on fewer wells rather than due to increasing COC concentrations.

At OU-1B North, there has been no statistical hot spot since 2012.

At OU-1B South, a statistical hot spot has been present in the first WBZ every year since system start-up, but there was no statistical hot spot in the first WBZ for the first time in 2015. This is interpreted to be due to the effects of ongoing remediation.

There has been no statistical hot spot in the OU-1B South second WBZ since 2010.

In the 2015 annual sampling event, a statistical hot spot was identified only in the OU-1A second WBZ.

The continuous extraction from hot spot areas at all OU-1A, OU-1B North, and OU-1B South sites has resulted in the following volumes being removed and treated from hot spot areas between July 3, 2008, and December 31, 2015:

- 10,614,891 gallons from the OU-1B North hot spot extraction wells
- 11,853,506 gallons from the OU-1A hot spot extraction wells

7.1.1.3 Performance of Institutional Controls

The LUC RD established Groundwater ARICs at each OU that encompass the VOC plumes and associated buffer zones. ICs were established within the ARICs to prevent contact with contaminated groundwater and to ensure the integrity of the remedy components until RGs are achieved. The ICs consist of land use restrictions that were incorporated in two separate legal instruments as provided in the MOA between the Navy and DTSC. These legal instruments are:

(1) Restrictive covenants to be included in one or more Quitclaim Deed(s) from the Navy to the property recipient

(2) Restrictive covenants to be included in one or more CRUPs entered into by the Navy, DTSC, and RWQCB

The CRUP incorporates the land use restrictions into environmental restrictive covenants that run with the land and are enforceable by DTSC against future transferees. The Quitclaim Deed(s) include similar land use restrictions in environmental restrictive covenants that run with

the land and that are enforceable by the Navy against future transferees. Land use restrictions will also be included in FOSTs.

A portion of OU-1A was conveyed under a FOSET to Columbus Square development, and LUCs were incorporated in the Quitclaim Deed and CRUP associated with this early transfer parcel. The remaining portion of OU-1A and all of OU-1B have not yet been transferred, although portions of these sites are under a LIFOC with the City of Tustin (Navy, 2002a).

IC performance was evaluated by conducting site inspections and interviews with stakeholders, and by reviewing IC compliance certifications and inspection checklists (presented in Appendix B). Because a portion of IRP-13S was conveyed to Columbus Square development, the Columbus Square Homeowners Association completes the IC compliance checklist annually. IC compliance checklists are also prepared in accordance with OMP requirements by the O&M contractor. The data review, site inspection, and interviews revealed no evidence of any activities that were inconsistent with the land use restrictions specified in the LUC RD.

Review of available IC compliance information from the sources above indicates that ICs continue to be effective in preventing contact with contaminated groundwater, and protecting the integrity of the remedy components.

In response to revised toxicity criteria for TCE the Five-Year Review Addendum (Navy, 2013a), recommended the development of VI ICs is required to protect human health and the environment based on the following:

- To accommodate uncertainty associated with future redevelopment activities (e.g. building reuse and restoration/renovation activities, utility infrastructure, grading, landscaping, HVAC systems, etc.) and the potential creation of preferential pathways in the subsurface which could exacerbate vapor migration;
- To meet DoD policy notification requirements; and
- To meet regulatory agency preferences for multiple lines of evidence in addressing potential VI risks.

The inclusion of additional VI ICs is consistent with the LUC RD (Section 3.9 of the Final RD/Remedial Action Work Plan [RAWP] [ERRG, 2007]) and the LIFOC (Navy, 2002a) and LIFOC Modification No. 1 (Navy, 2014d) with the City of Tustin, which addresses indoor air quality requirements and building occupancy restrictions. The following VI LUC objectives are described in the Revised Draft Final ESDs to the Final ROD/RAP for OU-1A/OU-1B (Navy, 2014a, 2014b) and are proposed to maintain the integrity of the remedial action until remediation is complete and the remedial goals (RGs) have been achieved:

- Notice to transferees from the United States Department of the Navy (DON) of the potential for VI to occur within a specified area requiring ICs for VI (VI ARIC). The proposed VI ARICs, shown on Figures 2 and 3, will be finalized in consultation with the FFSRA signatories following the completion of the VI assessment at CO-5 and CO-6.The VI ICs will be documented in the Final LUC RD Amendment No. 1.
- Prohibit occupancy of all enclosed structures within the proposed VI ARIC.

7.1.1.4 Question A Summary and Conclusion

Results of this five-year review indicate that hydraulic containment of the VOC plumes and hot spot mass removal have been effective, and that ICs designed to prevent contact with contaminated groundwater and to protect the integrity of the remedies have been effective.

The hydraulic containment remedies for OU-1A, OU-1B North, and OU-1B South are functioning as intended by their respective ROD/RAPs (Navy, 2004a and 2004b). The remedy of ICs, proposed in the Revised Draft Final ESDs to the Final ROD/RAP for OU-1A/OU-1B (Navy, 2014a, 2014b) and to be implemented in the Revised Draft Final LUC RD Amendment No. 1 (Navy 2014c), once finalized, will be effective in the long-term in addressing potential VI from VOC-impacted groundwater within the VI ARICs.

The remedies for OU-1A, OU-1B North, and OU-1B South are considered to be functioning as designed. As a result, the response to Question A is "affirmative."

7.1.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs Used at the Time of Remedy Selection Still Valid?

7.1.2.1 Exposure Assumptions

The exposure assumptions considered during the remedy selection for OU-1A, OU-1B North, and OU-1B South are consistent with current site conditions and remain unchanged. No changes to site conditions have occurred that would negatively impact remedy performance.

7.1.2.2 Toxicity Data and Effect on Health Risk

The following subsections present an evaluation of changes in toxicity criteria applicable to the risk drivers at OU-1A, OU-1B North, and OU-1B South, and the effects of any such changes on human health risks.

Changes to Toxicity Criteria

No additional routes of exposure to chemicals in the subsurface at OU-1A, OU-1B North, and OU-1B South have been identified since the implementation of their respective remedies. The previous baseline human health risk assessment, and the VI specific evaluation performed during the last Five-Year Review were based on conservative assumptions that overestimated risk. Potential risks and hazards from other site contaminants, including potential chemical degradation byproducts of TCE, continue to be insignificant or inconsequential because of incomplete exposure pathways or low concentrations.

No changes to toxicity criteria for site COCs were identified during this review.

Effects on Health Risk

There have been no changes in potential effects on health risk since the last Five-Year Review.

7.1.2.3 Cleanup Levels and RAOs

Based on the evaluation conducted for this five-year review, there have been no significant changes to the standards or requirements identified as ARARs in the respective RODs for OU-1A, OU-1B North, and OU-1B South that could negatively affect the protectiveness of the remedies. Additionally, no newly promulgated laws or regulations were identified that could negatively affect the protectiveness of the remedies.

The remedies at the sites are in place and the RAOs and RGs presented in their respective RODs are still applicable and appropriate.

7.1.2.4 Question B Summary and Conclusion

Based on the evaluation conducted for this five-year review, there have been no significant changes to the standards or requirements identified as ARARs in the OU-1A and OU-1B RODs that could negatively affect the protectiveness of the remedies. Additionally, no newly promulgated regulations or enforceable standards were identified that could negatively affect the protectiveness of the remedies.

Cleanup levels, and RAOs used at the time of the remedy have not changed, however, certain exposure assumption and toxicity criteria for TCE have changed. The changes were evaluated in the Five-Year Review Addendum (Navy, 2013a).

The remedies for OU-1A and OU-1B South are determined to be protective under current site conditions. The long-term protectiveness of the remedies at OU-1A and OU-1B South were evaluated as the results of updated toxicity for 1,2,3-TCP and TCE during the last five-year review period (2006-2011), and was effectively addressed by establishing additional ICs for potential VI risk with concurrence from regulatory agencies. These ICs were documented in the Revised Draft Final ESDs to the Final ROD/RAP for OU-1A/OU-1B (Navy, 2014a, 2014b) as recommended in the 2013 five-year review addendum (Navy, 2013). These specific ICs augmented existing ICs in the original ROD and are documented in the Revised Draft Final LUC RD Amendment No. 1 (Navy, 2014c).

Therefore, the negative response to Question B does not present a concern regarding the protectiveness of the remedies.

7.1.3 Question C: Has Any Other Information Come to Light That Could Call into Question the Protectiveness of the Remedy?

The document review, data review, site inspections, and interviews have identified no other information that would call into question the protectiveness of the remedies implemented for OU-1A, OU-1B North, and/or OU-1B South. In addition, there have been no technology development or advances in science that have come to light that could call into question the protectiveness of the final remedies.

The response to Question C for OU-1A, OU-1B North, and OU-1B South is "negative."

7.1.4 Technical Assessment Summary

Based on the monitoring data and documents reviewed, the site inspections, and the interviews, the remedies for OU-1A, OU-1B North, and OU-1B South are functioning as intended by their respective RODs. Groundwater monitoring data and the capture analyses indicate that the COCs are being hydraulically contained by the extraction and treatment systems operating at the sites and the concentrations of VOCs in the hot spots are being reduced by the hot spot extraction wells. The engineering components of the remedies are functioning as designed to protect the integrity of the remedies and there is no evidence of activity at the sites that is inconsistent with the land use restrictions presented in the LUC RD. The evaluation of ARARs documented in the RODs indicated that there were no significant changes to the standards/requirements identified as ARARs in respective RODs that could negatively affect the

protectiveness of the remedies at the sites. Additionally, no newly promulgated laws or regulations were identified that could negatively affect the protectiveness of the remedies.

The long-term protectiveness of the remedies at OU-1B North is addressed by existing ICs documented in RODs (Navy, 2004a, 2004b) for OU-1A and OU-1B respectively. The remedies at OU-1A and OU-1B South will be protective in the long-term with finalizing the Revised Draft Final Land Use Control Amendment No. 1 (Navy, 2014c) to establish and implement additional VI-specific ICs in accordance with the Revised Draft Final ESDs to the Final ROD/RAP for OU-1A/OU-1B (Navy, 2014a, 2014b).

The responses to the three technical assessment questions for OU-1A, OU-1B North, and OU-1B South are presented in Table 7-1.

Table 7-1
OU-1A, OU-1B North, and OU-1B South Technical Assessment Summary

Question	Response	Comment
Question A: Is the remedy functioning as intended by the decision documents?	**Affirmative**	The hydraulic containment remedies for OU-1A, OU-1B North, and OU-1B South are functioning as intended by their respective ROD/RAPs. The remedy of ICs, proposed in the 2014 Revised Draft Final ESDs to the Final ROD/RAP for OU-1A/OU-1B and implemented in the Revised Draft Final LUC RD Amendment No. 1 (Navy 2014c), once finalized, will be effective in addressing potential VI from VOC-impacted groundwater within the VI ARICs.
Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?	**Negative**	Cleanup levels, and RAOs used at the time of the remedy have not changed, however, certain exposure assumption and toxicity criteria for TCE have changed. The changes were evaluated in the Five-Year Review Addendum (Navy, 2013a).
Question C: Has any other information come to light that could call into question the protectiveness of the remedy?	**Negative**	No additional information has come to light that affects the protectiveness of the remedies.

7.2 OU-3

7.2.1 Question A: Is the Remedy Functioning as Intended by the Decision Documents?

The remedy at OU-3 is functioning as intended by the ROD (Navy, 2001), as evidenced by results of monitoring data and document reviews, site inspections, interviews, and ongoing O&M activities. The selected remedy was implemented to assure continued containment of impacted groundwater at OU-3 and to restrict access to contaminated media.

The major components of the remedy include ICs, groundwater and surface water monitoring, inspection and maintenance of the containment wall and cover, inspection of the channel bed, maintenance of the monitoring wells and security features, and periodic review. Potential

exposure routes to contaminated media are effectively cut off by the cover, containment wall, and by the site security features.

ICs were established to prevent contact with contaminated groundwater and to ensure the integrity of the remedy components. The ICs consist of land use restrictions that were incorporated into two separate legal instruments as documented in the MOA between the Navy and DTSC. These legal instruments are:

(1) Restrictive covenants included in one or more Quitclaim Deed(s) from the Navy to the property recipient

(2) Restrictive covenants included in one or more CRUPs entered into by the Navy, DTSC, and RWQCB

The LUCIP (OMP, Attachment F) (BEI, 2003c) presents procedures for monitoring and maintaining the remedy, including the ICs. The land use restrictions are being implemented in accordance with the LUCIP.

The performance of ICs was evaluated by conducting site inspections, interviewing stakeholders, and reviewing IC compliance certifications and inspection checklists. Because the entire site area at OU-3 was conveyed to the City of Tustin in 2004, the City completes the IC compliance checklist annually. IC compliance checklists are also prepared in accordance with OMP requirements by the O&M contractor. The data review, site inspections, and interviews revealed no evidence of any activities that were inconsistent with the land use restrictions specified in the LUCIP.

The site inspections verified that all of the remedy's engineering components, including the containment wall, cover, monitoring wells, access restrictions (fence and/or signs), and drainage features, are in good overall condition and are operating and functioning as designed.

O&M activities continue to monitor the effectiveness of the OU-3 remedy. These activities are designed and implemented to ensure that the OU-3 remedy remains protective of human health and the environment. The document and data reviews indicate the following:

- Many groundwater COC concentrations are below their respective RGs.
- Water level monitoring consistently shows hydraulic separation between the first and second WBZs, indicating that downward migration of contaminants is not occurring.
- Water quality monitoring indicates that downward migration of contaminants is not occurring.
- No COCs have been reported in surface water samples from Peters Canyon Channel since the inception of surface water monitoring.
- No methane has been reported in the LFG probes since the inception of LFG monitoring. As a result of numerous consecutive years of non-reported landfill gas chemical concentrations, the Navy discontinued landfill gas monitoring with concurrence from regulatory agencies, and the six LFG monitoring probes were destroyed in July 2014.
- No seepage through, or breaches of, the containment wall have been reported.

- Inspections of the channel bed have not revealed any evidence of channel bed erosion or other conditions that could call into question the integrity of the containment wall.

The response to Question A for OU-3 is “affirmative.”

7.2.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs Used at the Time of Remedy Selection Still Valid?

7.2.2.1 Exposure Assumptions

The exposure assumptions considered during selection of the OU-3 remedy are consistent with current site conditions and remain unchanged. No changes to site conditions have occurred that would negatively affect the remedy performance.

7.2.2.2 Toxicity Data and Effect on Health Risk

The following COCs were identified in the OU-3 ROD:

- 1,1-DCA
- 1,1-DCE
- 1,2-dichlorobenzene
- 1,4-dichlorobenzene
- benzene
- chlorobenzene
- ethylbenzene
- TCE
- vinyl chloride
- antimony
- arsenic
- cadmium
- manganese
- molybdenum
- thallium

The OU-3 ROD identified the metals antimony, arsenic, cadmium, manganese, molybdenum, and thallium as potentially site-related because elevated concentrations of these metals exceeded typical background concentrations in soil at the site. However, these metals occur naturally, are present in groundwater both onsite and offsite, including upgradient from the site, and as a result may not be site related.

The groundwater risk drivers in the baseline HHRA were arsenic for cancer risk and antimony, arsenic, cadmium, manganese, molybdenum, thallium, chlorobenzene, and 1,2-dichlorobenzene for noncancer HI. None of these COCs have updated toxicity criteria posted on the USEPA IRIS website that post-date the OU-3 ROD. As a result, the OU-3 remedy remains protective to these COCs. Changes in toxicity of TCE do not pose an increased risk nor do they impact the protectiveness of the remedy.

7.2.2.3 Cleanup Levels and RAOs

The ARARs identified in the OU-3 ROD (Navy, 2001) were evaluated to determine whether there have been any changes in these standards that may affect the protectiveness of the OU-3 remedy. Based on the five-year review evaluation, the state MCLs for arsenic and ethylbenzene were revised to 10 and 300 µg/L, respectively, after remedy selection. The results of the 2015 groundwater and surface water sampling indicate that the OU-3 remedy remains protective even when the concentrations of arsenic and ethylbenzene are evaluated against the revised arsenic and ethylbenzene MCLs. Additionally, the containment wall remedy is effective in

containing impacted groundwater, and established ICs restrict exposure to impacted groundwater.

Certain toxicity criteria for COCs have changed; however, these changes do not affect the protectiveness of the remedies at OU-3.

The remedy at OU-3 is in place and the RAOs and RGs presented in the ROD are still applicable and appropriate.

Therefore, the negative response to Question B does not present a concern regarding the protectiveness of the remedies.

7.2.3 Question C: Has any other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

The document and data reviews, site inspections, and interviews identified no information that would call into question the protectiveness of the OU-3 remedy. No technological developments or scientific advances have called into question the protectiveness of the OU-3 remedy.

The response to Question C for OU-3 is “negative.”

7.2.4 Technical Assessment Summary

Based on the monitoring data and documents reviewed, the site inspections, and interviews, the OU-3 remedy is functioning as intended by the ROD. Groundwater, surface water, and LFG monitoring data indicate that COCs at OU-3 are being effectively contained by the engineering components of the remedy. There was no evidence of any activities at the site that are inconsistent with the land use restrictions established in the LUCIP.

The evaluation of the ARARs that were documented in the ROD indicated revised state MCLs for arsenic and ethylbenzene; however, this change would not negatively affect the protectiveness of the OU-3 remedy. No other newly promulgated standards were identified that could negatively affect the protectiveness of the remedy. Certain toxicity criteria for COCs have changed; however, these changes do not affect the protectiveness of the remedies at OU-3.

The OU-3 remedy includes groundwater containment through engineering controls, with ICs to prevent exposure to groundwater COCs. In the baseline HHRA, the groundwater risk drivers were arsenic for cancer risk, and antimony, arsenic, cadmium, manganese, molybdenum, thallium, chlorobenzene, and 1,2-dichlorobenzene for the noncancer HI. None of these COCs have updated toxicity criteria posted to the USEPA IRIS website that post-date the OU-3 ROD. As a result, the OU-3 remedy remains protective relative to these COCs.

Per- and polyfluoroalkyl substances (PFASs) are an emerging contaminant and will be addressed accordingly.

The responses to the three technical assessment questions for OU-3 are presented in Table 7-2.

Table 7-2
OU-3 Technical Assessment Summary

Question	Response	Comment
Question A: Is the remedy functioning as intended by the decision documents?	**Affirmative**	The remedy at OU-3 is functioning as intended by the ROD/RAP.
Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?	**Negative**	The state MCLs for arsenic and ethylbenzene were revised after remedy selection and certain toxicity criteria for COCs have changed. However, these changes do not negatively affect the protectiveness of the remedies at OU-3.
Question C: Has any other information come to light that could call into question the protectiveness of the remedy?	**Negative**	No additional information has come to light that affects the protectiveness of the remedy.

7.3 OU-4B LOW CONCENTRATION SITES

7.3.1 Question A: Is the Remedy Functioning as Intended by the Decision Documents?

The remedy at the low concentration sites (IRP-11 and IRP-13W) is functioning as intended by the ROD/RAP, as evidenced by results of monitoring data and document reviews, site inspections, and interviews. The selected remedy for IRP-11 and IRP-13W is ICs to prevent contact with contaminated groundwater. The ICs consist of land use restrictions presented in a LUC RD (AIS-TN&A JV, 2012) for IRP-11 and IRP-13W.

A portion of IRP-13W was transferred early under a FOSET that also contains restrictions on contact with impacted groundwater.

The performance of the ICs was evaluated in this five-year review by conducting site inspections and interviews with stakeholders, and by reviewing IC compliance certifications. The data review, site inspections, and interviews revealed no evidence of any activities that were inconsistent with the land use restrictions.

The response to Question A for OU-4B low concentration sites is “affirmative.”

7.3.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs Used at the Time of Remedy Selection Still Valid?

7.3.2.1 Exposure Assumptions

The exposure assumptions considered during remedy selection for IRP-11 and IRP-13W are consistent with current site conditions and remain unchanged. No changes to site conditions have occurred that would negatively affect the remedy performance.

7.3.2.2 Toxicity Data and Effect on Health Risk

Updated toxicity criteria for TCE were published in IRIS on September 28, 2011. TCE in groundwater is the primary risk driver at all OU-4B low concentration sites. Since the baseline HHRA used the previously published TCE toxicity criteria, this review focused on a re-evaluation of cancer risk and noncancer hazard resulting from the updated toxicity criteria under the VI pathway because there are no specific ICs addressing VI at OU-4B low concentration sites.

For the low concentration sites, a re-evaluation of cancer risk and non-cancer hazard resulting from the updated toxicity criteria was completed in support of the 2013 Five-Year Review Addendum (Navy, 2013a). Using maximum TCE groundwater concentrations for IRP-11 and -13W the re-evaluation indicated that both the cancer risk and non-cancer hazard for the VI pathway were below regulatory levels of concern (Navy, 2013a).

7.3.2.3 Cleanup Levels and RAOs

The ARARs identified in the OU-4B ROD/RAP (Navy, 2010) were evaluated to determine whether there have been any changes in these standards that may affect the protectiveness of the remedy at the sites. Based on the evaluation conducted for this five-year review, there have been no significant changes to the standards/requirements identified as ARARs in the ROD/RAP that could affect the protectiveness of the remedy.

Additionally, no newly promulgated laws or regulations were identified that could negatively affect the protectiveness of the remedy. Since updated TCE toxicity criteria were published in IRIS, the response to Question B for IRP-11 and IRP-13W is "negative." However, the risk and HIs at the low concentration sites do not exceed regulatory levels of concern.

Therefore, the negative response to Question B does not present a concern regarding the protectiveness of the remedies.

7.3.3 Question C: Has Any Other Information Come to Light That Could Call into Question the Protectiveness of the Remedy?

The document and data reviews, site inspections, and interviews identified no information that would call into question the protectiveness of the OU-4B low concentration sites remedy. No technological developments or scientific advances have called into question the protectiveness of the OU-4B low concentration sites remedy.

The response to Question C for OU-4B low concentration sites is “negative.”

7.3.4 Technical Assessment Summary

The evaluation of the ARARs that were documented in the ROD/RAP indicated that there were no significant changes to the standards or requirements identified as ARARs that could negatively affect the protectiveness of the OU-4B low concentration sites remedy. Additionally, no newly promulgated standards were identified that could negatively affect the protectiveness of the remedy.

Based on the monitoring data and documents reviewed, site inspections, and interviews, the remedy for IRP-11-and IRP-13W is functioning as intended by the ROD/RAP. Groundwater monitoring data indicate that TCE groundwater concentrations are low and relatively stable. Site inspections and interviews revealed no evidence of any activities at the site that are inconsistent with the land use restrictions established in the FOSET and LUC RD (AIS-TN&A JV, 2012).

The remedy for IRP-11 and IRP-13W was designed to prevent contact with TCE-impacted groundwater through ICs. The ICs do not specifically address the VI pathway, and updated toxicity criteria for TCE were published on September 28, 2011. An evaluation of VI risk for the low concentration sites using the updated TCE toxicity criteria was conducted during the previous five-year review (Navy, 2013a). The estimated maximum VI cancer risk and noncancer hazard are well below regulatory levels of concern. No other information calls into question the protectiveness of the remedy for IRP-11 and IRP-13W.

The responses to the three technical assessment questions for OU-4B low concentration sites are presented in Table 7-3.

Table 7-3
OU-4B Low Concentration Sites Technical Assessment Summary

Question	Response	Comment
Question A: Is the remedy functioning as intended by the decision documents?	**Affirmative**	The remedies for the OU-4B low concentration sites are functioning as intended by the ROD/RAP. OPS has been achieved for the low concentration sites (USEPA, 2015).
Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?	**Negative**	Cleanup levels, and RAOs used at the time of the remedy have not changed, however, certain exposure assumption and toxicity criteria for TCE have changed. The changes were evaluated for the OU-4B low concentration sites (IRP-11 and 13W) in the Five-Year Review Addendum (Navy, 2013a) and demonstrate that the remedy in place at the low concentration sites remains protective.
Question C: Has any other information come to light that could call into question the protectiveness of the remedy?	**Negative**	No additional information has come to light that affects the protectiveness of the remedies.

7.4 OU-4B MODERATE CONCENTRATION SITES

7.4.1 Question A: Is the Remedy Functioning as Intended by the Decision Documents?

The remedy at the moderate concentration sites (IRP-5S(a), IRP-6, and the MPA) is functioning as intended by the ROD/RAP, as evidenced by the results of monitoring data, document reviews, site inspections, and interviews. The selected remedy for IRP-5S(a), IRP-6, and the MPA is ISB/MNA/ICs. The ICs consist of land use restrictions presented in a LUC RD (AIS-TN&A JV, 2015a) for IRP-5S(a), IRP-6, and the MPA.

The LUC RD for IRP-5S(a), IRP-6, and the MPA (AIS-TN&A JV, 2015a) presents ICs to be applied to two main categories of property:

(1) Property owned by the Navy (i.e., all of the MPA and portions of IRP-5S(a) and IRP-6), including property leased to the City of Tustin under a LIFOC (Navy, 2002a); and

(2) Property previously transferred by the Navy (i.e., portions of IRP-5S(a) and IRP-6 that were transferred by the Navy to the City of Tustin and portions subsequently transferred to private ownership).

Per the ROD/RPA, ISB was used to treat key areas at each site, where COC concentrations historically were not decreasing (AIS-TN&A JV, 2015c). Currently, the sites are being monitored to document ISB performance and MNA progress as presented in the Final OMP (AIS-TN&A JV, 2015b). The collective data demonstrate that groundwater geochemical conditions are favorable for natural attenuation in the first WBZ at IRP-5S(a), IRP-6, and the MPA and the second WBZ at the MPA, with the exception of the elevated concentrations of alternate electron acceptor sulfate. Despite the elevated sulfate concentrations, evidence of reductive dechlorination was observed at all sites, including the presence of daughter products and trends of declining COC concentrations at specific wells. No unacceptable buildup of daughter products is evident (AIS-TN&A JV, 2015c). IC inspections were completed and no issues were noted. The OPS demonstration for remedy implementation to address COCs in groundwater at OU-4B moderate concentration sites has been achieved (USEPA, 2016).

The response to Question A for OU-4B moderate concentration sites is “affirmative.”

7.4.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs Used at the Time of Remedy Selection Still Valid?

7.4.2.1 Exposure Assumptions

Primary release mechanisms at OU-4B moderate concentration sites (IRP-5S(a), IRP-6, and the MPA) to the environment are assumed to have included infiltration and percolation through the unsaturated zone to the groundwater table. No secondary sources or release mechanisms are known to exist. The exposure medium is groundwater and the complete exposure pathways include ingestion, inhalation of groundwater vapors (directly and via vapor intrusion), and dermal contact. For the inhalation pathway, human receptors include the construction worker, industrial worker, and hypothetical future resident. However, IRP-6 and the southern portion of IRP-5S(a) have been redeveloped for commercial business uses. Future residential land use is unlikely. The MPA and the northern portion of IRP-5S(a) are vacant and there are currently no direct exposure pathways.

The exposure assumptions considered during remedy selection for IRP-5S(a), IRP-6, and the MPA are consistent with current site conditions and remain unchanged. No changes to site conditions have occurred that would negatively affect the remedy performance.

7.4.2.2 Toxicity Data and Effect on Health Risk

Updated toxicity criteria for TCE were published in IRIS on September 28, 2011. TCE in groundwater is the primary risk driver at all OU-4B moderate concentration sites, with the exception of IRP-6 where 1,1-DCE is also a risk driver. Since the baseline HHRA used the previously published TCE toxicity criteria, this review focused on a re-evaluation of cancer risk and noncancer hazard resulting from the updated toxicity criteria under the VI pathway because there are no specific ICs addressing VI at OU-4B moderate concentration sites.

The OU-4B moderate concentration sites were not included in the 2013 VI re-assessment because the remedial action had not begun. Following the start of remedial action at IRP-5S(a), 6, and the MPA, and as the result of the revised toxicity for TCE, DTSC performed a specific inhalation and dermal exposure evaluation to estimate cancer and noncancer risk for previously transferred property at portions of IRP-5S(a) and IRP-6. The evaluation used concentrations of COCs in groundwater wells at the property for hypothetical residential, commercial, and construction trench worker scenarios (DTSC, 2015). Using the conservative input data, the DTSC evaluation resulted in cancer risks and noncancer hazards associated with vapor intrusion to indoor air under both the residential and commercial scenarios that are less than the point of departure of 10^{-6} and hazard index of 1.0. Inhalation of and dermal contact with COCs in groundwater at these locations by a construction trench worker also resulted in cancer risks at or below the point of departure. However, noncancer vapor inhalation risks for construction trench workers using data from several individual wells were above the hazard index threshold of 1.0. Noncancer risks resulting from construction trench worker dermal contact with groundwater COCs were all less than the HI threshold of 1.0 (DTSC, 2015).

Following the DTSC evaluation, the Navy recalculated the inhalation risk from COCs in groundwater using the same updated toxicity values and site-specific exposure assumptions for the construction trench worker scenario. The site-specific input parameters considered in this refined evaluation included depth of groundwater relative to bottom of trench and site-specific exposure frequency, given the relatively small size of the existing plume and the rate of utility placement. The refined risk evaluation resulted in HIs less than the threshold value of 1.0 for construction trench worker dermal exposure to groundwater COCs at the previously transferred portions of OU-4B (RORE, 2016a). DTSC and other BCT members concurred (DTSC, 2016).

While the re-assessment didn't specifically address the MPA, a qualitative risk evaluation is presented based on reported TCE concentrations at the MPA, IRP-5S(a) and 6, and the revised risk estimates at IRP-5S(a) and 6. Maximum reported TCE concentration of 25 µg/L at the MPA is significantly less than the concentration of 73 µg/L used to evaluate risk at IRP-5S(a). Furthermore, groundwater at the MPA occurs at greater depth (approximately 11 to 18 feet) than at IRP-5S(a) where groundwater occurs at approximately 9 to 13 feet below top of casing, thus a greater vertical separation between groundwater COCs and receptors. The results of this qualitative assessment indicate that estimated cancer risk is less than the point of departure of 10^{-6} and non-cancer hazard is acceptable (i.e., less than 1) for the VI pathway using the maximum measured TCE concentration in groundwater and the updated TCE toxicity criteria.

7.4.2.3 Cleanup Levels and RAOs

The ARARs identified in the OU-4B ROD/RAP (Navy, 2010) were evaluated to determine whether there have been any changes in these standards that may affect the protectiveness of the remedy at the sites. Based on the evaluation conducted for this five-year review, there have been no significant changes to the standards/requirements identified as ARARs in the ROD/RAP that could affect the protectiveness of the remedy.

Additionally, no newly promulgated laws or regulations were identified that could negatively affect the protectiveness of the remedy. Since updated TCE toxicity criteria were published in IRIS, the response to Question B for OU-4B moderate concentration sites is "negative." However, the risk and HIs at the moderate concentration sites do not exceed regulatory levels of concern.

Therefore, the negative response to Question B does not present a concern regarding the protectiveness of the remedies.

7.4.3 Question C: Has Any Other Information Come to Light That Could Call into Question the Protectiveness of the Remedy?

The document and data reviews, site inspections, and interviews identified no information that would call into question the protectiveness of the OU-4B moderate concentration sites remedy. No technological developments or scientific advances have called into question the protectiveness of the OU-4B moderate concentration sites remedy.

The response to Question C for the OU-4B moderate concentration sites is “negative.”

7.4.4 Technical Assessment Summary

The evaluation of the ARARs that were documented in the ROD/RAP indicated that there were no significant changes to the standards or requirements identified as ARARs that could negatively affect the protectiveness of the OU-4B moderate concentration sites remedy. Additionally, no newly promulgated standards were identified that could negatively affect the protectiveness of the remedy.

Groundwater monitoring data indicate that TCE groundwater concentrations are low and relatively stable. Site inspections and interviews revealed no evidence of any activities at the site that are inconsistent with the land use restrictions established in the FOSET and LUC RD (AIS-TN&A JV, 2012).

The remedy at the moderate concentration sites (IRP-5S(a), IRP-6, and the MPA) is functioning as intended by the ROD/RAP, as evidenced by the results of monitoring data and document reviews, site inspections, and interviews. The selected remedy for IRP-5S(a), IRP-6, and the MPA is ISB/MNA/ICs. The ICs consist of land use restrictions presented in a LUC RD (AIS-TN&A JV, 2015a) to prohibit or restrict groundwater use for IRP-5S(a), IRP-6, and the MPA. Residential consumption of groundwater is unlikely at IRP-5S(a), IRP-6, and the MPA. IRP-6 and the southern portion of IRP-5S(a) have been redeveloped for commercial business uses. Future residential land use is unlikely. The MPA and the northern portion of IRP-5S(a) are vacant and there are currently no direct exposure pathways. There is no other information that calls in to question the protectiveness of the remedy. The ICs at these moderate concentration sites do not specifically address the VI pathway, and updated toxicity criteria for TCE were published on September 28, 2011. The Navy and DTSC performed evaluation of VI risk for the moderate concentration sites using the updated TCE toxicity criteria in support of this five-year review (RORE, 2016a; DTSC, 2015). The estimated maximum VI cancer risk and noncancer hazard are well below regulatory levels of concern. No other information calls into question the protectiveness of the remedy at OU-4B moderate concentration sites (IRP-5S(a), IRP-6, and the MPA).

The responses to the three technical assessment questions for OU-4B moderate concentration sites are presented in Table 7-4.

Table 7-4
OU-4B Moderate Concentration Sites Technical Assessment Summary

Question	Response	Comment
Question A: Is the remedy functioning as intended by the decision documents?	**Affirmative**	The remedies for the OU-4B moderate concentration sites are functioning as intended by the ROD/RAP. OPS has been achieved for the moderate concentration sites (USEPA, 2016).
Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?	**Negative**	Cleanup levels, and RAOs used at the time of the remedy have not changed, however, certain exposure assumption and toxicity criteria for TCE have changed. Changes in exposure assumptions were addressed for IRP-5S(a) and IRP-6 in the 2015 Annual Performance Evaluation Report (RORE, 2016a) and demonstrate that the remedy in place at those moderate concentration sites remains protective. A qualitative assessment of VI pathway risk at the MPA indicates that the remedy in place remains protective.
Question C: Has any other information come to light that could call into question the protectiveness of the remedy?	**Negative**	No additional information has come to light that affects the protectiveness of the remedies.

8 ISSUES, RECOMMENDATIONS, AND FOLLOW-UP ACTIONS

No issues have been identified for OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B that currently or in the future would prevent the respective remedies at these sites from being protective of human health and the environment.

Because no issues have been identified for OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B that currently prevent the remedies at these sites from being protective, no recommendations or follow-up actions are required to ensure protectiveness of the remedies. However, consistent with USEPA Guidance (USEPA, 2001), recommendations are made that do not directly relate to achieving or maintaining the protectiveness of the remedies, but pertain to activities such as O&M of the remedies and coordination with other agencies.

PFASs have been identified as an emerging contaminant. The historical use of OU-3 as a fire fighting training area indicates the potential for release of compounds known to contain PFASs. The DON is conducting installation-wide assessments to identify potential releases of PFASs, and will prioritize future site investigations and remediation (if required) based on potential risks. The DON will continue to closely monitor regulatory and technical developments related to PFASs, and will develop an appropriate approach for OU-3 in accordance with evolving regulations and policy.

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9 PROTECTIVENESS STATEMENT

9.1 OU-1A, OU-1B NORTH, AND OU-1B SOUTH

Based on the technical assessment presented in Section 7, the remedies for OU-1A, OU-1B North, and OU-1B South are determined to be protective of human health and the environment under current site conditions. The remedies at OU-1A and OU-1B South will be protective in the long term with finalizing the Revised Draft Final LUC RD Amendment No. 1 (Navy, 2014c) and Revised Draft Final ESDs to the Final ROD/RAP for OU-1A/OU-1B (Navy, 2014a, 2014b). The VI ARICs are shown in Figure 2 for OU-1A and OU-1B North, and in Figure 3 for OU-1B South.

9.2 OU-3

Based on the technical assessment presented in Section 7, the remedy at OU-3 is being implemented in accordance with the ROD (Navy, 2001) and is protective of human health and the environment. Potential exposure to waste and groundwater contamination at OU-3 has been addressed through engineering controls that isolate and contain the waste, access restrictions and warning signs, and implementation of ICs. The long-term protectiveness of the remedy is ensured by ongoing O&M activities that include inspection and maintenance of the engineering controls, including the steel-reinforced concrete containment wall, groundwater monitoring, and ICs that run with the land.

9.3 OU-4B LOW CONCENTRATION SITES

Based on the technical assessment presented in Section 7, the remedies at the OU-4B low concentration sites are being implemented in accordance with the ROD (Navy, 2010) and are determined to be protective of human health and the environment.

9.4 OU-4B MODERATE CONCENTRATION SITES

Based on the technical assessment presented in Section 7, the remedies at the OU-4B moderate concentration sites are being implemented in accordance with the ROD (Navy, 2010) and are determined to be protective of human health and the environment.

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10 NEXT REVIEW

The next five-year review for Former MCAS Tustin will be required by October 31, 2021, five years from the signature date of the final version of this Five-Year Review Report. This five-year review included an evaluation of available O&M data for OU-1A, OU-1B North, OU-1B South, OU-3, and OU-4B.

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FIGURES

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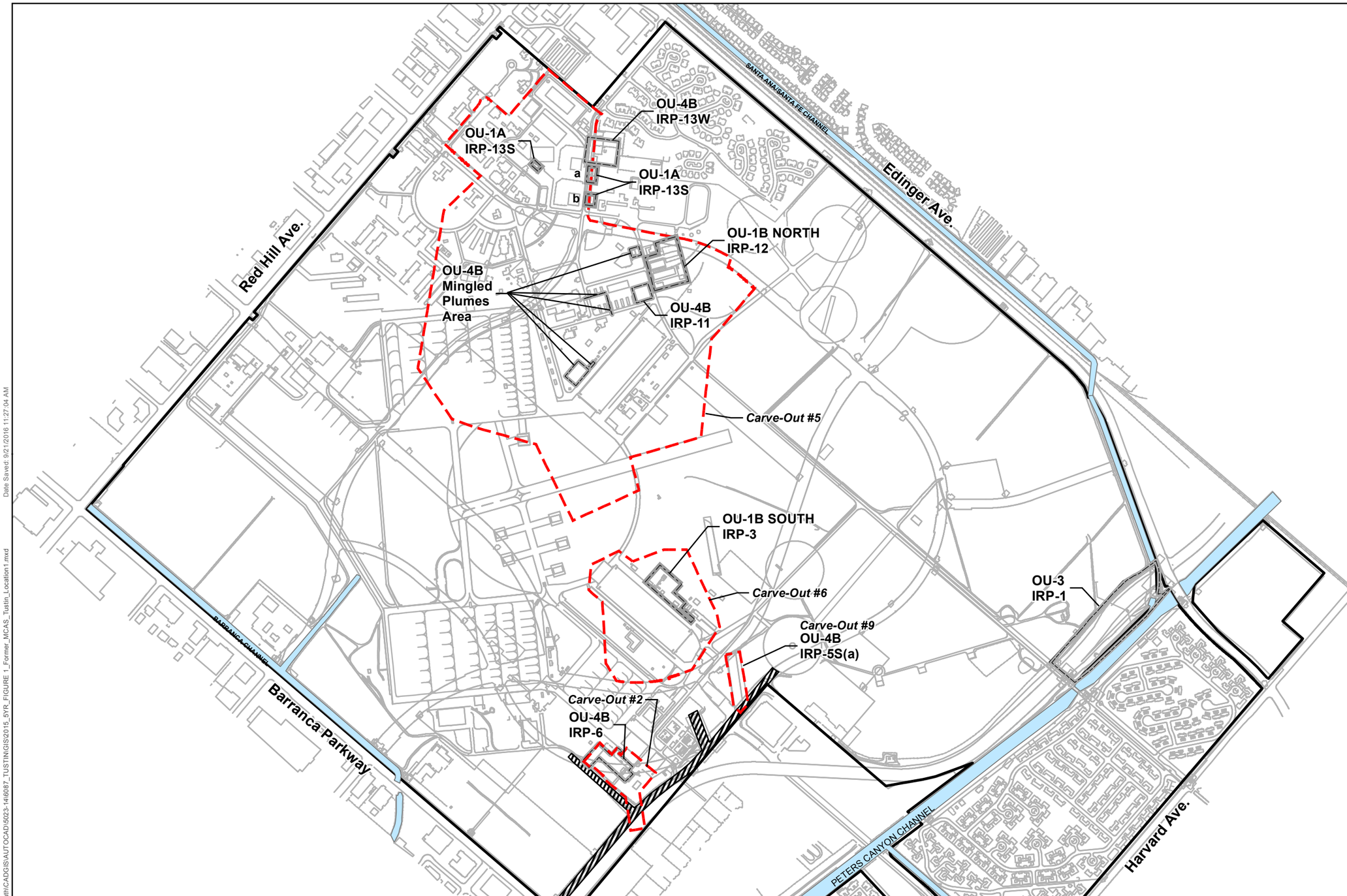

LEGEND

- Former MCAS Tustin Boundary
- Carve-Out Area Boundary
- Surface Channel
- Box Culvert Channel
- IRP Sites

Notes:
a = Temporary storage area (ST-72)
b = Miscellaneous Wash Area (MWA-18)

Abbreviations:
IRP - Installation Restoration Program
MCAS - Marine Corps Air Station
OU - Operable Unit

PROJECT:	5023-14-6087
DATE:	October 2016
DRAWN BY:	CAB / SB
CHECKED BY:	KR

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Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station Tustin, California

Site Location Map

CERCLA Five-Year Review Report
Operable Units 1A and 1B North, 1B South, 3, and 4B

FIGURE
1

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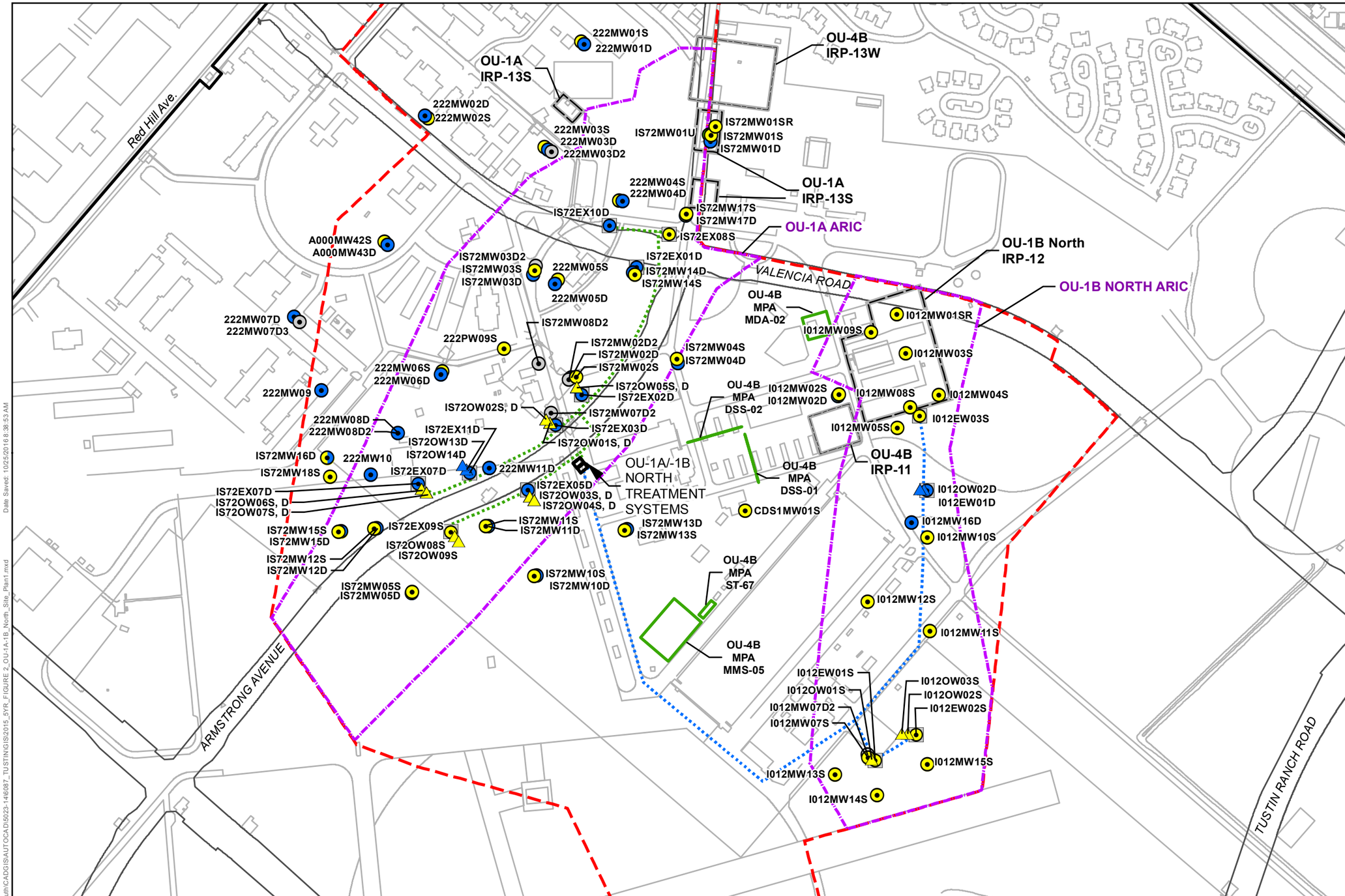


LEGEND

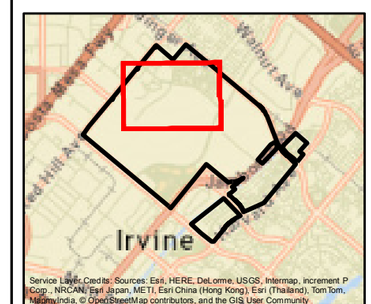
- Monitoring Well (Upper Clay)
- Observation Well (First WBZ)
- Monitoring Well (First WBZ)
- Monitoring Well (Second WBZ)
- Observation Well (Second WBZ)
- Monitoring Well (First & Second WBZ)
- Monitoring Well (Third WBZ)
- Extraction Well (First WBZ)
- Extraction Well (Second WBZ)
- Former MCAS Tustin Boundary
- Conveyance Piping (OU-1A)
- Conveyance Piping (OU-1B North)
- Carve-Out Area #5 Boundary: Proposed Vapor Intrusion ARIC
- Groundwater ARIC
- Mingled Plumes Area (MPA)
- IRP Sites

WELL ID SUFFIX

U - Upper Clay
S, SA, SB, SC, SD, SR - First WBZ
D - Second WBZ
D2 - Third WBZ

ABBREVIATIONS

ARIC - Area Requiring Institutional Controls
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
DSS - Disposal Sanitary Sewer
MMS - Miscellaneous, Major Spill
OU - Operable Unit
ST - Storage, Temporary
WBZ - Water-Bearing Zone



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MMEC GROUP

Former Marine Corps Air Station Tustin, California

OU-1A/1B North Site Plan

CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
2

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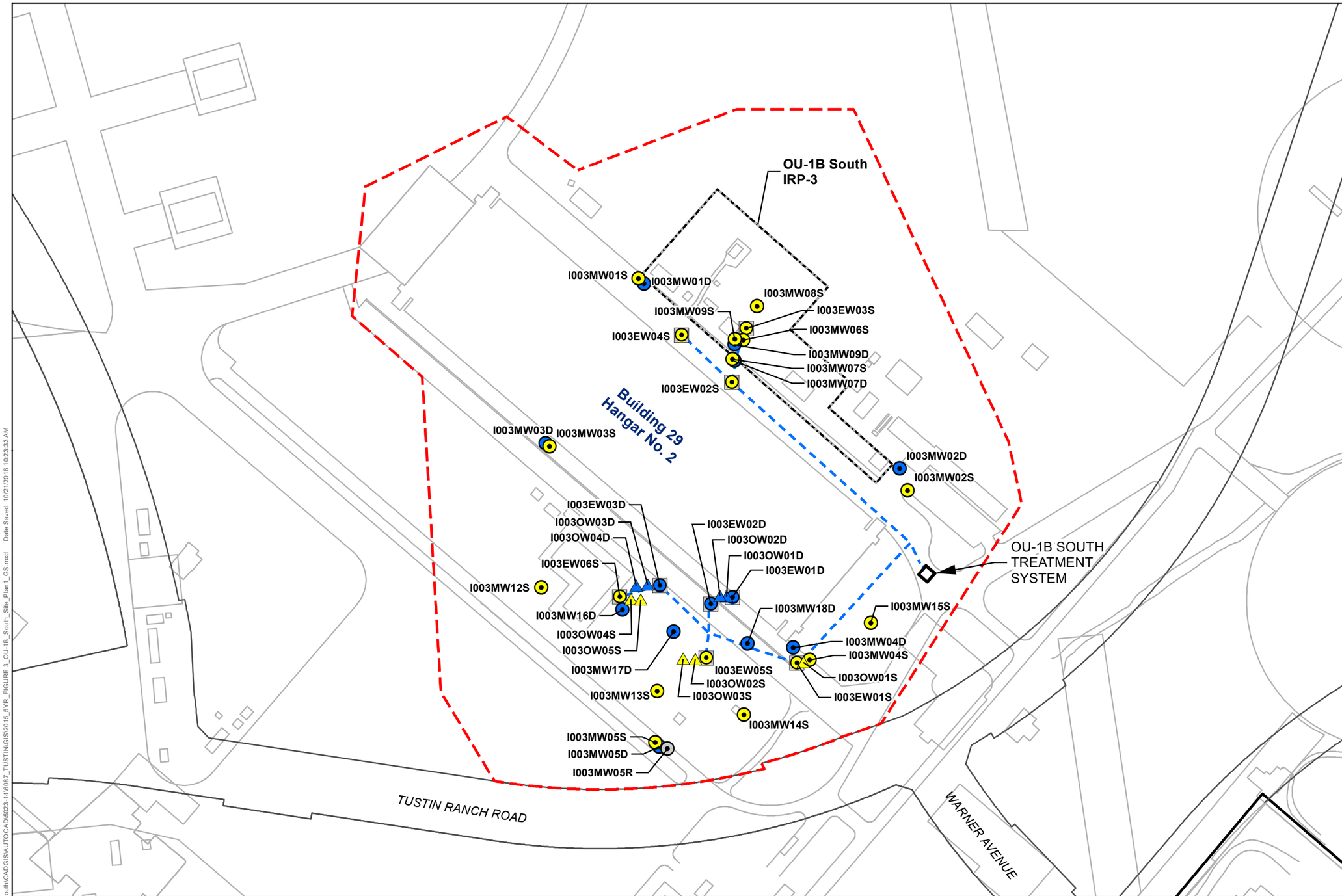


LEGEND

- Observation Well (First WBZ)
- Monitoring Well (First WBZ)
- Monitoring Well (Second WBZ)
- Observation Well (Second WBZ)
- Monitoring Well (Third WBZ)
- Extraction Well (First WBZ)
- Extraction Well (Second WBZ)
- Former MCAS Tustin Boundary
- Conveyance Piping (OU-1B South)
- Carve-Out Area #6 Boundary; Groundwater ARIC and Proposed Vapor Intrusion ARIC
- IRP Sites

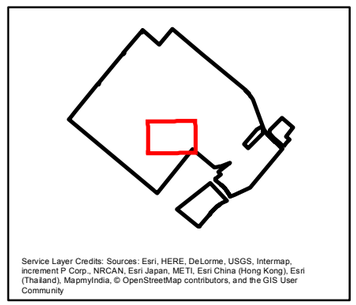
WELL ID SUFFIX

S - First WBZ
D - Second WBZ
R - Third WBZ

ABBREVIATIONS

ARIC - Area Requiring Institutional Controls
OU - Operable Unit
WBZ - Water-Bearing Zone

Note:
1. Extraction Well 1003EW01D is not part of the groundwater extraction network.



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DATE:	October 2016
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Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station
Tustin, California

OU-1B South Site Plan

CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
3

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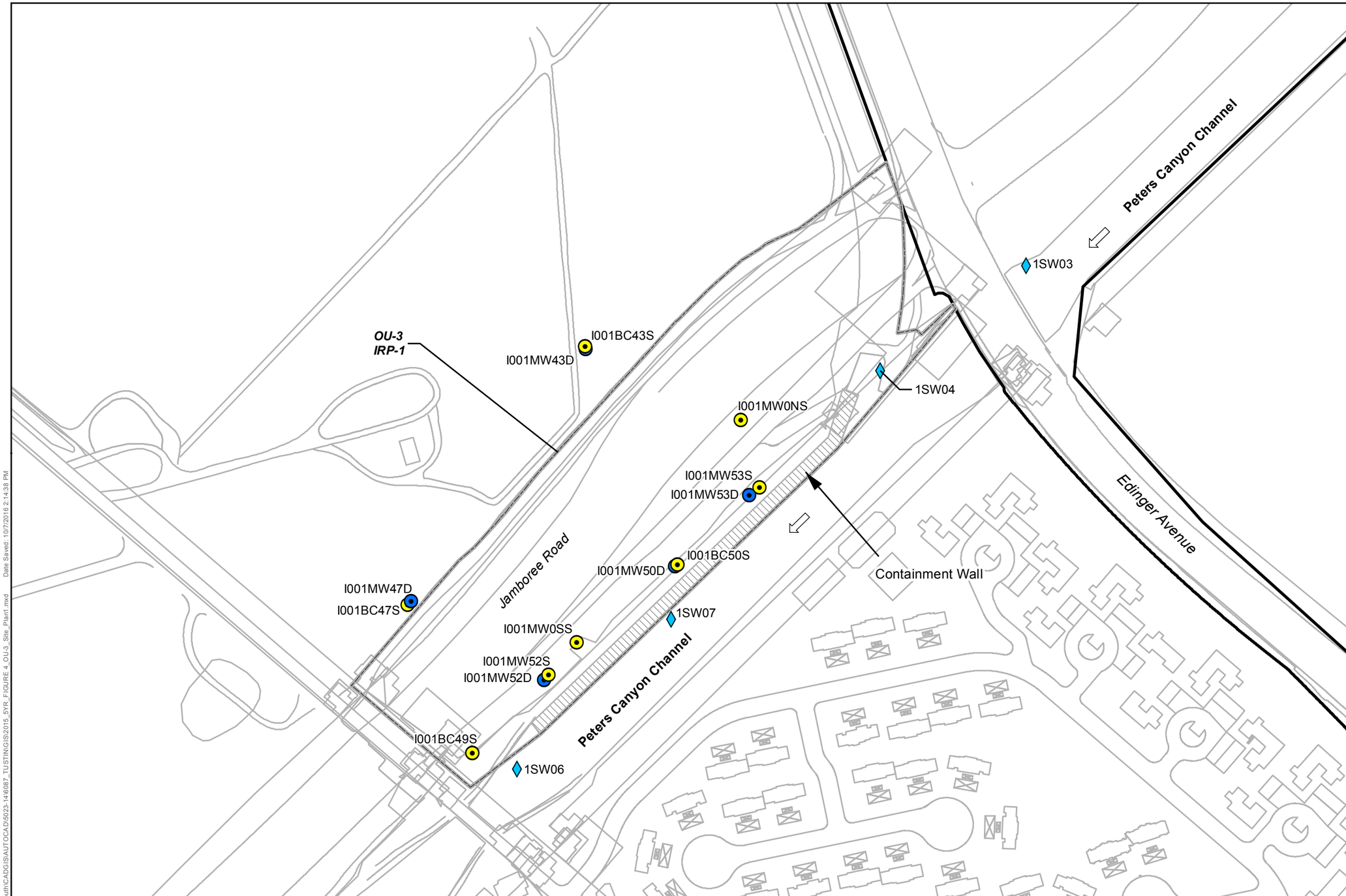


LEGEND

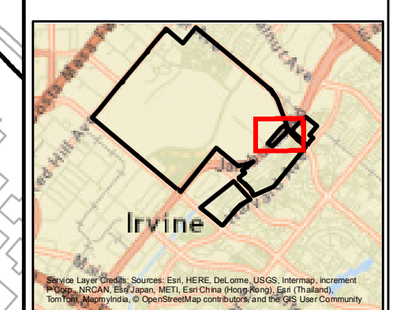
- Surface Monitoring Point
- Monitoring Well (First WBZ)
- Monitoring Well (Second WBZ)
- IRP Site Boundary
- Former MCAS Tustin Boundary
- Surface Channel Flow

WELL ID SUFFIX

S - First WBZ
D - Second WBZ

ABBREVIATIONS

OU - Operable Unit
WBZ - water bearing zone



PROJECT:	5023-14-6087
DATE:	October 2016
DRAWN BY:	CAB / SB
CHECKED BY:	KR

N

0 200 400
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station
Tustin, California

OU-3 Site Plan
CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
4

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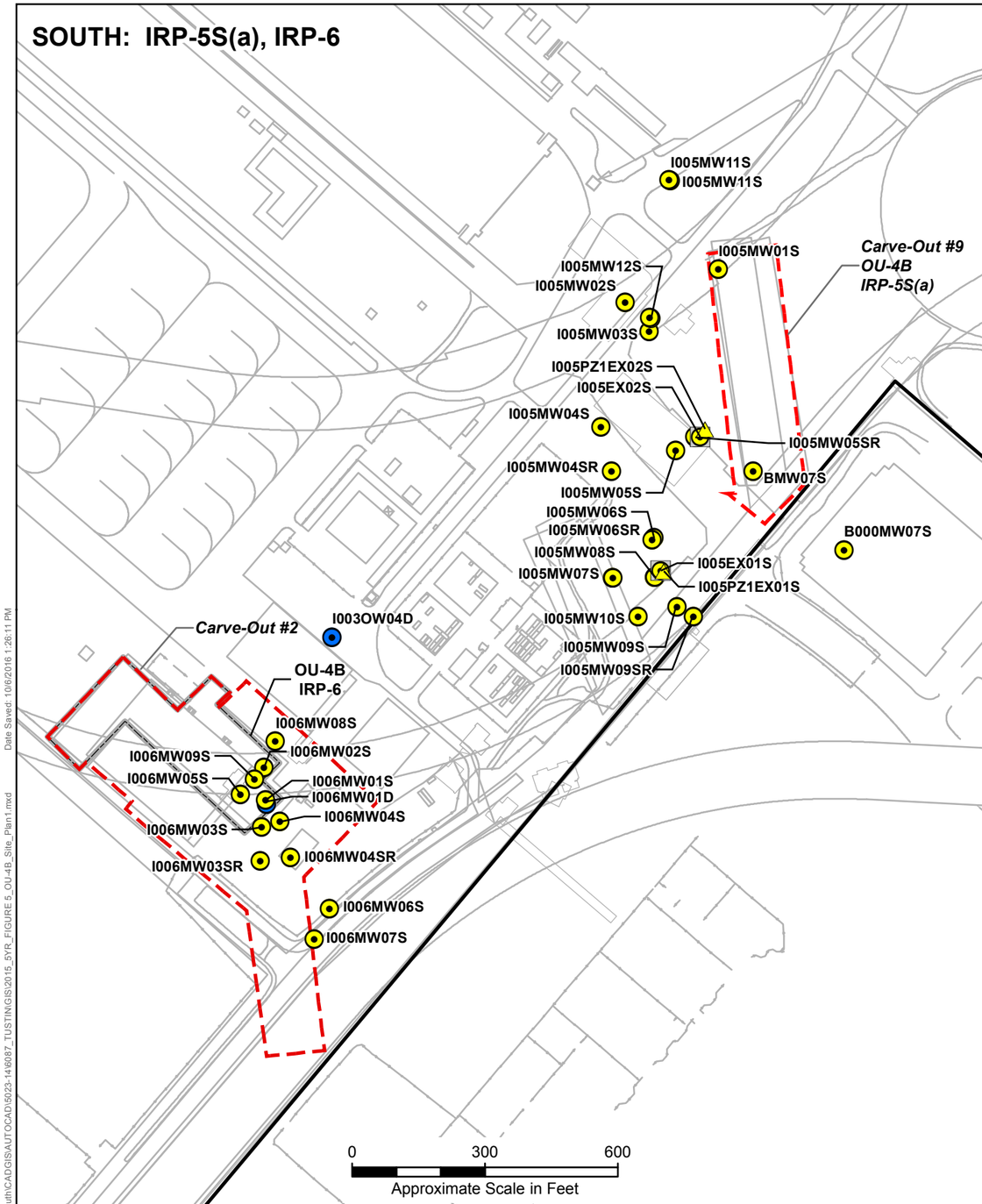
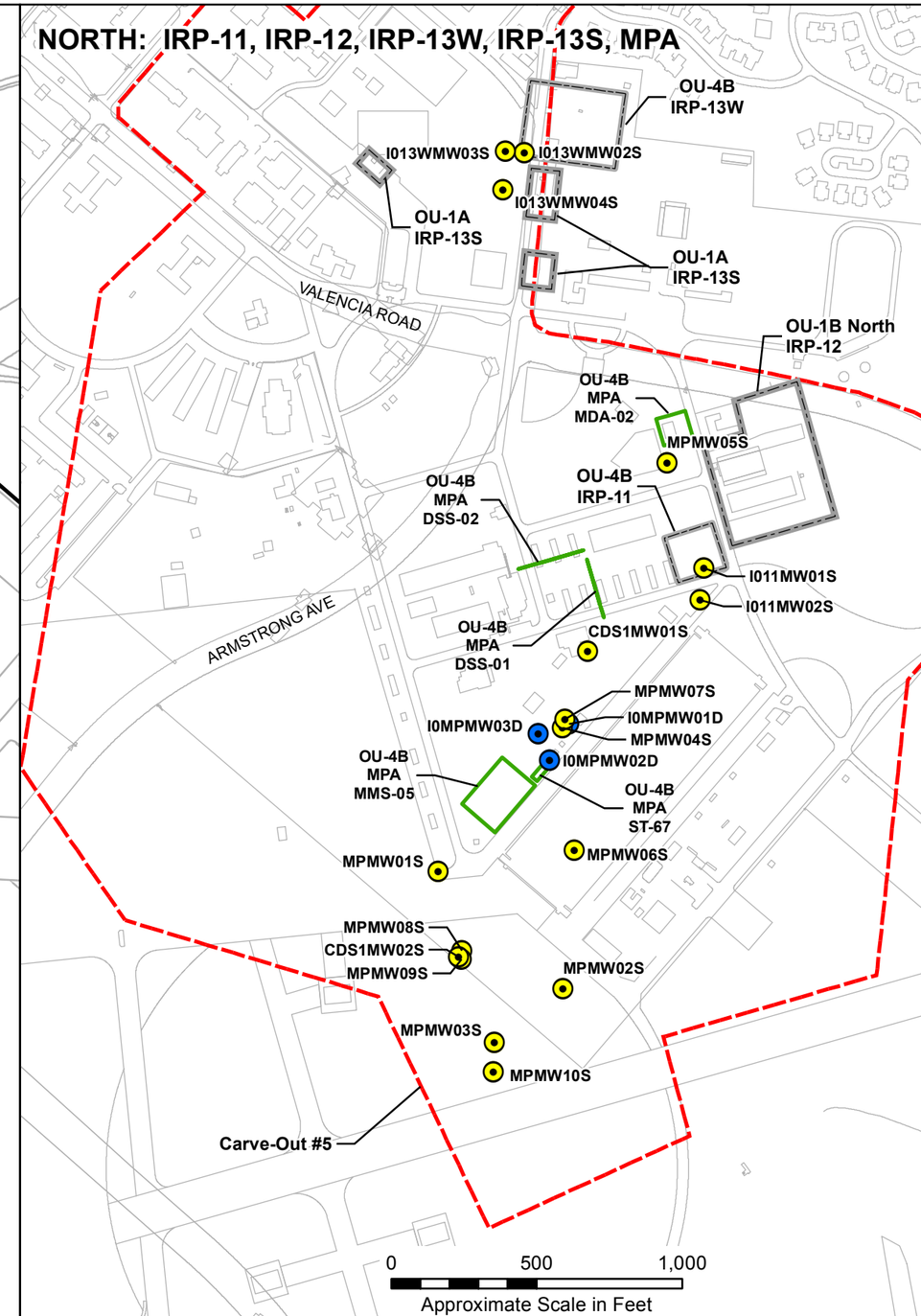




LEGEND

- Observation Well (First WBZ)
- Monitoring Well (First WBZ)
- Monitoring Well (Second WBZ)
- Extraction Well (First WBZ)
- Former MCAS Tustin Boundary
- Carve-Out Area Boundary
- Mingled Plumes Area (MPA)
- IRP Sites

NOTES

Low concentration sites consist of IRP-11, IRP-13W, and MMS-04.

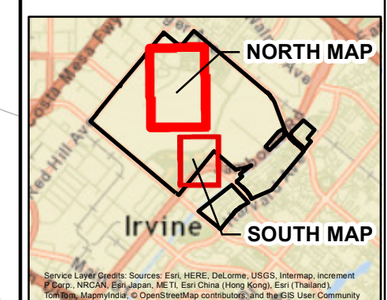
Moderate concentration sites consist of IRP-5S(a) IRP-6, and the MPA.

WELL ID SUFFIX

S, SR - First WBZ
D - Second WBZ

ABBREVIATIONS

DSS - Disposal Sanitary Sewer
IRP - Installation Restoration Program
MMS - Miscellaneous, Major Spill
MCAS - Marine Corps Air Station
MDA - Miscellaneous, Potential Disposal Area
OU – Operable Unit
ST - Storage, Temporary
WBZ - water bearing zone



PROJECT:	5023-14-6087
DATE:	October 2016
DRAWN BY:	CAB / SB
CHECKED BY:	KR

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MMEC GROUP

Former Marine Corps Air Station
Tustin, California

OU-4B Site Plan

CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
5

Document Path: P:\Projects-South\CAD\GIS\AUTOCAD\5023-14\6087_TUSTIN\GIS\2015_5YR_FIGURE 5_OU-4B_Site_Plan1.mxd
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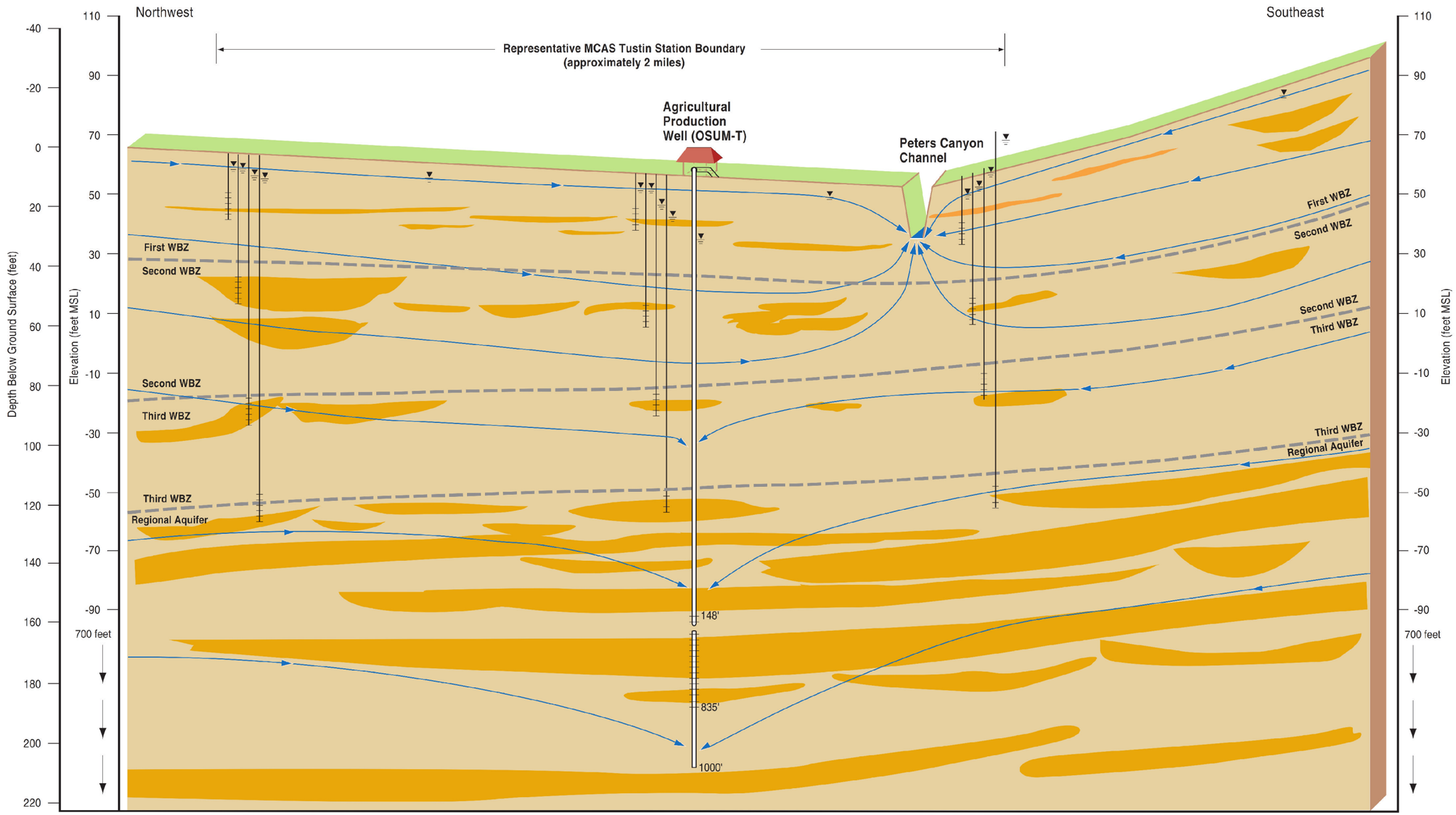

Legend

- Clayey Silt and Clay
- Silty Sand and Sand
- Water Level
- Groundwater Flow Direction
- Monitoring Well
- Production Well

Acronyms/Abbreviations:

MSL mean sea level
WBZ water-bearing zone

PROJECT: 5023-14-6087 **DATE:** October 2016 **DRAWN BY:** CAB **CHECKED BY:** KR		Notes: Cross section is not to Scale. Source: US Department of the Navy. 2004. Final Record of Decision/Remedial Action Plan, Operable Unit 1A, Former Marine Corps Air Station, Tustin, CA. October.	MMEC GROUP	**Former Marine Corps Air Station Tustin, California**	**Generalized Geologic Cross Section** CERCLA Five-Year Review Report Operable Units 1A and 1B North, 1B South, 3, and 4B	**FIGURE** 6

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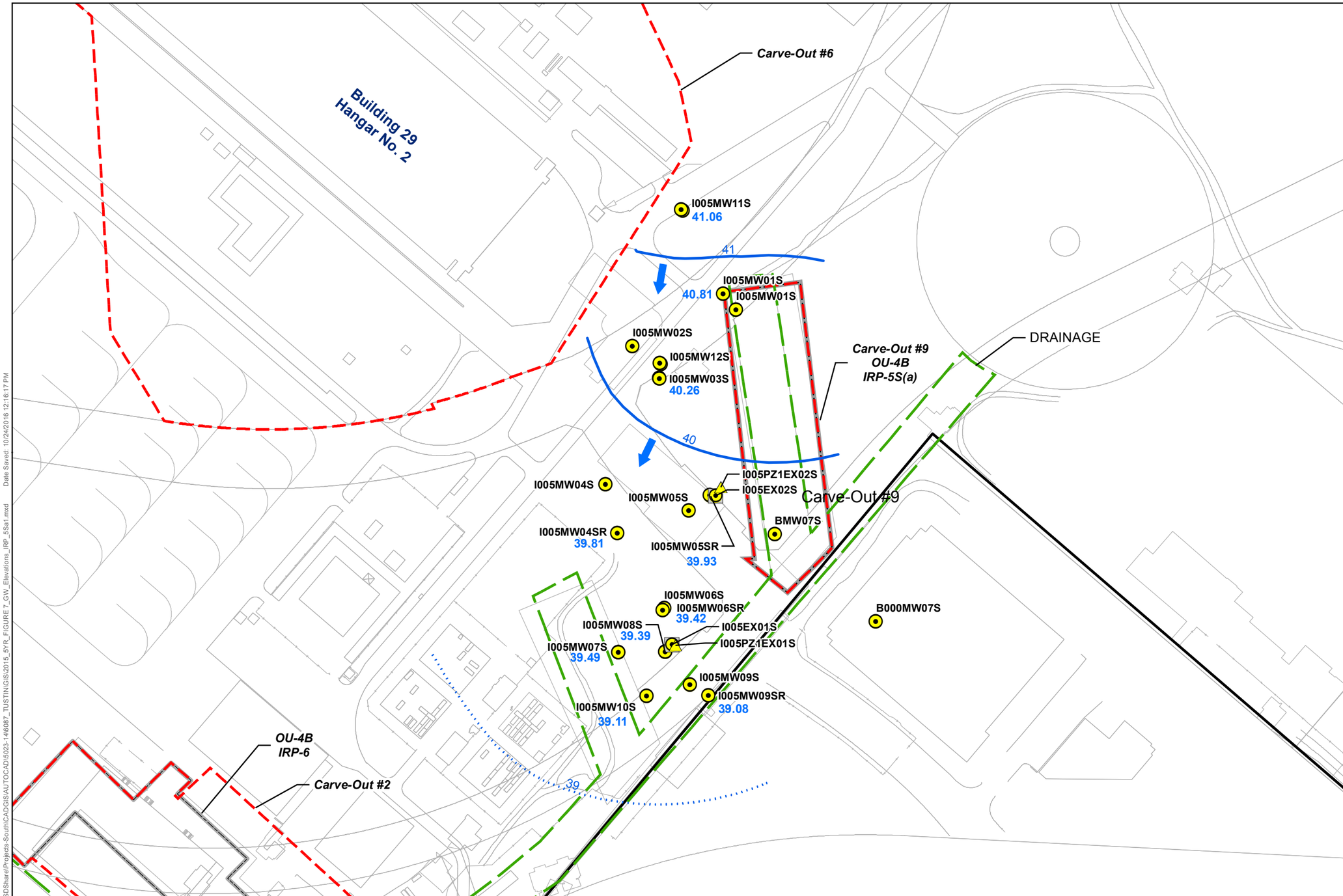

LEGEND

- Observation Well (First WBZ)
- 39.81 Monitoring Well (First WBZ) and Groundwater Level Where Measured
- Extraction Well (First WBZ)
- Former MCAS Tustin Boundary
- Drainage Area No. 1
- IRP Sites
- Carve-Out Area Boundary
- 42 Water Level Elevation Contour in Feet Above Mean Sea Level, May 2015.
- Dotted = Estimated Contour
- Groundwater Flow Direction*, May 2015

NOTES

*Groundwater elevation contours and flow direction modified from: RORE, Inc. 2015a; Final 2015 Semiannual Data Update, Installation Restoration Program Sites 5S(a), 6, and Mingled Plumes Area, Operable Unit 4B, Former Marine Corps Air Station Tustin, Tustin, California. November.

Groundwater contours were based on a larger well data set including wells at surrounding sites (not shown here).

WELL ID SUFFIX

S, SR - First WBZ
D - Second WBZ

ABBREVIATIONS

IRP - Installation Restoration Program
MCAS - Marine Corps Air Station
OU - Operable Unit
WBZ - water bearing zone

PROJECT:	5023-14-6087
DATE:	October 2016
DRAWN BY:	CAB/SB
CHECKED BY:	KR

N

0 200 400
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station Tustin, California

2015 Groundwater Elevations for IRP-5S(a)

CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
7

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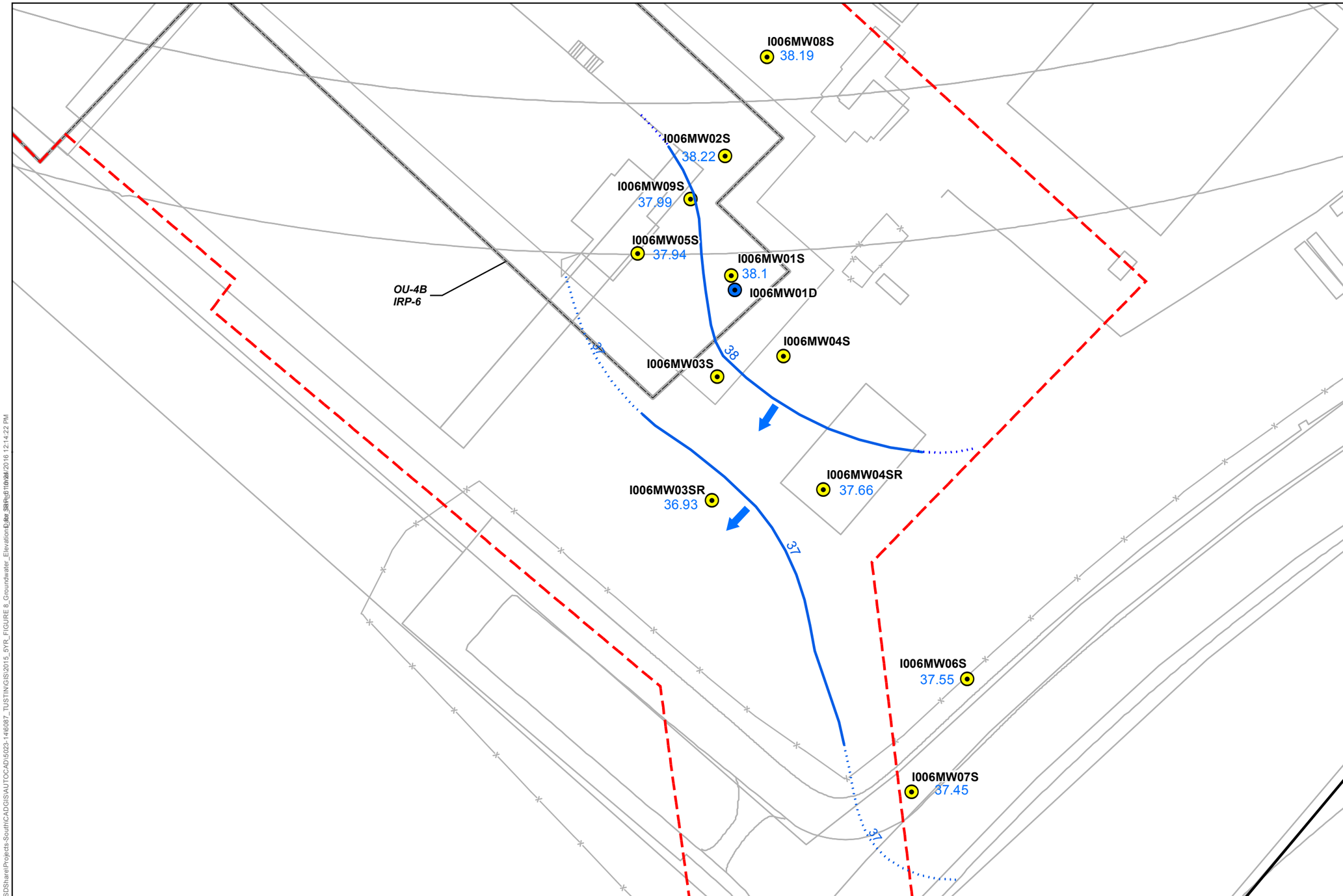

LEGEND

- Monitoring Well (First WBZ) and Groundwater Level Where Measured (37.94)
- Monitoring Well (Second WBZ)
- IRP Sites
- Carve-Out Area #2 Boundary
- Former MCAS Tustin Boundary
- Water Level Elevation Contour in Feet Above Mean Sea Level, May 2015. (38)
- Dotted = Estimated Contour
- Groundwater Flow Direction*, May 2015

NOTES

*Groundwater elevation contours and flow direction modified from: RORE, Inc. 2015a; Final 2015 Semiannual Data Update, Installation Restoration Program Sites 5S(a), 6, and Mingled Plumes Area, Operable Unit 4B, Former Marine Corps Air Station Tustin, Tustin, California. November.

Groundwater contours were based on a larger well data set including wells at surrounding sites (not shown here).

WELL ID SUFFIX

S, SR - First WBZ
D - Second WBZ

ABBREVIATIONS

IRP - Installation Restoration Program
MCAS - Marine Corps Air Station
WBZ - water bearing zone

PROJECT: 5023-14-6087	N	0 60 120 Approximate Scale in Feet	MNEC GROUP	Former Marine Corps Air Station Tustin, California	2015 Groundwater Elevations for IRP- 6
DATE: October 2016					CERCLA Five-Year Review Report Operable Units 1A, 1B North, 1B South, 3, and 4B
DRAWN BY: CAB/SB					FIGURE 8
CHECKED BY: KR					

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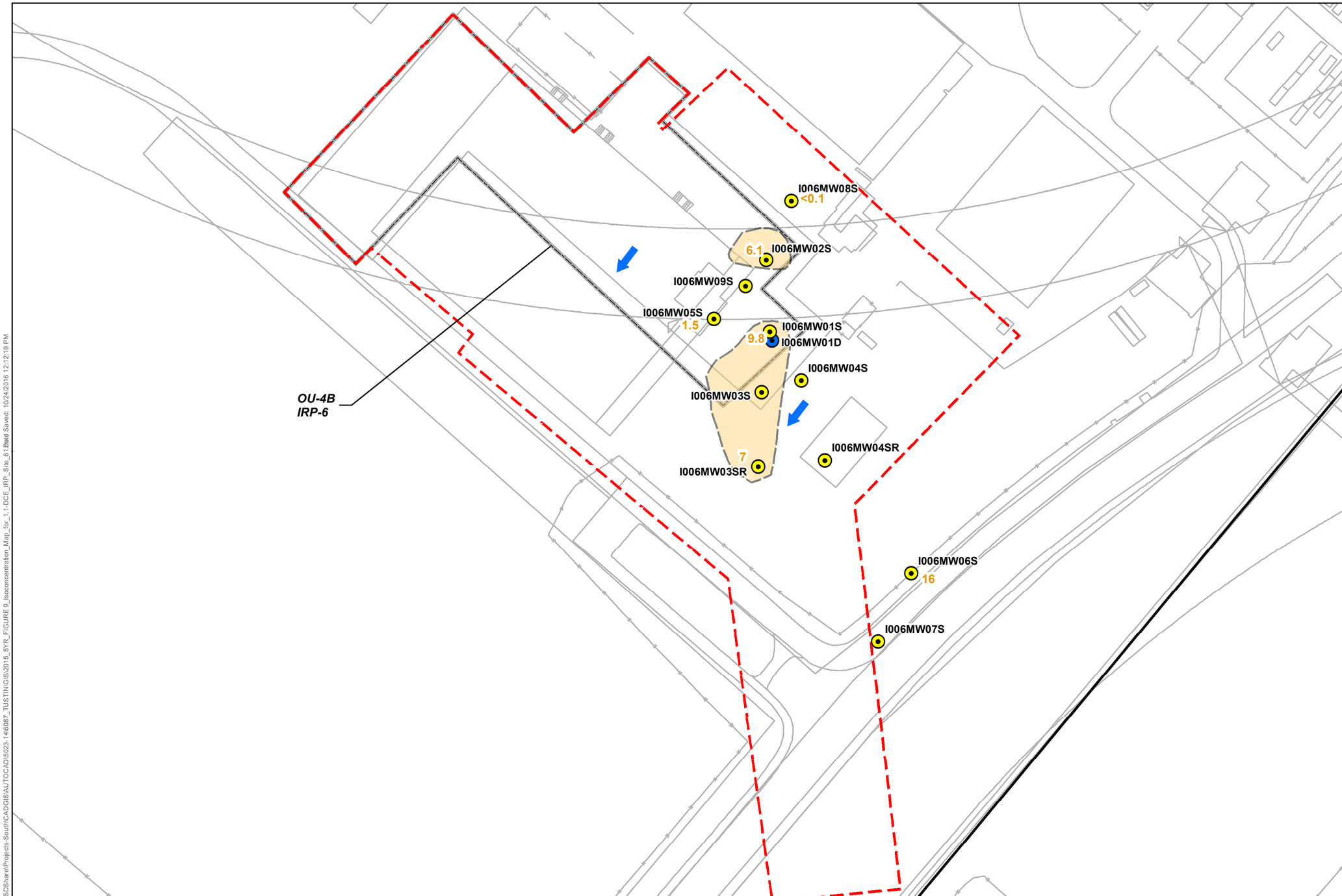

LEGEND

- Monitoring Well (First WBZ)
- Monitoring Well (Second WBZ)
- IRP Sites
- Carve-Out Area #2 Boundary
- 1,1-DCE Plume, 6 µg/L, June 2015*
- Former MCAS Tustin Boundary
- 1.5 — 1,1-DCE concentration (µg/L), June 2015
- Groundwater Flow Direction, May 2015

NOTES

*Source of isoconcentration contours:
RORE, Inc. 2015a; Final 2015 Semiannual Data Update, Installation Restoration Program Sites 5S(a), 6, and Mingled Plumes Area, Operable Unit 4B, Former Marine Corps Air StationTustin, Tustin, California. November.

Plume boundaries show approximate extent of where COC concentrations exceed RGs.
1,1-DCE RG = 6 µg/L

WELL ID SUFFIX

S, SR - First WBZ
D - Second WBZ

ABBREVIATIONS

COC - Contaminant of Concern
DCE - dichloroethene
IRP - Installation Restoration Program
MCAS - Marine Corps Air Station
RG - remediation goal
TCE - trichloroethene
µg/L - micrograms per liter
WBZ - water bearing zone

PROJECT:	5023-14-6087
DATE:	October 2016
DRAWN BY:	CAB/SB
CHECKED BY:	KR

N

0 50 100 200
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station Tustin, California

2015 OU-4B Isoconcentration Map for 1,1-DCE at IRP-6

CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
9

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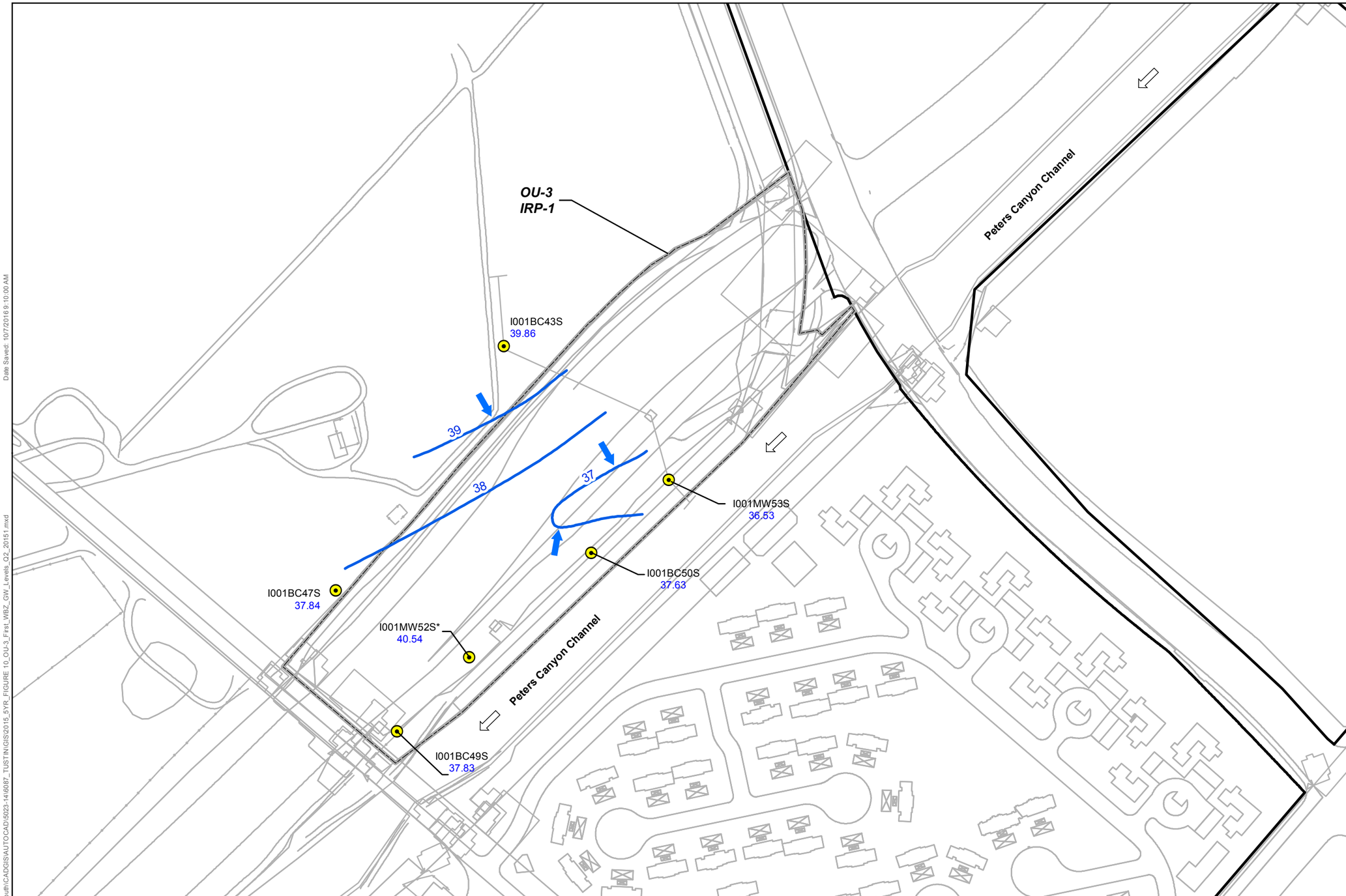

LEGEND

- Monitoring Well (First WBZ) and Groundwater Level Where Measured (39)
- IRP Site Boundary
- Former MCAS Tustin Boundary
- Groundwater Flow Direction, May 2015
- Surface Channel Flow
- Water Level Elevation Contour in Feet Above Mean Sea Level, May 2015. (42)
- * The water level elevation at I001MW52S represents a localized anomaly and was not used for contouring.

NOTE

Source of isoconcentration contours:
MMEC Group, 2016. Draft 2015 Annual Long-term Monitoring Report Operable Unit 3 (OU-3), Installation Restoration Program Site 1 for Former Marine Corps Air Station Tustin, Tustin, California. April.

WELL ID SUFFIX

S, SR - First WBZ

ABBREVIATIONS

OU - Operable Unit
WBZ - Water-Bearing Zone

PROJECT:	5023-14-6087
DATE:	October 2016
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N

0 100 200 400
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station Tustin, California

2015 OU-3 First WBZ Groundwater Elevations

CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
10

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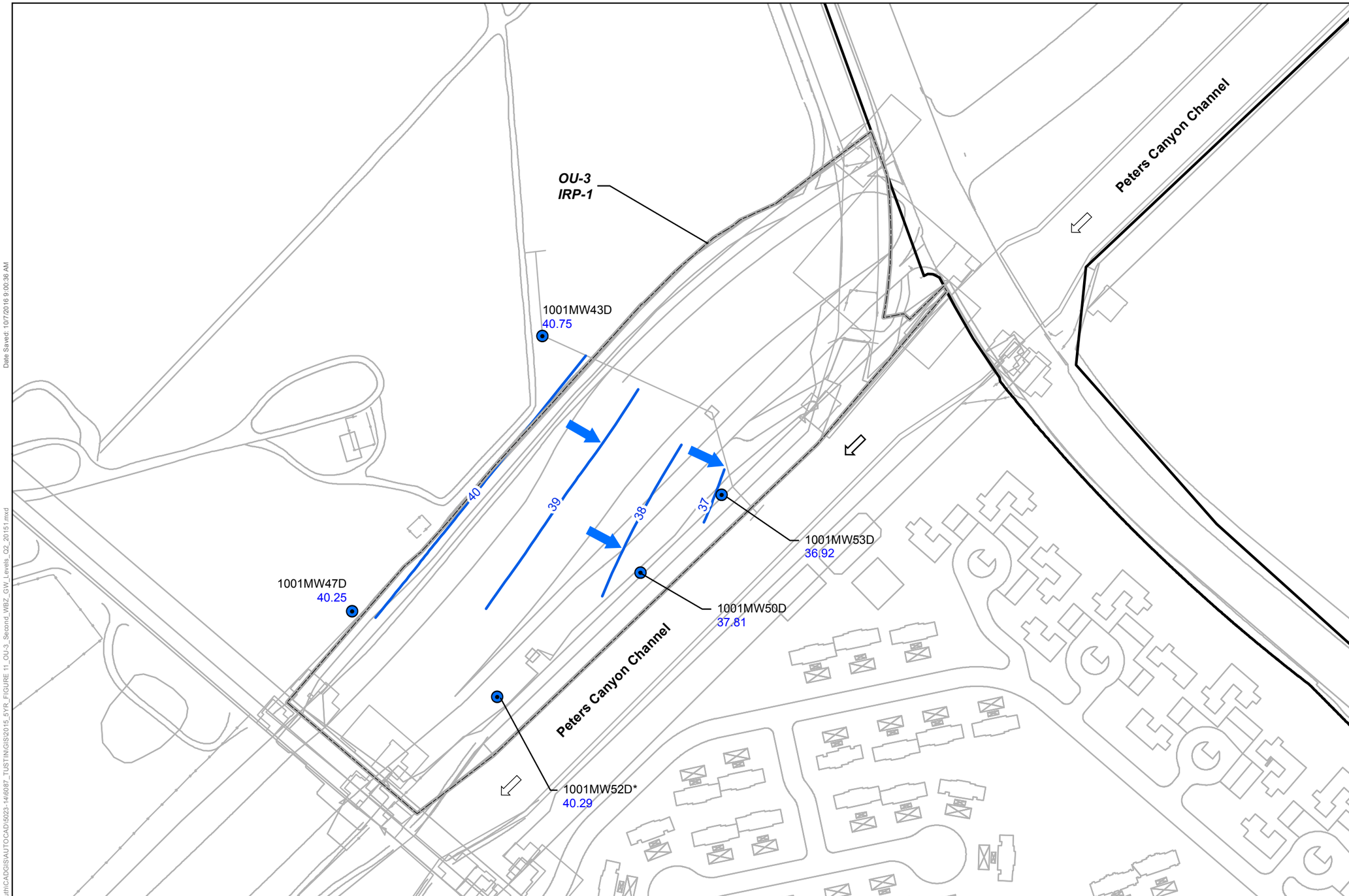

LEGEND

- 40.25 — Monitoring Well (Second WBZ) and Groundwater Level Where Measured
- IRP Site Boundary
- Former MCAS Tustin Boundary
- Groundwater Flow Direction
- Surface Channel Flow
- 40 — Water Level Elevation Contour in Feet Above Mean Sea Level, May 2015.
- Dotted = Estimated Contour
- * The water level elevation at I001MW52D represents a localized anomaly and was not used for contouring.

NOTE

Source of isoconcentration contours:
MMEC Group, 2016. Draft 2015 Annual Long-term Monitoring Report Operable Unit 3 (OU-3), Installation Restoration Program Site 1 for Former Marine Corps Air Station Tustin, Tustin, California. April.

WELL ID SUFFIX

D - Second WBZ

ABBREVIATIONS

OU - Operable Unit
WBZ - Water-Bearing Zone

PROJECT:	5023-14-6087
DATE:	October 2016
DRAWN BY:	CAB
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N

0 200 400
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station Tustin, California

2015 OU-3 Second WBZ Groundwater Elevations

CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
11

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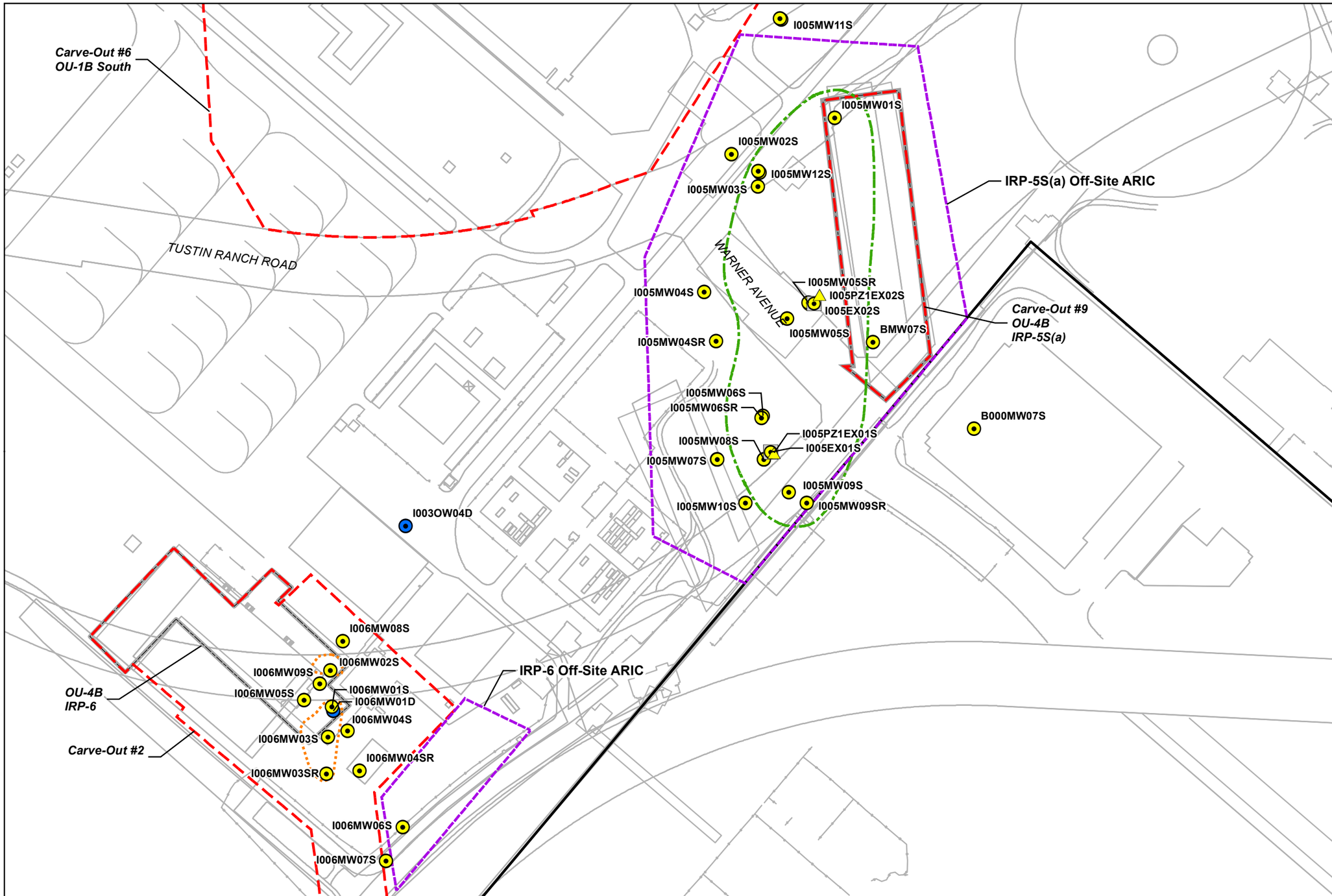

LEGEND

- Observation Well (First WBZ)
- Monitoring Well (First WBZ)
- Monitoring Well (Second WBZ)
- Extraction Well (First WBZ)
- Former MCAS Tustin Boundary
- DCE Plume, 6 µg/L, June 2015
- TCE Plume, 5 µg/L, June 2015
- Carve-Out Area Boundary
- Off-Site ARICs
- IRP Sites

NOTES

*Source of DCE, TCE concentrations and isoconcentration contours:
RORE, 2015; Final 2015 Semiannual Data Update, Installation Restoration Program Sites 5S(a), 6, and Mingled Plumes Area, Operable Unit 4B, Former Marine Corps Air StationTustin, Tustin, California. November.

Plume boundaries show approximate extent of where COC concentrations exceed RGs.
DCE RG = 6 µg/L
TCE RG = 5 µg/L

WELL ID SUFFIX

S, SR - First WBZ
D - Second WBZ

ABBREVIATIONS

ARIC - Area Requiring Institutional Controls
COC - contaminant of concern
DCE - dichloroethene
IRP - Installation Restoration Site
OU - Operable Unit
RG - remediation goal
TCE - trichloroethene
µg/L - micrograms per liter
WBZ - water bearing zone

PROJECT:	5023-14-6087
DATE:	October 2016
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N

0 100 200 300 400
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station
Tustin, California

OU-4B Off-Site ARICs

CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
12

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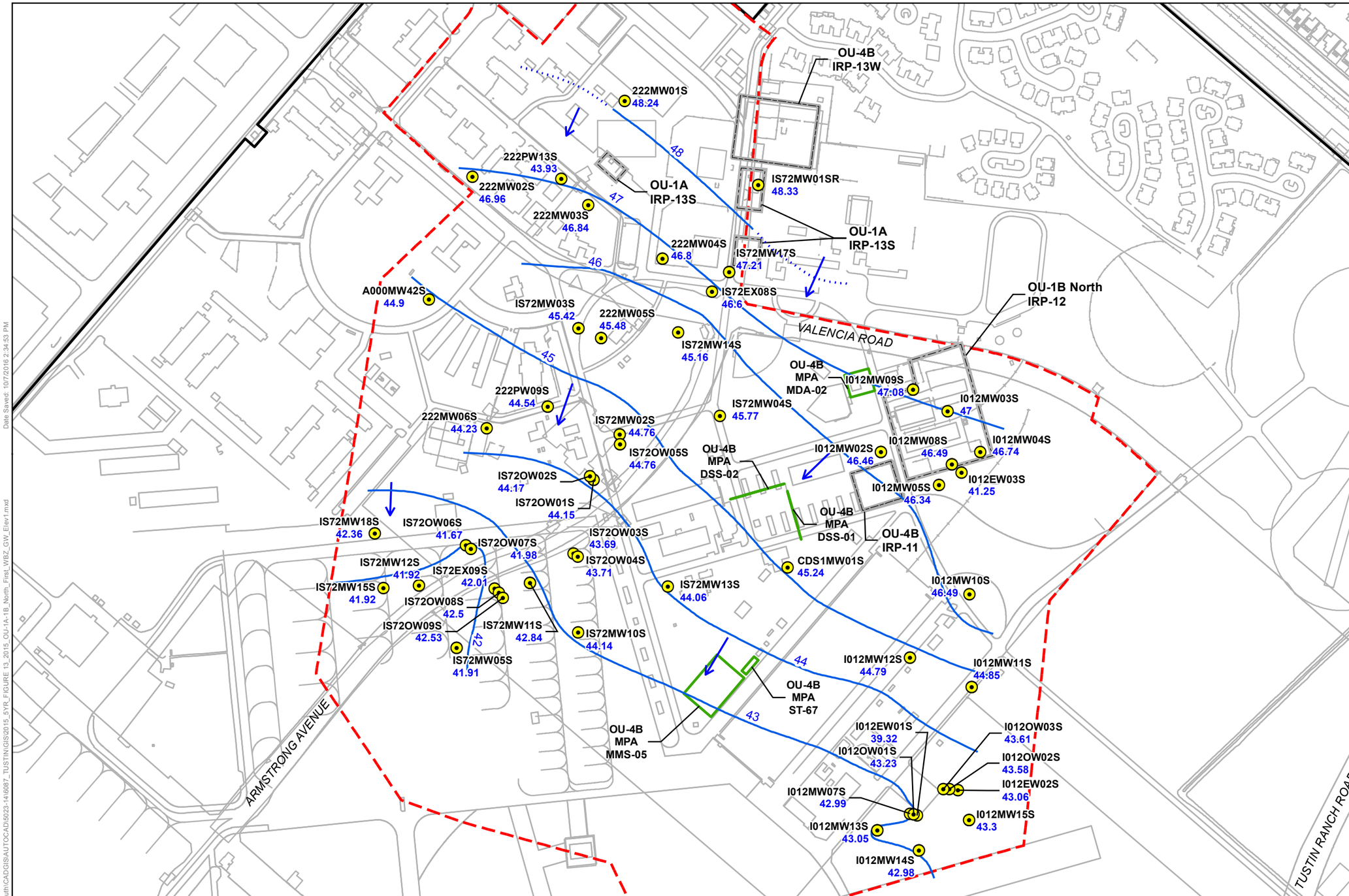

LEGEND

- Monitoring Well (First WBZ) and Groundwater Level Where Measured (42.36)
- Former MCAS Tustin Boundary
- Carve-Out Area #5 Boundary
- Mingled Plumes Area (MPA)
- IRP Sites
- Water Level Elevation Contour in Feet Above Mean Sea Level, October 2015. (42)
- Dotted = Estimated Contour
- Groundwater Flow Direction, October 2015

NOTES

Source:
MMEC Group 2016. Draft Annual Performance Evaluation Groundwater Remedy at OUs 1A (IRP-13S) and 1B (IRP-12), Former Marine Corps Air Station Tustin, Tustin, California. June.

Groundwater level measurements from operating extraction wells were not used to create groundwater elevation contours.

WELL ID SUFFIX

S, SR - First WBZ

ABBREVIATIONS

DSS - Disposal Sanitary Sewer
IRP - Installation Restoration Program
MDA - Miscellaneous, Potential Disposal Area
MMS - Miscellaneous, Major Spill
OU - Operable Unit
ST - Storage, Temporary
WBZ - Water-Bearing Zone

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N

0 400 800
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station Tustin, California

2015 OU-1A/OU-1B North First WBZ Groundwater Elevations

CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
13

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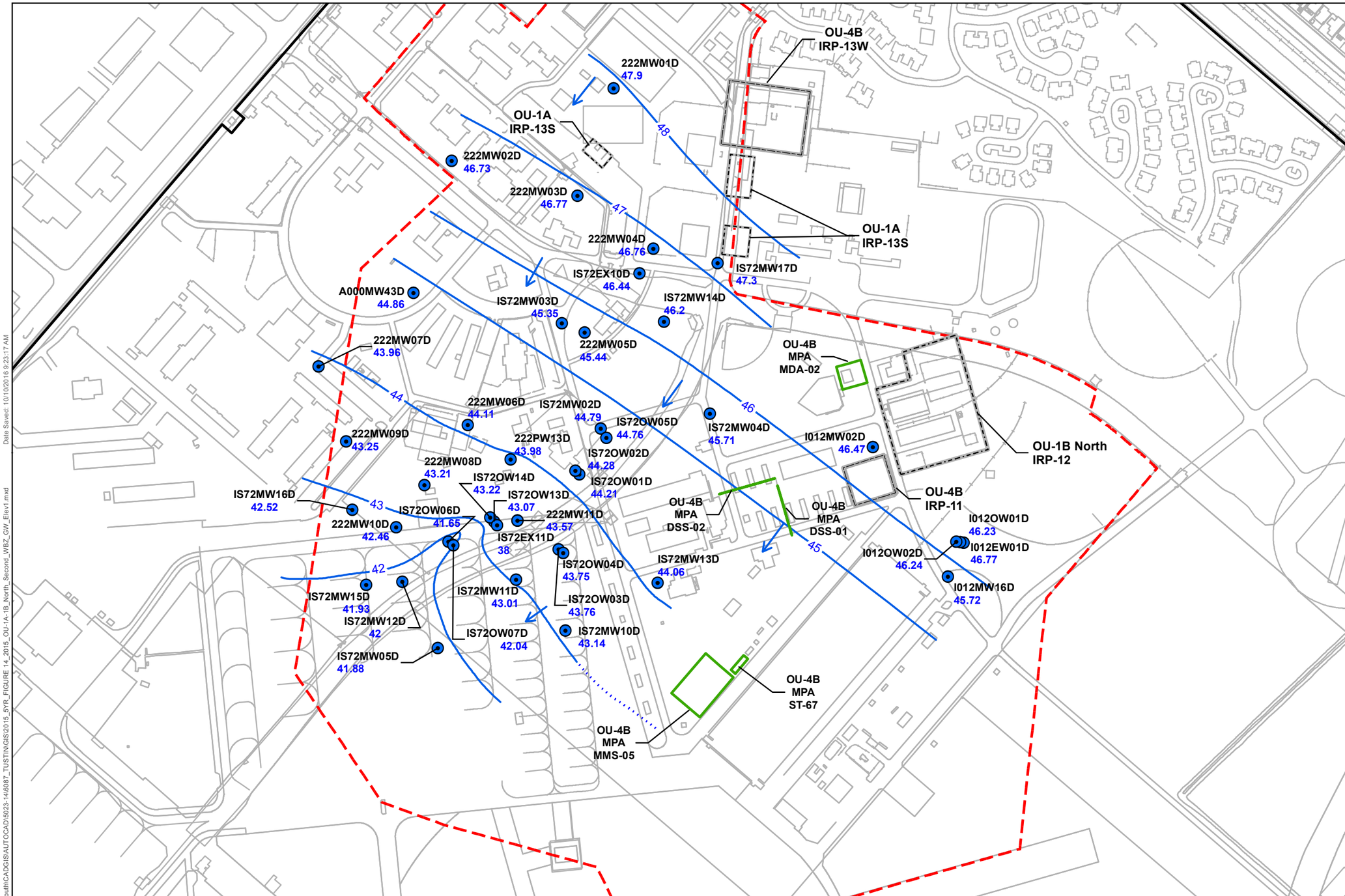

LEGEND

- Monitoring Well (Second WBZ) and Groundwater Level Where Measured (39.81)
- Former MCAS Tustin Boundary
- Mingled Plumes Area (MPA)
- Carve-Out Area #5 Boundary
- IRP Sites
- Water Level Elevation Contour in Feet Above Mean Sea Level, October 2015. (42)
- Dotted = Estimated Contour
- Groundwater Flow Direction, October 2015

NOTES

Source:
MMEC Group 2016. Draft Annual Performance Evaluation Groundwater Remedy at OUs 1A (IRP-13S) and 1B (IRP-12), Former Marine Corps Air Station Tustin, Tustin, California. June.

Groundwater level measurements from operating extraction wells were not used to create groundwater elevation contours.

WELL ID SUFFIX

D - Second WBZ

ABBREVIATIONS

DSS - Disposal Sanitary Sewer
IRP - Installation Restoration Program
MDA - Miscellaneous, Potential Disposal Area
MMS - Miscellaneous, Major Spill
OU - Operable Unit
ST - Storage, Temporary
WBZ - Water-Bearing Zone

PROJECT:	5023-14-6087
DATE:	October 2016
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N

0 400 800
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station Tustin, California

2015 OU-1A/OU-1B North Second WBZ Groundwater Elevations

CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
14

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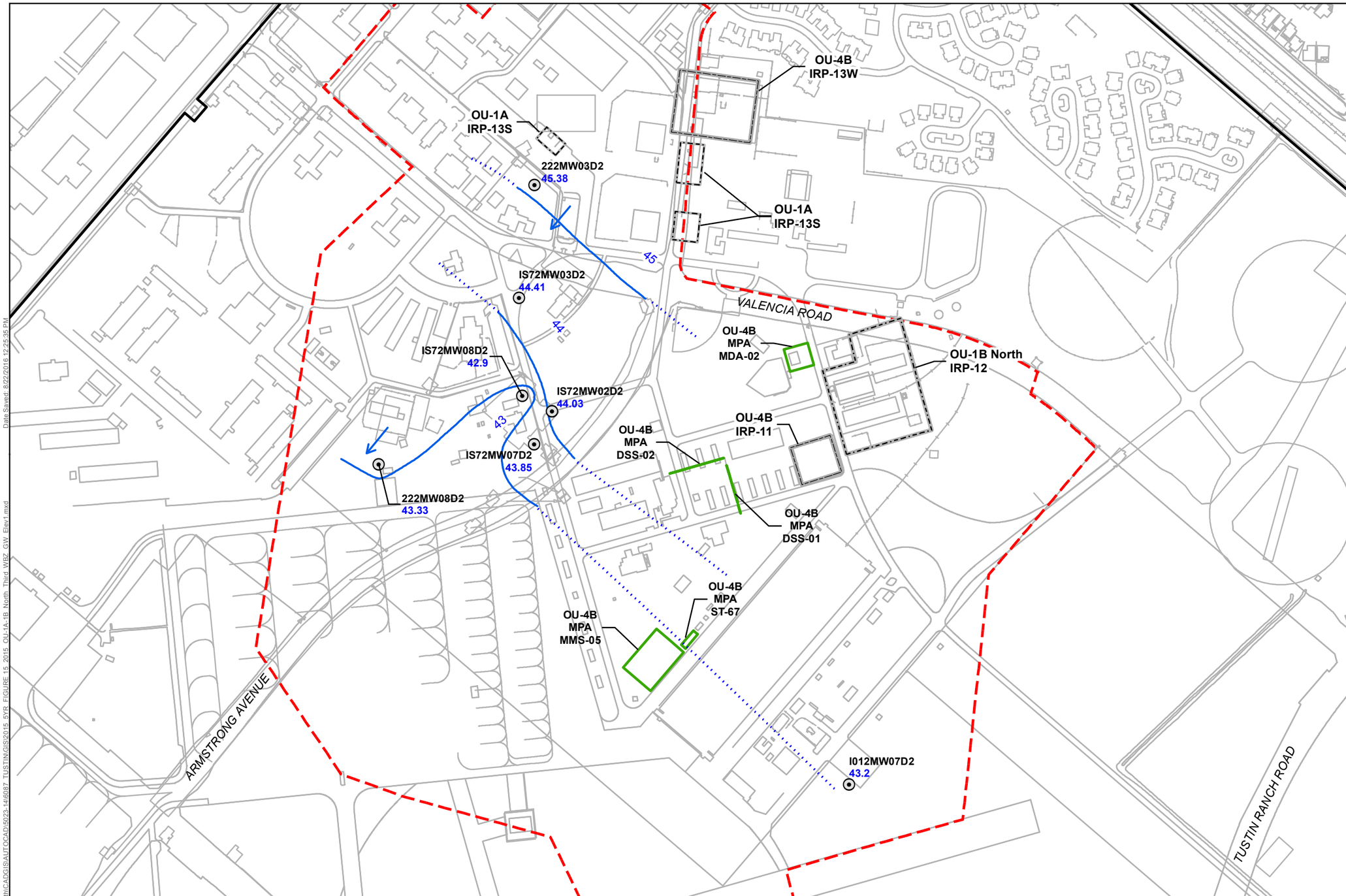

LEGEND

- 43.33 — Monitoring Well (Third WBZ) and Groundwater Level Where Measured
- Former MCAS Tustin Boundary
- Mingled Plumes Area (MPA)
- Carve-Out Area #5 Boundary
- IRP Sites
- 42 — Water Level Elevation Contour in Feet Above Mean Sea Level, October 2015.
- Dotted = Estimated Contour
- Groundwater Flow Direction, October 2015

NOTES

Source:
MMEC Group 2016. Draft Annual Performance Evaluation Groundwater Remedy at OUs 1A (IRP-13S) and 1B (IRP-12), Former Marine Corps Air Station Tustin, Tustin, California. June.

Groundwater level measurements from operating extraction wells were not used to create groundwater elevation contours.

WELL ID SUFFIX

D2 - Third WBZ

ABBREVIATIONS

DSS - Disposal Sanitary Sewer
IRP - Installation Restoration Program
MDA - Miscellaneous, Potential Disposal Area
MMS - Miscellaneous, Major Spill
OU - Operable Unit
ST - Storage, Temporary
WBZ - Water-Bearing Zone

PROJECT:	5023-14-6087
DATE:	October 2016
DRAWN BY:	CAB / SB
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N

0 400 800
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station Tustin, California

2015 OU-1A/OU-1B North Third WBZ Groundwater Elevations

CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
15

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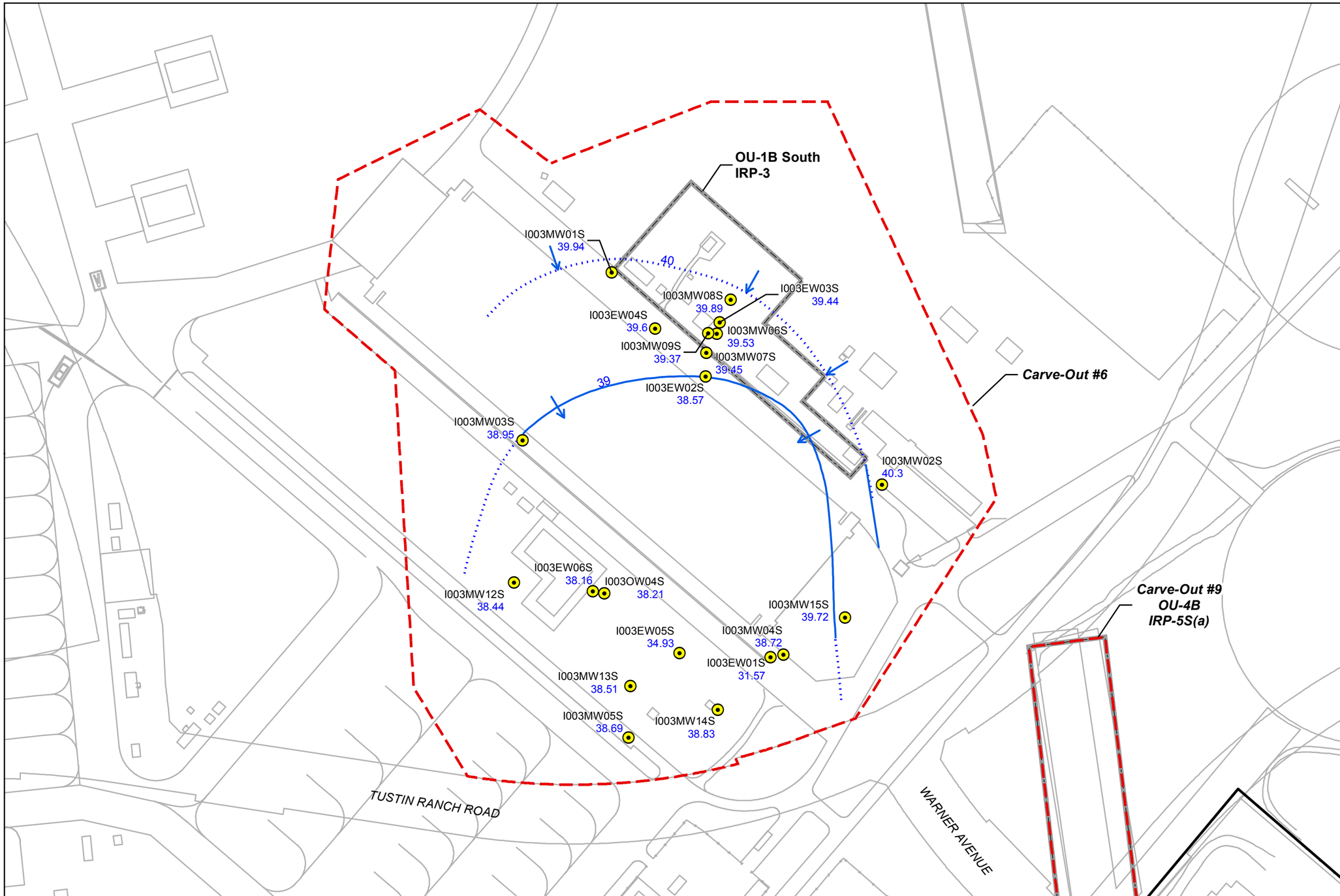

LEGEND

- 38.44 — Monitoring Well (First WBZ)
- IRP Site Boundary
- Carve-Out Area Boundary
- Former MCAS Tustin Boundary
- 42 — Water Level Elevation Contour in Feet Above Mean Sea Level, October 2015.
- Dotted = Estimated Contour
- Groundwater Flow Direction, October 2015

NOTES

Source:
MMEC Group 2016. Draft Annual Performance Evaluation Groundwater Remedy at OUs 1A (IRP-13S) and 1B (IRP-12), Former Marine Corps Air Station Tustin, Tustin, California. June.

Groundwater level measurements from operating extraction wells were not used to create groundwater elevation contours.

WELL ID SUFFIX

S - First WBZ

ABBREVIATIONS

IRP - Installation Restoration Program
OU - Operable Unit
WBZ - Water-Bearing Zone

PROJECT:	5023-14-6087
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N

0 200 400
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station Tustin, California

2015 OU-1B South First WBZ Groundwater Elevations
CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
16

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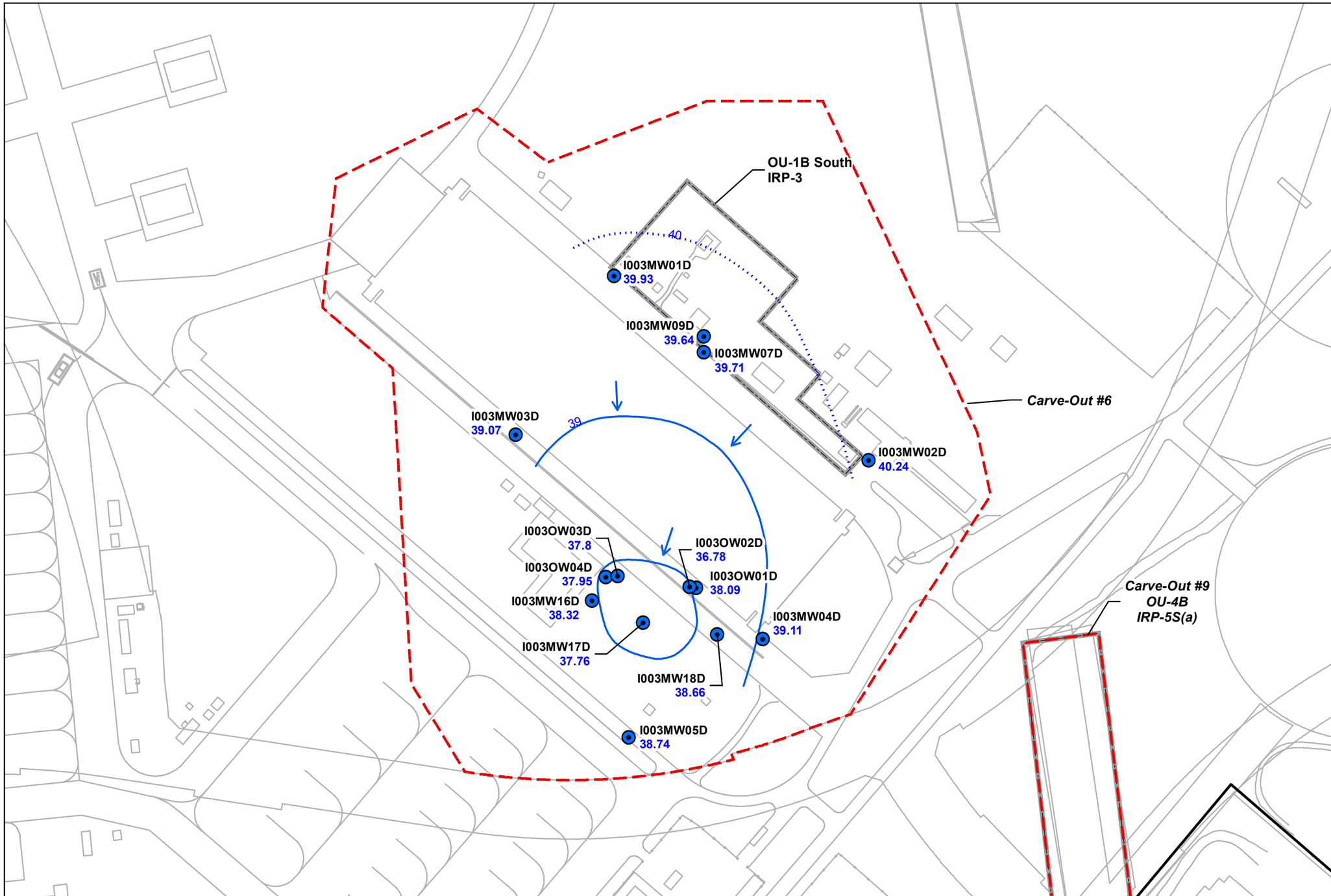

LEGEND

- 39.07 — Monitoring Well (Second WBZ) and Groundwater Level Where Measured
- Former MCAS Tustin Boundary
- IRP Site Boundary
- Carve-Out Area Boundary
- 40 — Water Level Elevation Contour in Feet Above Mean Sea Level, October 2015.
- Dotted = Estimated Contour
- Groundwater Flow Direction, October 2015

NOTE

Source:
MMEC Group 2016. Draft Annual Performance Evaluation Groundwater Remedy at OUs 1A (IRP-13S) and 1B (IRP-12), Former Marine Corps Air Station Tustin, Tustin, California. June.

WELL ID SUFFIX

D - Second WBZ

ABBREVIATIONS

IRP - Installation Restoration Program
OU - Operable Unit
WBZ - Water-Bearing Zone

PROJECT: 5023-14-6087	N	0 200 400 Approximate Scale in Feet	MMEC GROUP	Former Marine Corps Air Station Tustin, California	2015 OU-1B South Second WBZ Groundwater Elevations CERCLA Five-Year Review Report Operable Units 1A, 1B North, 1B South, 3, and 4B	FIGURE 17
DATE: October 2016						
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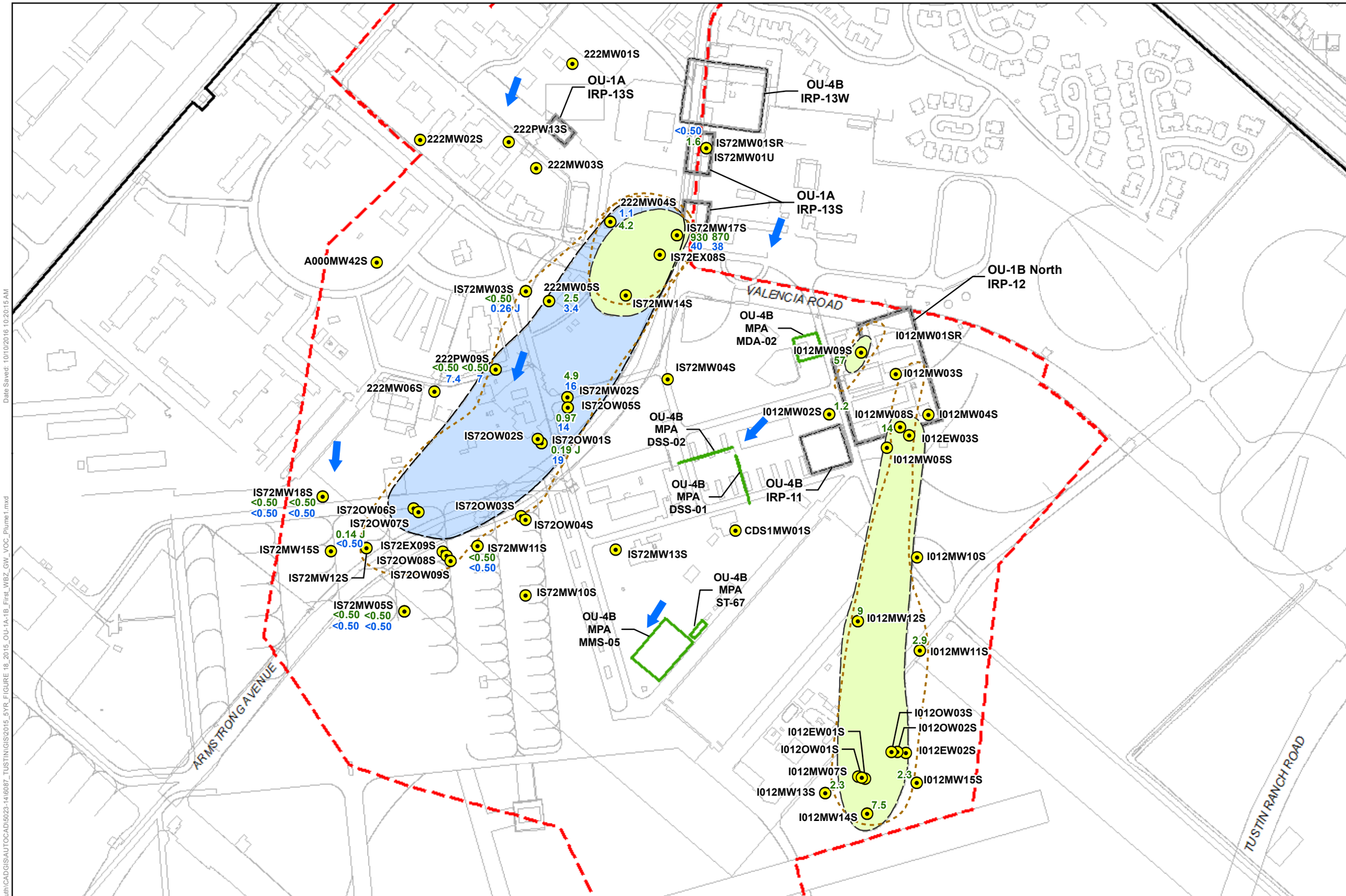

LEGEND

- Monitoring Well (First WBZ)
- Former MCAS Tustin Boundary
- Carve-Out Area #5 Boundary
- TCE Plume, >5 µg/L, November 2015
- TCP Plume, >0.5 µg/L, November 2015
- VOC Plume (TCE and TCP); October 2010 (Source: 2011 Five Year Review Report)
- Mingled Plumes Area (MPA)
- IRP Sites
- 2.5 TCE concentration (µg/L), November 2015
- 7.4 TCP concentration (µg/L), November 2015
- Groundwater Flow Direction, October 2015

NOTES

Sources:
1. Navy 2011. Final CERCLA Five-year Review, Operable Units 1A, 1B North, 1B South, and 3 (Instalation Program Sites 13S, 12, 3, and 1), Former Marine Corps Air Station, Tustin, California. October.
2. MMEC 2016. Draft Annual Performance Evaluation Groundwater Remedy at OUs 1A (IRP-13S) and 1B (IRP-12), Former Marine Corps Air Station Tustin, Tustin, California. June.

Plume boundaries show approximate extent of where COC concentrations exceed RGs.
TCE RG = 5 µg/L
TCP RG = 0.5 µg/L

WELL ID SUFFIX

S, SR - First WBZ

ABBREVIATIONS

COC - Contaminant of Concern
DSS - Disposal Sanitary Sewer
IRP - Installation Restoration Program
MDA - Miscellaneous, Potential Disposal Area
MMS - Miscellaneous, Major Spill
OU - Operable Unit
RG - remediation goal
TCE – trichloroethene
TCP – trichloropropane
ST - Storage, Temporary
µg/L - micrograms per liter
VOC - volatile organic compound
WBZ - Water-Bearing Zone

PROJECT:	5023-14-6087
DATE:	October 2016
DRAWN BY:	CAB/SB
CHECKED BY:	KR

N

0 400 800
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station Tustin, California

OU-1A/OU-1B North First WBZ VOC Plume Boundaries 2010 - 2015

CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
18

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Document Path: P:\Projects-South\CADGIS\AUTOCAD\5023-14\6087_TUSTIN\GIS\2015_5YR_FIGURE 18_2015_OU-1A-1B_First_WBZ_GW_VOC_Plume1.mxd

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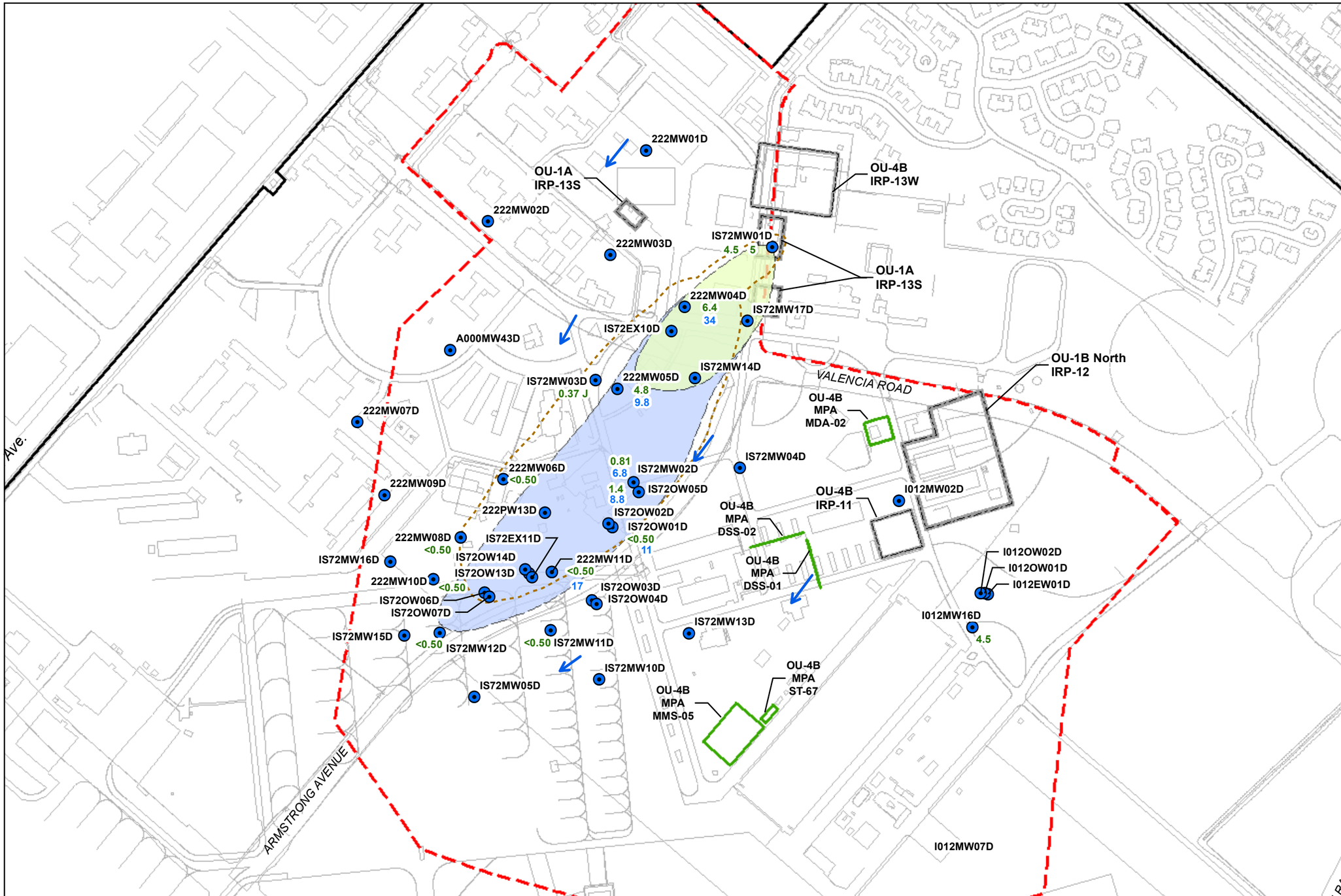

LEGEND

- Monitoring Well (Second WBZ)
- Former MCAS Tustin Boundary
- Groundwater Flow Direction, October 2015
- Carve-Out Area #5 Boundary
- TCE Plume, >5 µg/L, November 2015
- TCP Plume, >0.5 µg/L, November 2015
- VOC Plume (TCE and TCP); October 2010 (Source: 2011 Five Year Review Report)
- Mingled Plumes Area (MPA)
- IRP Sites
- 0.37 TCE concentration (µg/L), November 2015
- 17 TCP concentration (µg/L), November 2015

NOTE

Sources:
1. Navy 2011. Final CERCLA Five-year Review, Operable Units 1A, 1B North, 1B South, and 3 (Instalation Program Sites 13S, 12, 3, and 1), Former Marine Corps Air Station, Tustin, California. October.
2. MMEC 2016. Draft Annual Performance Evaluation Groundwater Remedy at OUs 1A (IRP-13S) and 1B (IRP-12), Former Marine Corps Air Station Tustin, Tustin, California. June.

Plume boundaries show approximate extent of where COC concentrations exceed RGs.
TCE RG = 5 µg/L
TCP RG = 0.5 µg/L

WELL ID SUFFIX

D - Second WBZ

ABBREVIATIONS

COC - Contaminant of Concern
DSS - Disposal Sanitary Sewer
IRP - Installation Restoration Program
MDA - Miscellaneous, Potential Disposal Area
MMS - Miscellaneous, Major Spill
OU - Operable Unit
RG - remediation goal
TCE – trichloroethene
TCP – trichloropropane
ST - Storage, Temporary
µg/L - micrograms per liter
VOC - volatile organic compound
WBZ - Water-Bearing Zone

PROJECT:	5023-14-6087
DATE:	October 2016
DRAWN BY:	CAB/SB
CHECKED BY:	KR

N

0 400 800
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station Tustin, California

OU-1A/1B North Second WBZ VOC Plume Boundaries 2010-2015

CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
19

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Document Path: P:\Projects-South\CAD\GIS\AUTOCAD\5023-14\6087_TUSTIN\GIS\2015_5YR_FIGURE 19_2015_OU-1A-1B_Second_WBZ_GW_VOC_Plume1.mxd

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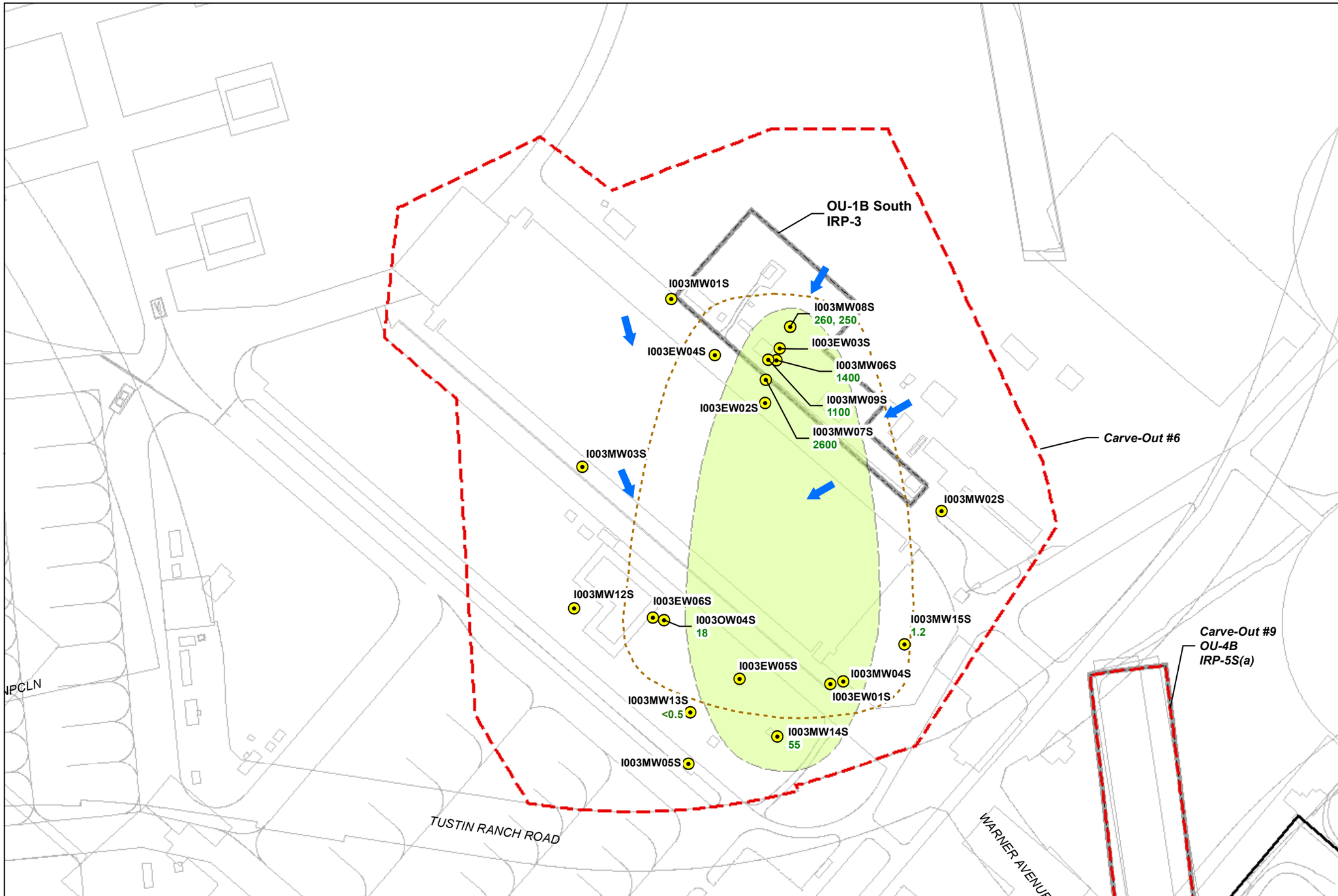

LEGEND

- Monitoring Well (First WBZ)
- Former MCAS Tustin Boundary
- TCE Plume, >5 µg/L, November 2015
- TCE Plume; October 2010 (Source: 2011 Five Year Review Report)
- IRP Site Boundary
- Carve-Out Area Boundary
- 18 TCE concentration (µg/L), November 2015
- Groundwater Flow Direction, October 2015

NOTE

Sources:
1. Navy 2011. Final CERCLA Five-year Review, Operable Units 1A, 1B North, 1B South, and 3 (Instalation Program Sites 13S, 12, 3, and 1), Former Marine Corps Air Station, Tustin, California. October.
2. MMEC 2016. Draft Annual Performance Evaluation Groundwater Remedy at OUs 1A (IRP-13S) and 1B (IRP-12), Former Marine Corps Air Station Tustin, Tustin, California. June.

Plume boundaries show approximate extent of where COC concentrations exceed RGs.
TCE RG = 5 µg/L

WELL ID SUFFIX

S - First WBZ

ABBREVIATIONS

COC - Contaminant of Concern
IRP - Installation Restoration Program
OU - Operable Unit
RG - remediation goal
TCE - trichloroethene
µg/L - micrograms per liter
VOC - volatile organic compound
WBZ - Water-Bearing Zone

PROJECT:	5023-14-6087
DATE:	October 2016
DRAWN BY:	CAB / SB
CHECKED BY:	KR

N

0 200 400
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station
Tustin, California

OU-1B South First WBZ
VOC Plume Boundaries 2010-2015

CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
20

Document Path: P:\Projects-South\CAD\GIS\AUTOCAD\5023-14\6087_TUSTIN\GIS\2015_5YR_FIGURE 20_OU-1B_South_FirstWBZ_GW_VOC_Plume1.mxd
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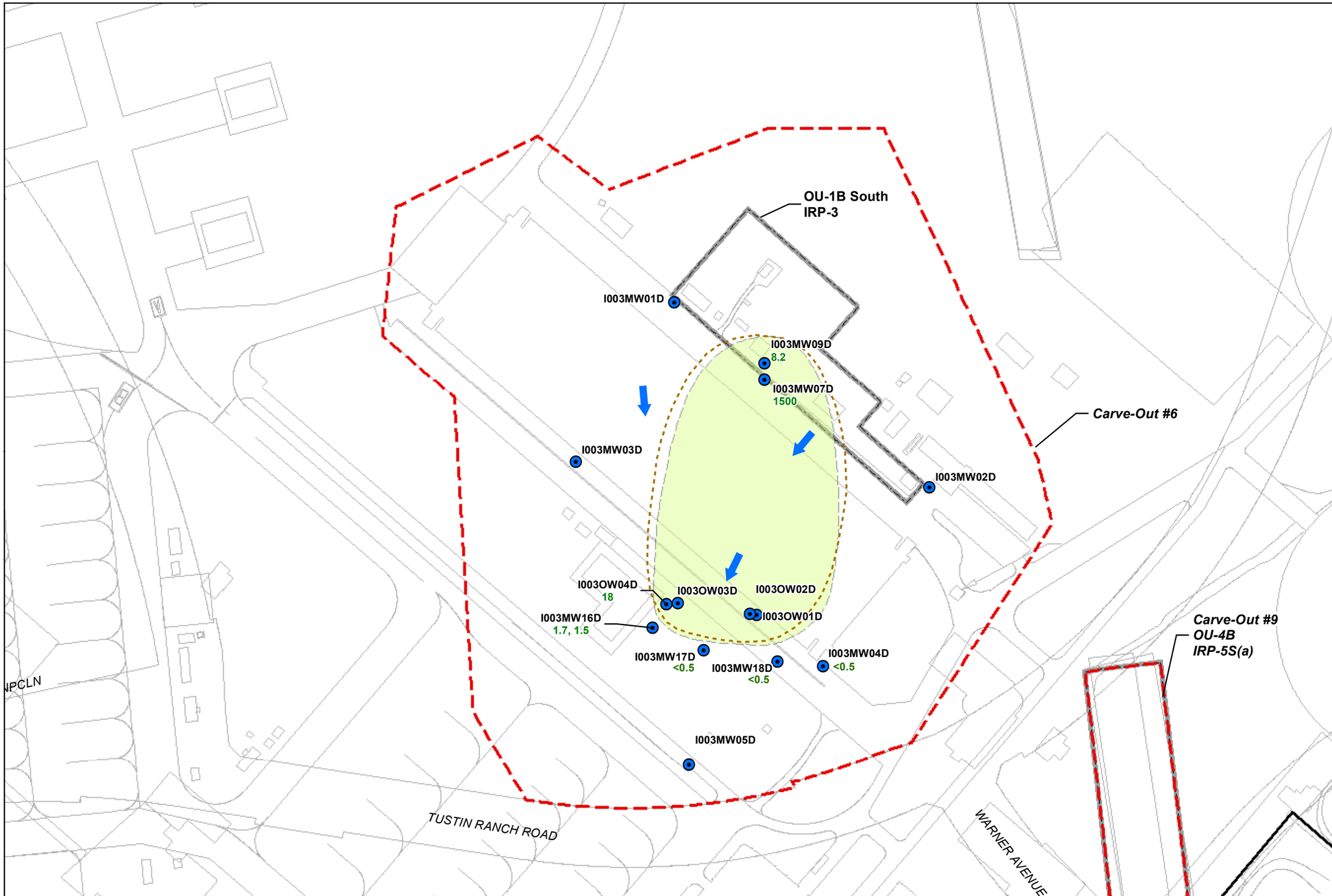

LEGEND

- Monitoring Well (Second WBZ)
- Former MCAS Tustin Boundary
- TCE Plume, >5 µg/L, November 2015
- TCE Plume; October 2010 (Source: 2011 Five Year Review Report)
- IRP Site Boundary
- Carve-Out Area Boundary
- 1.7 TCE concentration (µg/L), November 2015
- Groundwater Flow Direction, October 2015

NOTE

Sources:
1. Navy 2011. Final CERCLA Five-year Review, Operable Units 1A, 1B North, 1B South, and 3 (Instalation Program Sites 13S, 12, 3, and 1), Former Marine Corps Air Station, Tustin, California. October.
2. MMEC 2016. Draft 2015 Annual Performance Evaluation Groundwater Remedy at OUs 1A (IRP-13S) and 1B (IRP-12), Former Marine Corps Air Station Tustin, Tustin, California. June.

Plume boundaries show approximate extent of where COC concentrations exceed RGs.
TCE RG = 5 µg/L

WELL ID SUFFIX

D - Second WBZ

ABBREVIATIONS

COC - Contaminant of Concern
IRP - Installation Restoration Program
OU - Operable Unit
RG - remediation goal
TCE - trichloroethene
µg/L - micrograms per liter
VOC - volatile organic compound
WBZ - Water-Bearing Zone

PROJECT:	5023-14-6087
DATE:	October 2016
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N

0 200 400
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station
Tustin, California

OU-1B South Second WBZ
VOC Plume Boundaries 2010-2015

CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
21

Document Path: P:\Projects-South\CADGIS\AUTOCAD\5023-14\6087_TUSTIN\GIS\2015_5YR_FIGURE 21_OU-1B_South_SecondWBZ_GW_VOC_Plume1.mxd
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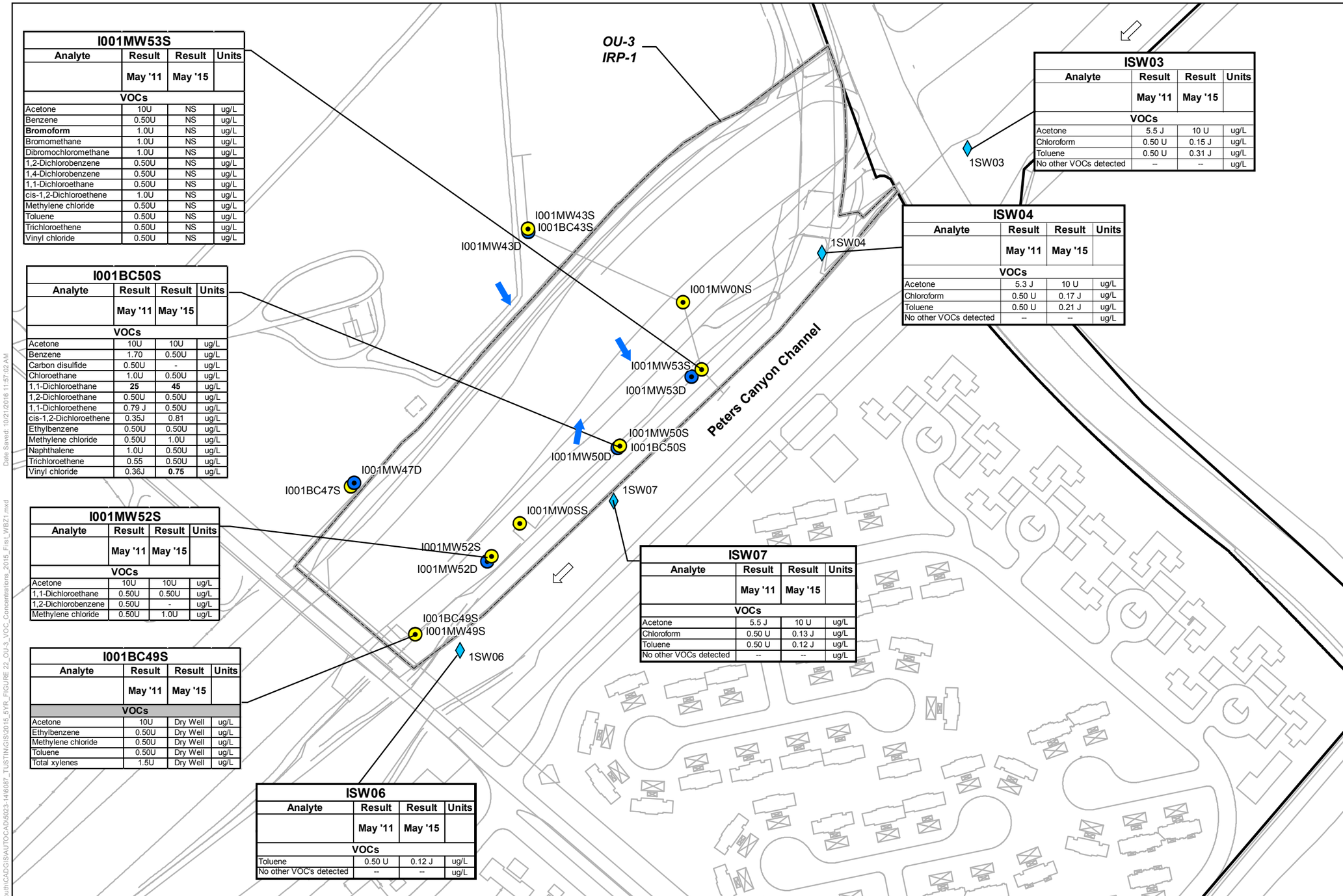

I001MW53S			
Analyte	Result	Result	Units
	May '11	May '15	
VOCs			
Acetone	10U	NS	ug/L
Benzene	0.50U	NS	ug/L
Bromoform	1.0U	NS	ug/L
Bromomethane	1.0U	NS	ug/L
Dibromochloromethane	1.0U	NS	ug/L
1,2-Dichlorobenzene	0.50U	NS	ug/L
1,4-Dichlorobenzene	0.50U	NS	ug/L
1,1-Dichloroethane	0.50U	NS	ug/L
cis-1,2-Dichloroethene	1.0U	NS	ug/L
Methylene chloride	0.50U	NS	ug/L
Toluene	0.50U	NS	ug/L
Trichloroethene	0.50U	NS	ug/L
Vinyl chloride	0.50U	NS	ug/L

I001BC50S			
Analyte	Result	Result	Units
	May '11	May '15	
VOCs			
Acetone	10U	10U	ug/L
Benzene	1.70	0.50U	ug/L
Carbon disulfide	0.50U	-	ug/L
Chloroethane	1.0U	0.50U	ug/L
1,1-Dichloroethane	**25**	**45**	ug/L
1,2-Dichloroethane	0.50U	0.50U	ug/L
1,1-Dichloroethene	0.79 J	0.50U	ug/L
cis-1,2-Dichloroethene	0.35J	0.81	ug/L
Ethylbenzene	0.50U	0.50U	ug/L
Methylene chloride	0.50U	1.0U	ug/L
Naphthalene	1.0U	0.50U	ug/L
Trichloroethene	0.55	0.50U	ug/L
Vinyl chloride	0.36J	**0.75**	ug/L

I001MW52S			
Analyte	Result	Result	Units
	May '11	May '15	
VOCs			
Acetone	10U	10U	ug/L
1,1-Dichloroethane	0.50U	0.50U	ug/L
1,2-Dichlorobenzene	0.50U	-	ug/L
Methylene chloride	0.50U	1.0U	ug/L

I001BC49S			
Analyte	Result	Result	Units
	May '11	May '15	
VOCs			
Acetone	10U	Dry Well	ug/L
Ethylbenzene	0.50U	Dry Well	ug/L
Methylene chloride	0.50U	Dry Well	ug/L
Toluene	0.50U	Dry Well	ug/L
Total xylenes	1.5U	Dry Well	ug/L

ISW03			
Analyte	Result	Result	Units
	May '11	May '15	
VOCs			
Acetone	5.5 J	10 U	ug/L
Chloroform	0.50 U	0.15 J	ug/L
Toluene	0.50 U	0.31 J	ug/L
No other VOCs detected	--	--	ug/L

ISW04			
Analyte	Result	Result	Units
	May '11	May '15	
VOCs			
Acetone	5.3 J	10 U	ug/L
Chloroform	0.50 U	0.17 J	ug/L
Toluene	0.50 U	0.21 J	ug/L
No other VOCs detected	--	--	ug/L

ISW07			
Analyte	Result	Result	Units
	May '11	May '15	
VOCs			
Acetone	5.5 J	10 U	ug/L
Chloroform	0.50 U	0.13 J	ug/L
Toluene	0.50 U	0.12 J	ug/L
No other VOCs detected	--	--	ug/L

ISW06			
Analyte	Result	Result	Units
	May '11	May '15	
VOCs			
Toluene	0.50 U	0.12 J	ug/L
No other VOC's detected	--	--	ug/L

LEGEND

- Surface Monitoring Point
- Monitoring Well (First WBZ)
- Monitoring Well (Second WBZ)
- IRP SIte Boundary
- Former MCAS Tustin Boundary
- Groundwater Flow Direction, May 2015
- Surface Channel Flow

NOTE
Bold value = Remediation Goal exceedance

Source:
MMEC Group, 2016. Draft 2015 Annual Long-term Monitoring Report Operable Unit 3 (OU-3), Installation Restoration Program Site 1 for Former Marine Corps Air Station Tustin, Tustin, California. April.

WELL ID SUFFIX

S - First WBZ

ABBREVIATIONS

NS - not sampled
J = estimated result
OU - Operable Unit
U = not detected at the reporting limit
µg/L - micrograms per liter
VOCs - volatile organic compounds
WBZ - Water-Bearing Zone

PROJECT: 5023-14-6087
DATE: October 2016
DRAWN BY: CAB/SB
CHECKED BY: KR

N

0 200 400
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station Tustin, California

OU-3 VOC Concentrations First WBZ , 2011-2015
CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
22

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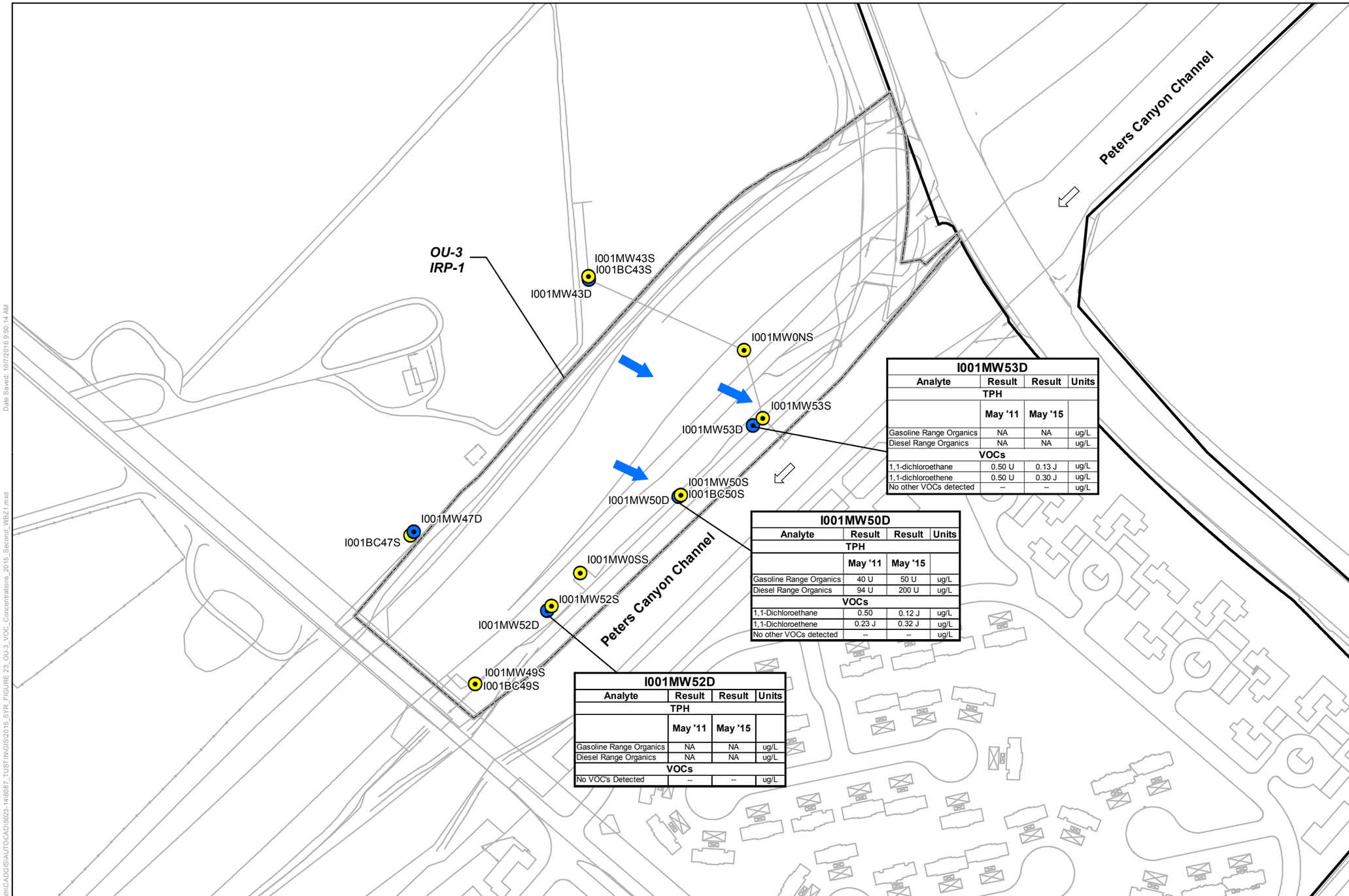

I001MW53D

Analyte	Result	Result	Units
TPH			
	May '11	May '15	
Gasoline Range Organics	NA	NA	ug/L
Diesel Range Organics	NA	NA	ug/L
VOCs			
1,1-dichloroethane	0.50 U	0.13 J	ug/L
1,1-dichloroethene	0.50 U	0.30 J	ug/L
No other VOCs detected	--	--	ug/L

I001MW50D

Analyte	Result	Result	Units
TPH			
	May '11	May '15	
Gasoline Range Organics	40 U	50 U	ug/L
Diesel Range Organics	94 U	200 U	ug/L
VOCs			
1,1-Dichloroethane	0.50	0.12 J	ug/L
1,1-Dichloroethene	0.23 J	0.32 J	ug/L
No other VOCs detected	--	--	ug/L

I001MW52D

Analyte	Result	Result	Units
TPH			
	May '11	May '15	
Gasoline Range Organics	NA	NA	ug/L
Diesel Range Organics	NA	NA	ug/L
VOCs			
No VOC's Detected	--	--	ug/L

LEGEND

- Monitoring Well (First WBZ)
- Monitoring Well (Second WBZ)
- IRP Site Boundary
- Former MCAS Tustin Boundary
- Groundwater Flow Direction, May 2015
- Surface Channel Flow

NOTE

Source:
MMEC Group, 2016. Draft 2015 Annual Long-term Monitoring Report Operable Unit 3 (OU-3), Installation Restoration Program Site 1 for Former Marine Corps Air Station Tustin, Tustin, California. April.

WELL ID SUFFIX

D - Second WBZ

ABBREVIATIONS

J = estimated result
NA - not analyzed
OU - Operable Unit
TPH - total petroleum hydrocarbons
U = not detected at the reporting limit
µg/L - micrograms per liter
VOCs - volatile organic compounds
WBZ - Water-Bearing Zone

PROJECT:	5023-14-6087
DATE:	October 2016
DRAWN BY:	CAB/SB
CHECKED BY:	KR

N

0 200 400
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station Tustin, California

OU-3 TPH and VOC Concentrations Second WBZ, 2011-2015

CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
23

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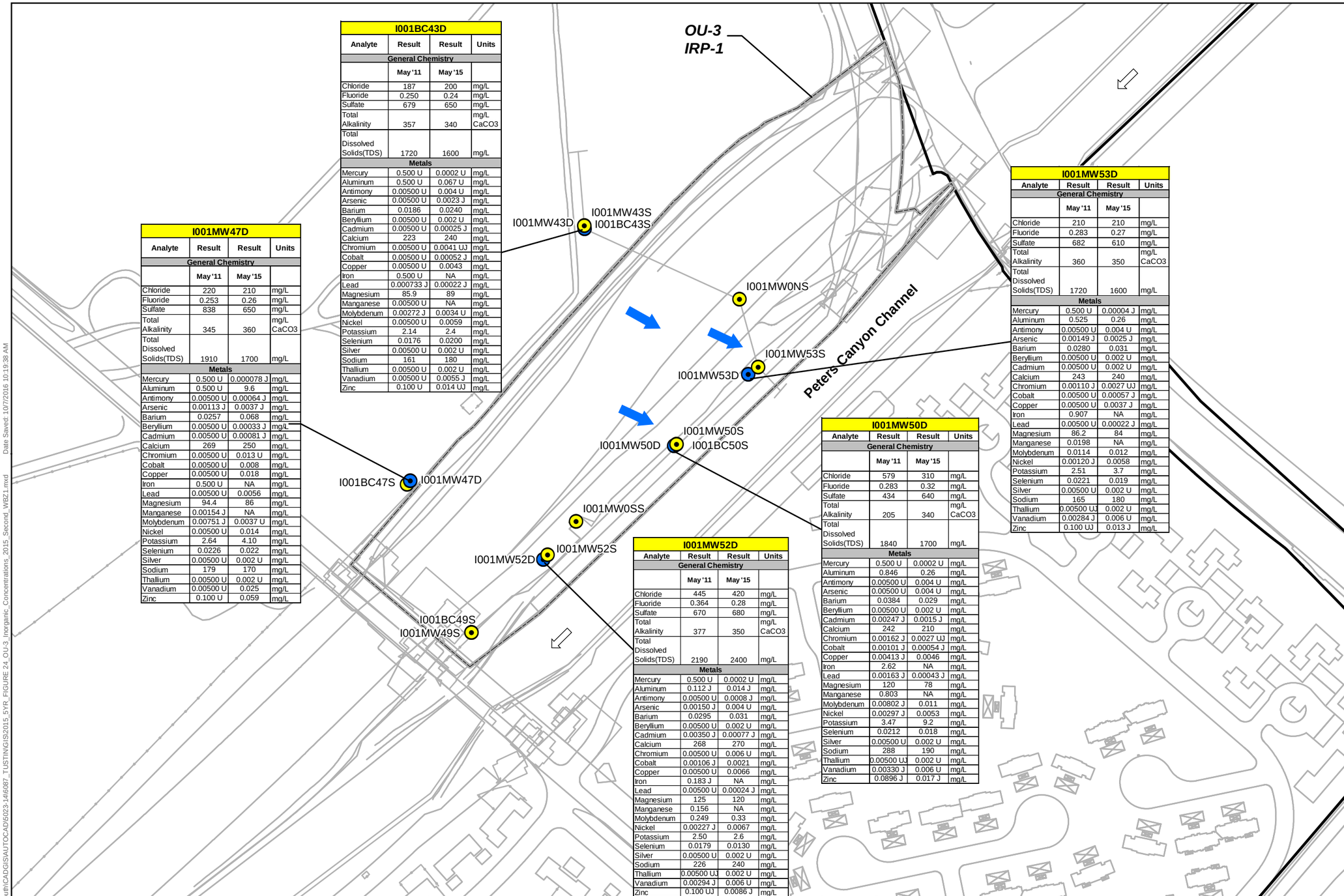

I001BC43D			
Analyte	Result	Result	Units
General Chemistry			
	May '11	May '15	
Chloride	187	200	mg/L
Fluoride	0.250	0.24	mg/L
Sulfate	679	650	mg/L
Total Alkalinity	357	340	mg/L CaCO3
Total Dissolved Solids(TDS)	1720	1600	mg/L
Metals			
Mercury	0.500 U	0.0002 U	mg/L
Aluminum	0.500 U	0.067 U	mg/L
Antimony	0.00500 U	0.004 U	mg/L
Arsenic	0.00500 U	0.0023 J	mg/L
Barium	0.0186	0.0240	mg/L
Beryllium	0.00500 U	0.002 U	mg/L
Cadmium	0.00500 U	0.00025 J	mg/L
Calcium	223	240	mg/L
Chromium	0.00500 U	0.0041 UJ	mg/L
Cobalt	0.00500 U	0.00052 J	mg/L
Copper	0.00500 U	0.0043	mg/L
Iron	0.500 U	NA	mg/L
Lead	0.000733 J	0.00022 J	mg/L
Magnesium	85.9	89	mg/L
Manganese	0.00500 U	NA	mg/L
Molybdenum	0.00272 J	0.0034 U	mg/L
Nickel	0.00500 U	0.0059	mg/L
Potassium	2.14	2.4	mg/L
Selenium	0.0176	0.0200	mg/L
Silver	0.00500 U	0.002 U	mg/L
Sodium	161	180	mg/L
Thallium	0.00500 U	0.002 U	mg/L
Vanadium	0.00500 U	0.0055 J	mg/L
Zinc	0.100 U	0.014 UJ	mg/L

I001MW47D			
Analyte	Result	Result	Units
General Chemistry			
	May '11	May '15	
Chloride	220	210	mg/L
Fluoride	0.253	0.26	mg/L
Sulfate	838	650	mg/L
Total Alkalinity	345	360	mg/L CaCO3
Total Dissolved Solids(TDS)	1910	1700	mg/L
Metals			
Mercury	0.500 U	0.000078 J	mg/L
Aluminum	0.500 U	9.6	mg/L
Antimony	0.00500 U	0.00064 J	mg/L
Arsenic	0.00113 J	0.0037 J	mg/L
Barium	0.0257	0.068	mg/L
Beryllium	0.00500 U	0.00033 J	mg/L
Cadmium	0.00500 U	0.00081 J	mg/L
Calcium	269	250	mg/L
Chromium	0.00500 U	0.013 U	mg/L
Cobalt	0.00500 U	0.008	mg/L
Copper	0.00500 U	0.018	mg/L
Iron	0.500 U	NA	mg/L
Lead	0.00500 U	0.0056	mg/L
Magnesium	94.4	86	mg/L
Manganese	0.00154 J	NA	mg/L
Molybdenum	0.00751 J	0.0037 U	mg/L
Nickel	0.00500 U	0.014	mg/L
Potassium	2.64	4.10	mg/L
Selenium	0.0226	0.022	mg/L
Silver	0.00500 U	0.002 U	mg/L
Sodium	179	170	mg/L
Thallium	0.00500 U	0.002 U	mg/L
Vanadium	0.00500 U	0.025	mg/L
Zinc	0.100 U	0.059	mg/L

I001MW53D			
Analyte	Result	Result	Units
General Chemistry			
	May '11	May '15	
Chloride	210	210	mg/L
Fluoride	0.283	0.27	mg/L
Sulfate	682	610	mg/L
Total Alkalinity	360	350	mg/L CaCO3
Total Dissolved Solids(TDS)	1720	1600	mg/L
Metals			
Mercury	0.500 U	0.00004 J	mg/L
Aluminum	0.525	0.26	mg/L
Antimony	0.00500 U	0.004 U	mg/L
Arsenic	0.00149 J	0.0025 J	mg/L
Barium	0.0280	0.031	mg/L
Beryllium	0.00500 U	0.002 U	mg/L
Cadmium	0.00500 U	0.002 U	mg/L
Calcium	243	240	mg/L
Chromium	0.00110 J	0.0027 UJ	mg/L
Cobalt	0.00500 U	0.00057 J	mg/L
Copper	0.00500 U	0.0037 J	mg/L
Iron	0.907	NA	mg/L
Lead	0.00500 U	0.00022 J	mg/L
Magnesium	86.2	84	mg/L
Manganese	0.0198	NA	mg/L
Molybdenum	0.0114	0.012	mg/L
Nickel	0.00120 J	0.0058	mg/L
Potassium	2.51	3.7	mg/L
Selenium	0.0221	0.019	mg/L
Silver	0.00500 U	0.002 U	mg/L
Sodium	165	180	mg/L
Thallium	0.00500 UJ	0.002 U	mg/L
Vanadium	0.00284 J	0.006 U	mg/L
Zinc	0.100 UJ	0.013 J	mg/L

I001MW50D			
Analyte	Result	Result	Units
General Chemistry			
	May '11	May '15	
Chloride	579	310	mg/L
Fluoride	0.283	0.32	mg/L
Sulfate	434	640	mg/L
Total Alkalinity	205	340	mg/L CaCO3
Total Dissolved Solids(TDS)	1840	1700	mg/L
Metals			
Mercury	0.500 U	0.0002 U	mg/L
Aluminum	0.846	0.26	mg/L
Antimony	0.00500 U	0.004 U	mg/L
Arsenic	0.00500 U	0.004 U	mg/L
Barium	0.0384	0.029	mg/L
Beryllium	0.00500 U	0.002 U	mg/L
Cadmium	0.00247 J	0.0015 J	mg/L
Calcium	242	210	mg/L
Chromium	0.00162 J	0.0027 UJ	mg/L
Cobalt	0.00101 J	0.00054 J	mg/L
Copper	0.00413 J	0.0046	mg/L
Iron	2.62	NA	mg/L
Lead	0.00163 J	0.00043 J	mg/L
Magnesium	120	78	mg/L
Manganese	0.803	NA	mg/L
Molybdenum	0.00802 J	0.011	mg/L
Nickel	0.00297 J	0.0053	mg/L
Potassium	3.47	9.2	mg/L
Selenium	0.0212	0.018	mg/L
Silver	0.00500 U	0.002 U	mg/L
Sodium	288	190	mg/L
Thallium	0.00500 UJ	0.002 U	mg/L
Vanadium	0.00330 J	0.006 U	mg/L
Zinc	0.0896 J	0.017 J	mg/L

I001MW52D			
Analyte	Result	Result	Units
General Chemistry			
	May '11	May '15	
Chloride	445	420	mg/L
Fluoride	0.364	0.28	mg/L
Sulfate	670	680	mg/L
Total Alkalinity	377	350	mg/L CaCO3
Total Dissolved Solids(TDS)	2190	2400	mg/L
Metals			
Mercury	0.500 U	0.0002 U	mg/L
Aluminum	0.112 J	0.014 J	mg/L
Antimony	0.00500 U	0.0008 J	mg/L
Arsenic	0.00150 J	0.004 U	mg/L
Barium	0.0295	0.031	mg/L
Beryllium	0.00500 U	0.002 U	mg/L
Cadmium	0.00350 J	0.00077 J	mg/L
Calcium	268	270	mg/L
Chromium	0.00500 U	0.006 U	mg/L
Cobalt	0.00106 J	0.0021	mg/L
Copper	0.00500 U	0.0066	mg/L
Iron	0.183 J	NA	mg/L
Lead	0.00500 U	0.00024 J	mg/L
Magnesium	125	120	mg/L
Manganese	0.156	NA	mg/L
Molybdenum	0.249	0.33	mg/L
Nickel	0.00227 J	0.0067	mg/L
Potassium	2.50	2.6	mg/L
Selenium	0.0179	0.0130	mg/L
Silver	0.00500 U	0.002 U	mg/L
Sodium	226	240	mg/L
Thallium	0.00500 UJ	0.002 U	mg/L
Vanadium	0.00294 J	0.006 U	mg/L
Zinc	0.100 UJ	0.0086 J	mg/L

LEGEND

- Monitoring Well (Second WBZ)
- Monitoring Well (First WBZ)
- IRP Site Boundary
- Former MCAS Tustin Boundary
- Groundwater Flow Direction, May 2015
- Surface Channel Flow

NOTE

Source:
MMEC Group, 2016. Draft 2015 Annual Long-term Monitoring Report Operable Unit 3 (OU-3), Installation Restoration Program Site 1 for Former Marine Corps Air Station Tustin, Tustin, California. April.

WELL ID SUFFIX

D - Second WBZ

ABBREVIATIONS

J = estimated result
mg/L - milligrams per liter
OU - Operable Unit
U = not detected at the reporting limit
WBZ - Water-Bearing Zone

PROJECT:	5023-14-6087
DATE:	October 2016
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N

0 100 200 400
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station Tustin, California

OU-3 Inorganic Concentrations Second WBZ, 2011-2015

CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
24

Document Path: P:\Projects-South\CADGIS\AUTOCAD\5023-14\6087_TUSTIN\GIS\2015_5YR_FIGURE 24_OU-3_Inorganic_Concentrations_2015_Second_WBZ1.mxd Date Saved: 10/7/2016 10:19:38 AM

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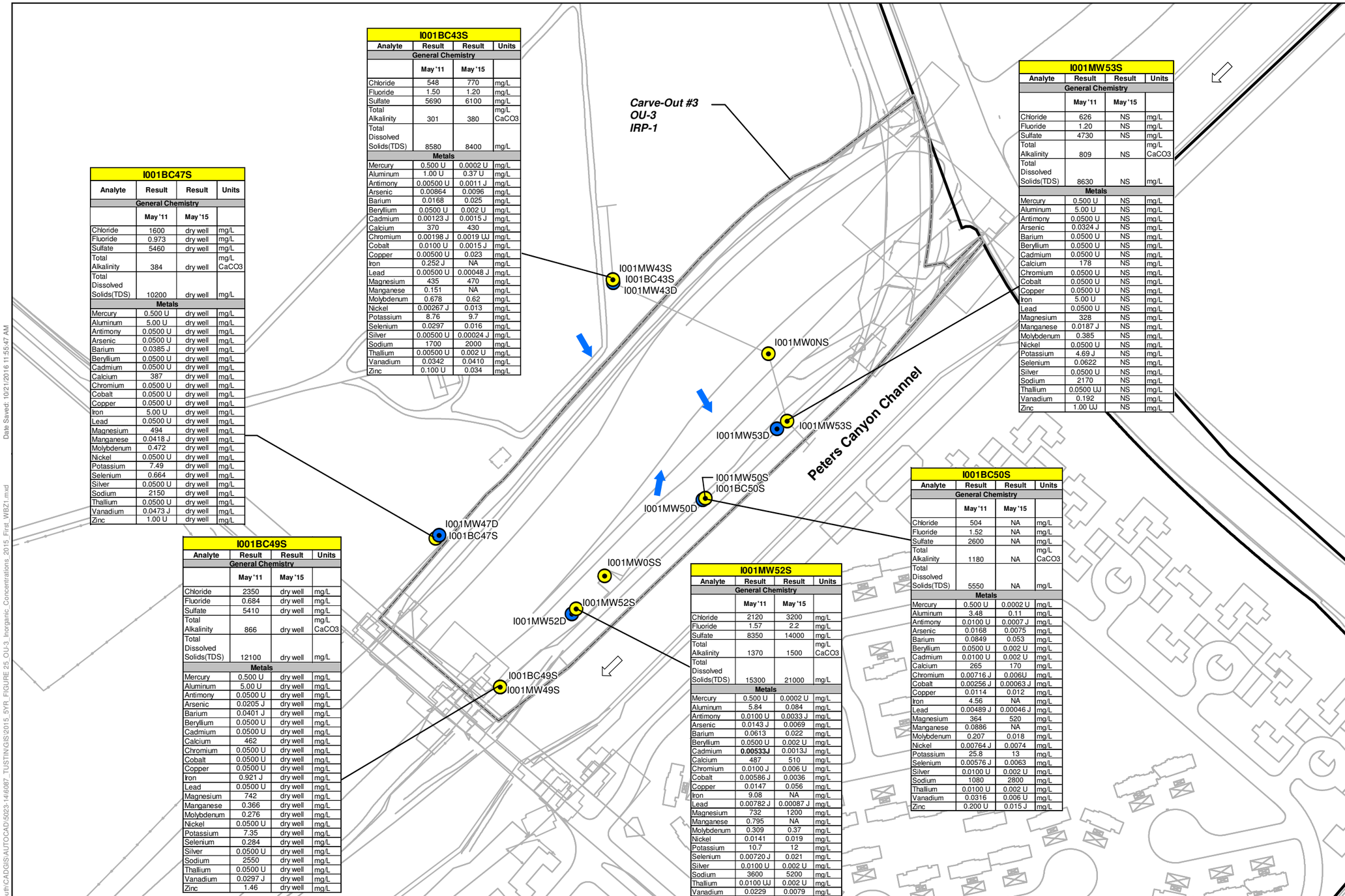

I001BC43S			
Analyte	Result	Result	Units
General Chemistry			
	May '11	May '15	
Chloride	548	770	mg/L
Fluoride	1.50	1.20	mg/L
Sulfate	5690	6100	mg/L
Total Alkalinity	301	380	mg/L CaCO3
Total Dissolved Solids(TDS)	8580	8400	mg/L
Metals			
Mercury	0.500 U	0.0002 U	mg/L
Aluminum	1.00 U	0.37 U	mg/L
Antimony	0.00500 U	0.0011 J	mg/L
Arsenic	0.00864	0.0096	mg/L
Barium	0.0168	0.025	mg/L
Beryllium	0.0500 U	0.002 U	mg/L
Cadmium	0.00123 J	0.0015 J	mg/L
Calcium	370	430	mg/L
Chromium	0.00198 J	0.0019 UJ	mg/L
Cobalt	0.0100 U	0.0015 J	mg/L
Copper	0.00500 U	0.023	mg/L
Iron	0.252 J	NA	mg/L
Lead	0.00500 U	0.00048 J	mg/L
Magnesium	435	470	mg/L
Manganese	0.151	NA	mg/L
Molybdenum	0.678	0.62	mg/L
Nickel	0.00267 J	0.013	mg/L
Potassium	8.76	9.7	mg/L
Selenium	0.0297	0.016	mg/L
Silver	0.00500 U	0.00024 J	mg/L
Sodium	1700	2000	mg/L
Thallium	0.00500 U	0.002 U	mg/L
Vanadium	0.0342	0.0410	mg/L
Zinc	0.100 U	0.034	mg/L

I001BC47S			
Analyte	Result	Result	Units
General Chemistry			
	May '11	May '15	
Chloride	1600	dry well	mg/L
Fluoride	0.973	dry well	mg/L
Sulfate	5460	dry well	mg/L
Total Alkalinity	384	dry well	mg/L CaCO3
Total Dissolved Solids(TDS)	10200	dry well	mg/L
Metals			
Mercury	0.500 U	dry well	mg/L
Aluminum	5.00 U	dry well	mg/L
Antimony	0.0500 U	dry well	mg/L
Arsenic	0.0500 U	dry well	mg/L
Barium	0.0385 J	dry well	mg/L
Beryllium	0.0500 U	dry well	mg/L
Cadmium	0.0500 U	dry well	mg/L
Calcium	387	dry well	mg/L
Chromium	0.0500 U	dry well	mg/L
Cobalt	0.0500 U	dry well	mg/L
Copper	0.0500 U	dry well	mg/L
Iron	5.00 U	dry well	mg/L
Lead	0.0500 U	dry well	mg/L
Magnesium	494	dry well	mg/L
Manganese	0.0418 J	dry well	mg/L
Molybdenum	0.472	dry well	mg/L
Nickel	0.0500 U	dry well	mg/L
Potassium	7.49	dry well	mg/L
Selenium	0.664	dry well	mg/L
Silver	0.0500 U	dry well	mg/L
Sodium	2150	dry well	mg/L
Thallium	0.0500 U	dry well	mg/L
Vanadium	0.0473 J	dry well	mg/L
Zinc	1.00 U	dry well	mg/L

I001BC49S			
Analyte	Result	Result	Units
General Chemistry			
	May '11	May '15	
Chloride	2350	dry well	mg/L
Fluoride	0.684	dry well	mg/L
Sulfate	5410	dry well	mg/L
Total Alkalinity	866	dry well	mg/L CaCO3
Total Dissolved Solids(TDS)	12100	dry well	mg/L
Metals			
Mercury	0.500 U	dry well	mg/L
Aluminum	5.00 U	dry well	mg/L
Antimony	0.0500 U	dry well	mg/L
Arsenic	0.0205 J	dry well	mg/L
Barium	0.0401 J	dry well	mg/L
Beryllium	0.0500 U	dry well	mg/L
Cadmium	0.0500 U	dry well	mg/L
Calcium	462	dry well	mg/L
Chromium	0.0500 U	dry well	mg/L
Cobalt	0.0500 U	dry well	mg/L
Copper	0.0500 U	dry well	mg/L
Iron	0.921 J	dry well	mg/L
Lead	0.0500 U	dry well	mg/L
Magnesium	742	dry well	mg/L
Manganese	0.366	dry well	mg/L
Molybdenum	0.276	dry well	mg/L
Nickel	0.0500 U	dry well	mg/L
Potassium	7.35	dry well	mg/L
Selenium	0.284	dry well	mg/L
Silver	0.0500 U	dry well	mg/L
Sodium	2550	dry well	mg/L
Thallium	0.0500 U	dry well	mg/L
Vanadium	0.0297 J	dry well	mg/L
Zinc	1.46	dry well	mg/L

I001MW52S			
Analyte	Result	Result	Units
General Chemistry			
	May '11	May '15	
Chloride	2120	3200	mg/L
Fluoride	1.57	2.2	mg/L
Sulfate	8350	14000	mg/L
Total Alkalinity	1370	1500	mg/L CaCO3
Total Dissolved Solids(TDS)	15300	21000	mg/L
Metals			
Mercury	0.500 U	0.0002 U	mg/L
Aluminum	5.84	0.084	mg/L
Antimony	0.0100 U	0.0033 J	mg/L
Arsenic	0.0143 J	0.0069	mg/L
Barium	0.0613	0.022	mg/L
Beryllium	0.0500 U	0.002 U	mg/L
Cadmium	**0.00533J**	0.0013J	mg/L
Calcium	487	510	mg/L
Chromium	0.0100 J	0.006 U	mg/L
Cobalt	0.00586 J	0.0036	mg/L
Copper	0.0147	0.056	mg/L
Iron	9.08	NA	mg/L
Lead	0.00782 J	0.00087 J	mg/L
Magnesium	732	1200	mg/L
Manganese	0.795	NA	mg/L
Molybdenum	0.309	0.37	mg/L
Nickel	0.0141	0.019	mg/L
Potassium	10.7	12	mg/L
Selenium	0.00720 J	0.021	mg/L
Silver	0.0100 U	0.002 U	mg/L
Sodium	3600	5200	mg/L
Thallium	0.0100 UJ	0.002 U	mg/L
Vanadium	0.0229	0.0079	mg/L

I001MW53S			
Analyte	Result	Result	Units
General Chemistry			
	May '11	May '15	
Chloride	626	NS	mg/L
Fluoride	1.20	NS	mg/L
Sulfate	4730	NS	mg/L
Total Alkalinity	809	NS	mg/L CaCO3
Total Dissolved Solids(TDS)	8630	NS	mg/L
Metals			
Mercury	0.500 U	NS	mg/L
Aluminum	5.00 U	NS	mg/L
Antimony	0.0500 U	NS	mg/L
Arsenic	0.0324 J	NS	mg/L
Barium	0.0500 U	NS	mg/L
Beryllium	0.0500 U	NS	mg/L
Cadmium	0.0500 U	NS	mg/L
Calcium	178	NS	mg/L
Chromium	0.0500 U	NS	mg/L
Cobalt	0.0500 U	NS	mg/L
Copper	0.0500 U	NS	mg/L
Iron	5.00 U	NS	mg/L
Lead	0.0500 U	NS	mg/L
Magnesium	328	NS	mg/L
Manganese	0.0187 J	NS	mg/L
Molybdenum	0.385	NS	mg/L
Nickel	0.0500 U	NS	mg/L
Potassium	4.69 J	NS	mg/L
Selenium	0.0622	NS	mg/L
Silver	0.0500 U	NS	mg/L
Sodium	2170	NS	mg/L
Thallium	0.0500 UJ	NS	mg/L
Vanadium	0.192	NS	mg/L
Zinc	1.00 UJ	NS	mg/L

I001BC50S			
Analyte	Result	Result	Units
General Chemistry			
	May '11	May '15	
Chloride	504	NA	mg/L
Fluoride	1.52	NA	mg/L
Sulfate	2600	NA	mg/L
Total Alkalinity	1180	NA	mg/L CaCO3
Total Dissolved Solids(TDS)	5550	NA	mg/L
Metals			
Mercury	0.500 U	0.0002 U	mg/L
Aluminum	3.48	0.11	mg/L
Antimony	0.0100 U	0.0007 J	mg/L
Arsenic	0.0168	0.0075	mg/L
Barium	0.0849	0.053	mg/L
Beryllium	0.0500 U	0.002 U	mg/L
Cadmium	0.0100 U	0.002 U	mg/L
Calcium	265	170	mg/L
Chromium	0.00716 J	0.006U	mg/L
Cobalt	0.00256 J	0.00063 J	mg/L
Copper	0.0114	0.012	mg/L
Iron	4.56	NA	mg/L
Lead	0.00489 J	0.00046 J	mg/L
Magnesium	364	520	mg/L
Manganese	0.0886	NA	mg/L
Molybdenum	0.207	0.018	mg/L
Nickel	0.00764 J	0.0074	mg/L
Potassium	25.8	13	mg/L
Selenium	0.00576 J	0.0063	mg/L
Silver	0.0100 U	0.002 U	mg/L
Sodium	1080	2800	mg/L
Thallium	0.0100 U	0.002 U	mg/L
Vanadium	0.0316	0.006 U	mg/L
Zinc	0.200 U	0.015 J	mg/L

LEGEND

- Monitoring Well (First WBZ)
- Monitoring Well (Second WBZ)
- IRP Site Boundary
- Former MCAS Tustin Boundary
- Groundwater Flow Direction, May 2015
- Surface Channel Flow

NOTE
Bold value = Remediation Goal exceedance

Source:
MMEC Group, 2016. Draft 2015 Annual Long-term Monitoring Report Operable Unit 3 (OU-3), Installation Restoration Program Site 1 for Former Marine Corps Air Station Tustin, Tustin, California. April.

WELL ID SUFFIX
S - First WBZ

ABBREVIATIONS
J = estimated result
mg/L - milligrams per liter
NA - not analyzed
NS - not sampled
OU - Operable Unit
U = not detected at the reporting limit
WBZ - Water-Bearing Zone

PROJECT: 5023-14-6087
DATE: October 2016
DRAWN BY: CAB/SB
CHECKED BY: KR

N

0 200 400
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station Tustin, California

OU-3 Inorganic Concentrations First WBZ, 2011-2015
CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE 25

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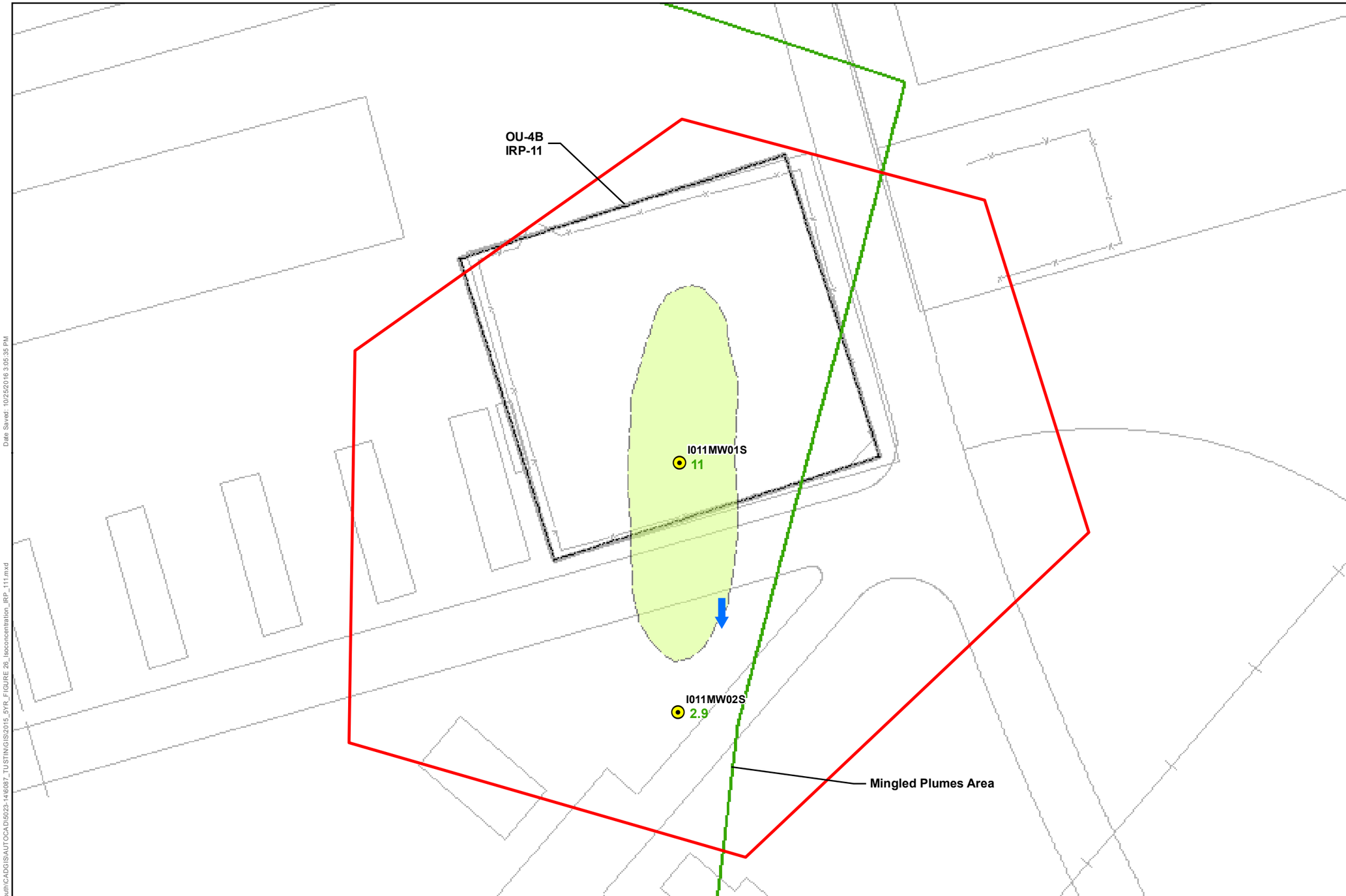


LEGEND

- Monitoring Well (First WBZ)*
- Mingled Plumes Area
- IRP Site 11
- TCE Plume, 5µg/L, 1st WBZ, September 2015*
- Area Requiring Institutional Controls (ARIC)
- Groundwater Flow Direction, September 2015 **
- 11 — TCE concentration (µg/L), September 2015

NOTES

* Source: RORE, Inc. 2016b; Final 2015 Annual Institutional Control Compliance Monitoring Report for Installation Restoration Program Sites 11 and 13W, Operable Unit 4B, Former Marine Corps Air Station Tustin, Tustin, California. June.
** Value is approximate due to small sample size.

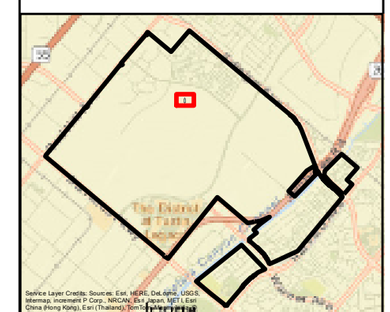
Plume boundaries show approximate extent of where COC concentrations exceed RGs.
TCE RG = 5 µg/L

WELL ID SUFFIX

S - First WBZ

ABBREVIATIONS

COC - Contaminant of Concern
IRP - Installation Restoration Program
RG - remediation goal
TCE - trichloroethene
OU - Operable Unit
µg/L - micrograms per liter
WBZ - water bearing zone



PROJECT:	5023-14-6087
DATE:	October 2016
DRAWN BY:	CAB / SB
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N

0 50 100
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station Tustin, California

2015 OU-4B Isoconcentration Map IRP-11

CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
26

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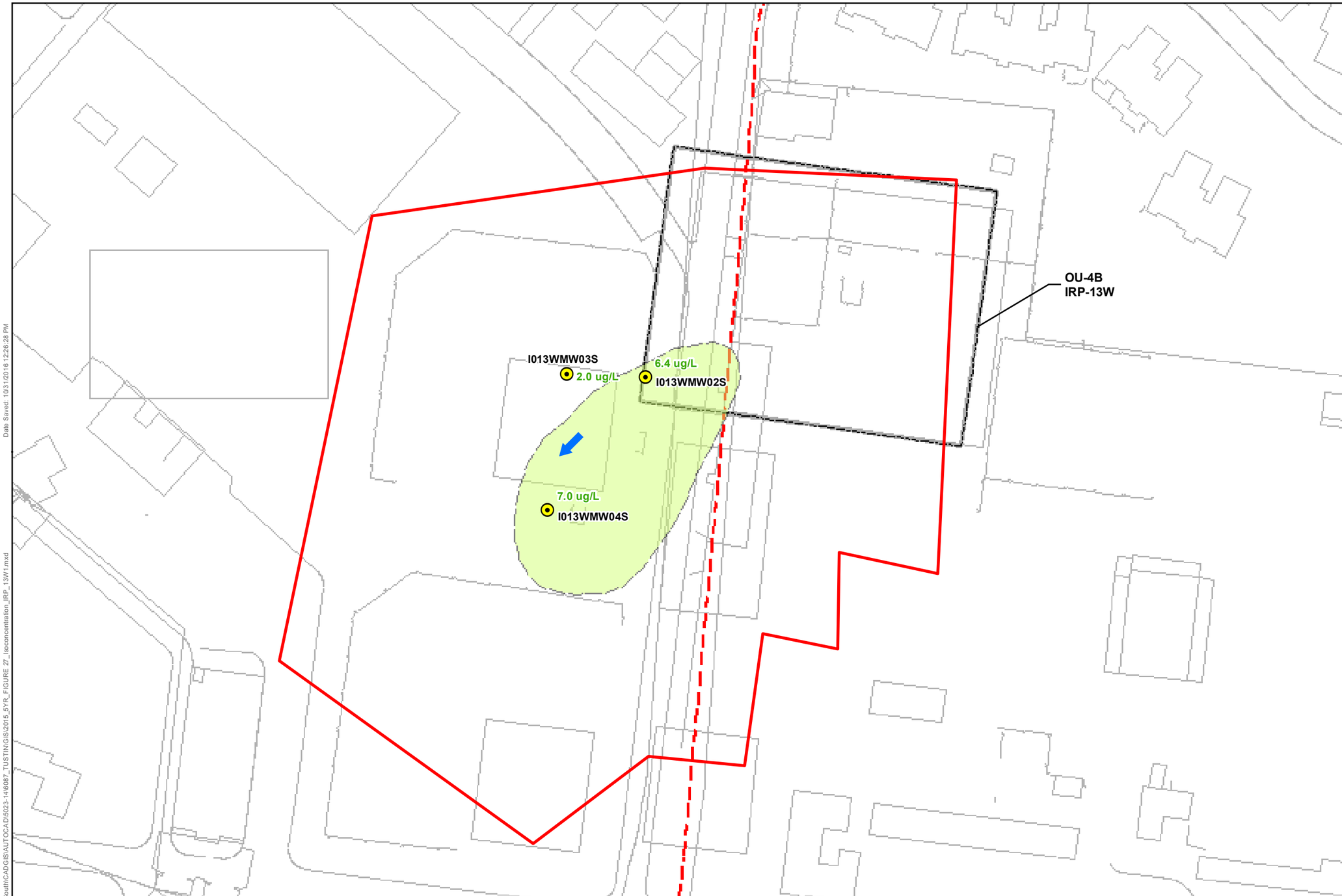


LEGEND

- Monitoring Well (First WBZ)*
- IRP Sites
- Carve-Out Area #5 Boundary
- TCE Plume, 5µg/L, 1st WBZ, September 2015 *
- Area Requiring Institutional Controls (ARIC)
- 7.9 TCE concentration (µg/L), September 2015
- Groundwater Flow Direction, September 2015 *

NOTES

* Source: RORE, Inc. 2016b; Final 2015 Annual Institutional Control Compliance Monitoring Report for Installation Restoration Program Sites 11 and 13W, Operable Unit 4B, Former Marine Corps Air Station Tustin, Tustin, California. June.

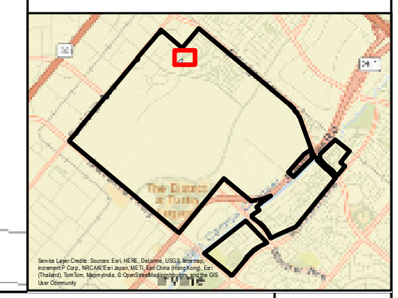
Plume boundaries show approximate extent of where COC concentrations exceed RGs.
TCE RG = 5 µg/L

WELL ID SUFFIX

S - First WBZ

ABBREVIATIONS

COC - Contaminant of Concern
IRP - Installation Restoration Program
OU - Operable Unit
RG - remediation goal
TCE - trichloroethene
µg/L - micrograms per liter
WBZ - water bearing zone



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DATE:	October 2016
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CHECKED BY:	KR

N

0 50 100 200
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station
Tustin, California

2015 OU-4B
Isoconcentration Map IRP-13W
CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
27

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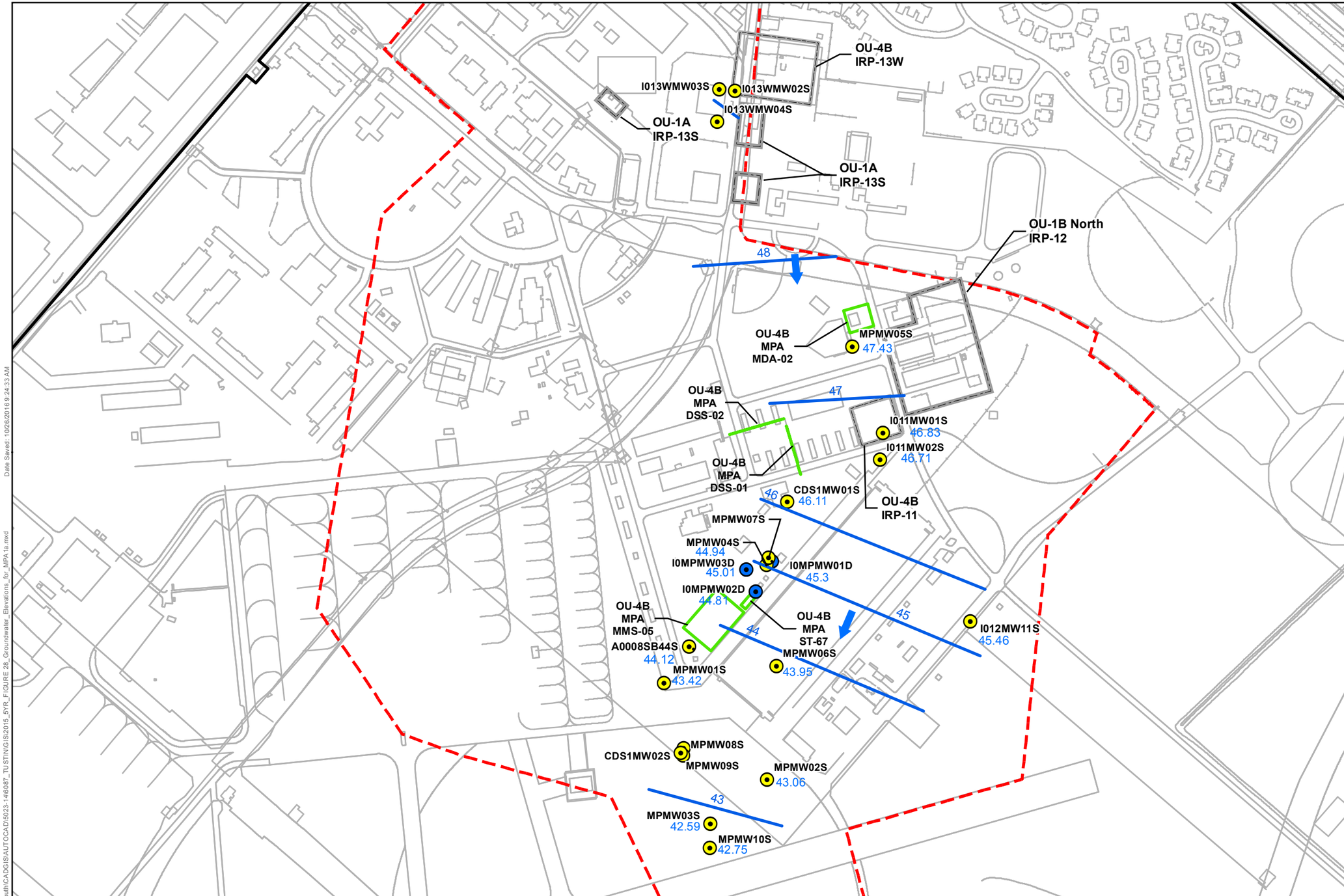

LEGEND

- 44.94 — Monitoring Well (First WBZ) and Groundwater Level Where Measured
- 45.01 — Monitoring Well (Second WBZ) and Groundwater Level Where Measured
- Former MCAS Tustin Boundary
- 45 — Groundwater Elevation Contour, May 2015 *
- Mingled Plumes Area (MPA)
- Carve-Out Area #5 Boundary
- IRP Sites
- Groundwater Flow Direction, May 2015 *

NOTES

*Source of groundwater elevation contours and flow direction: RORE, Inc. 2015a; Final 2015 Semiannual Data Update, Installation Restoration Program Sites 5S(a), 6, and Mingled Plumes Area, Operable Unit 4B, Former Marine Corps Air Station Tustin, Tustin, California. November.

Groundwater elevation contours are based on measurements from first WBZ wells only.

WELL ID SUFFIX

D - Second WBZ
S - First WBZ

ABBREVIATIONS

DSS - Disposal Sanitary Sewer
IRP - Installation Restoration Program
MCAS - Marine Corps Air Station
MDA - Miscellaneous, Potential Disposal Area
MMS - Miscellaneous, Major Spill
OU – Operable Unit
ST - Storage, Temporary
WBZ - Water-Bearing Zone

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N

0 410 820
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station
Tustin, California

2015 Groundwater Elevations
The Mingled Plumes Area
CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
28

Document Path: P:\Projects-South\CADGIS\AUTOCAD\5023-14\6087_TUSTIN\GIS\2015_5YR_FIGURE 28_Groundwater_Elevations_for_MPA1a.mxd

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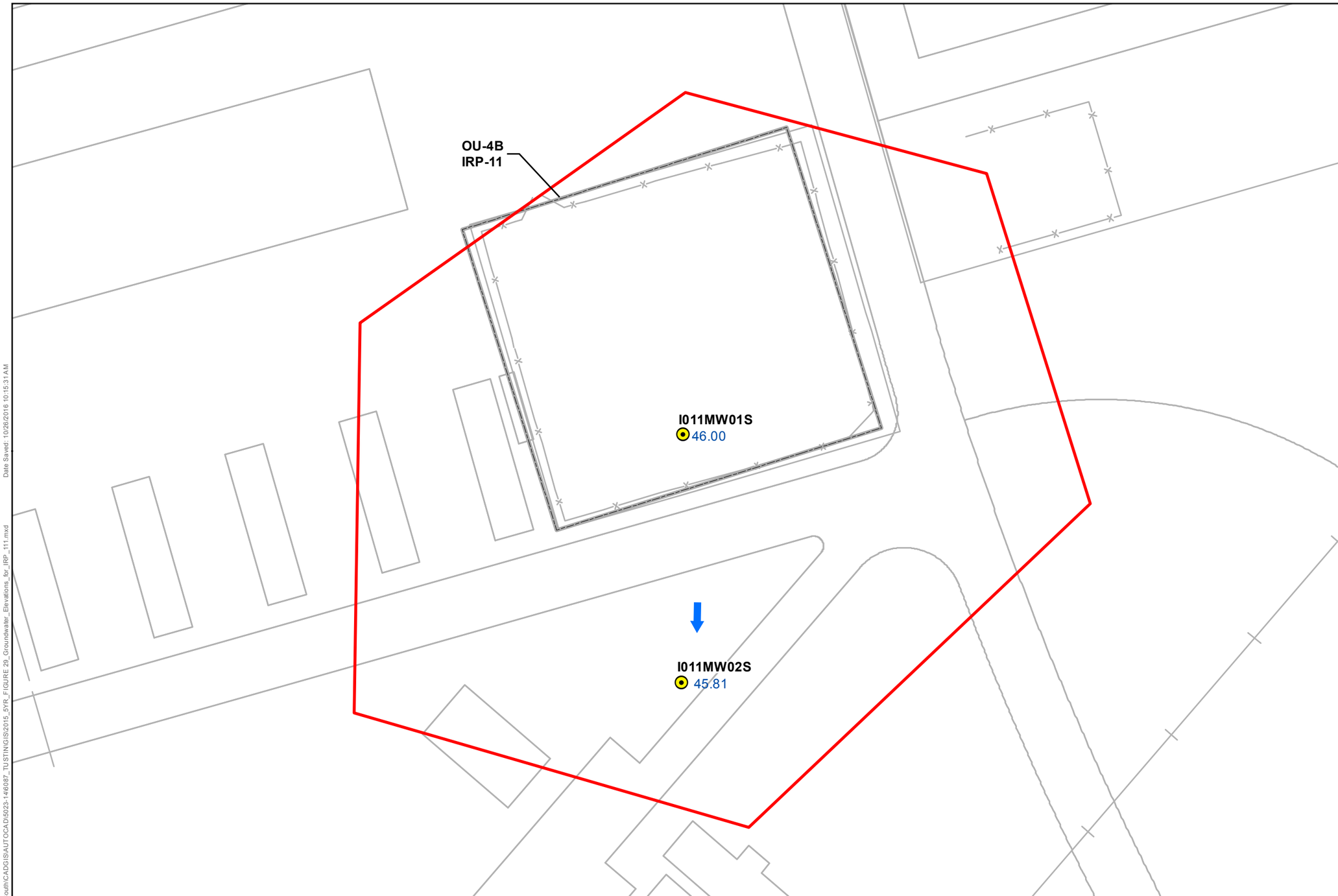


LEGEND

- Monitoring Well (First WBZ)*
- Area Requiring Institutional Controls (ARIC)
- IRP Sites
- Groundwater Flow Direction, September 2015**
- 46.00 Groundwater Elevation, September 2015*

NOTES

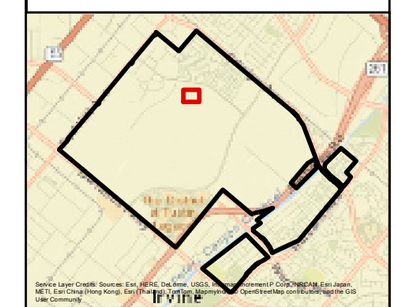
*Source: RORE, Inc, 2016b; Final 2015 Annual Institutional Control Compliance Monitoring Report for Installation Restoration Program Sites 11 and 13W, Operable Unit 4B, Former Marine Corps Air Station Tustin, Tustin, California. June.
** Value is approximate due to small sample size.

WELL ID SUFFIX

S - First WBZ

ABBREVIATIONS

IRP - Installation Restoration Program
MCAS - Marine Corps Air Station
OU - Operable Unit
WBZ - water bearing zone



PROJECT: 5023-14-6087	N	0 50 100 Approximate Scale in Feet	MNEC GROUP	Former Marine Corps Air Station Tustin, California	2015 Groundwater Elevations for IRP-11 CERCLA Five-Year Review Report Operable Units 1A, 1B North, 1B South, 3, and 4B
DATE: October 2016					FIGURE 29
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CHECKED BY: KR					

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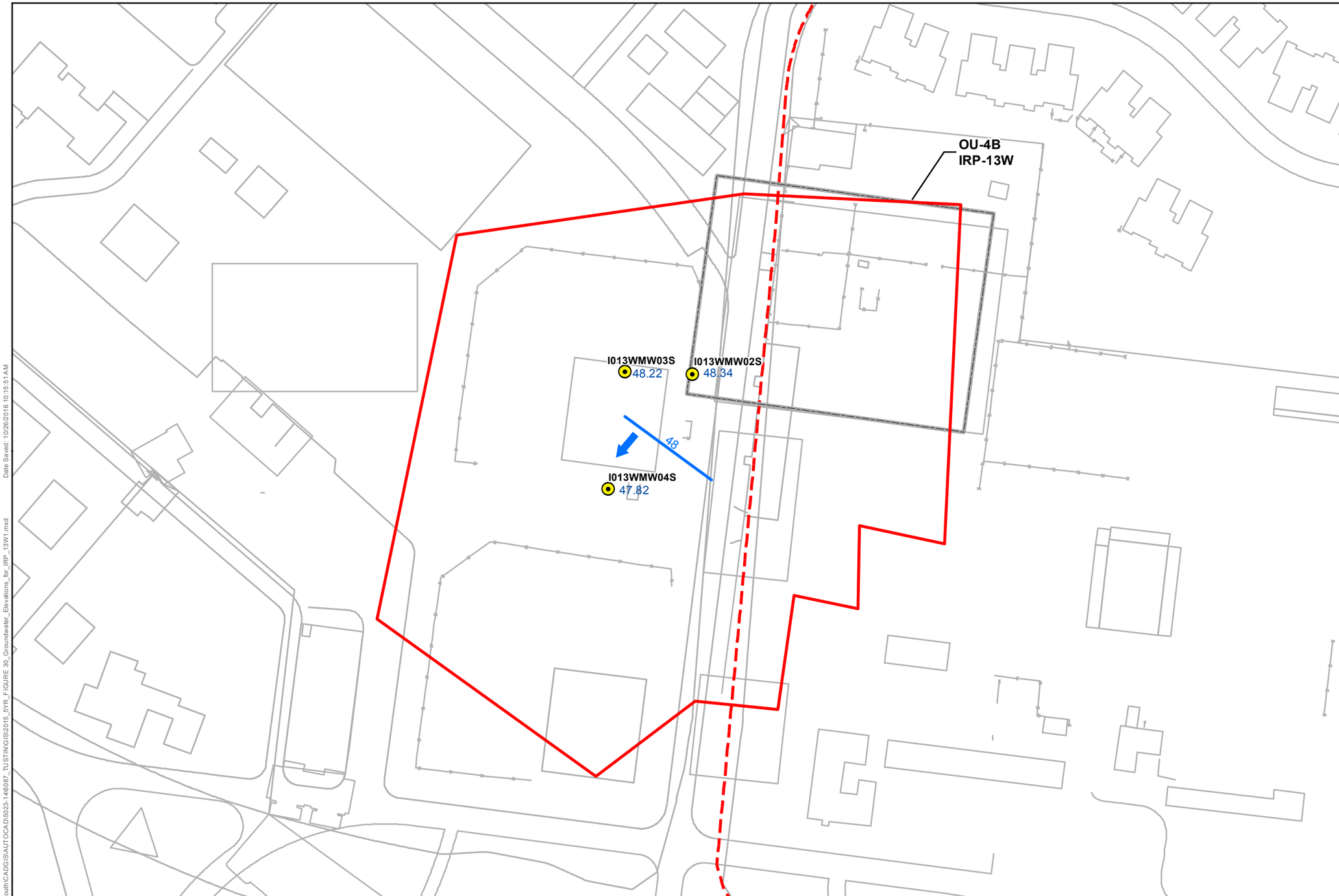


LEGEND

- 49.24 — Monitoring Well (First WBZ) and Groundwater Level Where Measured*
- IRP Sites
- Carve-Out Area #5 Boundary
- Area Requiring Institutional Controls (ARIC)
- 48 — Water Level Elevation Contour in Feet Above Mean Sea Level, September 2015*
- Dotted = Estimated Contour
- Groundwater Flow Direction, September 2015*

NOTES

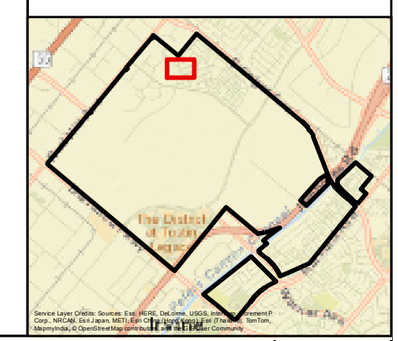
* Source: RORE, Inc. 2016b; Final 2015 Annual Institutional Control Compliance Monitoring Report for Installation Restoration Program Sites 11 and 13W, Operable Unit 4B, Former Marine Corps Air Station Tustin, Tustin, California. June.

WELL ID SUFFIX

S - First WBZ

ABBREVIATIONS

IRP - Installation Restoration Program
MCAS - Marine Corps Air Station
OU - Operable Unit
WBZ - water bearing zone



PROJECT:	5023-14-6087
DATE:	October 2016
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N

0 60 120 240
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station Tustin, California

2015 Groundwater Elevations for IRP-13W

CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
30

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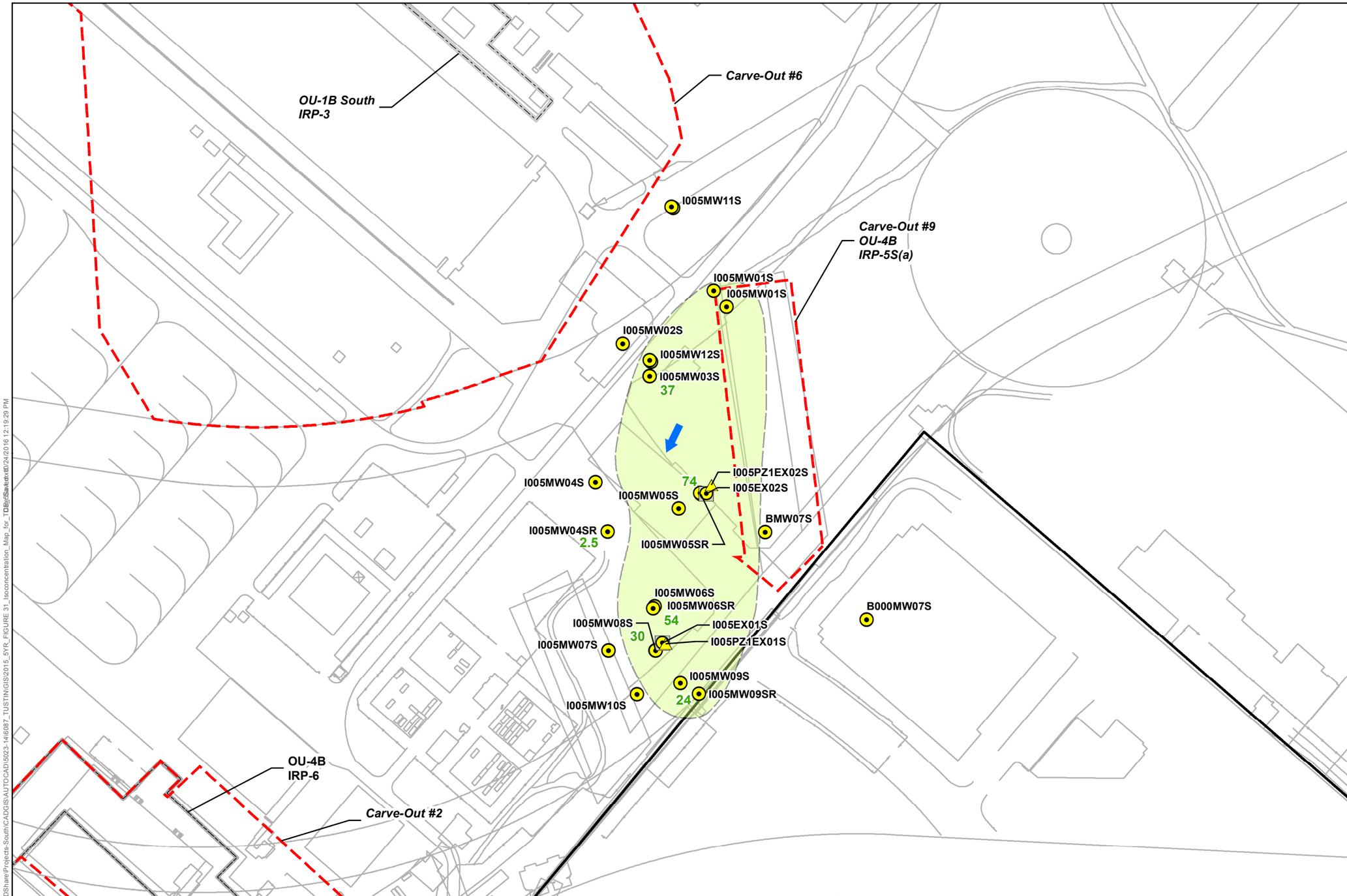

LEGEND

- Observation Well (First WBZ)
- Monitoring Well (First WBZ)
- Extraction Well (First WBZ)
- Former MCAS Tustin Boundary
- TCE Plume, 5 µg/L, May 2015*
- IRP Sites
- Carve-Out Area Boundary
- 2.5 TCE concentration (µg/L), May 2015 *
- Groundwater Flow Direction, May 2015

NOTES

* Source of TCE concentrations and isoconcentration contours:
RORE, Inc. 2015a; Final 2015 Semiannual Data Update, Installation Restoration Program Sites 5S(a), 6, and Mingled Plumes Area, Operable Unit 4B, Former Marine Corps Air StationTustin, Tustin, California. November.

Plume boundaries show approximate extent of where COC concentrations exceed RGs.
TCE RG = 5 µg/L

WELL ID SUFFIX

S, SR - First WBZ

ABBREVIATIONS

COC - Contaminant of Concern
IRP - Installation Restoration Program
MCAS - Marine Corps Air Station
OU - Operable Unit
RG - remediation goal
TCE - trichloroethene
µg/L - micrograms per liter
WBZ - water bearing zone

PROJECT:	5023-14-6087
DATE:	October 2016
DRAWN BY:	CAB/SB
CHECKED BY:	KR

N

0 200 400
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station Tustin, California

2015 OU-4B Isoconcentration Map for TCE at IRP-5S(a)

CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
31

Document Path: \\SDG1-FS1\SDShare\Projects-South\CADGIS\AUTOCAD\5023-14\6087_TUSTIN\GIS\2015_5YR_FIGURE 31_Isoconcentration_Map_for_TDB.mxd

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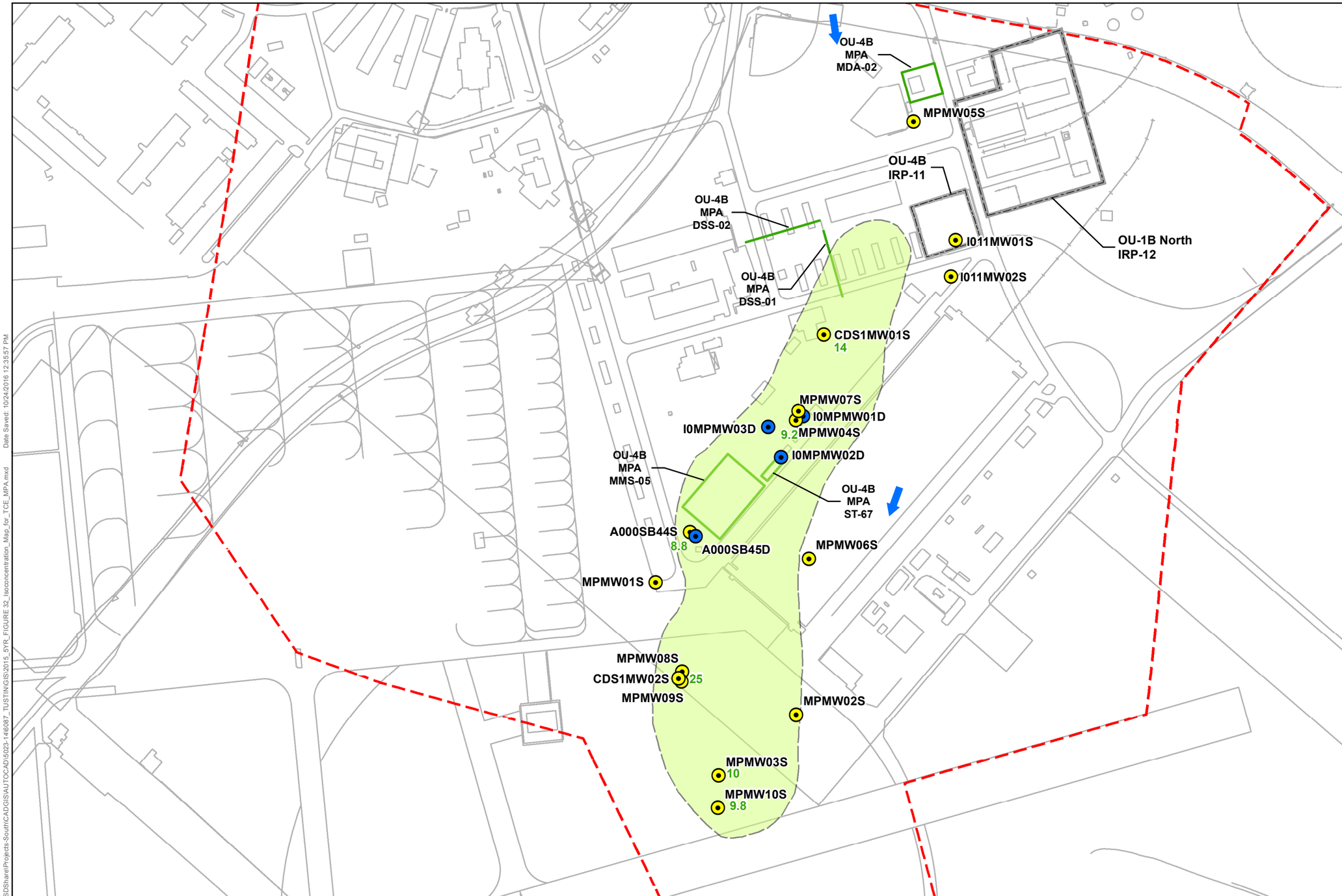

LEGEND

- Monitoring Well (First WBZ)
- Monitoring Well (Second WBZ)
- Carve-Out Area #5 Boundary
- Mingled Plumes Area (MPA)
- TCE Plume, >5 µg/L, May 2015*
- IRP Sites
- 8.8 TCE concentration (µg/L), May 2015*
- Groundwater Flow Direction, May 2015

NOTES

*Source of TCE concentrations and isoconcentration contours:
RORE, Inc. 2015a; Final 2015 Semiannual Data Update, Installation Restoration Program Sites 5S(a), 6, and Mingled Plumes Area, Operable Unit 4B, Former Marine Corps Air StationTustin, Tustin, California. November.

Plume boundaries show approximate extent of where COC concentrations exceed RGs.
TCE RG = 5 µg/L

WELL ID SUFFIX

D - Second WBZ
S - First WBZ

ABBREVIATIONS

COC - Contaminant of Concern
DSS - Disposal Sanitary Sewer
IRP - Installation Restoration Program
MDA - Miscellaneous, Potential Disposal Area
MMS - Miscellaneous, Major Spill
OU - Operable Unit
RG - remediation goal
TCE - trichloroethene
ST - Storage, Temporary
µg/L - micrograms per liter
VOC - volatile organic compound
WBZ - Water-Bearing Zone

PROJECT: 5023-14-6087 DATE: October 2016 DRAWN BY: CAB/SB CHECKED BY: KR	N	0 300 600 Approximate Scale in Feet	MMEC GROUP	Former Marine Corps Air Station Tustin, California	2015 OU-4B Isoconcentration Map for TCE at the MPA, First WBZ CERCLA Five-Year Review Report Operable Units 1A, 1B North, 1B South, 3, and 4B	FIGURE 32

Document Path: \\SDG1-FS1\SDShare\Projects-South\CAD\GIS\AUTOCAD\5023-146087_TUSTIN\GIS\2015_5YR_FIGURE 32_Isoconcentration_Map_for_TCE_MPA.mxd Date Saved: 10/24/2016 12:35:57 PM

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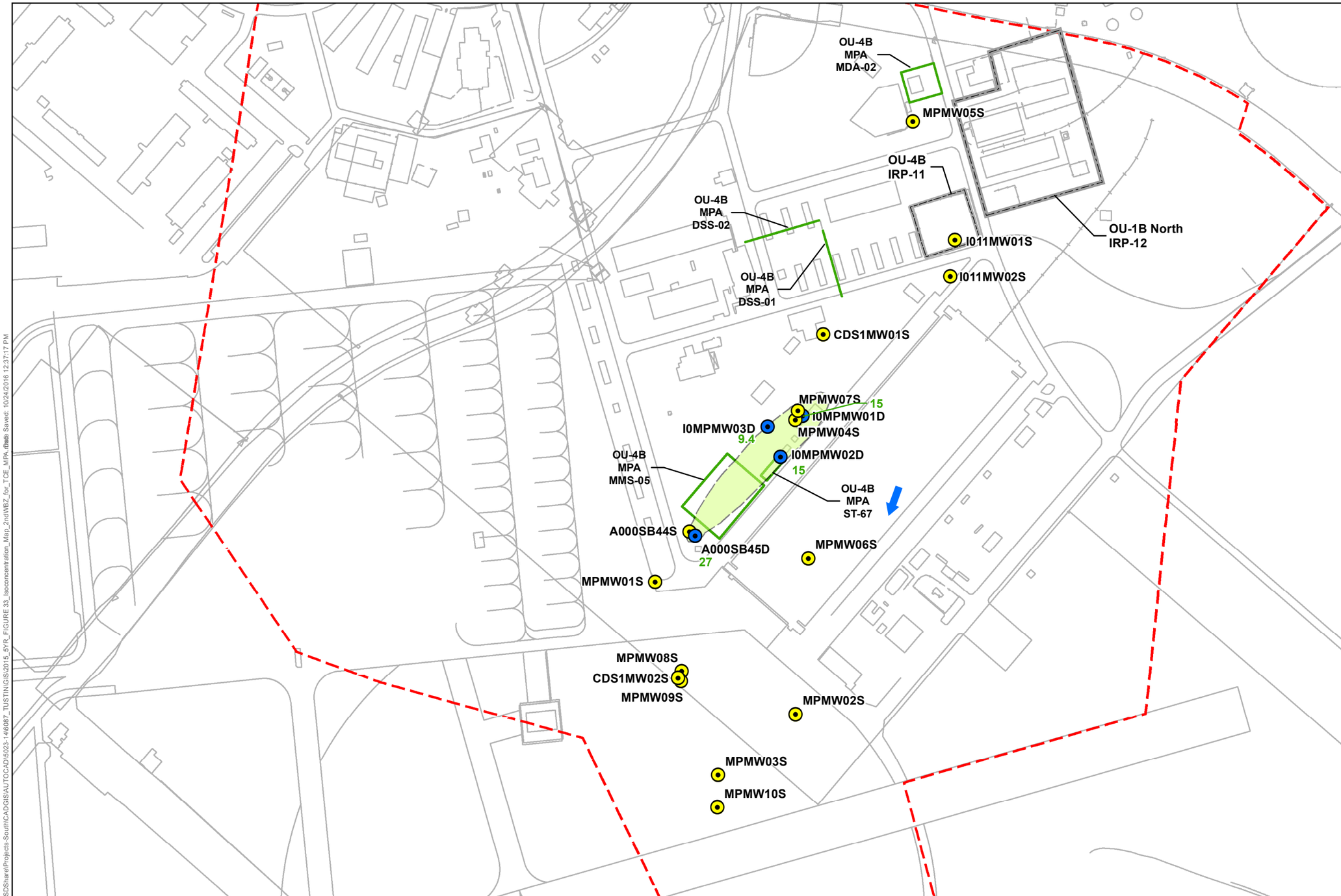

LEGEND

- Monitoring Well (First WBZ)
- Monitoring Well (Second WBZ)
- Carve-Out Area #5 Boundary
- Mingled Plumes Area (MPA)
- TCE Plume, >5 µg/L, May 2015*
- IRP Sites
- 27 TCE concentration (µg/L), May 2015*
- Groundwater Flow Direction, May 2015

NOTES

* Source of TCE concentrations and isoconcentration contours:
RORE, Inc. 2015a; Final 2015 Semiannual Data Update, Installation Restoration Program Sites 5S(a), 6, and Mingled Plumes Area, Operable Unit 4B, Former Marine Corps Air StationTustin, Tustin, California. November.

Plume boundaries show approximate extent of where COC concentrations exceed RGs.
TCE RG = 5 µg/L

WELL ID SUFFIX

D - Second WBZ
S - First WBZ

ABBREVIATIONS

COC - Contaminant of Concern
DSS - Disposal Sanitary Sewer
IRP - Installation Restoration Program
MDA - Miscellaneous, Potential Disposal Area
MMS - Miscellaneous, Major Spill
OU - Operable Unit
RG - remediation goal
TCE - trichloroethene
ST - Storage, Temporary
µg/L - micrograms per liter
VOC - volatile organic compound
WBZ - Water-Bearing Zone

PROJECT:	5023-14-6087
DATE:	October 2016
DRAWN BY:	CAB/SB
CHECKED BY:	KR

N

0 300 600
Approximate Scale in Feet

MMEC GROUP

Former Marine Corps Air Station Tustin, California

2015 OU-4B Isoconcentration Map for TCE at the MPA, Second WBZ

CERCLA Five-Year Review Report
Operable Units 1A, 1B North, 1B South, 3, and 4B

FIGURE
33

Document Path: \\SDG1-FS1\SDShare\Projects-South\CAD\GIS\AUTOCAD\5023-146087_TUSTIN\GIS\2015_5YR_FIGURE 33_Isoconcentration_Map_2ndWBZ_for_TCE_MPA.mxd Date Saved: 10/24/2016 12:37:17 PM

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Appendix A
LIST OF DOCUMENTS REVIEWED

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AIS-TN&A Joint Venture (AIS-TN&A JV). 2012. Final Land Use Control Remedial Design and Long Term Monitoring/Operations and Maintenance Plan for Installation Restoration Program Sites 11 and 13W, Operable Unit 4B, Former Marine Corps Air Station, Tustin, California, Revision1. November.

_____. 2013. Final Remedial Design/Remedial Action Work Plan for IRP-5S(a), 6, and the MPA, OU-4B, Former Marine Corps Air Station, Tustin, California. January.

_____. 2014a. Final Interim-Remedial Action Completion Report for Installation Restoration Program (IRP) Sites 5S(a), 6, and the Mingled Plumes Area (MPA). June.

_____. 2014b Final 2013 Annual Institutional Control Compliance Monitoring Report for Installation Restoration Program (IRP) Sites 11 and 13W, Operable Unit 4B, Former Marine Corps Air Station Tustin, California. July.

_____. 2015a. Final Land Use Control Remedial Design for Installation Restoration Program Sites 5S(a), 6, and the Mingled Plumes Area, Operable Unit 4B, Former Marine Corps Air Station Tustin, Tustin, California. June.

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_____. 2015c. Final Annual Performance Groundwater Monitoring Report (June 2013 through February 2014), Installation Restoration Program Sites 5S(a), 6, and the Mingled Plumes Area, Operable Unit 4B, Former Marine Corps Air Station Tustin, Tustin, California. January.

_____. 2016b. Final Operating Properly and Successfully Demonstration Report, Installation Program Sites 5S(a), 6, and the Mingled Plumes Area, Operable Unit 4B, Former Marine Corps Air Station Tustin, Tustin, California. February.

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_____. 2012a. Final 2011 Annual Long-Term Monitoring Report, Operable Unit 3 (OU-3), Former Marine Corps Air Station Tustin, Tustin, California. September.

_____. 2012b. Final 2011 Annual Performance Evaluation, Groundwater Remedy at Operable Units 1A (IRP-13S) and 1B (IRP-3 and -12), Former Marine Corps Air Station, Tustin, California. November.

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_____ 2013b. Final 2012 Annual Performance Evaluation, Groundwater Remedy at Operable Units 1A (IRP-13S) and 1B (IRP-3 and -12), Former Marine Corps Air Station, Tustin, California. October.

_____. 2014a. Final 2013 Annual Long-Term Monitoring Report, Operable Unit 3 (OU-3), Former Marine Corps Air Station Tustin, Tustin, California. June.

_____ 2014b. Final 2013 Annual Performance Evaluation, Groundwater Remedy at Operable Units 1A (IRP-13S) and 1B (IRP-3 and -12), Former Marine Corps Air Station, Tustin, California. October.

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_____. 2015c. Final 2014 Annual Performance Evaluation, Groundwater Remedy at Operable Units 1A (IRP-13S) and 1B (IRP-3 and -12), Former Marine Corps Air Station, Tustin, California. December.

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_____. 2016a. Final Annual Performance Evaluation Report, March 2014 through February 2015, Installation Restoration Program Sites 5S(a), 6, and the Mingled Plumes Area, Operable Unit 4B, Former Marine Corps Air Station Tustin, Tustin, California. January.

_____. 2016b. Final 2015 Annual Institutional Control Compliance Monitoring Report for Installation Restoration Program Sites 11 and 13W, Operable Unit 4B, Former Marine Corps Air Station Tustin, Tustin, California. June.

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_____. 2002a. Lease in Furtherance of Conveyance (LIFOC) Between the United States of America and the City of Tustin, California for Portions of Former Marine Corps Air Station Tustin. May.

_____. 2004a. Final Record of Decision/Remedial Action Plan, Operable Unit 1A, Former Marine Corps Air Station, Tustin, California. October.

_____. 2004b. Final Record of Decision/Remedial Action Plan, Operable Unit 1B, IRP-3 Paint Stripper Disposal Area, IRP-12 Drum Storage Area. October.

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_____. 2010. Final Record of Decision/Remedial Action Plan for Operable Unit 4B, Former Marine Corps Air Station Tustin, California. January.

_____. 2011a. Navy/Marine Corps Policy for Conducting Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Five-Year Reviews. June.

_____. 2011b. Final CERCLA Five-Year Review, Operable Units 1A, 1B North, 1B South, and 3 (Installation Restoration Program Sites 13S, 12, 3, and 1), Former Marine Corps Air Station, Tustin, California. October.

_____. 2012a. Defense Environmental Restoration Program (DERP) Manual. March.

_____. 2013a. Final CERCLA Five-Year Review Report Addendum Operable Units 1A, 1B South, and 4B Low Concentration Sites (Installation Restoration Program Sites 13S, 3, 11, 13W, and MMS-04), Former Marine Corps Air Station Tustin, Tustin, California. March.

_____. 2013b. Letter from U.S. Navy requesting Operating Properly and Successfully (OPS) determination from the U.S. Environmental Protection Agency (USEPA) for the groundwater remedy at Installation Restoration Program (IRP) Sites 11 and 13W, Operable Unit (OU)-4B, Former Marine Corps Air Station (MCAS) Tustin, California. August 15.

_____. 2014a. Revised Draft Final Explanation of Significant Differences to the Final Record of Decision/Remedial Action Plan Operable Unit 1A, Former Marine Corps Air Station Tustin, Tustin, California. December.

_____. 2014b. Revised Draft Final Explanation of Significant Differences to the Final Record of Decision/Remedial Action Plan Operable Unit 1B, IRP-3 – Paint Stripper Disposal Area, IRP-12 – Drum Storage Area No. 2, Former Marine Corps Air Station Tustin, Tustin, California. December.

_____. 2014c. Revised Draft Final Land Use Controls Remedial Design (LUC RD) Amendment No. 1, Remedial Design Hydraulic Containment with Hot Spot Removal Operable Units 1A and 1B, Former Marine Corps Air Station Tustin, Tustin, California. December.

_____. 2014d. Modification No. 1 LIFOC Between the United States of America and the City of Tustin, California for Portions of Former Marine Corps Air Station Tustin. December.

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_____. 2009b. Toxicological Review of 1,2,3-Trichloropropane (CAS No. 96-18-4) In Support of Summary Information on the Integrated Risk Information System (IRIS). September.

_____. 2010. Toxicological Review of 1,2-Dichloroethylene (CAS No. 156-59-2) In Support of Summary Information on the Integrated Risk Information System (IRIS). September.

_____. 2011. Toxicological Review of Trichloroethylene (CAS No. 79-01-6) In Support of Summary Information on the Integrated Risk Information System (IRIS). September.

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_____. 2016. Determination of Operating Properly and Successfully for the Remedial Action at the Moderate Concentration Sites, Operable Unit 4B, Former Marine Corps Air Station Tustin, Tustin, California. 17 February.

Appendix B
LAND USE CONTROLS COMPLIANCE CHECKLIST

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Table 5-2
Institutional Controls Annual Field Inspection Log (for Transferee use)

Land-Use Restriction Checklist: **Provide descriptions and comments on separate pieces of paper and attach.**

Inspected by: Ken Nishikawa
City of Tustin
300 Centennial Way, Tustin, Ca, 92780 (714) 573-3389
(name, affiliation, address, and telephone number)

Date: 2/11/13

1. Structures in the area containing the containment remedy:

   Is the area containing the containment remedy being used as a residence, hospital for humans, a school for persons under 21 years of age, a day care center for children, or any permanently occupied human habitation other than those used for industrial purposes? YES / NO (circle one). If yes, describe.

   Has there been any construction of facilities or structures, or appurtenances on the surface of the area containing the containment remedy since the last inspection? YES / NO (circle one).

   If yes, was prior written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one). Describe.

   If yes, was construction conducted in accordance with the approved plan?

2. Land-disturbing activities and potential for damaging the geotextile liner (excavations greater than 5 feet below ground surface):

   Is there evidence of land-disturbing activity on the surface of the area containing the containment remedy? YES / NO (circle one). If yes, what was the depth of the excavation? _____ feet.

   If the excavation was greater than 5 feet below ground surface:

   (a) Was prior review and written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one).

   (b) Was the excavation undertaken in accordance with any and all applicable conditions of approval? YES / NO (circle one).

   (c) Were necessary measures taken to locate the depth of the geotextile liner prior to the excavation to prevent damage to the geotextile liner? YES / NO (circle one).

   (d) Was the geotextile liner or waste encountered in the course of any excavation? YES / NO (circle one). If yes, when did it occur (date, time)? _____. At what depth below land surface was it encountered? _____. Was the excavation stopped immediately? YES / NO (circle one). Were the DON, DTSC, and RWQCB notified by the party responsible for the excavation? YES / NO (circle one). If yes, describe how and when the notifications occurred.

3. Land-disturbing activities and potential for damaging the geotextile liner (shallow excavations to a depth not greater than 5 feet below the ground surface, or to the geotextile liner, whichever is closer to the ground surface):

   If the excavation was to a depth not greater than 5 feet below the ground surface:

   (a) Were necessary measures taken to locate the depth of the geotextile liner prior to the excavation to prevent damage to the geotextile liner? YES / NO (circle one).

   (b) Was the geotextile liner or waste encountered in the course of any excavation? YES / NO (circle one). If yes, when did it occur (date, time)? _____. At what depth below ground surface was it encountered? _____. Was the excavation stopped immediately? YES / NO (circle one). Were the DON, DTSC, and RWQCB notified by the party responsible for the excavation? YES / NO (circle one). If yes, describe how and when the notifications occurred.

Exhibit D
Institutional Controls Annual
Field Inspection Log

Table 5-2 (continued)

4. Irrigation and landscaping activities:

Is there evidence of irrigation, landscaping, or planting activities within the area of the containment remedy? YES / NO (circle one).

If yes, was an irrigation and landscaping plan submitted, reviewed, and approved in writing by the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity prior to conducting this activity? YES / NO (circle one). Describe. (See prior inspection log)

If yes, were the irrigation, landscaping, and planting activities conducted in accordance with the approved plan? Yes

5. Groundwater extraction:

Has any groundwater been extracted within the area of the containment remedy? YES / NO (circle one).

Are there any new groundwater wells installed within the area of the containment remedy since the last inspection? YES / NO (circle one).

If yes, was prior review and written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one). Describe.

If yes, were the wells installed in accordance with any applicable conditions of approval?

6. Monitoring equipment:

Have any of the following items located within the area of the containment remedy been removed or damaged: French drain system, sumps, monitoring wells and associated monitoring equipment, survey monuments, landfill gas probes, signs describing use restrictions, fencing, or other related equipment? YES / NO (circle one).

If they were removed or damaged, was prior review and written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one). Describe.

If yes, were they removed or managed in accordance with any applicable conditions of approval?

7. Adjacent monitoring equipment:

Have any of the following items located adjacent to the area of the containment remedy been removed or damaged: monitoring wells and associated monitoring equipment, survey monuments, signs describing use restrictions, fencing, or other related equipment? YES / NO (circle one).

If they were removed or damaged, was prior review and written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one). Describe.

If yes, were they removed or managed in accordance with any applicable conditions of approval?

I hereby certify that the information contained in this report is true and accurate based upon information and belief following a reasonable inquiry.

Name: MATT WEST

Signature: Matt West

Title: RED / PROJECT MANAGER

Date: 2/11/13

Acronyms/Abbreviations:

DON – Department of the Navy
DTSC – (California Environmental Protection Agency) Department of Toxic Substances Control
RWQCB – (California) Regional Water Quality Control Board

Exhibit D
Institutional Controls Annual Field Inspection Log

Exhibit E
Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1A
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

Property Owner[a]: Columbus Square Community Association

This evaluation is the final Navy certification just prior to site conveyance (yes or no) NO

If for an annual inspection, this evaluation covers the period from through 1/1/2012 - 12/31/2012

Checklist

	In Compliance	Non-Compliance	See Comment
1) No installation of new groundwater wells of any type within the area requiring institutional controls.[b,c]	☒	☐	☐
2) No activities that could expose groundwater within the area requiring institutional controls.[b,c]	☒	☐	☐
3) No groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling purposes, and other industrial processes).[b,c]	☒	☐	☐
4) No altering, disturbing, or removing groundwater monitoring wells and associated equipment within the area requiring institutional controls.[b,c]	☒	☐	☐
5) No installation of structure or improvement that has the potential to affect plume migration within the area requiring institutional controls.[b,c]	☒	☐	☐
6) No construction and/or operation within the area requiring institutional controls that interfere with ongoing monitoring or assessment work, or the final remedy being conducted by Department of the Navy, or the Federal, State, or local regulatory agencies.[b,c]	☒	☐	☐
7) Parcel use consistent with Specific Plan/Reuse Plan City of Tustin. "Draft MCAS Tustin Specific Plan/ Reuse Plan" (original July 1996, errata September 1998).	☒	☐	☐

Comments:

Exhibit E (continued)
Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1A
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

I, the undersigned, hereby certify that the above-described land use restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

On behalf of the Board of Directors

Signature: Jon Cernok, 949-448-6080
jcernok@meritpm.com

Date: 2/4/2013

Notes:

a) A Homeowners Association may submit this form on behalf of all Property Owners, whose property is subject to the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1A" and the Quitclaim Deed.
b) Future property owner(s) may apply for a written variance from the restrictions in accordance with the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1A" and the Quitclaim Deed
c) A property owner(s) may seek a variance or termination of restrictions on the property contained in the Quitclaim Deed pursuant to the variance and termination provisions in that document.

Mail completed form(s) to the DON, U.S. Environmental Protection Agency (EPA), Department of Toxic Substances Control (DTSC), and Regional Water Quality Control Board (RWQCB) by January 15th of each calendar year.

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Ste. 900
San Diego, CA 92108-4310

Department of Toxic Substances Control
Office of Military Facilities
5796 Corporate Avenue
Cypress, CA 90630

U.S. Environmental Protection Agency
Superfund (SDF 8-1) Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Santa Ana Regional Water Quality Control Board
California Tower
3737 Main Street, Suite 500
Riverside, CA 92501-3339

Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1B
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

Property Owner[a]: Columbus Square Community Association

This evaluation is the final Navy certification just prior to site conveyance (yes or no) NO

If for an annual inspection, this evaluation covers the period from through 1/1/2012 – 12/31/2012

Checklist

	In Compliance	Non-Compliance	See Comment
1) No installation of new groundwater wells of any type within the area requiring institutional controls.[b,c]	☒	☐	☐
2) No activities that could expose groundwater within the area requiring institutional controls.[b,c]	☒	☐	☐
3) No groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling purposes, and other industrial processes).[b,c]	☒	☐	☐
4) No altering, disturbing, or removing groundwater monitoring wells and associated equipment within the area requiring institutional controls.[b,c]	☒	☐	☐
5) No installation of structure or improvement that has the potential to affect plume migration within the area requiring institutional controls.[b,c]	☒	☐	☐
6) No construction and/or operation within the area requiring institutional controls that interfere with ongoing monitoring or assessment work, or the final remedy being conducted by Department of the Navy, or the Federal, State, or local regulatory agencies.[b,c]	☒	☐	☐
7) Parcel use consistent with Specific Plan/Reuse Plan. City of Tustin. "Draft MCAS Tustin Specific Plan/ Reuse Plan" (original July 1996, errata September 1998).	☒	☐	☐

Comments:

Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1B
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

I, the undersigned, hereby certify that the above-described land use restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

On behalf of the Board of Directors

Signature: Jon Cernok, 949-448-6080
jcernok@meritpm.com

2/4/2013
Date

Notes:

a) A Homeowners Association may submit this form on behalf of all Property Owners, whose property is subject to the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed.
b) Future property owner(s) may apply for a written variance from the restrictions in accordance with the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed
c) A property owner(s) may seek a variance or termination of restrictions on the property contained in the Quitclaim Deed pursuant to the variance and termination provisions in that document.

Mail completed form(s) to the DON, U.S. Environmental Protection Agency (EPA), Department of Toxic Substances Control (DTSC), and Regional Water Quality Control Board (RWQCB) by January 15th of each calendar year.

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Ste. 900
San Diego, CA 92108-4310

Department of Toxic Substances Control
Office of Military Facilities
5796 Corporate Avenue
Cypress, CA 90630

U.S. Environmental Protection Agency
Superfund (SDF 8-1) Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Santa Ana Regional Water Quality Control Board
California Tower
3737 Main Street, Suite 500
Riverside, CA 92501-3339

Land Use Controls Compliance Certificate
Operable Unit 4B, IRP Sites 11 and 13W
Former Marine Corps Air Station Tustin
U.S. EPA I.D. Number: CA9170090022

Property Owner: Department of the Navy
This evaluation is the final Navy certification just prior to site conveyance (yes or no) no
If for an annual inspection, this evaluation covers the period from November 15, 2012 through February 20, 2013

Checklist

	In Compliance	Non-Compliance	See Comment
1) No installation of new groundwater wells of any type within the area requiring institutional controls.	☑	☐	☐
2) No activities that could expose groundwater within the area requiring institutional controls.	☑	☐	☐
3) No groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling, and other industrial processes).	☑	☐	☐
4) No altering, disturbing, or removing groundwater monitoring wells and associated equipment within the area requiring institutional controls.	☑	☐	☐
5) No installation of structures or improvements that have the potential to affect plume migration within the area requiring institutional controls.	☑	☐	☐
6) No construction and/or operation within the area requiring institutional controls that interferes with ongoing monitoring and assessment work or the final remedy being conducted by the Department of the Navy or other federal, state, or local regulatory agencies.	☑	☐	☐

Comments:

Monitoring system maintenance and inspections were conducted during the annual groundwater monitoring event on January 3, 2013. Institutional Control (IC) site inspection conducted on February 20, 2013.

Land Use Controls Compliance Certificate
Operable Unit 4B, IRP Sites 11 and 13W
Former Marine Corps Air Station Tustin
U.S. EPA I.D. Number: CA9170090022

I, the undersigned, hereby certify that the above-described land use restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

Signature _____ Date 2/20/13

Notes:

[a] A Homeowners Association may submit this form on behalf of all Property Owners, whose property is subject to the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed

[b] Future property owner(s) may apply for a written variance from the restrictions in accordance with the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed

[c] A property owner(s) may seek a variance or termination of restrictions on the property contained in the Quitclaim Deed pursuant to the variance and termination provisions in that document

Mail completed form(s) to the DON, U.S. Environmental Protection Agency (U.S. EPA), Department of Toxic Substances Control (DTSC), and Regional Water Quality Control Board (RWQCB) by January 15th of each calendar year.

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San Francisco, CA 94105-3901

Santa Ana Regional Water Quality
Control Board
California Tower
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Riverside, CA 92501-3348

Land Use Controls Compliance Certificate
Operable Unit 4B, IRP Sites 11 and 13W
Former Marine Corps Air Station Tustin
U.S. EPA I.D. Number: CA9170090022

Property Owner: City of Tustin (By a Lease in Furtherance of Conveyance affecting a portion of 13W)
This evaluation is the final Navy certification just prior to site conveyance (yes or no) No
If for an annual inspection, this evaluation covers the period from January 2012 through December 2012

Checklist

	In Compliance	Non-Compliance	See Comment
1) No installation of new groundwater wells of any type within the area requiring institutional controls.	☒	☐	☐
2) No activities that could expose groundwater within the area requiring institutional controls.	☒	☐	☐
3) No groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling, and other industrial processes).	☒	☐	☐
4) No altering, disturbing, or removing groundwater monitoring wells and associated equipment within the area requiring institutional controls.	☒	☐	☐
5) No installation of structures or improvements that have the potential to affect plume migration within the area requiring institutional controls.	☒	☐	☐
6) No construction and/or operation within the area requiring institutional controls that interferes with ongoing monitoring and assessment work or the final remedy being conducted by the Department of the Navy or other federal, state, or local regulatory agencies.	☒	☐	☐

Comments:

NOTE - The City of Tustin is submitting this form as it only applies to the portion of IRP 13W that is located within a Portion of Reuse Parcels 40 (existing Severyns Road) and 22 (Future City Community Park Site). The City of Tustin leases Parcels 40 and 22 separately pursuant to the "Lease in Furtherance of Conveyance (LIFOC)", dated May 10, 2002 and June 16th, 2004, respectively.

Land Use Controls Compliance Certificate
Operable Unit 4B, IRP Sites 11 and 13W
Former Marine Corps Air Station Tustin
U.S. EPA I.D. Number: CA9170090022

I, the undersigned, hereby certify that the above-described land use restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

Matt West (on behalf of the City of Tustin)

Print Name

Matt West

Signature

6/24/13

Date

Notes:

[a] A Homeowners Association may submit this form on behalf of all Property Owners, whose property is subject to the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed

[b] Future property owner(s) may apply for a written variance from the restrictions in accordance with the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed

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Mail completed form(s) to the DON, U.S. Environmental Protection Agency (U.S. EPA), Department of Toxic Substances Control (DTSC), and Regional Water Quality Control Board (RWQCB) by January 15th of each calendar year.

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California Tower
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Riverside, CA 92501-3348

Table 5-2
Institutional Controls Annual Field Inspection Log (for Transferee use)

Land-Use Restriction Checklist: Provide descriptions and comments on separate pieces of paper and attach.

Inspected by: Ken Nishitsuka, City of Tustin, 300 Centennial Way, Tustin, CA 92780 (714) 573-3389 Date: 1/9/14
(name, affiliation, address, and telephone number)

1. Structures in the area containing the containment remedy:

   Is the area containing the containment remedy being used as a residence, hospital for humans, a school for persons under 21 years of age, a day care center for children, or any permanently occupied human habitation other than those used for industrial purposes? YES / NO (circle one). If yes, describe.

   Has there been any construction of facilities or structures, or appurtenances on the surface of the area containing the containment remedy since the last inspection? YES / NO (circle one).

   If yes, was prior written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one). Describe.

   If yes, was construction conducted in accordance with the approved plan?

2. Land-disturbing activities and potential for damaging the geotextile liner (excavations greater than 5 feet below ground surface):

   Is there evidence of land-disturbing activity on the surface of the area containing the containment remedy? YES / NO (circle one). If yes, what was the depth of the excavation? _____ feet.

   If the excavation was greater than 5 feet below ground surface:

   (a) Was prior review and written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one).

   (b) Was the excavation undertaken in accordance with any and all applicable conditions of approval? YES / NO (circle one).

   (c) Were necessary measures taken to locate the depth of the geotextile liner prior to the excavation to prevent damage to the geotextile liner? YES / NO (circle one).

   (d) Was the geotextile liner or waste encountered in the course of any excavation? YES / NO (circle one). If yes, when did it occur (date, time)? _____. At what depth below land surface was it encountered? _____ Was the excavation stopped immediately? YES / NO (circle one). Were the DON, DTSC, and RWQCB notified by the party responsible for the excavation? YES / NO (circle one). If yes, describe how and when the notifications occurred.

3. Land-disturbing activities and potential for damaging the geotextile liner (shallow excavations to a depth not greater than 5 feet below the ground surface, or to the geotextile liner, whichever is closer to the ground surface):

   If the excavation was to a depth not greater than 5 feet below the ground surface:

   (a) Were necessary measures taken to locate the depth of the geotextile liner prior to the excavation to prevent damage to the geotextile liner? YES / NO (circle one).

   (b) Was the geotextile liner or waste encountered in the course of any excavation? YES / NO (circle one). If yes, when did it occur (date, time)? _____. At what depth below ground surface was it encountered? _____. Was the excavation stopped immediately? YES / NO (circle one). Were the DON, DTSC, and RWQCB notified by the party responsible for the excavation? YES / NO (circle one). If yes, describe how and when the notifications occurred.

Exhibit D
Institutional Controls Annual
Field Inspection Log

Table 5-2 (continued)

4. Irrigation and landscaping activities:

   Is there evidence of irrigation, landscaping, or planting activities within the area of the containment remedy? YES / NO (circle one).

   If yes, was an irrigation and landscaping plan submitted, reviewed, and approved in writing by the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity prior to conducting this activity? YES / NO (circle one). Describe. (See prior inspection logs)

   If yes, were the irrigation, landscaping, and planting activities conducted in accordance with the approved plan? Yes

5. Groundwater extraction:

   Has any groundwater been extracted within the area of the containment remedy? YES / NO (circle one).

   Are there any new groundwater wells installed within the area of the containment remedy since the last inspection? YES / NO (circle one).

   If yes, was prior review and written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one). Describe.

   If yes, were the wells installed in accordance with any applicable conditions of approval?

6. Monitoring equipment:

   Have any of the following items located within the area of the containment remedy been removed or damaged: French drain system, sumps, monitoring wells and associated monitoring equipment, survey monuments, landfill gas probes, signs describing use restrictions, fencing, or other related equipment? YES / NO (circle one).

   If they were removed or damaged, was prior review and written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one). Describe.

   If yes, were they removed or managed in accordance with any applicable conditions of approval?

7. Adjacent monitoring equipment:

   Have any of the following items located adjacent to the area of the containment remedy been removed or damaged: monitoring wells and associated monitoring equipment, survey monuments, signs describing use restrictions, fencing, or other related equipment? YES / NO (circle one).

   If they were removed or damaged, was prior review and written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one). Describe.

   If yes, were they removed or managed in accordance with any applicable conditions of approval?

I hereby certify that the information contained in this report is true and accurate based upon information and belief following a reasonable inquiry.

Name: Matt West

Signature: Matt West

Title: Principal Management Analyst

Date: January 9, 2014

Acronyms/Abbreviations:

DON – Department of the Navy
DTSC – (California Environmental Protection Agency) Department of Toxic Substances Control
RWQCB – (California) Regional Water Quality Control Board

Exhibit D
Institutional Controls Annual
Field Inspection Log

Land Use Controls Compliance Certificate
Operable Unit 4B, IRP Sites 11 and 13W
Former Marine Corps Air Station Tustin
U.S. EPA I.D. Number: CA9170090022

Property Owner: City of Tustin (By a Lease in Furtherance of Conveyance affecting a portion of 13W)
This evaluation is the final Navy certification just prior to site conveyance (yes or no) No
If for an annual inspection, this evaluation covers the period from January 2013 through December 2013

Checklist

	In Compliance	Non-Compliance	See Comment
1) No installation of new groundwater wells of any type within the area requiring institutional controls.	[X]	[ ]	[ ]
2) No activities that could expose groundwater within the area requiring institutional controls.	[X]	[ ]	[ ]
3) No groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling, and other industrial processes).	[X]	[ ]	[ ]
4) No altering, disturbing, or removing groundwater monitoring wells and associated equipment within the area requiring institutional controls.	[X]	[ ]	[ ]
5) No installation of structures or improvements that have the potential to affect plume migration within the area requiring institutional controls.	[X]	[ ]	[ ]
6) No construction and/or operation within the area requiring institutional controls that interferes with ongoing monitoring and assessment work or the final remedy being conducted by the Department of the Navy or other federal, state, or local regulatory agencies.	[X]	[ ]	[ ]

Comments:

NOTE - The City of Tustin is submitting this form as it only applies to the portion of IRP 13W that is located within a Portion of Reuse Parcels 40 (existing Severyns Road) and 22 (Future City Community Park Site). The City of Tustin leases Parcels 40 and 22 separately pursuant to the "Lease in Furtherance of Conveyance (LIFOC)", dated May 10, 2002 and June 16, 2004, respectively.

Land Use Controls Compliance Certificate
Operable Unit 4B, IRP Sites 11 and 13W
Former Marine Corps Air Station Tustin
U.S. EPA I.D. Number: CA9170090022

I, the undersigned, hereby certify that the above-described land use restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

Matt West (on behalf of the City of Tustin)

Print Name

Matt West

Signature

1/9/14

Date

Notes:

[a] A Homeowners Association may submit this form on behalf of all Property Owners, whose property is subject to the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed

[b] Future property owner(s) may apply for a written variance from the restrictions in accordance with the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed

[c] A property owner(s) may seek a variance or termination of restrictions on the property contained in the Quitclaim Deed pursuant to the variance and termination provisions in that document

Mail completed form(s) to the DON, U.S. Environmental Protection Agency (U.S. EPA), Department of Toxic Substances Control (DTSC), and Regional Water Quality Control Board (RWQCB) by January 15th of each calendar year.

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, CA 92108-4310

Department of Toxic Substances Control
Office of Military Facilities
5796 Corporate Avenue
Cypress, CA 90630

U.S. Environmental Protection Agency
Superfund (SFD-H-8) Region 9
75 Hawthorne Street
San Francisco, CA 94105-3901

Santa Ana Regional Water Quality
Control Board
California Tower
3737 Main Street, Suite 500
Riverside, CA 92501-3348

Land Use Controls Compliance Certificate
Operable Unit 4B, IRP Sites 11 and 13W
Former Marine Corps Air Station Tustin
U.S. EPA I.D. Number: CA9170090022

Property Owner: Department of the Navy
This evaluation is the final Navy certification just prior to site conveyance (yes or no) no
If for an annual inspection, this evaluation covers the period from 1/1/13 through 12/31/13

Checklist

	In Compliance	Non-Compliance	See Comment
1) No installation of new groundwater wells of any type within the area requiring institutional controls.	☑	☐	☐
2) No activities that could expose groundwater within the area requiring institutional controls.	☑	☐	☐
3) No groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling, and other industrial processes).	☑	☐	☐
4) No altering, disturbing, or removing groundwater monitoring wells and associated equipment within the area requiring institutional controls.	☑	☐	☐
5) No installation of structures or improvements that have the potential to affect plume migration within the area requiring institutional controls.	☑	☐	☐
6) No construction and/or operation within the area requiring institutional controls that interferes with ongoing monitoring and assessment work or the final remedy being conducted by the Department of the Navy or other federal, state, or local regulatory agencies.	☑	☐	☐

Comments:

Land Use Controls Compliance Certificate
Operable Unit 4B, IRP Sites 11 and 13W
Former Marine Corps Air Station Tustin
U.S. EPA I.D. Number: CA9170090022

I, the undersigned, hereby certify that the above-described land use restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

Signature

Date 12/31/13

Paula Jewell (on behalf of the Navy)

Notes: OTIE

[a] A Homeowners Association may submit this form on behalf of all Property Owners, whose property is subject to the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed

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Department of the Navy
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Exhibit E
Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1A
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

Property Owner[a]: Columbus Square Community Assoc

This evaluation is the final Navy certification just prior to site conveyance (yes or no) No.

If for an annual inspection, this evaluation covers the period from through 12/31/2013

Checklist

	In Compliance	Non-Compliance	See Comment
1) No installation of new groundwater wells of any type within the area requiring institutional controls.[b,c]	☒	☐	☐
2) No activities that could expose groundwater within the area requiring institutional controls.[b,c]	☒	☐	☐
3) No groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling purposes, and other industrial processes).[b,c]	☒	☐	☐
4) No altering, disturbing, or removing groundwater monitoring wells and associated equipment within the area requiring institutional controls.[b,c]	☒	☐	☐
5) No installation of structure or improvement that has the potential to affect plume migration within the area requiring institutional controls.[b,c]	☒	☐	☐
6) No construction and/or operation within the area requiring institutional controls that interfere with ongoing monitoring or assessment work, or the final remedy being conducted by Department of the Navy, or the Federal, State, or local regulatory agencies.[b,c]	☒	☐	☐
7) Parcel use consistent with Specific Plan/Reuse Plan City of Tustin. "Draft MCAS Tustin Specific Plan/ Reuse Plan" (original July 1996, errata September 1998).	☒	☐	☐

Comments:

Exhibit E (continued)
Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1A
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

I, the undersigned, hereby certify that the above-described land use restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

Signature — Jon Cernok, 949-448-6080
Jon.cernok@fsresidential.com

February 4, 2014
Date

Notes:

a. A Homeowners Association may submit this form on behalf of all Property Owners, whose property is subject to the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1A" and the Quitclaim Deed.
b. Future property owner(s) may apply for a written variance from the restrictions in accordance with the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1A" and the Quitclaim Deed.
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Department of the Navy
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75 Hawthorne Street
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California Tower
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Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1B
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

Property Owner: Columbus Square Community Assoc.

This evaluation is the final Navy certification just prior to site conveyance (yes or no) NO

If for an annual inspection, this evaluation covers the period from through 12/31/2013

Checklist

	In Compliance	Non-Compliance	See Comment
1) No installation of new groundwater wells of any type within the area requiring institutional controls.[b,c]	☒	☐	☐
2) No activities that could expose groundwater within the area requiring institutional controls.[b,c]	☒	☐	☐
3) No groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling purposes, and other industrial processes).[b,c]	☒	☐	☐
4) No altering, disturbing, or removing groundwater monitoring wells and associated equipment within the area requiring institutional controls.[b,c]	☒	☐	☐
5) No installation of structure or improvement that has the potential to affect plume migration within the area requiring institutional controls.[b,c]	☒	☐	☐
6) No construction and/or operation within the area requiring institutional controls that interfere with ongoing monitoring or assessment work, or the final remedy being conducted by Department of the Navy, or the Federal, State, or local regulatory agencies.[b,c]	☒	☐	☐
7) Parcel use consistent with Specific Plan/Reuse Plan. City of Tustin. "Draft MCAS Tustin Specific Plan/ Reuse Plan" (original July 1996, errata September 1998).	☒	☐	☐

Comments:

Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1B
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

I, the undersigned, hereby certify that the above-described land use restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

Signature Jon Cernok, 949-448-6080
Jon.cernok@fsresidential.com

Date Feby 4, 2014

Notes:

- A Homeowners Association may submit this form on behalf of all Property Owners, whose property is subject to the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed.
- Future property owner(s) may apply for a written variance from the restrictions in accordance with the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed.
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Exhibit E
Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1A
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

Property Owner[a]: Columbus Square Community Association

This evaluation is the final Navy certification just prior to site conveyance (yes or no) NO

If for an annual inspection, this evaluation covers the period from through 12/31/2014

Checklist

	In Compliance	Non-Compliance	See Comment
1) No installation of new groundwater wells of any type within the area requiring institutional controls.[b,c]	☑	☐	☐
2) No activities that could expose groundwater within the area requiring institutional controls.[b,c]	☑	☐	☐
3) No groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling purposes, and other industrial processes).[b,c]	☑	☐	☐
4) No altering, disturbing, or removing groundwater monitoring wells and associated equipment within the area requiring institutional controls.[b,c]	☑	☐	☐
5) No installation of structure or improvement that has the potential to affect plume migration within the area requiring institutional controls.[b,c]	☑	☐	☐
6) No construction and/or operation within the area requiring institutional controls that interfere with ongoing monitoring or assessment work, or the final remedy being conducted by Department of the Navy, or the Federal, State, or local regulatory agencies.[b,c]	☑	☐	☐
7) Parcel use consistent with Specific Plan/Reuse Plan. City of Tustin. "Draft MCAS Tustin Specific Plan/ Reuse Plan" (original July 1996, errata September 1998).	☑	☐	☐

Comments:

Exhibit E (continued)
Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1A
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

I, the undersigned, hereby certify that the above-described land use restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

On behalf of the Board of Directors

Signature: Holly Dawson, 714-258-8241
Holly.Dawson@fsresidential.com

2/18/15
Date

Notes:

a) A Homeowners Association may submit this form on behalf of all Property Owners, whose property is subject to the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1A" and the Quitclaim Deed.
b) Future property owner(s) may apply for a written variance from the restrictions in accordance with the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1A" and the Quitclaim Deed
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Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Ste. 900
San Diego, CA 92108-4310

Department of Toxic Substances Control
Office of Military Facilities
5796 Corporate Avenue
Cypress, CA 90630

U.S. Environmental Protection Agency
Superfund (SDF 8-1) Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Santa Ana Regional Water Quality Control Board
California Tower
3737 Main Street, Suite 500
Riverside, CA 92501-3339

Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1B
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

Property Owner[a]: Columbus Square Community Association

This evaluation is the final Navy certification just prior to site conveyance (yes or no) no

If for an annual inspection, this evaluation covers the period from through 12/31/2004

Checklist

	In Compliance	Non-Compliance	See Comment
1) No installation of new groundwater wells of any type within the area requiring institutional controls.[b,c]	☑	☐	☐
2) No activities that could expose groundwater within the area requiring institutional controls.[b,c]	☑	☐	☐
3) No groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling purposes, and other industrial processes).[b,c]	☑	☐	☐
4) No altering, disturbing, or removing groundwater monitoring wells and associated equipment within the area requiring institutional controls.[b,c]	☑	☐	☐
5) No installation of structure or improvement that has the potential to affect plume migration within the area requiring institutional controls.[b,c]	☑	☐	☐
6) No construction and/or operation within the area requiring institutional controls that interfere with ongoing monitoring or assessment work, or the final remedy being conducted by Department of the Navy, or the Federal, State, or local regulatory agencies.[b,c]	☑	☐	☐
7) Parcel use consistent with Specific Plan/Reuse Plan. City of Tustin. "Draft MCAS Tustin Specific Plan/ Reuse Plan" (original July 1996, errata September 1998).	☑	☐	☐

Comments:

Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1B
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

I, the undersigned, hereby certify that the above-described land use restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

On behalf of the Board of Directors

Signature: Holly Dawson, 714-258-8241
Holly.Dawson@fsresidential.com

2/18/15
Date

Notes:

a) A Homeowners Association may submit this form on behalf of all Property Owners, whose property is subject to the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed.
b) Future property owner(s) may apply for a written variance from the restrictions in accordance with the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed
c) A property owner(s) may seek a variance or termination of restrictions on the property contained in the Quitclaim Deed pursuant to the variance and termination provisions in that document.

Mail completed form(s) to the DON, U.S. Environmental Protection Agency (EPA), Department of Toxic Substances Control (DTSC), and Regional Water Quality Control Board (RWQCB) by January 15th of each calendar year.

Table 5-2
Institutional Controls Annual Field Inspection Log (for Transferee use)

Land-Use Restriction Checklist: **Provide descriptions and comments on separate pieces of paper and attach.**

Inspected by: Ken Nishikawa
City of Tustin
300 Centennial Way, Tustin, CA 92780 (714) 573-3150
(name, affiliation, address, and telephone number)

Date: 2/19/15

1. Structures in the area containing the containment remedy:

   Is the area containing the containment remedy being used as a residence, hospital for humans, a school for persons under 21 years of age, a day care center for children, or any permanently occupied human habitation other than those used for industrial purposes? YES / NO (circle one). If yes, describe.

   Has there been any construction of facilities or structures, or appurtenances on the surface of the area containing the containment remedy since the last inspection? YES / NO (circle one).

   If yes, was prior written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one). Describe.

   If yes, was construction conducted in accordance with the approved plan?

2. Land-disturbing activities and potential for damaging the geotextile liner (excavations greater than 5 feet below ground surface):

   Is there evidence of land-disturbing activity on the surface of the area containing the containment remedy? YES / NO (circle one). If yes, what was the depth of the excavation? _____ feet.

   If the excavation was greater than 5 feet below ground surface:

   (a) Was prior review and written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one).

   (b) Was the excavation undertaken in accordance with any and all applicable conditions of approval? YES / NO (circle one).

   (c) Were necessary measures taken to locate the depth of the geotextile liner prior to the excavation to prevent damage to the geotextile liner? YES / NO (circle one).

   (d) Was the geotextile liner or waste encountered in the course of any excavation? YES / NO (circle one). If yes, when did it occur (date, time)? _____ At what depth below land surface was it encountered? _____ Was the excavation stopped immediately? YES / NO (circle one). Were the DON, DTSC, and RWQCB notified by the party responsible for the excavation? YES / NO (circle one). If yes, describe how and when the notifications occurred.

3. Land-disturbing activities and potential for damaging the geotextile liner (shallow excavations to a depth not greater than 5 feet below the ground surface, or to the geotextile liner, whichever is closer to the ground surface):

   If the excavation was to a depth not greater than 5 feet below the ground surface:

   (a) Were necessary measures taken to locate the depth of the geotextile liner prior to the excavation to prevent damage to the geotextile liner? YES / NO (circle one).

   (b) Was the geotextile liner or waste encountered in the course of any excavation? YES / NO (circle one). If yes, when did it occur (date, time)? _____ At what depth below ground surface was it encountered? _____ Was the excavation stopped immediately? YES / NO (circle one). Were the DON, DTSC, and RWQCB notified by the party responsible for the excavation? YES / NO (circle one). If yes, describe how and when the notifications occurred.

Exhibit D
Institutional Controls Annual
Field Inspection Log

Table 5-2 (continued)

4.	Irrigation and landscaping activities: Is there evidence of irrigation, landscaping, or planting activities within the area of the containment remedy? YES / NO (circle one). If yes, was an irrigation and landscaping plan submitted, reviewed, and approved in writing by the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity prior to conducting this activity? YES / NO (circle one). Describe. (See prior inspection logs) If yes, were the irrigation, landscaping, and planting activities conducted in accordance with the approved plan? Yes
5.	Groundwater extraction: Has any groundwater been extracted within the area of the containment remedy? YES / NO (circle one). Are there any new groundwater wells installed within the area of the containment remedy since the last inspection? YES / NO (circle one). If yes, was prior review and written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one). Describe. If yes, were the wells installed in accordance with any applicable conditions of approval?
6.	Monitoring equipment: Have any of the following items located within the area of the containment remedy been removed or damaged: French drain system, sumps, monitoring wells and associated monitoring equipment, survey monuments, landfill gas probes, signs describing use restrictions, fencing, or other related equipment? YES / NO (circle one). If they were removed or damaged, was prior review and written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one). Describe. If yes, were they removed or managed in accordance with any applicable conditions of approval?
7.	Adjacent monitoring equipment: Have any of the following items located adjacent to the area of the containment remedy been removed or damaged: monitoring wells and associated monitoring equipment, survey monuments, signs describing use restrictions, fencing, or other related equipment? YES / NO (circle one). If they were removed or damaged, was prior review and written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one). Describe. If yes, were they removed or managed in accordance with any applicable conditions of approval?

I hereby certify that the information contained in this report is true and accurate based upon information and belief following a reasonable inquiry.

Name: Matthew S. West

Signature: Matthew S. West

Title: Assistant to the City Manager

Date: February 19, 2015

Acronyms/Abbreviations:

DON – Department of the Navy
DTSC – (California Environmental Protection Agency) Department of Toxic Substances Control
RWQCB – (California) Regional Water Quality Control Board

Exhibit D
Institutional Controls Annual
Field Inspection Log

Exhibit E
Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1A
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

Property Owner*: Columbus Square Community Association

This evaluation is the final Navy certification just prior to site conveyance (yes or no) NO

If for an annual inspection, this evaluation covers the period from through 12/31/2014

Checklist

	In Compliance	Non-Compliance	See Comment
1) No installation of new groundwater wells of any type within the area requiring institutional controls.[b,c]	☑	☐	☐
2) No activities that could expose groundwater within the area requiring institutional controls.[b,c]	☑	☐	☐
3) No groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling purposes, and other industrial processes).[b,c]	☑	☐	☐
4) No altering, disturbing, or removing groundwater monitoring wells and associated equipment within the area requiring institutional controls.[b,c]	☑	☐	☐
5) No installation of structure or improvement that has the potential to affect plume migration within the area requiring institutional controls.[b,c]	☑	☐	☐
6) No construction and/or operation within the area requiring institutional controls that interfere with ongoing monitoring or assessment work, or the final remedy being conducted by Department of the Navy, or the Federal, State, or local regulatory agencies.[b,c]	☑	☐	☐
7) Parcel use consistent with Specific Plan/Reuse Plan. City of Tustin. "Draft MCAS Tustin Specific Plan/ Reuse Plan" (original July 1996, errata September 1998).	☑	☐	☐

Comments:

Exhibit E (continued)
Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1A
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

I, the undersigned, hereby certify that the above-described land use restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

On behalf of the Board of Directors

Signature: Holly Dawson, 714-258-8241
Holly.Dawson@fsresidential.com

2/18/15
Date

Notes:

a) A Homeowners Association may submit this form on behalf of all Property Owners, whose property is subject to the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1A" and the Quitclaim Deed.
b) Future property owner(s) may apply for a written variance from the restrictions in accordance with the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1A" and the Quitclaim Deed
c) A property owner(s) may seek a variance or termination of restrictions on the property contained in the Quitclaim Deed pursuant to the variance and termination provisions in that document.

Mail completed form(s) to the DON, U.S. Environmental Protection Agency (EPA), Department of Toxic Substances Control (DTSC), and Regional Water Quality Control Board (RWQCB) by January 15th of each calendar year.

Department of the Navy
Base Realignment and Closure
Program Management Office West
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San Diego, CA 92108-4310

Department of Toxic Substances Control
Office of Military Facilities
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U.S. Environmental Protection Agency
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75 Hawthorne Street
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Santa Ana Regional Water Quality Control Board
California Tower
3737 Main Street, Suite 500
Riverside, CA 92501-3339

Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1B
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

Property Owner[a]: Columbus Square Community Association

This evaluation is the final Navy certification just prior to site conveyance (yes or no) no

If for an annual inspection, this evaluation covers the period from through 12/31/2014

Checklist

	In Compliance	Non-Compliance	See Comment
1) No installation of new groundwater wells of any type within the area requiring institutional controls.[b,c]	☑	☐	☐
2) No activities that could expose groundwater within the area requiring institutional controls.[b,c]	☑	☐	☐
3) No groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling purposes, and other industrial processes).[b,c]	☑	☐	☐
4) No altering, disturbing, or removing groundwater monitoring wells and associated equipment within the area requiring institutional controls.[b,c]	☑	☐	☐
5) No installation of structure or improvement that has the potential to affect plume migration within the area requiring institutional controls.[b,c]	☑	☐	☐
6) No construction and/or operation within the area requiring institutional controls that interfere with ongoing monitoring or assessment work, or the final remedy being conducted by Department of the Navy, or the Federal, State, or local regulatory agencies.[b,c]	☑	☐	☐
7) Parcel use consistent with Specific Plan/Reuse Plan. City of Tustin. "Draft MCAS Tustin Specific Plan/ Reuse Plan" (original July 1996, errata September 1998).	☑	☐	☐

Comments:

Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1B
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

I, the undersigned, hereby certify that the above-described land use restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

On behalf of the Board of Directors

Signature: Holly Dawson, 714-258-8241
Holly.Dawson@fsresidential.com

2/18/15
Date

Notes:

a) A Homeowners Association may submit this form on behalf of all Property Owners, whose property is subject to the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed.
b) Future property owner(s) may apply for a written variance from the restrictions in accordance with the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed
c) A property owner(s) may seek a variance or termination of restrictions on the property contained in the Quitclaim Deed pursuant to the variance and termination provisions in that document.

Mail completed form(s) to the DON, U.S. Environmental Protection Agency (EPA), Department of Toxic Substances Control (DTSC), and Regional Water Quality Control Board (RWQCB) by January 15th of each calendar year.

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Ste. 900
San Diego, CA 92108-4310

Department of Toxic Substances Control
Office of Military Facilities
5796 Corporate Avenue
Cypress, CA 90630

U.S. Environmental Protection Agency
Superfund (SDF 8-1) Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Santa Ana Regional Water Quality Control Board
California Tower
3737 Main Street, Suite 500
Riverside, CA 92501-3339

Table 5-2
Institutional Controls Annual Field Inspection Log (for Transferee use)

Land-Use Restriction Checklist: **Provide descriptions and comments on separate pieces of paper and attach.**

Inspected by: Ken Nishikawa
City of Tustin
300 Centennial Way, Tustin, CA 92780 (714) 573-3150
(name, affiliation, address, and telephone number)

Date: 2/19/15

1. Structures in the area containing the containment remedy:

   Is the area containing the containment remedy being used as a residence, hospital for humans, a school for persons under 21 years of age, a day care center for children, or any permanently occupied human habitation other than those used for industrial purposes? YES / NO (circle one). If yes, describe.

   Has there been any construction of facilities or structures, or appurtenances on the surface of the area containing the containment remedy since the last inspection? YES / NO (circle one).

   If yes, was prior written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one). Describe.

   If yes, was construction conducted in accordance with the approved plan?

2. Land-disturbing activities and potential for damaging the geotextile liner (excavations greater than 5 feet below ground surface):

   Is there evidence of land-disturbing activity on the surface of the area containing the containment remedy? YES / NO (circle one). If yes, what was the depth of the excavation? _____ feet.

   If the excavation was greater than 5 feet below ground surface:

   (a) Was prior review and written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one).

   (b) Was the excavation undertaken in accordance with any and all applicable conditions of approval? YES / NO (circle one).

   (c) Were necessary measures taken to locate the depth of the geotextile liner prior to the excavation to prevent damage to the geotextile liner? YES / NO (circle one).

   (d) Was the geotextile liner or waste encountered in the course of any excavation? YES / NO (circle one). If yes, when did it occur (date, time)? _____. At what depth below land surface was it encountered? _____ Was the excavation stopped immediately? YES / NO (circle one). Were the DON, DTSC, and RWQCB notified by the party responsible for the excavation? YES / NO (circle one). If yes, describe how and when the notifications occurred.

3. Land-disturbing activities and potential for damaging the geotextile liner (shallow excavations to a depth not greater than 5 feet below the ground surface, or to the geotextile liner, whichever is closer to the ground surface):

   If the excavation was to a depth not greater than 5 feet below the ground surface:

   (a) Were necessary measures taken to locate the depth of the geotextile liner prior to the excavation to prevent damage to the geotextile liner? YES / NO (circle one).

   (b) Was the geotextile liner or waste encountered in the course of any excavation? YES / NO (circle one). If yes, when did it occur (date, time)? _____. At what depth below ground surface was it encountered? _____ Was the excavation stopped immediately? YES / NO (circle one). Were the DON, DTSC, and RWQCB notified by the party responsible for the excavation? YES / NO (circle one). If yes, describe how and when the notifications occurred.

Exhibit D
Institutional Controls Annual
Field Inspection Log

Table 5-2 (continued)

4. Irrigation and landscaping activities:

   Is there evidence of irrigation, landscaping, or planting activities within the area of the containment remedy? YES / NO (circle one).

   If yes, was an irrigation and landscaping plan submitted, reviewed, and approved in writing by the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity prior to conducting this activity? YES / NO (circle one). Describe. (See prior inspection logs)

   If yes, were the irrigation, landscaping, and planting activities conducted in accordance with the approved plan? Yes

5. Groundwater extraction:

   Has any groundwater been extracted within the area of the containment remedy? YES / NO (circle one).

   Are there any new groundwater wells installed within the area of the containment remedy since the last inspection? YES / NO (circle one).

   If yes, was prior review and written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one). Describe.

   If yes, were the wells installed in accordance with any applicable conditions of approval?

6. Monitoring equipment:

   Have any of the following items located within the area of the containment remedy been removed or damaged: French drain system, sumps, monitoring wells and associated monitoring equipment, survey monuments, landfill gas probes, signs describing use restrictions, fencing, or other related equipment? YES / NO (circle one).

   If they were removed or damaged, was prior review and written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one). Describe.

   If yes, were they removed or managed in accordance with any applicable conditions of approval?

7. Adjacent monitoring equipment:

   Have any of the following items located adjacent to the area of the containment remedy been removed or damaged: monitoring wells and associated monitoring equipment, survey monuments, signs describing use restrictions, fencing, or other related equipment? YES / NO (circle one).

   If they were removed or damaged, was prior review and written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one). Describe.

   If yes, were they removed or managed in accordance with any applicable conditions of approval?

I hereby certify that the information contained in this report is true and accurate based upon information and belief following a reasonable inquiry.

Name: Matthew S. West

Signature: Matthew S. West

Title: Assistant to the City Manager

Date: February 19, 2015

Acronyms/Abbreviations:
DON – Department of the Navy
DTSC – (California Environmental Protection Agency) Department of Toxic Substances Control
RWQCB – (California) Regional Water Quality Control Board

Exhibit D
Institutional Controls Annual Field Inspection Log

Exhibit E
Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1A
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

Property Owner*: Columbus Square Community Association

This evaluation is the final Navy certification just prior to site conveyance (yes or no) NO

If for an annual inspection, this evaluation covers the period from through 12/31/2014

Checklist

	In Compliance	Non-Compliance	See Comment
1) No installation of new groundwater wells of any type within the area requiring institutional controls.[b,c]	☑	☐	☐
2) No activities that could expose groundwater within the area requiring institutional controls.[b,c]	☑	☐	☐
3) No groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling purposes, and other industrial processes).[b,c]	☑	☐	☐
4) No altering, disturbing, or removing groundwater monitoring wells and associated equipment within the area requiring institutional controls.[b,c]	☑	☐	☐
5) No installation of structure or improvement that has the potential to affect plume migration within the area requiring institutional controls.[b,c]	☑	☐	☐
6) No construction and/or operation within the area requiring institutional controls that interfere with ongoing monitoring or assessment work, or the final remedy being conducted by Department of the Navy, or the Federal, State, or local regulatory agencies.[b,c]	☑	☐	☐
7) Parcel use consistent with Specific Plan/Reuse Plan. City of Tustin. "Draft MCAS Tustin Specific Plan/ Reuse Plan" (original July 1996, errata September 1998).	☑	☐	☐

Comments:

Exhibit E (continued)
Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1A
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

I, the undersigned, hereby certify that the above-described land use restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

On behalf of the Board of Directors

Signature: Holly Dawson, 714-258-8241
Holly.Dawson@fsresidential.com

2/18/15
Date

Notes:

a) A Homeowners Association may submit this form on behalf of all Property Owners, whose property is subject to the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1A" and the Quitclaim Deed.
b) Future property owner(s) may apply for a written variance from the restrictions in accordance with the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1A" and the Quitclaim Deed
c) A property owner(s) may seek a variance or termination of restrictions on the property contained in the Quitclaim Deed pursuant to the variance and termination provisions in that document.

Mail completed form(s) to the DON, U.S. Environmental Protection Agency (EPA), Department of Toxic Substances Control (DTSC), and Regional Water Quality Control Board (RWQCB) by January 15th of each calendar year.

Department of the Navy
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Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1B
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

Property Owner[a]: Columbus Square Community Association

This evaluation is the final Navy certification just prior to site conveyance (yes or no) no

If for an annual inspection, this evaluation covers the period from through 12/31/2014

Checklist

	In Compliance	Non-Compliance	See Comment
1) No installation of new groundwater wells of any type within the area requiring institutional controls.[b,c]	☑	☐	☐
2) No activities that could expose groundwater within the area requiring institutional controls.[b,c]	☑	☐	☐
3) No groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling purposes, and other industrial processes).[b,c]	☑	☐	☐
4) No altering, disturbing, or removing groundwater monitoring wells and associated equipment within the area requiring institutional controls.[b,c]	☑	☐	☐
5) No installation of structure or improvement that has the potential to affect plume migration within the area requiring institutional controls.[b,c]	☑	☐	☐
6) No construction and/or operation within the area requiring institutional controls that interfere with ongoing monitoring or assessment work, or the final remedy being conducted by Department of the Navy, or the Federal, State, or local regulatory agencies.[b,c]	☑	☐	☐
7) Parcel use consistent with Specific Plan/Reuse Plan. City of Tustin. "Draft MCAS Tustin Specific Plan/ Reuse Plan" (original July 1996, errata September 1998).	☑	☐	☐

Comments:

Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1B
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

I, the undersigned, hereby certify that the above-described land use restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

On behalf of the Board of Directors

Signature: Holly Dawson, 714-258-8241
Holly.Dawson@fsresidential.com

2/18/15
Date

Notes:

a) A Homeowners Association may submit this form on behalf of all Property Owners, whose property is subject to the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed.
b) Future property owner(s) may apply for a written variance from the restrictions in accordance with the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed
c) A property owner(s) may seek a variance or termination of restrictions on the property contained in the Quitclaim Deed pursuant to the variance and termination provisions in that document.

Mail completed form(s) to the DON, U.S. Environmental Protection Agency (EPA), Department of Toxic Substances Control (DTSC), and Regional Water Quality Control Board (RWQCB) by January 15th of each calendar year.

Department of the Navy
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Land Use Controls Compliance Certificate
Operable Unit 4B, IRP Sites 11 and 13W
Former Marine Corps Air Station Tustin
U.S. EPA I.D. Number: CA9170090022

Property Owner: Department of the Navy
This evaluation is the final Navy certification just prior to site conveyance (yes or no) NO
If for an annual inspection, this evaluation covers the period from 1/1/2014 through 12/31/2014

Checklist

	In Compliance	Non-Compliance	See Comment
1) No installation of new groundwater wells of any type within the area requiring institutional controls.	☑	☐	☐
2) No activities that could expose groundwater within the area requiring institutional controls.	☑	☐	☐
3) No groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling, and other industrial processes).	☑	☐	☐
4) No altering, disturbing, or removing groundwater monitoring wells and associated equipment within the area requiring institutional controls.	☑	☐	☐
5) No installation of structures or improvements that have the potential to affect plume migration within the area requiring institutional controls.	☑	☐	☐
6) No construction and/or operation within the area requiring institutional controls that interferes with ongoing monitoring and assessment work or the final remedy being conducted by the Department of the Navy or other federal, state, or local regulatory agencies.	☑	☐	☐

Comments:

Land Use Controls Compliance Certificate
Operable Unit 4B, IRP Sites 11 and 13W
Former Marine Corps Air Station Tustin
U.S. EPA I.D. Number: CA9170090022

I, the undersigned, hereby certify that the above-described land use restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

Signature

Date 12/31/2014

Matthew McClellan (on behalf of the NAVY)
RORS, Inc.

Notes:

[a] A Homeowners Association may submit this form on behalf of all Property Owners, whose property is subject to the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed

[b] Future property owner(s) may apply for a written variance from the restrictions in accordance with the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed

[c] A property owner(s) may seek a variance or termination of restrictions on the property contained in the Quitclaim Deed pursuant to the variance and termination provisions in that document

Mail completed form(s) to the DON, U.S. Environmental Protection Agency (U.S. EPA), Department of Toxic Substances Control (DTSC), and Regional Water Quality Control Board (RWQCB) by January 15th of each calendar year.

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, CA 92108-4310

Department of Toxic Substances Control
Office of Military Facilities
5796 Corporate Avenue
Cypress, CA 90630

U.S. Environmental Protection Agency
Superfund (SFD-H-8) Region 9
75 Hawthorne Street
San Francisco, CA 94105-3901

Santa Ana Regional Water Quality
Control Board
California Tower
3737 Main Street, Suite 500
Riverside, CA 92501-3348

Land Use Controls Compliance Certificate
Operable Unit 4B, IRP Sites 11 and 13W
Former Marine Corps Air Station Tustin
U.S. EPA I.D. Number: CA9170090022

Property Owner: City of Tustin (By a Lease in Furtherance of Conveyance affecting a portion of 13W)
This evaluation is the final Navy certification just prior to site conveyance (yes or no) No
If for an annual inspection, this evaluation covers the period from January 2014 through December 2014

Checklist

	In Compliance	Non-Compliance	See Comment
1) No installation of new groundwater wells of any type within the area requiring institutional controls.	☒	☐	☐
2) No activities that could expose groundwater within the area requiring institutional controls.	☒	☐	☐
3) No groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling, and other industrial processes).	☒	☐	☐
4) No altering, disturbing, or removing groundwater monitoring wells and associated equipment within the area requiring institutional controls.	☒	☐	☐
5) No installation of structures or improvements that have the potential to affect plume migration within the area requiring institutional controls.	☒	☐	☐
6) No construction and/or operation within the area requiring institutional controls that interferes with ongoing monitoring and assessment work or the final remedy being conducted by the Department of the Navy or other federal, state, or local regulatory agencies.	☒	☐	☐

Comments:

NOTE - The City of Tustin is submitting this form as it only applies to the portion of IRP 13W that is located within a Portion of Reuse Parcels 40 (existing Severyns Road) and 22 (Future City Community Park Site). The City of Tustin leases Parcels 40 and 22 separately pursuant to the "Lease in Furtherance of Conveyance (LIFOC)", dated May 10, 2002 and June 16, 2004, respectively.

Land Use Controls Compliance Certificate
Operable Unit 4B, IRP Sites 11 and 13W
Former Marine Corps Air Station Tustin
U.S. EPA I.D. Number: CA9170090022

I, the undersigned, hereby certify that the above-described land use restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

Matthew S. West (on behalf of the City of Tustin)

Print Name

Matthew S. West

Signature

2/19/15

Date

Notes:

a A Homeowners Association may submit this form on behalf of all Property Owners, whose property is subject to the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed

b Future property owner(s) may apply for a written variance from the restrictions in accordance with the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed

c A property owner(s) may seek a variance or termination of restrictions on the property contained in the Quitclaim Deed pursuant to the variance and termination provisions in that document

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5796 Corporate Avenue
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U.S. Environmental Protection Agency
Superfund (SFD-H-8) Region 9
75 Hawthorne Street
San Francisco, CA 94105-3901

Santa Ana Regional Water Quality
Control Board
California Tower
3737 Main Street, Suite 500
Riverside, CA 92501-3348

Exhibit E
Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1A
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

Property Owner[a]: Columbus Square Community Association

This evaluation is the final Navy certification just prior to site conveyance (yes or no) no

If for an annual inspection, this evaluation covers the period from through 12/31/15

Checklist

	In Compliance	Non-Compliance	See Comment
1) No installation of new groundwater wells of any type within the area requiring institutional controls.[b,c]	☑	☐	☐
2) No activities that could expose groundwater within the area requiring institutional controls.[b,c]	☑	☐	☐
3) No groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling purposes, and other industrial processes).[b,c]	☑	☐	☐
4) No altering, disturbing, or removing groundwater monitoring wells and associated equipment within the area requiring institutional controls.[b,c]	☑	☐	☐
5) No installation of structure or improvement that has the potential to affect plume migration within the area requiring institutional controls.[b,c]	☑	☐	☐
6) No construction and/or operation within the area requiring institutional controls that interfere with ongoing monitoring or assessment work, or the final remedy being conducted by Department of the Navy, or the Federal, State, or local regulatory agencies.[b,c]	☑	☐	☐
7) Parcel use consistent with Specific Plan/Reuse Plan. City of Tustin. "Draft MCAS Tustin Specific Plan/ Reuse Plan" (original July 1996, errata September 1998).	☑	☐	☐

Comments:

Exhibit E (continued)
Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1A
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

I, the undersigned, hereby certify that the above-described land use restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

Signature Holly Dawson 714-258-8241 holly.dawson@fsresidential.com Date 1/13/16

Notes:

[a] A Homeowners Association may submit this form on behalf of all Property Owners, whose property is subject to the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1A" and the Quitclaim Deed.

[b] Future property owner(s) may apply for a written variance from the restrictions in accordance with the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1A" and the Quitclaim Deed.

[c] A property owner(s) may seek a variance or termination of restrictions on the property contained in the Quitclaim Deed pursuant to the variance and termination provisions in that document.

Mail completed form(s) to the DON, U.S. Environmental Protection Agency (EPA), Department of Toxic Substances Control (DTSC), and Regional Water Quality Control Board (RWQCB) by January 15th of each calendar year.

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Superfund (SDF 8-1) Region IX
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California Tower
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Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1B
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

Property Owner[a]: Columbus Square Community Association

This evaluation is the final Navy certification just prior to site conveyance (yes or no) no

If for an annual inspection, this evaluation covers the period from through 12/31/15

Checklist

	In Compliance	Non-Compliance	See Comment
1) No installation of new groundwater wells of any type within the area requiring institutional controls.[b,c]	☑	☐	☐
2) No activities that could expose groundwater within the area requiring institutional controls.[b,c]	☑	☐	☐
3) No groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling purposes, and other industrial processes).[b,c]	☑	☐	☐
4) No altering, disturbing, or removing groundwater monitoring wells and associated equipment within the area requiring institutional controls.[b,c]	☑	☐	☐
5) No installation of structure or improvement that has the potential to affect plume migration within the area requiring institutional controls.[b,c]	☑	☐	☐
6) No construction and/or operation within the area requiring institutional controls that interfere with ongoing monitoring or assessment work, or the final remedy being conducted by Department of the Navy, or the Federal, State, or local regulatory agencies.[b,c]	☑	☐	☐
7) Parcel use consistent with Specific Plan/Reuse Plan. City of Tustin. "Draft MCAS Tustin Specific Plan/ Reuse Plan" (original July 1996, errata September 1998).	☑	☐	☐

Comments:

Land Use Controls Compliance Certificate
Early Transfer Parcel 24-1B
Former Marine Corps Air Station Tustin
EPA I.D. Number: CA9170090022

I, the undersigned, hereby certify that the above-described land use restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

Holly Dawson

Signature Holly Dawson 714-258-8241 holly.dawson@fsresidential.com

1/13/16

Date

Notes:

a. A Homeowners Association may submit this form on behalf of all Property Owners, whose property is subject to the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed.

b. Future property owner(s) may apply for a written variance from the restrictions in accordance with the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed.

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Mail completed form(s) to the DON, U.S. Environmental Protection Agency (EPA), Department of Toxic Substances Control (DTSC), and Regional Water Quality Control Board (RWQCB) by January 15th of each calendar year.

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Riverside, CA 92501-3339

Table 5-2
Institutional Controls Annual Field Inspection Log (for Transferee use)

Land-Use Restriction Checklist: Provide descriptions and comments on separate pieces of paper and attach.

Inspected by: Ken Nishikawa
City of Tustin
300 Centennial Way, Tustin, CA, 92780 (714)573-3150
(name, affiliation, address, and telephone number)

Date: 1/5/16

1. Structures in the area containing the containment remedy:

   Is the area containing the containment remedy being used as a residence, hospital for humans, a school for persons under 21 years of age, a day care center for children, or any permanently occupied human habitation other than those used for industrial purposes? YES / NO (circle one). If yes, describe.

   Has there been any construction of facilities or structures, or appurtenances on the surface of the area containing the containment remedy since the last inspection? YES / NO (circle one).

   If yes, was prior written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one). Describe.

   If yes, was construction conducted in accordance with the approved plan?

2. Land-disturbing activities and potential for damaging the geotextile liner (excavations greater than 5 feet below ground surface):

   Is there evidence of land-disturbing activity on the surface of the area containing the containment remedy? YES / NO (circle one). If yes, what was the depth of the excavation? _____ feet.

   If the excavation was greater than 5 feet below ground surface:

   (a) Was prior review and written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one).

   (b) Was the excavation undertaken in accordance with any and all applicable conditions of approval? YES / NO (circle one).

   (c) Were necessary measures taken to locate the depth of the geotextile liner prior to the excavation to prevent damage to the geotextile liner? YES / NO (circle one).

   (d) Was the geotextile liner or waste encountered in the course of any excavation? YES / NO (circle one). If yes, when did it occur (date, time)? _____. At what depth below land surface was it encountered? _____. Was the excavation stopped immediately? YES / NO (circle one). Were the DON, DTSC, and RWQCB notified by the party responsible for the excavation? YES / NO (circle one). If yes, describe how and when the notifications occurred.

3. Land-disturbing activities and potential for damaging the geotextile liner (shallow excavations to a depth not greater than 5 feet below the ground surface, or to the geotextile liner, whichever is closer to the ground surface):

   If the excavation was to a depth not greater than 5 feet below the ground surface:

   (a) Were necessary measures taken to locate the depth of the geotextile liner prior to the excavation to prevent damage to the geotextile liner? YES / NO (circle one).

   (b) Was the geotextile liner or waste encountered in the course of any excavation? YES / NO (circle one). If yes, when did it occur (date, time)? _____. At what depth below ground surface was it encountered? _____. Was the excavation stopped immediately? YES / NO (circle one). Were the DON, DTSC, and RWQCB notified by the party responsible for the excavation? YES / NO (circle one). If yes, describe how and when the notifications occurred.

Exhibit D
Institutional Controls Annual
Field Inspection Log

Table 5-2 (continued)

4. Irrigation and landscaping activities:

   Is there evidence of irrigation, landscaping, or planting activities within the area of the containment remedy? YES / NO (circle one).

   If yes, was an irrigation and landscaping plan submitted, reviewed, and approved in writing by the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity prior to conducting this activity? YES / NO (circle one). Describe. (see prior inspection logs)

   If yes, were the irrigation, landscaping, and planting activities conducted in accordance with the approved plan? Yes

5. Groundwater extraction:

   Has any groundwater been extracted within the area of the containment remedy? YES / NO (circle one).

   Are there any new groundwater wells installed within the area of the containment remedy since the last inspection? YES / NO (circle one).

   If yes, was prior review and written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one). Describe.

   If yes, were the wells installed in accordance with any applicable conditions of approval?

6. Monitoring equipment:

   Have any of the following items located within the area of the containment remedy been removed or damaged: French drain system, sumps, monitoring wells and associated monitoring equipment, survey monuments, landfill gas probes, signs describing use restrictions, fencing, or other related equipment? YES / NO (circle one).

   If they were removed or damaged, was prior review and written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one). Describe.

   If yes, were they removed or managed in accordance with any applicable conditions of approval?

7. Adjacent monitoring equipment:

   Have any of the following items located adjacent to the area of the containment remedy been removed or damaged: monitoring wells and associated monitoring equipment, survey monuments, signs describing use restrictions, fencing, or other related equipment? YES / NO (circle one).

   If they were removed or damaged, was prior review and written approval obtained from the DON, DTSC, RWQCB, and other regulatory agencies that have jurisdiction over the proposed activity? YES / NO (circle one). Describe.

   If yes, were they removed or managed in accordance with any applicable conditions of approval?

I hereby certify that the information contained in this report is true and accurate based upon information and belief following a reasonable inquiry.

Name: Ken Nishikawa

Signature: Ken Nishikawa

Title: Deputy Director of Public Works - Engineering

Date: 1/5/16

Acronyms/Abbreviations:

DON – Department of the Navy

DTSC – (California Environmental Protection Agency) Department of Toxic Substances Control

RWQCB – (California) Regional Water Quality Control Board

Exhibit D
Institutional Controls Annual
Field Inspection Log

Land Use Controls Compliance Certificate
Property Owned by U.S. Department of the Navy (On-Site ARICs)
Operable Unit 4B, IRP Sites 5S(a), 6, and the MPA
Former Marine Corps Air Station Tustin
U.S. EPA I.D. Number: CA9170090022

Property Owner: City of Tustin (By a Lease in Furtherance of Conveyance)

IRP Site Number: 5S(a), 6* and a portion of the MPA

Assessor's Parcel Number(s) (APN): 430-371-18,21,23,24,62,63**,64,66; 430-381-28,31,32,34,35,39,40,68; 434-431-32; portions of CO-2 (IRP Site 6) shown as "No APN" on exhibit for Park Avenue and Jamboree Road

Attach location map. Number of pages attached: 3

This evaluation covers the period from June 2015 through December 2015

This evaluation is the final Navy certification just prior to site conveyance (yes or no) No

Checklist

	In Compliance	Non-Compliance	See Comment
1) No installation of new groundwater wells of any type within the area requiring institutional controls.	☑	☐	☐
2) No activities that could expose groundwater within the area requiring institutional controls.	☑	☐	☐
3) No groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling, and other industrial processes).	☑	☐	☐
4) No altering, disturbing, or removing groundwater monitoring wells and associated equipment within the area requiring institutional controls.	☑	☐	☐
5) No installation of structures or improvements that may affect groundwater contaminant plume within the area requiring institutional controls.	☑	☐	☐
6) No construction and/or operation within the area requiring institutional controls that interferes with ongoing monitoring and assessment work or the final remedy being conducted by the U.S. Department of the Navy or other federal, state, or local regulatory agencies.	☑	☐	☐

Comments:

The City of Tustin leases CO-2 (IRP Site 6), a portion of CO-5 (MPA), and CO-9 (IRP Site 5S(a)) pursuant to the Lease in Furtherance of Conveyance (LIFOC) dated May 10, 2002.

*Portions of CO-2 (IRP Site 6) are subleased to Vestar/Kimco Tustin L.P. A compliance certificate for the subleased property is attached with this submission.

**430-371-63 is not shown on Figure 8 of the "Final Land Use Control Remedial Design for Installation Resoration Sites 5S(a), 6, and the Mingled Plumes Area" (June 2015) which is being used as the exhibit for this compliance certificate. Figure 8 shows 430-381-68 as one continuous parcel, but 430-371-63 comprises some of that parcel as shown on Figure 8.

Land Use Controls Compliance Certificate
Property Owned by U.S. Department of the Navy (On-Site ARICs)
Operable Unit 4B, IRP Sites 5S(a), 6, and the MPA
Former Marine Corps Air Station Tustin
U.S. EPA I.D. Number: CA9170090022

I, the undersigned, hereby certify that the above-described land use and activity restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

Matthew S. West
Signature

1/7/16
Date

Matthew S. West, Assistant to the City Manager
Name and Title (printed)

Mail completed form(s) to the DON, Department of Toxic Substances Control (DTSC), and Regional Water Quality Control Board (RWQCB) by January 15th of each calendar year.

U.S. Department of the Navy
Base Realignment and Closure
Program Management Office West
33000 Nixie Way
Building 50
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Cypress, CA 90630

Santa Ana Regional Water Quality
Control Board
California Tower
3737 Main Street, Suite 500
Riverside, CA 92501-3348

Land Use Controls Compliance Certificate
Property Owned by U.S. Department of the Navy (On-Site ARICs)
Operable Unit 4B, IRP Sites 5S(a), 6, and the MPA
Former Marine Corps Air Station Tustin
U.S. EPA I.D. Number: CA9170090022

Property Owner: Vestar/Kimco Tustin L.P. - Subleased from City of Tustin (City of Tustin leases property by a Lease in Furtherance of Conveyance)

IRP Site Number: 6

Assessor's Parcel Number(s) (APN): 434-431-13,14,15,26,27,28; 434-441-23

Attach location map. Number of pages attached: 1

This evaluation covers the period from June 2015 through December 2015

This evaluation is the final Navy certification just prior to site conveyance (yes or no) No

Checklist

	In Compliance	Non-Compliance	See Comment
1) No installation of new groundwater wells of any type within the area requiring institutional controls.	☒	☐	☐
2) No activities that could expose groundwater within the area requiring institutional controls.	☒	☐	☐
3) No groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling, and other industrial processes).	☒	☐	☐
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5) No installation of structures or improvements that may affect groundwater contaminant plume within the area requiring institutional controls.	☒	☐	☐
6) No construction and/or operation within the area requiring institutional controls that interferes with ongoing monitoring and assessment work or the final remedy being conducted by the U.S. Department of the Navy or other federal, state, or local regulatory agencies.	☒	☐	☐

Comments:

Land Use Controls Compliance Certificate
Property Owned by U.S. Department of the Navy (On-Site ARICs)
Operable Unit 4B, IRP Sites 5S(a), 6, and the MPA
Former Marine Corps Air Station Tustin
U.S. EPA I.D. Number: CA9170090022

I, the undersigned, hereby certify that the above-described land use and activity restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

Vestar/Kimco Tustin, L.P. , a California limted partnership, By: Vestar Tustin, L.L.C., a Delaware limited liabilty company, its General Partner, By: Hanley Tustin, Inc., its Manging Member

By: _____ January 12, 2016
Signature Date

Edward J. Reading, Vice President _____
Name and Title (printed)

Mail completed form(s) to the DON, Department of Toxic Substances Control (DTSC), and Regional Water Quality Control Board (RWQCB) by January 15th of each calendar year.

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Land Use Controls Compliance Certificate
Operable Unit 4B, IRP Sites 11 and 13W
Former Marine Corps Air Station Tustin
U.S. EPA I.D. Number: CA9170090022

Property Owner: City of Tustin (By a Lease in Furtherance of Conveyance affecting a portion of 13W)
This evaluation is the final Navy certification just prior to site conveyance (yes or no) No
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	In Compliance	Non-Compliance	See Comment
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5) No installation of structures or improvements that have the potential to affect plume migration within the area requiring institutional controls.	☒	☐	☐
6) No construction and/or operation within the area requiring institutional controls that interferes with ongoing monitoring and assessment work or the final remedy being conducted by the Department of the Navy or other federal, state, or local regulatory agencies.	☒	☐	☐

Comments:

NOTE - The City of Tustin is submitting this form only as it applies to the portion of IRP 13W that is located within a portion of Reuse Parcels 40 (existing Severyns Road) and 22 (Future Community Park site). The City of Tustin leases Parcels 40 and 22 separately pursuant to the Lease in Furtherance of Conveyance (LIFOC)" dated May 10, 2002 and June 16, 2004, respectively.

Land Use Controls Compliance Certificate
Operable Unit 4B, IRP Sites 11 and 13W
Former Marine Corps Air Station Tustin
U.S. EPA I.D. Number: CA9170090022

I, the undersigned, hereby certify that the above-described land use restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

Matthew S. West
Signature

1/4/16
Date

Notes:

[a] A Homeowners Association may submit this form on behalf of all Property Owners, whose property is subject to the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed

[b] Future property owner(s) may apply for a written variance from the restrictions in accordance with the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed

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U.S. EPA I.D. Number: CA9170090022

Property Owner: Department of the Navy
This evaluation is the final Navy certification just prior to site conveyance (yes or no) _____
If for an annual inspection, this evaluation covers the period from 01/01/2015 through 12/31/2015

Checklist

January 14, 2016 - Site 13W & 11

	In Compliance	Non-Compliance	See Comment
1) No installation of new groundwater wells of any type within the area requiring institutional controls.	☑	☐	☐
2) No activities that could expose groundwater within the area requiring institutional controls.	☑	☐	☐
3) No groundwater use for any purpose (including, but not limited to, human consumption, irrigation, heating/cooling, and other industrial processes).	☑	☐	☐
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6) No construction and/or operation within the area requiring institutional controls that interferes with ongoing monitoring and assessment work or the final remedy being conducted by the Department of the Navy or other federal, state, or local regulatory agencies.	☑	☐	☐

Comments:

Land Use Controls Compliance Certificate
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I, the undersigned, hereby certify that the above-described land use restrictions have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

Sara McMullen

Signature Sara McMullen on behalf of the Navy

01/14/2016
Date

Notes:

a A Homeowners Association may submit this form on behalf of all Property Owners, whose property is subject to the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed

b Future property owner(s) may apply for a written variance from the restrictions in accordance with the "Covenant to Restrict Use of Property – Former Marine Corps Air Station – Early Transfer Parcel ETP 24-1B" and the Quitclaim Deed

c A property owner(s) may seek a variance or termination of restrictions on the property contained in the Quitclaim Deed pursuant to the variance and termination provisions in that document

Mail completed form(s) to the DON, U.S. Environmental Protection Agency (U.S. EPA), Department of Toxic Substances Control (DTSC), and Regional Water Quality Control Board (RWQCB) by January 15th of each calendar year.

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, CA 92108-4310

Department of Toxic Substances Control
Office of Military Facilities
5796 Corporate Avenue
Cypress, CA 90630

U.S. Environmental Protection Agency
Superfund (SFD-H-8) Region 9
75 Hawthorne Street
San Francisco, CA 94105-3901

Santa Ana Regional Water Quality
Control Board
California Tower
3737 Main Street, Suite 500
Riverside, CA 92501-3348

Appendix C
SITE INSPECTION CHECKLISTS

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FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST	
I. SITE INFORMATION	
Site Name: OU-1A (IRP Site 13S) and 1B North (IRP Site 12)	Date of Inspection: April 7, 2016
Location and Region: Former MCAS Tustin, CA	EPA ID: CA9170090022
Agency, office, or company leading the five year review: Department of the Navy (DON)	Weather/temperature: Cloudy, 65 F

Remedy includes: (check all that apply)

☐ Landfill Cover/Containment	☐ Monitored Natural Attenuation	☒ Institutional Controls
☐ Access Controls	☒ Groundwater Containment	☐ Vertical Barrier Walls
☒ Groundwater Pump/Treatment	☐ Surface Water Collection/Treatment	☒ Groundwater Monitoring

☒ Other: Hydraulic Containment and Hot spot mass removal

II. INTERVIEWS

Agency: Interviews conducted separately

Contact:

Name Title Date

Interview: ☐ office ☐ site ☐ email _____ ☐ phone _____

☐ Report attached See Appendix I

Problems, regulations, or policy changes, suggestions:

Agency:

Contact:

Name Title Date

Interview: ☐ office ☐ site ☐ email _____ ☐ phone _____

☐ Report attached

Problems, regulations, or policy changes, suggestions:

O&M Site Manager Dhananjay Rawal, Lead Site Manager and Project Manager

Name Title Date

Interview ☐ office ☒ site ☒ email _____ ☒ phone _____

☐ Report attached _____

Problems, regulations, or policy changes, suggestions:

O&M Site Staff _____

Name Title Date

Interview ☐ office ☐ site ☐ email _____ ☐ phone _____

☐ Report attached _____

Problems, regulations, or policy changes, suggestions:

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (check all that apply)

A. O&M Documents

☒ O&M Manual	☒ Readily available	☐ Up-to-date	☐ N/A
☒ As-built drawings	☐ Readily available	☐ Up-to-date	☐ N/A
☒ Maintenance logs	☒ Readily available	☐ Up-to-date	☐ N/A

Remarks: As-built drawings are not part of the O&M Manual. As-built drawings are available for viewing at the MCAS Tustin Information Repository located at the University of California, Irvine campus.

B. Site-Specific Health and Safety Plan	☒ Readily available	☐ Up-to-date	☐ N/A
☐ Contingency plan/emergency response plan	☒ Readily available	☐ Up-to-date	☐ N/A

Remarks:

C. O&M and OSHA Training Records ☒ Readily available ☐ Up-to-date ☐ N/A

Remarks: Training records and certifications are kept up-to-date and are included in the Health and Safety Plans.

D. Permits and Service Agreements

☐ Air discharge permit	☐ Readily available	☐ Up-to-date	☒ N/A
☐ Effluent discharge	☒ Readily available	☐ Up-to-date	☐ N/A
☐ Waste disposal, PTOW	☐ Readily available	☐ Up-to-date	☐ N/A
☐ Other permits	☐ Readily available	☐ Up-to-date	☐ N/A

Remarks: OCSD Special Purpose Discharge Permits. (2)

E. Gas Generation Records ☐ Readily available ☐ Up-to-date ☒ N/A

Remarks:

F. Settlement Monument Records ☐ Readily available ☐ Up-to-date ☒ N/A

Remarks:

G. Groundwater Monitoring Records ☒ Readily available ☐ Up-to-date ☐ N/A

Remarks:

H. Leachate Extraction Records ☐ Readily available ☐ Up-to-date ☒ N/A

Remarks:

I. Discharge Compliance Records

☐ Air	☐ Readily available	☐ Up-to-date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up-to-date	☐ N/A

Remarks:

J. Daily Access/Security Logs ☐ Readily available ☐ Up-to-date ☒ N/A

Remarks:

IV. O&M COSTS

A. O&M Organization

☐ State in-house ☐ Contractor for State ☐ Other

☐ PRP in-house ☐ Contractor for PRP

☐ Federal Facility in-house ☒ Contractor for Federal Facility

Remarks:

B. O&M Cost Records

☒ Funding mechanism/agreement in place ☐ Readily available ☐ Up to date

Original O&M Cost Estimate: N/A ☐ Not available ☐ Breakdown attached

Total annual cost by year for review period:

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total Cost

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total Cost

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total Cost

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total Cost

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total Cost

C. Unanticipated or Unusually High O&M Costs During Review Period

Describe costs and reasons: N/A

V. ACCESS AND INSTITUTIONAL CONTROLS

A. Fencing: ☐ Fencing damaged ☐ Location shown on site map ☒ Gates ☐ N/A

Remarks: All gates secured

B. Other Access Restrictions:

☒ Signs and other security measures ☐ Location shown on site map ☐ N/A

Remarks: Signs on perimeter fence and on treatment buildings (2)

C. Institutional Controls (ICs)

1. Implementation and Enforcement:

Site Conditions Imply ICs Not Properly Implemented ☐ Yes ☒ No ☐ N/A

Site Conditions Imply ICs Not Being Fully Enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by): Self-reporting and LUC compliance certificates

Frequency: Quarterly/ Annually

Responsible party/agency: DON

Contact: James Sullivan

Name	Title	Date	Phone no.

Reporting is up to date ☒ Yes ☐ No ☐ N/A

Reports are verified by lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☐ No ☐ N/A

There have been no violations to report. ☐ Report attached

Other problems or Suggestions: See Appendix C (DEH Inspections) and Appendix I (Interview Record).

2. Adequacy: ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks:

D. General

1. Vandalism/Trespassing ☐ Location shown on site map ☐ No vandalism evident

Remarks:

2. Land use changes on-site ☐ N/A

Remarks:

3. Land use changes off-site ☐ N/A

Remarks:

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. Road damaged ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks:

B. Other Site Conditions:

VII. GROUNDWATER/SURFACE WATER REMEDIES

☒ Applicable ☐ N/A

A. Monitoring Wells

☒ Properly secured locked ☒ Functioning ☒ Routinely sampled ☒ Good condition

☐ All required wells located ☐ Needs maintenance ☐ N/A

Remarks:

B. Groundwater Extraction Wells, Pumps, and Pipelines ☒ Applicable ☐ N/A

1. Pump, Wellhead Plumbing, and Electrical

☒ Good condition ☐ All required wells properly operating ☐ Needs maintenance ☐ N/A

Remarks:

2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances

☒ Good condition ☐ Need maintenance

Remarks:

3. Spare Parts and Equipment

☒ Readily available ☒ Good condition ☐ Requires upgrade ☐ Need to be provided

Remarks:

C. Treatment System ☒ Applicable ☐ N/A

1. Treatment Train (check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☒ Carbon adsorbers

☐ Filter ☐ Additive (e.g., chelation agent, flocculent)

☐ Others: _____

☒ Good condition ☐ Needs maintenance

☒ Sampling ports properly marked and functional

☒ Sampling/maintenance log displayed and up to date

☒ Equipment properly identified

☒ Quantity of groundwater treated annually See Annual Report

☐ Quantity of surface water treated annually

2. Electrical Enclosures and Panels (properly rated and functional)

☐ N/A ☒ Good condition ☐ Needs maintenance

Remarks:

3. Tanks, Vaults, Storage Vessels

☐ N/A ☒ Good condition ☒ Proper secondary containment ☐ Needs maintenance

Remarks:

4. Discharge Structure and Appurtenances

☐ N/A ☒ Good condition ☐ Needs maintenance

Remarks

5. Treatment Building(s)

☐ N/A ☒ Good condition (esp. roof and doorways) ☐ Needs repair

☒ Chemicals and equipment properly stored

Remarks:

VIII. LANDFILL COVERS

☐ Applicable ☒ N/A

A. Landfill Surface

1. Settlement (low spots) ☐ Location shown on site map ☐ Settlement not evident

Area extent: Depth:

Remarks: N/A

2. Cracks ☐ Location shown on site map ☐ Cracking not evident

Lengths: Widths: _____ Depths: _____

Remarks: N/A

3. Erosion ☐ Location shown on site map ☐ Erosion not evident

Area extent: Depth:

Remarks: N/A

4. **Holes** ☐ Location shown on site map ☐ Holes not evident

Area extent: _____ Depth:

Remarks: N/A

5. Vegetable Cover ☐ Grass ☐ Cover properly established ☐ No signs of stress

☐ Trees/shrubs (indicate size and locations on a diagram

Remarks: N/A

6. Alternative Cover (armored rock, concrete, etc.) ☒ N/A

Remarks:

7. Bulges ☐ Location shown on site map ☐ Bulges not evident

Area extent: _____ Depth: _____

Remarks: N/A

8. Wet Areas/Water Damage ☐ Wet areas/water damage not evident

☐ Wet areas	☐ Location shown on site map	Area extent: _____
☐ Ponding	☐ Location shown on site map	Area extent: _____
☐ Seeps	☐ Location shown on site map	Area extent: _____
☐ Soft subgrade	☐ Location shown on site map	Area extent:

Remarks: N/A

9. Slope Instability ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability

Area extent: _____

Remarks: N/A

B. Cover Penetration ☐ Applicable ☒ N/A

1. Gas Vents ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A

Remarks: N/A

2. Gas Monitoring Probes

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A

Remarks:

3. Monitoring Wells (within surface area of landfill)

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A

Remarks:

4. Leachate Extraction Wells

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A

Remarks:

5. Settlement Monuments ☐ Located ☐ Routinely surveyed ☒ N/A

Remarks:

C. Gas Collection Treatment ☐ Applicable ☒ N/A

1. Gas Treatment Facilities

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs maintenance

Remarks: N/A

2. Gas Collection Wells, Manifolds, and Piping

☐ Good condition ☐ Needs maintenance

Remarks: N/A

3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs maintenance ☒ N/A

Remarks:

IX. OVERALL OBSERVATIONS

A. IMPLEMENTATION OF THE REMEDY

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration, and gas emission, etc.)

There are no issues with the system. Remedy is effective and functioning as designed. TCE and 1,2,3 TCP Plumes are hydraulically contained within the respective Carve Outs.

B. ADEQUACY OF O&M (Including pre-construction communications)

Describe issues and observations relating to the implementation and scope of O&M procedures. In particular, discuss their relation to the current and long term protectiveness of the remedy.

There are no issues with the implementation of O&M procedures in relation to long term protectiveness of the remedy. Groundwater plume is contained and concentrations are decreasing.

C. EARLY INDICATORS OF POTENTIAL REMEDY PROBLEMS

Describe issues and observations such as unexpected changes in the cost of scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

None.

D. OPPORTUNITIES FOR OPTIMIZATION

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Per review of Annual Sampling and Capture Zone analysis, system is optimized and extraction wells pumping rates are adjusted according to water levels. Reduction is groundwater sampling was implemented over past five years from Quarterly to Semi-Annual and Annual sampling.

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FIVE- YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: OU-1B South	Date of Inspection: April 7, 2016
Location and Region: Former NAS Tustin, CA	EPA ID: CA9170090022
Agency, office, or company leading the five year review: Department of the Navy (DON)	Weather/temperature: Cloudy, 65 F

Remedy includes: (check all that apply)

- ☐ Landfill Cover/Containment
- ☐ Monitored Natural Attenuation
- ☒ Institutional Controls
- ☐ Access Controls
- ☒ Groundwater Containment
- ☐ Vertical Barrier Walls
- ☒ Groundwater Pump/Treatment
- ☐ Surface Water Collection/Treatment
- ☒ Groundwater Monitoring
- ☒ Other: Hydraulic containment and Hot spot mass removal

II. INTERVIEW

Interviews conducted separately

Contact: _____

Name Title Date

Interview: ☐ office ☐ site ☐ email _____ ☐ phone _____

☐ Report attached See Appendix I

Problems, regulations, or policy changes, suggestions:

Agency: _____

Contact: _____

Name Title Date

Interview: ☐ office ☐ site ☐ email _____ ☐ phone _____

☐ Report attached _____

Problems, regulations, or policy changes, suggestions:

O&M Site Manager	Dhananjay Rawal, Lead Site Manager and Project Manager		
	Name	Title	Date
Interview ☐ office ☒ site ☒ email		☐ phone	
☐ Report attached	See Appendix		
Problems, regulations, or policy changes, suggestions:			

O&M Site Staff	See Appendix		
	Name	Title	Date
Interview ☐ office ☐ site ☐ email		☐ phone	
☐ Report attached			
Problems, regulations, or policy changes, suggestions:			

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (check all that apply)

A. O&M Documents

☒ O&M Manual	☒ Readily available	☐ Up-to-date	☐ N/A
☒ As-built drawings	☒ Readily available	☐ Up-to-date	☐ N/A
☒ Maintenance logs	☒ Readily available	☐ Up-to-date	☐ N/A

Remarks: As-built drawings are not part of the O&M Manual. As-built drawings are available for viewing at the MCAS Tustin Information Repository located at the University of California, Irvine campus.

B. Site-Specific Health and Safety Plan	☒ Readily available	☐ Up-to-date	☐ N/A
☐ Contingency plan/emergency response plan	☒ Readily available	☐ Up-to-date	☐ N/A

Remarks:

C. O&M and OSHA Training Records ☒ Readily available ☐ Up-to-date ☐ N/A

Remarks: Training records and certifications are kept up-to-date and are included in the Health and Safety Plans.

D. Permits and Service Agreements

☐ Air discharge permit	☐ Readily available	☐ Up-to-date	☒ N/A
☐ Effluent discharge	☒ Readily available	☐ Up-to-date	☐ N/A
☐ Waste disposal, PTOW	☐ Readily available	☐ Up-to-date	☐ N/A
☐ Other permits	☐ Readily available	☐ Up-to-date	☐ N/A

Remarks: OCSD Special Purpose Discharge Permits (2)

E. Gas Generation Records ☐ Readily available ☐ Up-to-date ☒ N/A

Remarks:

F. Settlement Monument Records ☐ Readily available ☐ Up-to-date ☒ N/A

Remarks:

G. Groundwater Monitoring Records ☒ Readily available ☐ Up-to-date ☐ N/A

Remarks:

H. Leachate Extraction Records ☐ Readily available ☐ Up-to-date ☒ N/A

Remarks:

I. Discharge Compliance Records

☐ Air	☐ Readily available	☐ Up-to-date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up-to-date	☐ N/A

Remarks:

J. Daily Access/Security Logs ☐ Readily available ☐ Up-to-date ☒ N/A

Remarks:

IV. O&M COSTS

A. O&M Organization

☐ State in-house ☐ Contractor for State ☐ Other

☐ PRP in-house ☐ Contractor for PRP

☐ Federal Facility in-house ☒ Contractor for Federal Facility

Remarks:

B. O&M Cost Records

☒ Funding mechanism/agreement in place ☐ Readily available ☐ Up to date

Original O&M Cost Estimate: N/A ☐ Not available ☐ Breakdown attached

Total annual cost by year for review period:

From	To			☐ Breakdown attached
Date	Date	Total Cost		
From	To			☐ Breakdown attached
Date	Date	Total Cost		
From	To			☐ Breakdown attached
Date	Date	Total Cost		
From	To			☐ Breakdown attached
Date	Date	Total Cost		
From	To			☐ Breakdown attached
Date	Date	Total Cost		

C. Unanticipated or Unusually High O&M Costs During Review Period

Describe costs and reasons: N/A

V. ACCESS AND INSTITUTIONAL CONTROLS

A. Fencing: ☐ Fencing damaged ☐ Location shown on site map ☒ Gates ☐ N/A

Remarks: All gates secured

B. Other Access Restrictions:

☒ Signs and other security measures ☐ Location shown on site map ☐ N/A

Remarks: Signs on perimeter fence and on treatment buildings

C. Institutional Controls (ICs)

1. Implementation and Enforcement:

Site Conditions Imply ICs Not Properly Implemented ☐ Yes ☒ No ☐ N/A

Site Conditions Imply ICs Not Being Fully Enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by): Self-reporting and LUC compliance certificates

Frequency: Quarterly/Annually

Responsible party/agency: DON

Contact: James Sullivan

Name	Title	Date	Phone no.

Reporting is up to date	☒ Yes	☐ No	☐ N/A
Reports are verified by lead agency	☒ Yes	☐ No	☐ N/A
Specific requirements in deed or decision documents have been met	☒ Yes	☐ No	☐ N/A
Violations have been reported	☐ Yes	☐ No	☐ N/A
There have been no violations to report.	☐ Report attached		

Other problems or Suggestions:

2. Adequacy: ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks:

D. General

1. Vandalism/Trespassing ☐ Location shown on site map ☒ No vandalism evident

Remarks:

2. Land use changes on-site ☐ N/A

Remarks:

3. Land use changes off-site ☒ N/A

Remarks:

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. Road damaged ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks:

B. Other Site Conditions:

VII. GROUNDWATER/SURFACE WATER REMEDIES

☒ Applicable ☐ N/A

A. Monitoring Wells

☒ Properly secured locked ☒ Functioning ☒ Routinely sampled ☒ Good condition

☐ All required wells located ☐ Needs maintenance ☐ N/A

Remarks:

B. Groundwater Extraction Wells, Pumps, and Pipelines ☒ Applicable ☐ N/A

1. Pump, Wellhead Plumbing, and Electrical

☒ Good condition ☒ All required wells properly operating ☐ Needs maintenance ☐ N/A

Remarks:

2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances

☒ Good condition ☐ Need maintenance

Remarks:

3. Spare Parts and Equipment

☒ Readily available ☒ Good condition ☐ Requires upgrade ☐ Need to be provided

Remarks:

C. Treatment System ☒ Applicable ☐ N/A

1. Treatment Train (check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☒ Carbon adsorbers

☐ Filter ☐ Additive (e.g., chelation agent, flocculent)

☐ Others: _____

☒ Good condition ☐ Needs maintenance

☒ Sampling ports properly marked and functional

☒ Sampling/maintenance log displayed and up to date

☒ Equipment properly identified

☐ Quantity of groundwater treated annually See Annual Report

☐ Quantity of surface water treated annually

2. Electrical Enclosures and Panels (properly rated and functional)

☐ N/A ☒ Good condition ☐ Needs maintenance

Remarks:

3. Tanks, Vaults, Storage Vessels

☐ N/A ☒ Good condition ☒ Proper secondary containment ☐ Needs maintenance

Remarks:

4. Discharge Structure and Appurtenances

☐ N/A ☒ Good condition ☐ Needs maintenance

Remarks

5. Treatment Building(s)

☐ N/A ☒ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks:

VIII. LANDFILL COVERS

☐ Applicable ☒ N/A

A. Landfill Surface

1. Settlement (low spots) ☐ Location shown on site map ☐ Settlement not evident

Area extent: Depth:

Remarks: N/A

2. Cracks ☐ Location shown on site map ☐ Cracking not evident

Lengths: Widths: _____ Depths: _____

Remarks: N/A

3. Erosion ☐ Location shown on site map ☐ Erosion not evident

Area extent: Depth:

Remarks: N/A

4. **Holes** ☐ Location shown on site map ☐ Holes not evident

Area extent: _____ Depth:

Remarks: N/A

5. Vegetable Cover ☐ Grass ☐ Cover properly established ☐ No signs of stress
☐ Trees/shrubs (indicate size and locations on a diagram

Remarks: N/A

6. Alternative Cover (armored rock, concrete, etc.) ☒ N/A

Remarks:

7. Bulges ☐ Location shown on site map ☐ Bulges not evident

Area extent: _____ Depth: _____

Remarks: N/A

8. Wet Areas/Water Damage ☐ Wet areas/water damage not evident

☐ Wet areas	☐ Location shown on site map	Area extent: _____
☐ Ponding	☐ Location shown on site map	Area extent: _____
☐ Seeps	☐ Location shown on site map	Area extent: _____
☐ Soft subgrade	☐ Location shown on site map	Area extent:

Remarks: N/A

9. Slope Instability ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability

Area extent: _____

Remarks: N/A

B. Cover Penetration ☐ Applicable ☐ N/A

1. Gas Vents ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A

Remarks: N/A

2. Gas Monitoring Probes

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A

Remarks:

3. Monitoring Wells (within surface area of landfill)

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A

Remarks: Monitoring wells W1-12R was not properly secured and did not have a locking mechanism..

4. Leachate Extraction Wells

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A

Remarks:

5. Settlement Monuments ☐ Located ☐ Routinely surveyed ☒ N/A

Remarks:

C. Gas Collection Treatment ☐ Applicable ☒ N/A

1. Gas Treatment Facilities

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs maintenance

Remarks:

2. Gas Collection Wells, Manifolds, and Piping

☐ Good condition ☐ Needs maintenance

Remarks: N/A

3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs maintenance ☒ N/A

Remarks:

IX. OVERALL OBSERVATIONS

A. IMPLEMENTATION OF THE REMEDY

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration, and gas emission, etc.)

There are no issues with the system. Remedy is effective and functioning as designed. TCE and 1,2,3 TCP Plumes are hydraulically contained within the respective Carve Outs.

B. ADEQUACY OF O&M (Including pre-construction communications)

Describe issues and observations relating to the implementation and scope of O&M procedures. In particular, discuss their relation to the current and long term protectiveness of the remedy.

There are no issues with the implementation of O&M procedures in relation to long term protectiveness of the remedy. Groundwater plume is contained and concentrations are decreasing.

C. EARLY INDICATORS OF POTENTIAL REMEDY PROBLEMS

Describe issues and observations such as unexpected changes in the cost of scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

None.

D. OPPORTUNITIES FOR OPTIMIZATION

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Per review of Annual Sampling and Capture Zone analysis, system is optimized and extraction wells pumping rates are adjusted according to water levels. Reduction in groundwater sampling was implemented over past five years from Quarterly to Semi-Annual and Annual sampling.

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FIVE- YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: OU-3	Date of Inspection: April 7, 2016
Location and Region: Former MCAS Tustin, CA	EPA ID: CA9170090022
Agency, office, or company leading the five year review: Department of the Navy (DON)	Weather/temperature: Cloudy, sprinkling, 65 F

Remedy includes: (check all that apply)

- ☒ Landfill Cover/Containment
- ☐ Monitored Natural Attenuation
- ☒ Institutional Controls
- ☒ Access Controls
- ☒ Groundwater Containment
- ☐ Vertical Barrier Walls
- ☐ Groundwater Pump/Treatment
- ☐ Surface Water Collection/Treatment
- ☒ Groundwater Monitoring
- ☐ Other:

II. INTERVIEWS

Agency: Interviews conducted separately

Contact: _____

Name Title Date

Interview: ☐ office ☐ site ☐ email _____ ☐ phone _____

☐ Report attached See Appendix I

Problems, regulations, or policy changes, suggestions:

Agency: _____

Contact: _____

Name Title Date

Interview: ☐ office ☐ site ☐ email _____ ☐ phone _____

☐ Report attached _____

Problems, regulations, or policy changes, suggestions:

O&M Site Manager Dhananjay Rawal, Lead Site Manager and Project Manager

Name Title Date

Interview ☐ office ☒ site ☒ email _____ ☒ phone _____

☐ Report attached _____

Problems, regulations, or policy changes, suggestions:

O&M Site Staff _____

Name Title Date

Interview ☐ office ☐ site ☐ email _____ ☐ phone _____

☐ Report attached _____

Problems, regulations, or policy changes, suggestions:

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (check all that apply)

A. O&M Documents

☒ O&M Manual	☒ Readily available	☐ Up-to-date	☐ N/A
☒ As-built drawings	☒ Readily available	☐ Up-to-date	☐ N/A
☒ Maintenance logs	☒ Readily available	☐ Up-to-date	☐ N/A

Remarks: As-built drawings are not part of the O&M Manual. As-built drawings are available for viewing at the MCAS Tustin Information Repository located at the University of California, Irvine campus.

B. Site-Specific Health and Safety Plan	☒ Readily available	☐ Up-to-date	☐ N/A
☐ Contingency plan/emergency response plan	☐ Readily available	☐ Up-to-date	☐ N/A

Remarks:

C. O&M and OSHA Training Records ☐ Readily available ☒ Up-to-date ☐ N/A

Remarks:

D. Permits and Service Agreements

☐ Air discharge permit	☐ Readily available	☐ Up-to-date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up-to-date	☒ N/A
☐ Waste disposal, PTOW	☐ Readily available	☐ Up-to-date	☒ N/A
☐ Other permits	☐ Readily available	☐ Up-to-date	☒ N/A

Remarks:

E. Gas Generation Records ☐ Readily available ☐ Up-to-date ☒ N/A

Remarks:

F. Settlement Monument Records ☐ Readily available ☐ Up-to-date ☒ N/A

Remarks:

G. Groundwater Monitoring Records ☒ Readily available ☐ Up-to-date ☐ N/A

Remarks:

H. Leachate Extraction Records ☐ Readily available ☐ Up-to-date ☒ N/A

Remarks:

I. Discharge Compliance Records

☐ Air	☐ Readily available	☐ Up-to-date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up-to-date	☒ N/A

Remarks:

J. Daily Access/Security Logs ☐ Readily available ☐ Up-to-date ☒ N/A

Remarks:

IV. O&M COSTS

A. O&M Organization

☐ State in-house ☐ Contractor for State ☐ Other

☐ PRP in-house ☐ Contractor for PRP

☐ Federal Facility in-house ☒ Contractor for Federal Facility

Remarks:

B. O&M Cost Records

☒ Funding mechanism/agreement in place ☐ Readily available ☐ Up to date

Original O&M Cost Estimate: N/A ☐ Not available ☐ Breakdown attached

Total annual cost by year for review period:

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total Cost

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total Cost

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total Cost

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total Cost

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total Cost

C. Unanticipated or Unusually High O&M Costs During Review Period

Describe costs and reasons: N/A

V. ACCESS AND INSTITUTIONAL CONTROLS

A. Fencing: ☐ Fencing damaged ☐ Location shown on site map ☒ Gates ☐ N/A

Remarks:

B. Other Access Restrictions:

☒ Signs and other security measures ☐ Location shown on site map ☐ N/A

Remarks: Signs located around perimeter of site

C. Institutional Controls (ICs)

1. Implementation and Enforcement:

Site Conditions Imply ICs Not Properly Implemented ☐ Yes ☒ No ☐ N/A

Site Conditions Imply ICs Not Being Fully Enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by): Self-reporting

Frequency: Annually

Responsible party/agency: City of Tustin

Contact: Matt West

Name	Title	Date	Phone no.

Reporting is up to date ☒ Yes ☐ No ☐ N/A

Reports are verified by lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☒ No ☐ N/A

There have been no violations to report. ☐ Report attached ☒ N/A

Other problems or Suggestions:

2. Adequacy: ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks:

D. General

1. Vandalism/Trespassing ☐ Location shown on site map ☒ No vandalism evident

Remarks:

2. Land use changes on-site ☒ N/A

Remarks:

3. Land use changes off-site ☒ N/A

Remarks:

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. Road damaged ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks:

B. Other Site Conditions:

VII. GROUNDWATER/SURFACE WATER REMEDIES

☐ Applicable ☒ N/A

A. Monitoring Wells

☒ Properly secured locked ☐ Functioning ☒ Routinely sampled ☒ Good condition

☐ All required wells located ☐ Needs maintenance ☐ N/A

Remarks: Sampled every five years

B. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. Pump, Wellhead Plumbing, and Electrical

☐ Good condition ☐ All required wells properly operating ☐ Needs maintenance ☒ N/A

Remarks:

2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances

☐ Good condition ☐ Need maintenance

Remarks:

3. Spare Parts and Equipment

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Need to be provided

Remarks:

C. Treatment System ☐ Applicable ☒ N/A

1. Treatment Train (check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filter ☐ Additive (e.g., chelation agent, flocculent)

☐ Others: _____

☐ Good condition ☐ Needs maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually _____

☐ Quantity of surface water treated annually

2. Electrical Enclosures and Panels (properly rated and functional)

☒ N/A ☐ Good condition ☐ Needs maintenance

Remarks:

3. Tanks, Vaults, Storage Vessels

☒ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs maintenance

Remarks:

4. Discharge Structure and Appurtenances

☒ N/A ☐ Good condition ☐ Needs maintenance

Remarks

5. Treatment Building(s)

☒ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks:

VIII. LANDFILL COVERS

☒ Applicable ☐ N/A

A. Landfill Surface

1. Settlement (low spots) ☐ Location shown on site map ☒ Settlement not evident

Area extent: Depth:

Remarks:

2. Cracks ☐ Location shown on site map ☒ Cracking not evident

Lengths: Widths: _____ Depths: _____

Remarks:

3. Erosion ☐ Location shown on site map ☒ Erosion not evident

Area extent: Depth:

Remarks: Erosion inspections performed regularly (quarterly?)

4. **Holes** ☐ Location shown on site map ☒ Holes not evident

Area extent: _____ Depth:

Remarks:

5. Vegetable Cover ☐ Grass ☒ Cover properly established ☒ No signs of stress

☐ Trees/shrubs (indicate size and locations on a diagram

Remarks:

6. Alternative Cover (armored rock, concrete, etc.) ☐ N/A

Remarks: Containment wall along eastern boundary is secure and in good condition. No visible leakage

7. Bulges ☐ Location shown on site map ☒ Bulges not evident

Area extent: _____ Depth: _____

Remarks:

8. Wet Areas/Water Damage ☒ Wet areas/water damage not evident

☐ Wet areas	☐ Location shown on site map	Area extent:
☐ Ponding	☐ Location shown on site map	Area extent:
☐ Seeps	☐ Location shown on site map	Area extent:
☐ Soft subgrade	☐ Location shown on site map	Area extent:

Remarks:

9. Slope Instability ☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability

Area extent: _____

Remarks:

B. Cover Penetration ☐ Applicable ☒ N/A

1. Gas Vents ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A

Remarks: Gas vents decommissioned

2. Gas Monitoring Probes

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A

Remarks:

3. Monitoring Wells (within surface area of landfill)

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A

Remarks: All wells enclosed by fencing

4. Leachate Extraction Wells

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A

Remarks:

5. Settlement Monuments ☐ Located ☐ Routinely surveyed ☒ N/A

Remarks:

C. Gas Collection Treatment ☐ Applicable ☒ N/A

1. Gas Treatment Facilities

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs maintenance

Remarks:

2. Gas Collection Wells, Manifolds, and Piping

☐ Good condition ☐ Needs maintenance

Remarks: N/A

3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs maintenance ☒ N/A

Remarks:

IX. OVERALL OBSERVATIONS

A. IMPLEMENTATION OF THE REMEDY

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration, and gas emission, etc.)

Remedy is effective and functioning as designed. Wastes are contained within the landfill area cover with vegetation and Jamboree Road on top.

B. ADEQUACY OF O&M (Including pre-construction communications)

Describe issues and observations relating to the implementation and scope of O&M procedures. In particular, discuss their relation to the current and long term protectiveness of the remedy.

None

C. EARLY INDICATORS OF POTENTIAL REMEDY PROBLEMS

Describe issues and observations such as unexpected changes in the cost of scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

None

D. OPPORTUNITIES FOR OPTIMIZATION

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Based on the review of historical data, and sampling, LFG sampling was discontinued and LFG probes were properly destroyed. Groundwater sampling frequency was reduced to every five years.

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FIVE- YEAR REVIEW SITE INSPECTION CHECKLIST	
I. SITE INFORMATION	
Site Name: OU-4B	Date of Inspection: April 7, 2016
Location and Region: Former MCAS Tustin, CA	EPA ID: CA9170090022
Agency, office, or company leading the five year review: Department of the Navy (DON)	Weather/temperature: Cloudy, 65 F

Remedy includes: (check all that apply)

☐ Landfill Cover/Containment	☒ Monitored Natural Attenuation	☒ Institutional Controls
☒ Access Controls	☐ Groundwater Containment	☐ Vertical Barrier Walls
☐ Groundwater Pump/Treatment	☐ Surface Water Collection/Treatment	☒ Groundwater Monitoring
☐ Other:		

II. INTERVIEWS

Agency: Interviews conducted separately

Contact:

Name	Title	Date

Interview: ☐ office ☐ site ☐ email _____ ☐ phone _____

☐ Report attached See Appendix I

Problems, regulations, or policy changes, suggestions:

Agency:

Contact:

Name	Title	Date

Interview: ☐ office ☐ site ☐ email _____ ☐ phone _____

☐ Report attached

Problems, regulations, or policy changes, suggestions:

O&M Site Manager

Tom Mulder, PG, GEG, CHG, Site Manager

Name Title Date

Steve Siefert, PE, Site Manager

Name Title Date

Interview ☐ office ☐ site ☐ email _____ ☐ phone _____

☐ Report attached See Appendix

Problems, regulations, or policy changes, suggestions:

O&M Site Staff

Name Title Date

Interview ☐ office ☐ site ☐ email _____ ☐ phone _____

☐ Report attached See Appendix

Problems, regulations, or policy changes, suggestions:

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (check all that apply)

A. O&M Documents

☐ O&M Manual	☐ Readily available	☐ Up-to-date	☒ N/A
☐ As-built drawings	☐ Readily available	☐ Up-to-date	☒ N/A
☐ Maintenance logs	☐ Readily available	☐ Up-to-date	☒ N/A

Remarks:

B. Site-Specific Health and Safety Plan	☐ Readily available	☐ Up-to-date	☒ N/A
☐ Contingency plan/emergency response plan	☐ Readily available	☐ Up-to-date	☒ N/A

Remarks:

C. O&M and OSHA Training Records ☐ Readily available ☐ Up-to-date ☒ N/A

Remarks:

D. Permits and Service Agreements

☐ Air discharge permit	☐ Readily available	☐ Up-to-date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up-to-date	☒ N/A
☐ Waste disposal, PTOW	☐ Readily available	☐ Up-to-date	☒ N/A
☐ Other permits	☐ Readily available	☐ Up-to-date	☒ N/A

Remarks:

E. Gas Generation Records ☐ Readily available ☐ Up-to-date ☒ N/A

Remarks:

F. Settlement Monument Records ☐ Readily available ☐ Up-to-date ☒ N/A

Remarks:

G. Groundwater Monitoring Records ☒ Readily available ☐ Up-to-date ☐ N/A

Remarks:

H. Leachate Extraction Records ☐ Readily available ☐ Up-to-date ☒ N/A

Remarks:

I. Discharge Compliance Records

☐ Air	☐ Readily available	☐ Up-to-date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up-to-date	☒ N/A

Remarks:

J. Daily Access/Security Logs ☒ Readily available ☐ Up-to-date ☒ N/A

Remarks:

IV. O&M COSTS

A. O&M Organization

☐ State in-house ☐ Contractor for State ☐ Other

☐ PRP in-house ☐ Contractor for PRP

☐ Federal Facility in-house ☒ Contractor for Federal Facility

Remarks:

B. O&M Cost Records

☐ Funding mechanism/agreement in place ☒ Readily available ☐ Up to date

Original O&M Cost Estimate: ☐ Not available ☐ Breakdown attached

Total annual cost by year for review period:

From	To			☐ Breakdown attached
	Date	Date	Total Cost	
From	To			☐ Breakdown attached
	Date	Date	Total Cost	
From	To			☐ Breakdown attached
	Date	Date	Total Cost	
From	To			☐ Breakdown attached
	Date	Date	Total Cost	
From	To			☐ Breakdown attached
	Date	Date	Total Cost	

C. Unanticipated or Unusually High O&M Costs During Review Period

Describe costs and reasons:

None

V. ACCESS AND INSTITUTIONAL CONTROLS

A. Fencing: ☐ Fencing damaged ☐ Location shown on site map ☒ Gates ☐ N/A

Remarks: Gates secure underdeveloped area of IRP-5S(a) by city of Tustin.

B. Other Access Restrictions:

☒ Signs and other security measures ☐ Location shown on site map ☐ N/A

Remarks: Sign warning and video monitoring in progress

C. Institutional Controls (ICs)

1. Implementation and Enforcement:

Site Conditions Imply ICs Not Properly Implemented ☐ Yes ☒ No ☐ N/A

Site Conditions Imply ICs Not Being Fully Enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive-by): Self-reporting

Frequency: Annual

Responsible party/agency: DON

Contact:

Name	Title	Date	Phone no.

Reporting is up to date	☒ Yes	☐ No	☐ N/A
Reports are verified by lead agency	☒ Yes	☐ No	☐ N/A
Specific requirements in deed or decision documents have been met	☒ Yes	☐ No	☐ N/A
Violations have been reported	☐ Yes	☐ No	☒ N/A
There have been no violations to report.	☐ Report attached		

Other problems or Suggestions:

2. Adequacy: ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks:

D. General

1. Vandalism/Trespassing ☐ Location shown on site map ☒ No vandalism evident

Remarks:

2. Land use changes on-site ☒ N/A

Remarks:

3. Land use changes off-site ☒ N/A

Remarks:

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. Road damaged ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks:

B. Other Site Conditions:

VII. GROUNDWATER/SURFACE WATER REMEDIES

☒ Applicable ☐ N/A

A. Monitoring Wells

☒ Properly secured locked ☒ Functioning ☒ Routinely sampled ☒ Good condition

☐ All required wells located ☐ Needs maintenance ☐ N/A

Remarks: Some wells sampled annually, some sampled semiannually

B. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. Pump, Wellhead Plumbing, and Electrical

☐ Good condition ☐ All required wells properly operating ☐ Needs maintenance ☒ N/A

Remarks:

2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances

☐ Good condition ☐ Need maintenance

Remarks:

3. Spare Parts and Equipment

☒ Readily available ☐ Good condition ☐ Requires upgrade ☐ Need to be provided

Remarks:

C. Treatment System ☐ Applicable ☒ N/A

1. Treatment Train (check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filter ☐ Additive (e.g., chelation agent, flocculent)

☐ Others: _____

☐ Good condition ☐ Needs maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually _____

☐ Quantity of surface water treated annually

2. Electrical Enclosures and Panels (properly rated and functional)

☒ N/A ☐ Good condition ☐ Needs maintenance

Remarks:

3. Tanks, Vaults, Storage Vessels

☒ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs maintenance

Remarks:

4. Discharge Structure and Appurtenances

☒ N/A ☐ Good condition ☐ Needs maintenance

Remarks

5. Treatment Building(s)

☒ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks:

VIII. LANDFILL COVERS

☐ Applicable ☒ N/A

A. Landfill Surface

1. Settlement (low spots) ☐ Location shown on site map ☐ Settlement not evident

Area extent: Depth:

Remarks: N/A

2. Cracks ☐ Location shown on site map ☐ Cracking not evident

Lengths: Widths: _____ Depths: _____

Remarks: N/A

3. Erosion ☐ Location shown on site map ☐ Erosion not evident

Area extent: Depth:

Remarks: N/A

4. **Holes** ☐ Location shown on site map ☐ Holes not evident

Area extent: _____ Depth:

Remarks: N/A

5. Vegetable Cover ☐ Grass ☐ Cover properly established ☐ No signs of stress
☐ Trees/shrubs (indicate size and locations on a diagram

Remarks: N/A

6. Alternative Cover (armored rock, concrete, etc.) ☒ N/A

Remarks:

7. Bulges ☐ Location shown on site map ☐ Bulges not evident

Area extent: _____ Depth: _____

Remarks: N/A

8. Wet Areas/Water Damage ☐ Wet areas/water damage not evident

☐ Wet areas	☐ Location shown on site map	Area extent: _____
☐ Ponding	☐ Location shown on site map	Area extent: _____
☐ Seeps	☐ Location shown on site map	Area extent: _____
☐ Soft subgrade	☐ Location shown on site map	Area extent:

Remarks: N/A

9. Slope Instability ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability

Area extent: _____

Remarks: N/A

B. Cover Penetration ☐ Applicable ☒ N/A

1. Gas Vents ☐ Active ☐ Passive

☐ **Properly secured/locked** ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A

Remarks: N/A

2. Gas Monitoring Probes

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A

Remarks: N/A

3. Monitoring Wells (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A

Remarks: N/A

4. Leachate Extraction Wells

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A

Remarks: N/A

5. Settlement Monuments ☐ Located ☐ Routinely surveyed ☒ N/A

Remarks:

C. Gas Collection Treatment ☐ Applicable ☒ N/A

1. Gas Treatment Facilities

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs maintenance

Remarks:

2. Gas Collection Wells, Manifolds, and Piping

☐ Good condition ☐ Needs maintenance

Remarks: N/A

3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs maintenance ☒ N/A

Remarks:

IX. OVERALL OBSERVATIONS

A. IMPLEMENTATION OF THE REMEDY

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration, and gas emission, etc.)

The groundwater remedy selected at OU-4B is in situ bioremediation (ISB), monitored natural attenuation (MNA) and institutional controls (ICs). The remedy is effective at all sites. ISB is effective at IRP Sites 5S(a) and 6 as designed; however, there is very localized migration off-site at one location (I005MW09SR) that has declined in recent events. MPA site is following the MNA model trend, with limited effectiveness of ISB.

B. ADEQUACY OF O&M (Including pre-construction communications)

Describe issues and observations relating to the implementation and scope of O&M procedures. In particular, discuss their relation to the current and long term protectiveness of the remedy.

N/A

C. EARLY INDICATORS OF POTENTIAL REMEDY PROBLEMS

Describe issues and observations such as unexpected changes in the cost of scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

None.

D. OPPORTUNITIES FOR OPTIMIZATION

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Changes to sampling frequency and parameters were proposed in the 2014 Annual Performance Evaluation Report. Possible opportunities could include additional ISB injections.

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Appendix D
SITE INSPECTION PHOTOGRAPHS

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FIELD PHOTOGRAPHS

FIVE YEAR REVIEW FOR MCAS TUSTIN

Page

Operable Units 1A and 1B North

Photographs # 1-7……D-3-D-6

Operable Unit 1B South

Photographs # 8-15……D-6-D-10

Operable Unit 3

Photographs # 16-19……D-10-D-12

Operable Unit 4

Photographs # 20-24……..D-12-D-14

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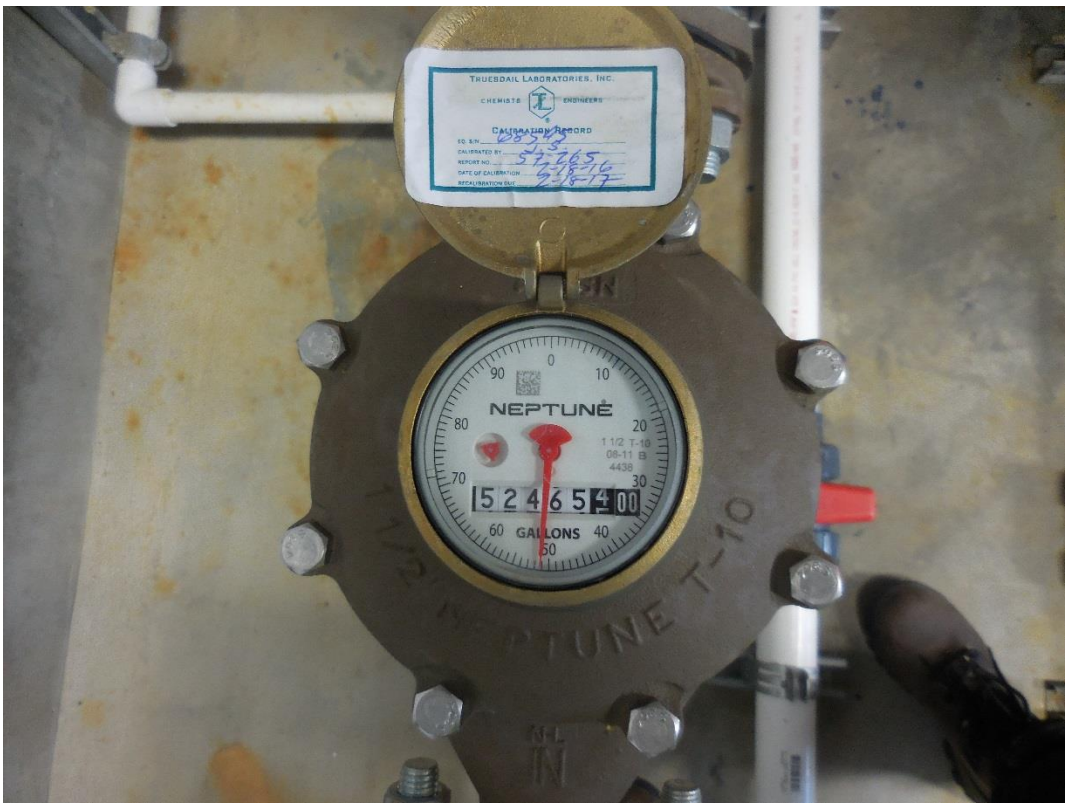
Photograph #1 – OU-1A Monitoring Well 222MW05D. Well completion is in good condition and representative of monitoring wells at OU-1A.

Photograph #2 – OU-1A & -1B North Treatment System Building, locked and secured.

Photograph #3 – OU-1A & -1B North Treatment System Granular Activated Carbon (GAC) Filters.

Photograph #4 – OU-1A & -1B North Treatment System Main Control Panel.

Photograph #5 – OU-1A & -1B North Treatment System Storage Tank.



Photograph #6 – OU-1A & OU-1B North Treatment System City of Tustin Water Meter. Water Meter is calibrated by the City of Tustin on a yearly basis.

Photograph #7 – OU-1B North - locked and secured access gate off Armstrong Avenue near the OU-1A & OU-1B North Treatment System Building.

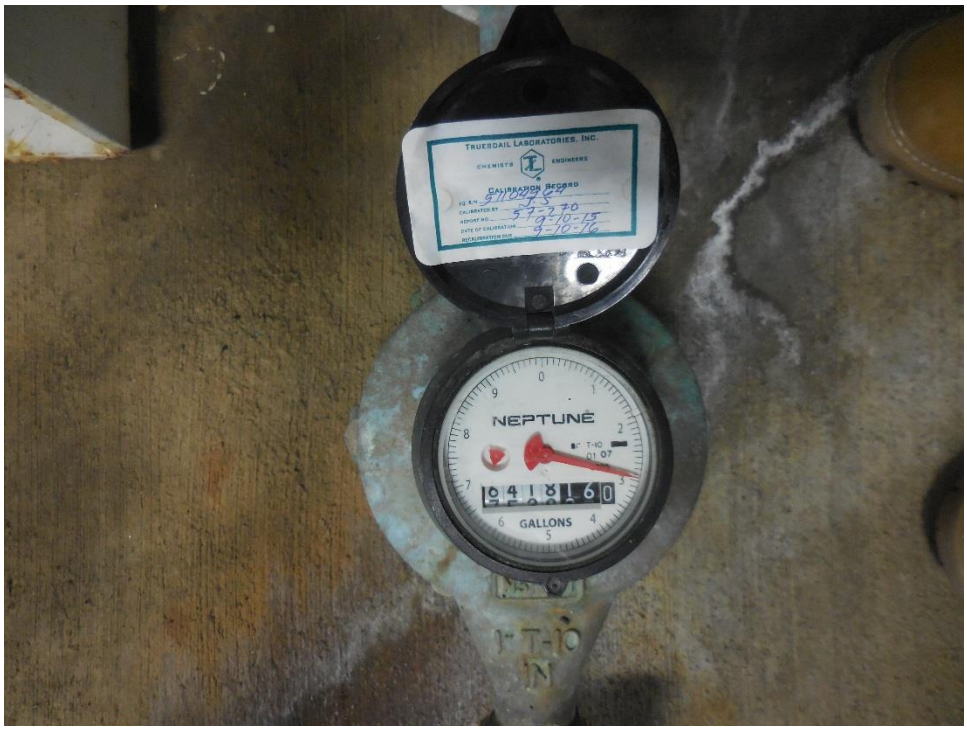
Photograph #8 – OU-1B South – locked and secured access gate at the corner of Victory Road and Tustin Ranch Road.

Photograph #9 – OU-1B South door of Treatment System building, locked and secured.

Photograph #10 – OU-1B South Treatment System GAC filter system.

Photograph #11 – OU-1B South Treatment System Main Control Panel.

Photograph #12 – OU-1B South Treatment System storage tank.



Photograph #13 – OU-1B South Treatment System City of Tustin water meter. Water meter is calibrated by the City of Tustin on a yearly basis.

Photograph # 14 – OU1-B South - new Extraction Well IO03EW07S installed in February 2016.

Photograph #15 – OU-1B South monitoring well field.

Photograph #16 – OU-3 locked and secured access gate and fencing.

Photograph #17 – OU-3, looking west across Peters Canyon Channel near Edinger Avenue channel wall.

Photograph #18 – OU-3 - access to channel.

Photograph #19 – OU-3 monitoring well 1MW-50D, locked and secured. Well is in good condition and representative of monitoring wells in OU-3.

Photograph #20 – OU-4B (IRP Site 5S [a]) fencing on southwest border.

Photograph #21 – OU-4B (IRP Site 5S [a]) monitoring well IO05SMW03S. Well completion is typical of wells installed along the sidewalks at OU-4B.

Photograph #22 – OU-4B (IRP Site 5S [a]) monitoring well field looking northwest toward Hanger 2.

Photograph #23 – OU-4B (IRP Site 6) Monitoring well field located on Costco parking lot.

**Photograph #24 – OU-4B (IRP Site 6) Monitoring well IO06MW06S.
Well completion typical of wells installed in the Costco Parking lot.**

Appendix E
INTERVIEW DOCUMENTATION

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INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Rafat Abbasi	**Title:** Remedial Project Manager (RPM)	**Organization:** Department of Toxic Substances Control
Telephone: (714) 484-5449 **E-Mail Address:** rafat.abbasi@dtsc.ca.gov		**Mailing Address:** 5796 Corporate Avenue Cypress, CA 90630
Subject: 5-Year Review Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B		**Date:** 4/19/2016 **Time:** 10:00 a.m.
Type: XTelephone ☐ Visit X Other		**Interview Location:** *form completed electronically and returned via email, responses confirmed by phone at date and time listed above.*
Contact Made By:		
Name: Katy Robinson	**Title:** Staff Geologist	**Organization:** MMEC Group

Summary of Interview:

1. *Do you have access to information on the remedies in place at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and the MPA; and do you access that information (e.g., at the BRAC PMO Website, Information Repository, Administrative Record File, or at Restoration Advisory Board [RAB] Meetings)?*

   Yes. I have access to information on the remedies in place through documents received from the Navy.

2. *Are you aware of any changes in site conditions that you feel may impact the protectiveness of the remedies implemented at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA?*

   I am not aware of any changes in site conditions.

3. *To the best of your knowledge, have there been an violations of the land use controls at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA that required a response from your office? If so, please provide details of the events and results of the responses.*

   Not aware of any violations at this time.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Rafat Abbasi	**Title:** Remedial Project Manager (RPM)	**Organization:** Department of Toxic Substances Control

4. *Are you aware of any community concerns regarding the protectiveness of the remedies at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and the MPA? If so, please give details.*

   Not aware of any community concerns at this time.

5. *Are you aware of any events, incidents, or activities at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA, such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.*

   Not aware of any events, incidents, or activities such as vandalism, trespassing, or emergency responses from local authorities at this time.

6. *Do you feel well-informed about former the remedial activities and progress at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and the MPA?*

   Yes.

7. *Have you or your office conducted any site visits and/or inspections at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and the MPA?*

   Yes, I have conducted numerous site visits.

8. *Do you have any comments, suggestions, or recommendations regarding the site's operation and management of the remedies at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and the MPA? If so, please give details.*

   OU 1A and 1B north and south still need to be evaluated for vapor intrusion. Additionally, issues associated with land use covenant are still pending regarding OU 4B. I would also like to comment on the remedy operations at OU 4B (IRP-5S[a] and IRP-6). I believe that time to achieve cleanup goal for TCE using bioremediation is too long. I would like the Navy to consider other viable alternatives that can potentially achieve clean up goals sooner.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Mary Aycock	**Title:** Remedial Project Manager (RPM)	**Organization:** USEPA
Telephone: (415) 972-3289 **E-Mail Address:** aycock.mary@epa.gov		**Mailing Address:** 75 Hawthorne Street (SFD-H-8) San Francisco, CA 94105
Subject: 5-Year Review Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B		**Date:** 5/5/2016 **Time:** 9:13 a.m.
Type: X Telephone ☐ Visit ☐ Other		**Interview Location:** *by phone*
Contact Made By:		
Name: Katy Robinson	**Title:** Staff Geologist	**Organization:** MMEC Group

Summary of Interview:

1. *Do you have access to information on the remedies in place at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and the MPA; and do you access that information (e.g., at the BRAC PMO Website, Information Repository, Administrative Record File, or at Restoration Advisory Board [RAB] Meetings)?*

   Yes.

2. *Are you aware of any changes in site conditions that you feel may impact the protectiveness of the remedies implemented at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA?*

   No, not at this time.

3. *To the best of your knowledge, have there been an violations of the land use controls at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA that required a response from your office? If so, please provide details of the events and results of the responses.*

   No.

4. *Are you aware of any community concerns regarding the protectiveness of the remedies at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and the MPA? If so, please give details.*

   No. We have not been contacted regarding any community concerns at the sites.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Mary Aycock	**Title:** Remedial Project Manager (RPM)	**Organization:** USEPA

5. *Are you aware of any events, incidents, or activities at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA, such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.*

   No.

6. *Do you feel well-informed about former the remedial activities and progress at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and the MPA?*

   Yes. Jim Sullivan has given tours and answered all of my questions regarding the remedial activities and progress at the sites.

7. *Have you or your office conducted any site visits and/or inspections at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and the MPA?*

   Yes.

8. *Do you have any comments, suggestions, or recommendations regarding the site's operation and management of the remedies at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and the MPA? If so, please give details.*

   Continue to follow the process you have been following. U.S. EPA is not as involved as we used to be.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Patricia Hannon	**Title:** Remedial Project Manager (RPM)	**Organization:** California Regional Water Quality Control Board, Santa Ana Region
Telephone: (951) 782-4130 **E-Mail Address:** patricia.hannon@waterboards.ca.gov		**Mailing Address:** 3737 Main Street, Suite 500 Riverside, CA 92501-3348
Subject: 5-Year Review Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B		**Date:** 4/19/2016 **Time:** 9:00 a.m.
Type: X Telephone ☐ Visit XOther		**Interview Location:** *form completed electronically and returned via email, responses confirmed via phone at the date and time listed above*
Contact Made By:		
Name: Katy Robinson	**Title:** Staff Geologist	**Organization:** MMEC Group

Summary of Interview:

1. *Do you have access to information on the remedies in place at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and the MPA; and do you access that information (e.g., at the BRAC PMO Website, Information Repository, Administrative Record File, or at Restoration Advisory Board [RAB] Meetings)?*

   Yes I have access to information on the remedies-in-place at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and the MPA. I access that information through the BCT meetings, RAB meetings and the documents that are submitted to me for review.

2. *Are you aware of any changes in site conditions that you feel may impact the protectiveness of the remedies implemented at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA?*

   No

3. *To the best of your knowledge, have there been an violations of the land use controls at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA that required a response from your office? If so, please provide details of the events and results of the responses.*

   Not that I am aware of.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Patricia Hannon	**Title:** Remedial Project Manager (RPM)	**Organization:** California Regional Water Quality Control Board, Santa Ana Region

4. *Are you aware of any community concerns regarding the protectiveness of the remedies at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and the MPA? If so, please give details.*

   No

5. *Are you aware of any events, incidents, or activities at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA, such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.*

   No

6. *Do you feel well-informed about former the remedial activities and progress at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and the MPA?*

   Yes

7. *Have you or your office conducted any site visits and/or inspections at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and the MPA?*

   Yes, I visited Sites 1, 3, 12, 13Ss, 5S(a) and 6 on April 7, 2016.

8. *Do you have any comments, suggestions, or recommendations regarding the site's operation and management of the remedies at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and the MPA? If so, please give details.*

   No

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Desiré Chandler	**Title:** RAB Community Co-Chair	**Organization:** Tustin Community RAB Co-Chair
Telephone: *on file* **E-Mail Address:** *on file*		**Mailing Address**: *on file*
Subject: 5-Year Review Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B		**Date:** *form received by email 4/21/2016* — **Time:** *not applicable*
Type: ☐Telephone ☐ Visit X Other		**Interview Location:** *not applicable*
Contact Made By:		
Name: Katy Robinson	**Title:** Staff Geologist	**Organization:** MMEC Group

Summary of Interview:

1. *What is your overall impression of the Navy's remedial activities at former MCAS Tustin; in particular with regard to the remedies in place at OU-1A (IRP 13S), OU-1B (IRP-3, and 12), OU-3 (IRP-1), OU-4B (IRP -5S([a], -6, 11, 13W, and the Mingled Plumes Area)?*

   I feel the remedies in place are protective of human health and the environment. The groundwater treatment area has been fenced off and there is no access by the public. The area is maintained.

2. *What effects have former MCAS Tustin's remedial activities had on the surrounding community?*

   OU 1 North, where with the treatment system is in place above ground has no development on it, therefore, there is no direct effect. However, because of the plume and treatment, that area has been fenced off and not redeveloped.

   At the area by Lowe's and Costco, IRP -6, IRP-5S, the monitoring and observation wells were not easily spotted in the parking lots and the hedges, therefore, and development has happened without a problem.

3. *Are you aware of any community concerns regarding former MCAS Tustin or its operation and administration? If so, please give details.*

   I have heard of past concerns by potential homeowners worried about encountering contamination and not being able to put in swimming pools. I have not heard of any current concerns. Perhaps the City of Tustin and their developers may be in a better position to answer this question.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Desiré Chandler	**Title:** RAB Community Co-Chair	**Organization:** Tustin Community RAB Co-Chair

4. *Are you aware of any events, incidents, or activities at former MCAS Tustin such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.*

   I am not aware of any of the events described above at the former MCAS Tustin.

5. *Do you feel well-informed about former MCAS Tustin's remedial activities and progress?*

   I feel well informed about the former MCAS Tustin's remediation activities and progress.

6. *Do you have any comments, suggestions, or recommendations regarding operation and management of the remedies at former MCAS Tustin?*

   I was pleased to learn that Carve out areas 6 and 9 were candidates for transfer soon.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): John Edwards	**Title:** Campus Coordinator	**Organization:** South Orange County Community College District
Telephone: (949) 348- 6071 **E-Mail Address:** jedwards@socccd.edu		**Mailing Address:** 28000 Marguerite Parkway Mission Viejo, CA 92692
Subject: 5-Year Review Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B		**Date:** *form received by email 4/11/2016* **Time:** *not applicable*
Type: ☐ Telephone ☐ Visit X Other		**Interview Location:** *not applicable*
Contact Made By:		
Name: Katy Robinson	**Title:** Staff Geologist	**Organization:** MMEC Group

Summary of Interview:

1. *Do you have access to information on the remedies in place at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and MPA; and do you access that information (e.g., at the BRAC PMO Website, Information Repository, Administrative Record File, or at Restoration Advisory Board [RAB] Meetings)?*

   I have kept well informed regarding the work in progress at the former Tustin MCAS site.

2. *Are you aware of any changes in site conditions that you feel may impact the protectiveness of the remedies implemented at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and MPA?*

   I am aware of no changes site-wide (other than the planned addition of the new well) that impact the site as a whole, or in particular that affect the LIFOC area that the South Orange County Community College District (SOCCCD) has responsibility to maintain (a sub-portion of OU-1A).

3. *Have there been any complaints or violations of the land use controls at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA; with the exception of previously approved activities (e.g., those activities approved under the Project Environmental Review Form [PERF] process)? If so, please provide details.*

   I have not heard, nor seen, any violations of the land use controls on our site (a sub portion of OU-1A)), or adjacent sites. All work the SOCCCD has undertaken on the LIFOC area of our site has been in strict compliance with City of Tustin and PERF guidelines.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): John Edwards	**Title:** Campus Coordinator	**Organization:** South Orange County Community College District

4. Have there been any complaints or other incidents at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA requiring a response by your office? If so, at which Sites and please give details of the events and results of the responses.

No complaints or incidents.

5. Have there been routine site visits or inspections conducted by your office at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA? If so, at which Sites and please give purpose and results.

During demolition work, I was on our site almost daily to validate the oversight of our construction manager. In the current maintenance mode, I visit the site weekly to ensure the area is being appropriately maintained

6. Do you feel well-informed about the remedial activities at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA and their progress?

Regarding the work underway, absolutely. Regarding the future of the transfer of FOST 9, we are in the dark and would like to know what we can expect to occur.

7. What is your overall impression of the Navy's remedial activities at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA?

I feel the work is progressing adequately, although the SOCCCD is interested in completing the soil gas testing currently underway and obtaining final transfer of the property in fee so it can be developed. We do understand there will be some level of environmental restrictions for the property and expect the soil gas testing to help establish those development guidelines.

8. Do you have any comments, suggestions, or recommendations regarding t management and/or protectiveness of the remedies in place at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA, at former MCAS Tustin?

Please keep us informed to the best level you can regarding what to expect regarding the transfer of land under FOST 9.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin	**EPA ID No.:** CA9170090022	
Individual Contacted (Name): Robert Kopecky	**Title:** RAB Member	**Organization:** MCAS Tustin Restoration Advisory Board (RAB)
Telephone: *on file* **E-Mail Address:** *on file*	**Mailing Address**: *on file*	
Subject: 5-Year Review Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B	**Date:** *form received by email on 4/25/2016*	**Time:** *not applicable*
Type: X Telephone ☐ Visit ☐ Other	**Interview Location:** *not applicable*	
Contact Made By:		
Name: Katy Robinson	**Title:** Staff Geologist	**Organization:** MMEC Group

Summary of Interview:

1. *What is your overall impression of the Navy's remedial activities at former MCAS Tustin; in particular with regard to the remedies in place at OU-1A (IRP 13S), OU-1B (IRP-3, and 12), OU-3 (IRP-1), OU-4B (IRP -5S([a], -6, -11, -13W, and the Mingled Plumes Area)?*

   Having been a RAB member for a number of years I have seen how the Navy has consistently responded to our concerns and addressed them in a timely manner. Remediation activities have been successful in the above areas. Reports have been thorough and presentations to the RAB and the community have been easy to understand and reassuring that remedies are in place and functioning.

2. *What effects have former MCAS Tustin's remedial activities had on the surrounding community?*

   Understanding that the Navy, City of Tustin, and the community-at-large working together assures the community that any remedial issues with the properties will be immediately and successfully addressed.

3. *Are you aware of any community concerns regarding former MCAS Tustin or its operation and administration? If so, please give details.*

   I am aware of no major concerns. The community, though, hopes that the remediation will eventually come to a conclusion and that no additional hot spots are found.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Robert Kopecky	**Title:** RAB Member	**Organization:** MCAS Tustin Restoration Advisory Board (RAB)

4. *Are you aware of any events, incidents, or activities at former MCAS Tustin such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.*

   As the former Provost of the Advanced Technology and Education Park (ATEP) of South Orange County Community College District I did witness trespassing on our parcel of property by individuals stealing copper pipes and wire from the old military buildings. The Tustin police responded and the trespassing was greatly reduced.

5. *Do you feel well-informed about former MCAS Tustin's remedial activities and progress?*

   Yes. Through the meetings, emails, and web site of the Navy the RAB board and community is well informed about MCAS Tustin's remedial activities and progress.

6. *Do you have any comments, suggestions, or recommendations regarding operation and management of the remedies at former MCAS Tustin?*

   I have been impressed with the professionalism of the Navy, City, and community participants in dealing with the remedial issues. I look forward to my continued service on the RAB and the continuance of a great working relationship with all parties involved.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin	**EPA ID No.:** CA9170090022	
Individual Contacted (Name): Susan Reynolds	**Title:** RAB Member	**Organization:** MCAS Tustin Restoration Advisory Board (RAB)
Telephone: *on file* **E-Mail Address:** *on file*	**Mailing Address**: *on file*	
Subject: 5-Year Review Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B	**Date:** 4/20/2016	**Time:** 9:00 a.m.
Type: XTelephone ☐ Visit X Other	**Interview Location:** *form completed electronically and returned via email, responses confirmed via phone at the date and time listed above*	

Contact Made By:

Name: Katy Robinson	**Title:** Staff Geologist	**Organization:** MMEC Group

Summary of Interview:

1. *What is your overall impression of the Navy's remedial activities at former MCAS Tustin; in particular with regard to the remedies in place at OU-1A (IRP 13S), OU-1B (IRP-3, and 12), OU-3 (IRP-1), OU-4B (IRP-5S([a], -6, -11, -13W, and the Mingled Plumes Area)?*

   Remedies are operating and overseen effectively and properly.

2. *What effects have former MCAS Tustin's remedial activities had on the surrounding community?*

   The current impact on the community is the existing carve out areas preventing transfer.

3. *Are you aware of any community concerns regarding former MCAS Tustin or its operation and administration? If so, please give details.*

   No.

4. *Are you aware of any events, incidents, or activities at former MCAS Tustin such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.*

   No.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin	**EPA ID No.:** CA9170090022

Individual Contacted (Name):	**Title:**	**Organization:**
Susan Reynolds	RAB Member	MCAS Tustin Restoration Advisory Board (RAB)

5. *Do you feel well-informed about former MCAS Tustin's remedial activities and progress?*

   Yes. I have been involved in the RAB from the beginning and the Navy has always given information regarding remedial activities and progress to those who are interested in it.

6. *Do you have any comments, suggestions, or recommendations regarding operation and management of the remedies at former MCAS Tustin?*

   It appears that the remedies are well managed, testing is done at the proper intervals and results are reported to overseeing agencies and the public. The site tour (4/14/2016) was also reassuring.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Donald Zweifel	**Title:** RAB Member	**Organization:** MCAS Tustin Restoration Advisory Board (RAB)
Telephone: *on file* **E-Mail Address:** *on file*		**Mailing Address**: *on file*
Subject: 5-Year Review Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B		**Date:** *responses received 4/25/2016* / **Time:** 11:00 a.m.
Type: X Telephone ☐ Visit ☐ Other		**Interview Location:**
Contact Made By:		
Name: Katy Robinson	**Title:** Staff Geologist	**Organization:** MMEC Group

Summary of Interview:

1. *What is your overall impression of the Navy's remedial activities at former MCAS Tustin; in particular with regard to the remedies in place at OU-1A (IRP 13S), OU-1B (IRP-3, and 12), OU-3 (IRP-1), OU-4B (IRP-5S([a], -6, -11, -13W, and the Mingled Plumes Area)?*

   As long as the primary COCs have not further contaminated the first, second, or third WBZs, plus the Irvine groundwater sub-basin, then that's a-okay.

   However, if that is not indeed the case, NFA is certainly not in the cards, in my opinion.

2. *What effects have former MCAS Tustin's remedial activities had on the surrounding community?*

   Well, one couldn't possibly contend that that was detrimental, could one?

3. *Are you aware of any community concerns regarding former MCAS Tustin or its operation and administration? If so, please give details.*

   If the WBZs and the Irvine groundwater subbasin are not becoming further contaminated, then, as stated previously, we're good to go. Do by the way contend that annual groundwater monitoring is absolutely advisable (i.e., until ND is achieved for all IRP sites).

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Donald Zweifel	**Title:** RAB Member	**Organization:** MCAS Tustin Restoration Advisory Board (RAB)

4. *Are you aware of any events, incidents, or activities at former MCAS Tustin such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.*

   Well, yes. The collapse of the mini tower above the northernmost hangar was a prime example of gross negligence, in my not so humble opinion. Therefore, neglecting annual maintenance and inspection upon both hangars is tantamount to being unconscionable. However, if the onus is upon the City of Tustin for the destruction of the Aerostat, then that is another indication of incompetence and again gross negligence. I respectfully wish to receive a reply for who is ultimately culpable for this lack of proper maintenance and who is paying for the restoration of the Aerostat and hangar. I would also wish to know if there was any litigation implemented.

5. *Do you feel well-informed about former MCAS Tustin's remedial activities and progress?*

   Sure.

6. *Do you have any comments, suggestions, or recommendations regarding operation and management of the remedies at former MCAS Tustin?*

   Of course, as mentioned previously, annual monitoring is, I contend, absolutely essential even if RWQCB, DTSC plus EPA don't concur—By the way, LIFOCs ought to be dissolved and deed transfers with potential deed restrictions, as needed, ought to be implemented ASAP.

   Note: the Irvine groundwater subbasin should become suitable for potable water extraction (i.e., with TDS filtration augmentation). Plus, with no MCL TCE contamination.

   However, the above also pertains to the adequacy of MCAS El Toro restoration and remediation as it directly affects the Irvine groundwater subbasin.

   Note: May I humbly request that the Navy allow most effluent from the wells to be pumped back to recharge the principal aquifer. However, if the TDS concentration has been augmented and/or selenium concentrations have spiked, then recharge would not be advisable.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Matthew S. West	**Title:** Assistant to the City Manager	**Organization:** City of Tustin
Telephone: (714) 573-3116 **E-Mail Address:** MWest@tustinca.org		**Mailing Address**: 300 Centennial Way Tustin, CA 92780
Subject: 5-Year Review Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B		**Date:** *form received by email 4/20/16* — **Time:** *not applicable*
Type: ☐Telephone ☐ Visit X Other		**Interview Location:** *not applicable*
Contact Made By:		
Name: Katy Robinson	**Title:** Staff Geologist	**Organization:** MMEC Group

Summary of Interview:

1. *Do you have access to information on the remedies in place at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and MPA; and do you access that information (e.g., at the BRAC PMO Website, Information Repository, Administrative Record File, or at Restoration Advisory Board [RAB] Meetings)?*

   Yes

2. *Are you aware of any changes in site conditions that you feel may impact the protectiveness of the remedies implemented at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and MPA?*

   No

3. *Have there been any complaints, violations of the land use controls at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA; with the exception of previously approved activities (e.g., those activities approved under the Project Environmental Review Form [PERF] process)? If so, please provide details.*

   Not to my knowledge

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Matthew S. West	**Title:** Assistant to the City Manager	**Organization:** City of Tustin

4. *Have there been any complaints or other incidents at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA requiring a response by your office? If so, at which Sites and please give details of the events and results of the responses.*

   Yes, there was an incident at IRP 13S in September 2013 in which three monitoring wells were damaged by the City of Tustin's sub-lessee (South Orange County Community College District or "SOCCCD") during demolition of former military improvements. The Navy was promptly notified of the damage to wells IS72MW02S, IS72MW02D, and IS72MW02D2, and the sub-lessee immediately arranged for repair of the wells. Proper protection measures (concrete construction barriers) were installed where they remain to this day.

   I am unaware of any other complaints or incidents at the other IRP sites.

5. *Have there been routine site visits or inspections conducted by your office at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA? If so, at which Sites and please give purpose and results.*

   As it relates to IRPs 1 and 3, and portions of IRPs 5S(a), 12, 13S, 13W, MPA, the City maintains an on-site caretaker Monday-Friday that ensures all remediation equipment are protected in place. In addition City staff, including myself and others, regularly (weekly) visit these sites due to on-going development and planning related activities and will also observe the IRPs for potential issues.

   The City's sub-lessee (SOCCCD) also maintains an on-site caretaker on property at IRP 13S and regularly monitors the protection measures in place. The City's other sub-lessee (Vestar) has developed property at IRP 6 and regularly monitors the protection of existing Navy remediation equipment.

6. *Do you feel well-informed about the remedial activities at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA and their progress?*

   Overall the City has been kept well informed of the remedial activities, and continues to be provided copies of CERCLA documents for review and comment. The City also disseminates those documents to its sub-lessees as appropriate and share additional comments when available. The City appreciates the ability to attend the quarterly BRAC Cleanup Team (BCT) meetings where the remedial activities are discuss in greater detail. The City would also welcome an opportunity to participate in the BCT Core meetings that typically occur prior to the regular BCT meetings to gain even greater insight when possible.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Matthew S. West	**Title:** Assistant to the City Manager	**Organization:** City of Tustin

7. *What is your overall impression of the Navy's remedial activities at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA?*

   The on-going remedial activities are continuing to show positive results by reducing contaminants in the groundwater and for the most part have the plumes under hydraulic containments. The Navy and its contractors are very much engaged at monitoring and optimizing the remedies even in face of the fact that the remedies are long-term efforts over many more years to come. While efforts continue towards reaching OPS on all IRPs and Tustin is a mature program with the current projection for conveyance of the remaining 244.5 acres being 2018, the City has been disappointed that this is well beyond the original projection identified in the 2002 Economic Development Conveyance to convey the balance of the site by 2008. In light of this the City continues to remain focused on receiving the property as soon as it safe to do so, which the City recognizes is in alignment with the Navy's objectives as well.

8. *Do you have any comments, suggestions, or recommendations regarding t management and/or protectiveness of the remedies in place at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA, at former MCAS Tustin?*

   The City remains concerned about the leading edge of the IRP-5S(a) plume. The City has previously identified concerns that the toe of the plume may be continuing to move south and on to property outside of the former MCAS Tustin and City of Tustin limits. Since Navy documents are now depicting a portion of the plume under the property at the southeast corner of Warner Avenue and Park Avenue in the City of Irvine, this concern is coming to fruition. Given the City of Tustin is both the Local Reuse Authority for former MCAS Tustin and is the jurisdiction in which the contamination is originating, it is of the highest importance that the affected property owner(s) and City of Irvine have been properly notified by the Department of the Navy, have to access to all information, and remain apprised of the developing situation. Lastly, the City also remains unconvinced that the plume will stop short of the building or will only migrate southerly away from the building.

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INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Zoila Finch	**Title:** Administrative Manager	**Organization:** Orange County Executive Office, Land Development
Telephone: (714) 834-3766 **E-Mail Address:** zoila.finch@ocgov.com		**Mailing Address**: 333 W. Santa Ana Blvd., Santa Ana, CA 92707
Subject: 5-Year Review Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B		**Date:** *form received by email 4/15/2016* **Time:** *not applicable*
Type: ☐Telephone ☐ Visit X Other		**Interview Location:** *not applicable*
Contact Made By:		
Name: Katy Robinson	**Title:** Staff Geologist	**Organization:** MMEC Group

Summary of Interview:

1. *Do you have access to information on the remedies in place at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and MPA; and do you access that information (e.g., at the BRAC PMO Website, Information Repository, Administrative Record File, or at Restoration Advisory Board [RAB] Meetings)?*

   I have requested and received some information regarding OU1A and OU1B from the Navy BRAC PMO West office.

2. *Are you aware of any changes in site conditions that you feel may impact the protectiveness of the remedies implemented at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and MPA?*

   No

3. *Have there been any complaints, violations of the land use controls at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA; with the exception of previously approved activities (e.g., those activities approved under the Project Environmental Review Form [PERF] process)? If so, please provide details.*

   Not that I am aware of.

4. *Have there been any complaints or other incidents at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA requiring a response by your office? If so, at which Sites and please give details of the events and results of the responses.*

   Not that I am aware of.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Zoila Finch	**Title:** Administrative Manager	**Organization:** Orange County Executive Office, Land Development

5. *Have there been routine site visits or inspections conducted by your office at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA? If so, at which Sites and please give purpose and results.*

   No.

6. *Do you feel well-informed about the remedial activities at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA and their progress?*

   No.

7. *What is your overall impression of the Navy's remedial activities at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA?*

   No comment.

8. *Do you have any comments, suggestions, or recommendations regarding the management and/or protectiveness of the remedies in place at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA, at former MCAS Tustin?*

   No.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Paula Jewell	**Title:** OU-4B, O&M/MNA, Staff Scientist	**Organization:** AIS-TN&A Joint Venture
Telephone: (619) 230-1712 X 22 **E-Mail Address:** pjewell@otie.com		**Mailing Address**: 2247 San Diego Ave, Ste#238 San Diego, CA 92110
Subject: 5-Year Review Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B		**Date:** 4/20/2016 **Time:** 10:00 a.m.
Type: XTelephone ☐ Visit X Other		**Interview Location:** *form completed electronically and returned via email, responses confirmed via phone at the date and time listed above*

Contact Made By:

Name: Katy Robinson	**Title:** Staff Geologist	**Organization:** MMEC Group

Summary of Interview:

1. *What is your affiliation with MCAS Tustin and what is your role in regard to the oversight of IRP Sites in OU-4B?*

   I am a staff scientist with Oneida Total Integrated Enterprises. I was involved in the plans, report writing and field work for OU-4B under contract N62473-09-D-2610, Task Order 0003. I was the Field Team Leader and SSHO for the Pilot Test, ISB and groundwater monitoring field work.

2. *Over the past five years, have you been involved in on-going communication with the Navy in regard to the Navy's environmental activities at IRP Sites in OU-4B?*

   Yes.

3. *Is there an on-site O&M presence at OU-4B? Please describe staff O&M activities and their frequency.*

   There is no on-site O&M presence by AIS-TN&A JV at this time. Current O&M activities consist of groundwater monitoring and are conducted by a different contractor under a different contract number and task order.

4. *Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years at OU-4B? Please describe and include whether they affect the protectiveness of the remedy.*

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Paula Jewell	**Title:** OU-4B, O&M/MNA, Staff Scientist	**Organization:** AIS-TN&A Joint Venture

There have not been any significant changes by AIS-TN&A JV in O&M requirements.

5. *Have there been unexpected O&M difficulties or changes in costs since start-up or in the last five years at OU-4B? If so, please give details.*

   No.

6. *Have there been opportunities to optimize O&M or sampling efforts at OU-4B? Please describe changes and results or improved efficiency.*

   Yes, optimizations to the groundwater monitoring O&M are detailed in the recommendations sections of the annual performance groundwater monitoring reports.

7. *What does the monitoring data show? Are there trends that show contaminant levels are decreasing at OU-4B?*

   Yes, monitoring data show that COC levels are decreasing at OU-4B. See Final Operating Properly and Successfully Demonstration Report, Installation Restoration Program Sites 5S(a), 6 and the Mingled Plumes Area, Operable Unit 4B, Former Marine Corps Air Station Tustin, Tustin, California dated February 2016 and Final Annual Performance Groundwater Monitoring Report (June 2013 through February 2014) for Installation Restoration Program Sites 5S(a), 6 and the Mingled Plumes Area, Operable Unit 4B, Former Marine Corps Air Station Tustin, Tustin, California dated January 2015.

8. *In your opinion, how well are the remedies at OU-4B functioning and are they functioning as expected?*

   The remedies at OU-4B are functioning as expected.

9. *Have there been any complaints, violations, or other incidents related to OU-4B? If so, please give details of the events and results of the responses.*

   Not to my knowledge.

10. *Describe any problems with vandalism or security to the integrity of the remedial actions in the last five years.*

    There have not been any problems with security at OU-4B to my knowledge.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Paula Jewell	**Title:** OU-4B, O&M/MNA, Staff Scientist	**Organization:** AIS-TN&A Joint Venture

11. What is your overall impression of the Navy's remedial activities at former MCAS Tustin?

The remedial activities have been functioning as expected.

12. Do you have any further comments, suggestions, or recommendations regarding operation and management of the remedies at OU-4B?

I do not have any further comments.

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INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Arian Maher	**Title:** Property Manager	**Organization:** Vestar Property Management
Telephone: (714) 259-9015 **E-Mail Address:** amaher@vestar.com		**Mailing Address**: 2437 Park Avenue Tustin, CA 92782
Subject: 5-Year Review Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B		**Date:** *form received by email 4/27/2016* **Time:** *not applicable*
Type: ☐Telephone ☐ Visit X Other		**Interview Location:** *not applicable*
Contact Made By:		
Name: Katy Robinson	**Title:** Staff Geologist	**Organization:** MMEC Group

Summary of Interview:

1. *Do you have access to information on the remedies in place at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and MPA; and do you access that information (e.g., at the BRAC PMO Website, Information Repository, Administrative Record File, or at Restoration Advisory Board [RAB] Meetings)?*

   We have periodically received and have obtained current information regarding remediation on IR5S(a) and IRP 6 from the Department of Navy and/or BRAC PMO.

   We have not currently obtained site information from the information databases or meetings but instead from individual mailings and/or email communication.

2. *Are you aware of any changes in site conditions that you feel may impact the protectiveness of the remedies implemented at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, and MPA?*

   No.

3. *Have there been any complaints, violations of the land use controls at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA; with the exception of previously approved activities (e.g., those activities approved under the Project Environmental Review Form [PERF] process)? If so, please provide details.*

   There have been no violations that we are aware of.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Arian Maher	**Title:** Property Manager	**Organization:** Vestar Property Management

4. *Have there been any complaints or other incidents at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA requiring a response by your office? If so, at which Sites and please give details of the events and results of the responses.*

   There have been no complaints that we are aware of.

5. *Have there been routine site visits or inspections conducted by your office at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA? If so, at which Sites and please give purpose and results.*

   No site visits or inspections have been conducted by our office.

6. *Do you feel well-informed about the remedial activities at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA and their progress?*

   Yes, we believe we are informed.

7. *What is your overall impression of the Navy's remedial activities at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA?*

   We were recently provided an update (February 2016) from the BRAC PMO that indicated the selected remedial action (bio-remediation and natural attenuation) for IRP 5S(a) and IRP 6 is working.

8. *Do you have any comments, suggestions, or recommendations regarding t management and/or protectiveness of the remedies in place at IRP Sites 1, 3, 5S(a), 6, 11, 12, 13W, 13S, or the MPA, at former MCAS Tustin?*

   Because Vestar leases tenant space, we request advance notification regarding remedial operations/activities that may affect day-to-day operations at these tenant spaces. This information would be forwarded to our tenants.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Dhananjay Rawal	**Title:** OU-1A/B and OU-3, O&M/LTM, Lead Site Manager, Project Manager	**Organization:** Enviro Compliance Solutions, Inc. (ECS)
Telephone: (714) 259-0295 **E-Mail Address:** drawal@ecs-i.com		**Mailing Address**: 4795 Blue Mountain Drive Yorba Linda, CA 92887
Subject: 5-Year Review Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B		**Date:** *form received by email 4/20/2016* — **Time:** *not applicable*
Type: Telephone Visit X Other		**Interview Location:** *not applicable*
Contact Made By:		
Name: Katy Robinson	**Title:** Staff Geologist	**Organization:** MMEC Group

Summary of Interview:

1. *What is your affiliation with MCAS Tustin and what is your role in regard to the oversight of IRP Sites in OU-1A/1B (North and South) and OU-3?*

   I am the Project Manager for Enviro Compliance Solutions Inc., (ECS) who is subcontractor to MMEC Group from 2015 to present for Tustin Project. ECS and I have been working as a Prime contractor to the Navy at MCAS Tustin since 2005 in operation, maintenance, and optimization of the IRP Sites OU1A/1B North and South Treatment Systems and Long Term Monitoring of OU-3.

2. *Over the past five years, have you been involved in on-going communication with the Navy in regard to the Navy's environmental activities at IRP Sites in OU-1A/1B (North and South) and OU-3?*

   Yes

3. *Is there an on-site O&M presence at OU-1A/B and OU-3? Please describe staff O&M activities and their frequency.*

   Yes, We (ECS) do minimum 2 times a week or 3 times a week complete inspections of the OU1A/1B North and South System. We take weekly, biweekly, and monthly readings. We respond to any alarms within 2 hours and complete troubleshoot and repair within 12 to 24 hour. We do monthly, quarterly, every six months and yearly maintenance of both the system including servicing of the system components. We do quarterly GAC sampling per OCSD requirements. We take monthly OCSD Flow Totalizer reading. We do cartridge filter change out every 2 months or an as needed basis.

   At OU-3, we do inspection of the landfill cover and other components of the OU-3 remedy after heavy rain event and every October. We also perform weed abatement and maintain vegetation and protection of groundwater monitoring wells in October.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Dhananjay Rawal	**Title:** OU-1A/B and OU-3, O&M/LTM, Lead Site Manager, Project Manager	**Organization:** Enviro Compliance Solutions, Inc. (ECS)

4. *Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years at OU-1A/B and OU-3? Please describe and include whether they affect the protectiveness of the remedy.*

   None. Both systems have been optimized and semi-annual and annual groundwater sampling is being conducted at OU1A/1B North and South Systems. At OU-3 Groundwater sampling is conducted every 5 years.

5. *Have there been unexpected O&M difficulties or changes in costs since start-up or in the last five years at OU-1A/B and OU-3? If so, please give details.*

   None

6. *Have there been opportunities to optimize O&M or sampling efforts at OU-1A/B and OU-3? Please describe changes and results or improved efficiency.*

   Yes, As mentioned earlier, OU1A/1B remedy has been optimized and based on the review of annual data, capture zone analysis, we optimize the system by shutting down extraction wells and sampling of monitoring wells based on the review of historical data and trends.

   Groundwater sampling has been optimized from quarterly to semi-annual and annual.

   Because of on-going optimization at OU1A/1B, the groundwater plumes of TCE, and 1,2,3 TCP are in hydraulic containment and overall plume footprint is reducing.

   OU-3 LTM remedy has been optimized as LFG monitoring was discontinued with consultation with the BCT and California Integrated Waste Board. LFG probes were properly destroyed. Groundwater sampling frequency was reduced to every five year.

7. *What does the monitoring data show? Are there trends that show contaminant levels are decreasing at OU-1A/B and OU-3?*

   Yes, trend shows contaminant levels are decreasing at OU1A/1B.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Dhananjay Rawal	**Title:** OU-1A/B and OU-3, O&M/LTM, Lead Site Manager, Project Manager	**Organization:** Enviro Compliance Solutions, Inc. (ECS)

8. *In your opinion, how well are the remedies at OU-1A/B and OU-3 functioning and are they functioning as expected?*

   Remedies at OU1A/1B and OU-3 are functioning exceptional and as expected groundwater plumes are contained.

9. *Have there been any complaints, violations, or other incidents related to OU-1A/B and OU-3? If so, please give details of the events and results of the responses.*

   None.

10. *Describe any problems with vandalism or security to the integrity of the remedial actions in the last five years.*

    There was one vandalism incident in April 2015 at OU1A/1B North system area related to thieves cutting wires to steal copper. Thieves tried to cut live OU1A/1B North extraction well wires and left in shock. This wire cut incident affected one Extraction Well at North and ECS was able to respond to this vandalism incident on Sunday and repaired the wires by removing spliced wires and then installing new wires and ECS then further secured electrical vaults by adding five point bolts. ECS and Tustin Police are very vigilant and gates are secured. Tustin police is making more rounds at the system and compounds.

11. *What is your overall impression of the Navy's remedial activities at former MCAS Tustin?*

    Both OU1A/1B North and South remedial systems and OU-3 LTM is working exceptionally fine. Navy is committed to the remedial activities per the ROD and OMP.

12. *Do you have any further comments, suggestions, or recommendations regarding operation and management of the remedies at OU-1A/B and OU-3?*

    None

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INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Stephen Siefert	**Title:** OU-4B, O&M/MNA, Site Manager, Project Manager	**Organization:** RORE, Inc.
Telephone: (858) 404-7393 **E-Mail Address:** ssiefert@roreinc.com		**Mailing Address**: 5151 Shoreham Place #260 San Diego, CA 92122
Subject: 5-Year Review Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B		**Date:** *form received by email 4/21/16* **Time:** *not applicable*
Type: Telephone Visit X Other		**Interview Location:** *not applicable*
Contact Made By:		
Name: Katy Robinson	**Title:** Staff Geologist	**Organization:** MMEC Group

Summary of Interview:

1. *What is your affiliation with MCAS Tustin and what is your role in regard to the oversight of IRP Sites in OU-4B?*

   Since December 2014, I have been the RORE Project Manager for an O&M/LTM contract with NAVFAC SW (N62473-14-C-4208). I oversee the monitoring activities and preparation of reports (e.g., Annual Performance Evaluation Reports, Institutional Controls Compliance Monitoring Reports, and Semi-Annual Data Updates).

2. *Over the past five years, have you been involved in ongoing communication with the Navy in regard to the Navy's environmental activities at IRP Sites in OU-4B?*

   Yes, since December 2014.

3. *Is there an on-site O&M presence at OU-4B? Please describe staff O&M activities and their frequency.*

   We conduct semi-annual and annual monitoring events. We typically mobilize to the site 3 or 4 times per year depending on the monitoring schedule. We also conduct annual Land Use Controls Compliance Certificates on behalf of the Navy for IRP Sites 11, 13W, 5S(a), 6, and MPA.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Stephen Siefert	**Title:** OU-4B, O&M/MNA, Site Manager, Project Manager	**Organization:** RORE, Inc.

4. *Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years at OU-4B? Please describe and include whether they affect the protectiveness of the remedy.*

   As part of our 2014 Annual Performance Evaluation and Recommendations Report for IRP Sites 5S(a), 6, and MPA, we recommended the reduction of ISB (in-situ bioremediation)/MNA (monitored natural attenuation) sampling frequency (including COCs) from semiannual to annual at certain monitoring wells as well as reducing the frequencies of non-COC ISB and/or MNA parameter sampling for specific wells due to stabilization of analytical results. One well (MPMW06S) was proposed to complete one final COC sampling then properly abandon due to lack of historical COC detections and lack of safe access to Hangar No. 1.

5. *Have there been unexpected O&M difficulties or changes in costs since start-up or in the last five years at OU-4B? If so, please give details.*

   A minor challenge developed when Hangar 1 was deemed unsafe due to structural collapse. This required a health & safety plan revision to mitigate the risk from monitoring well inside the hangar.

6. *Have there been opportunities to optimize O&M or sampling efforts at OU-4B? Please describe changes and results or improved efficiency.*

   Each year there are optimization recommendations in the Annual Performance Evaluation Reports (APER). However, the 2014-2015 APER has not yet been finalized, so most recent recommendations have not been implemented yet.

7. *What does the monitoring data show? Are there trends that show contaminant levels are decreasing at OU-4B?*

   Yes, in many cases trends show that COC concentrations are decreasing, often meeting or surpassing expected trends generated from models.

8. *In your opinion, how well are the remedies at OU-4B functioning and are they functioning as expected?*

   The remedies at OU-4B (in situ bioremediation (ISB), monitoring and institutional controls) are functioning well, and generally meet expectations. No further ISB injections have been recommended in the last two years.

INTERVIEW RECORD

FIVE-YEAR REVIEW – Operable Units (OUs) 1A, 1B North, 1B South, 3, and 4B

FORMER MARINE CORPS AIR STATION TUSTIN

Site Name: Former Marine Corps Air Station (MCAS) Tustin		**EPA ID No.:** CA9170090022
Individual Contacted (Name): Stephen Siefert	**Title:** OU-4B, O&M/MNA, Site Manager, Project Manager	**Organization:** RORE, Inc.

9. *Have there been any complaints, violations, or other incidents related to OU-4B? If so, please give details of the events and results of the responses.*

   To the best of my knowledge, there have been no complaints, violations, or other incidents related to OU-4B.

10. *Describe any problems with vandalism or security to the integrity of the remedial actions in the last five years.*

    We are not aware of any problems with vandalism or security to the integrity of the remedial actions in the last five years.

11. *What is your overall impression of the Navy's remedial activities at former MCAS Tustin?*

    Our overall impression is that the remedial activities at OU-4B are effective in progressing toward achievement of the Remedial Action Objectives.

12. *Do you have any further comments, suggestions, or recommendations regarding operation and management of the remedies at OU-4B?*

    I am available to discuss further questions if needed.

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Appendix F
PUBLIC NOTICE

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NOTICE: COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT FIVE-YEAR REVIEW FOR OPERABLE UNITS -1A, -1B, -3 & -4B ON FORMER MARINE CORPS AIR STATION TUSTIN, TUSTIN, CA

December 2015

The Department of the Navy (Navy), in coordination with state and federal environmental regulatory agencies, is performing the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Five-Year Review of the selected remedies for Operable Units (OU)-1A, -1B, -3 & -4B on former Marine Corps Air Station (MCAS) Tustin, Tustin, CA. MCAS Tustin is located approximately 40 miles south of Los Angeles.

In accordance with the requirements of CERCLA, the Five-Year Review evaluates whether the performance of remedies detailed in the Record of Decision (ROD) documents for the subject OUs remain protective of human health and the environment:

- OU-1A and -1B (IRP Sites 13S; 3 & 12)
  - Remedy: extract and treat contaminated groundwater (GW), prevent GW contaminant migration, excavate and dispose of contaminated soil off-site, monitor GW and institutional controls (ICs).
  - Current activities: operate and maintain (O&M) two GW treatment systems, conduct semiannual GW monitoring as part of the long-term monitoring (LTM) program and enforce ICs.
- OU-3 (IRP Site 1)
  - Remedy: engineering controls to prevent contact with and migration of contamination; monitor landfill gas (LFG); monitor GW and surface water; and ICs.
  - Current activities: O&M/LTM: LFG monitoring was terminated in 2014, with agency concurrence; the most recent round of GW and surface water monitoring occurred in May 2015; enforce ICs.
- OU-4B low concentration sites (IRP Sites 11 & 13W)
  - Remedy: enforce ICs on property.
  - Current activities: enforce ICs.
- OU-4B moderate concentration sites (IRP Sites 5S[a], 6 & the Mingled Plumes Area [MPA])
  - Remedy: insitu-bioremediation of contaminated GW, monitored natural attenuation, and ICs.
  - Current activities: O&M/LTM, conduct semi-annual GW monitoring and enforce ICs.

The Navy will issue the final Five-Year Review report in October 2016, with another notice.

Questions or comments regarding the preparation of this CERCLA Five-Year Review or other Navy environmental activities at the former MCAS Tustin may be directed to:

James B. Sullivan
Navy Base Realignment and Closure Program Management Office West
Base Realignment and Closure Environmental Coordinator
33000 Nixie Way
Building 50, Suite 200S
San Diego, CA 92147
(619) 524-4048
james.b.sullivan2@navy.mil

FOR MORE INFORMATION

Information on the former MCAS Tustin and the remediation efforts at these OUs are available at www.bracpmo.navy.mil and the following locations:

Information Repository
University of California, Irvine
Ayala Science Library
Government Publications Department
Irvine, CA 92697
(949) 824-3692

Administrative Record Contact:
Ms. Diane Silva Environmental Records Manager NAVFAC Southwest
1220 Pacific Highway, Code EV33
San Diego, CA 92132-5190
(619) 556-1280

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Appendix G
RESPONSES TO COMMENTS

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Document Title: DRAFT CERCLA Five-Year Review Report, OPERABLE UNITS 1A, 1B NORTH, 1B SOUTH, 3, AND 4B, Former Marine Corps Air Station Tustin, Tustin, California, July 2016.

Comments by: *Patricia Hannon, PG, California Regional Water Quality Control Board. Email dated September 7, 2016.*

No.	Comment	Response
1.	Page 3-19. The Cleanup and Abatement Order 85-74 was rescinded on May 31, 1996. Please update the last sentence on this page.	The sentence was revised as follows: "The CAO was rescinded on May 31, 1996, after the RWQCB Santa Ana determined that MCAS Tustin had fulfilled the requirements of the CAO."
2.	Page 11-3, References. Please correct the reference for the citation RWQCB 2015 on page 2-3. The reference should be California Water Quality Control Board, Santa Ana Region (RWQCB) 2016 "Water Quality Control Plan (Basin Plan) for the Santa Ana River Basin" , Last revised 2016 http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/index.shtml Also on page 2-3 RWQCB 2015 should be updated to RWQCB 2016.	This Five-Year Review Report includes data collected since the previous 2011 Five-Year Review Report through December 2015. Therefore, the Basin Plan with revisions through 2015 is the document that was reviewed for this report, and the citation for 2015 has been retained. Other revisions were made as requested, and the reference listed on Page 11-3, References, was revised as follows: "California Regional Water Quality Control Board, Santa Ana Region (RWQCB). 2015. Water Quality Control Plan (Basin Plan) for the Santa Ana River Basin. Available online at http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/index.shtml"
3.	Appendix A, Page A1, List of Documents Reviewed. As written: "California Department of Toxic Substances Control (DTSC). _____. 2015. Water Quality Control Plan (Basin Plan) for the San Francisco Bay Basin. Last revised 2015." I think this supposed to be the same as number 2 above. Correct as appropriate.	The citation in Appendix A, Page A-1 was revised as follows: "California Regional Water Quality Control Board, Santa Ana Region (RWQCB). 2015. Water Quality Control Plan (Basin Plan) for the Santa Ana River Basin. Last revised 2015."

Document Title: DRAFT CERCLA Five-Year Review Report, OPERABLE UNITS 1A, 1B NORTH, 1B SOUTH, 3, AND 4B, Former Marine Corps Air Station Tustin, Tustin, California, July 2016.

Comments by: *Mary Aycock, Remedial Project Manager, U.S. Environmental Protection Agency (EPA). Email dated September 13, 2016.*

No.	Comment	Response
1.	We will defer to DTSC and the Water Board for comments.	Comment Noted.

Document Title: DRAFT CERCLA Five-Year Review Report, Operable Units 1A, 1B North, 1B South, 3, and 4B, Former Marine Corps Air Station Tustin, Tustin, California, July 2016.

Comments by: *Rafat Abbasi, PE, California Department of Toxic Substances Control (DTSC). Letter dated September 15, 2016.*

No.	Comment	Response
1.	Page xiv: Question C: Please change the comment section to indicate that a land use covenant (LUC) institutional controls (IC) will be required and is still pending resolution. The Final Remedial Action Plan/Record of Decision (RAP/ROD) included LUC as a remedy. Any changes to the approved remedy may require an evaluation of the applicability of "Explanation of Significant differences."	The Final Record of Decision/Remedial Action Plan (ROD/RAP) (Navy, 2010) and approved Final Land Use Control (LUC) Remedial Design (RD) (AIS-TN&A JV, 2015) provide a detailed description of the institution controls (ICs). No change to Question C will be made since no new information has come to light to affect the effectiveness of the ICs.
2.	Tables 2-2 and 2-3: Include a discussion to state that a vapor intrusion (VI) investigation is being planned for OU 1A and 1B to further refine the areas subject to the LUC/IC.	Please note that Tables 2-2 and 2-3 discuss the chronology and milestones of previous investigations and remedial actions completed at these sites. As indicated in the response to comment No. 5, text on the proposed vapor intrusion (VI) assessment will be added to the last paragraph in Section 5.1.2.
3.	Section 3.0: Background: Please revise the text at appropriate locations in this section to indicate that VI investigation is underway to further refine areas subject to LUC/IC.	See response to comment No. 2. The purpose of Section 3.0 is to present environmental characteristics, history, previous investigations, and remedial actions conducted at these sites.
4.	Page 3-27: Initial Response: same as comment 1. Please change comment section to indicate that a LUC/IC will be required and is still pending resolution. The Final RAP/ROD included LUC/IC as a remedy. Any changes to the approved remedy may require an evaluation of applicability of "Explanation of Significant differences."	See response to Comment No. 1. The LUCs are presented in Section 4.4.2.3. The information is consistent with both the Final ROD/RAP and agency concurred Final LUC RD. As a result, no changes to the text will be made.
5.	Section 5.1.2: Progress Since the Previous Five-Year Review: The section needs to be revised to indicate that Navy is conducting VI investigation.	The last paragraph of Section 5.1.2 on page 5-3 has been revised as follows: "The LUC RD contained in Section 3.9 of the Final RD/RAWP for OU-1A/OU-1B (ERRG, 2007) is being amended in the Revised Draft Final LUC RD Amendment No. 1 (Navy, 2014c) to include provisions for ICs to address potential VI from VOC-impacted groundwater to indoor air for occupied structures. The Navy is working with the regulatory agencies to conduct a VI assessment in CO Areas 5 and 6 that will assist in the completion of

Document Title: DRAFT CERCLA Five-Year Review Report, Operable Units 1A, 1B North, 1B South, 3, and 4B, Former Marine Corps Air Station Tustin, Tustin, California, July 2016.

Comments by: *Rafat Abbasi, PE, California Department of Toxic Substances Control (DTSC). Letter dated September 15, 2016.*

No.	Comment	Response
		the Revised Draft Final ESDs and Revised Draft Final LUC RD Amendment No. 1." The above edit has also been made in Tables 2-2 and 2-4 under the objective for the Revised Draft Final LUC RD Amendment No. 1, as applicable.
6.	Section 6.4.1.6: IC Compliance Data: The areas subject to LUC/IC will be refined based on the results of the ongoing VI investigation. Text must be revised accordingly.	The last paragraph of Section 6.4.1.6 on page 6-6 has been revised as follows: "The proposed vapor intrusion ARICs at OU-1A and OU-1B are shown on Figures 2 and 3 (Navy, 2014c). The Navy is working with the regulatory agencies to conduct a VI assessment in Carve Out (CO) Areas 5 and 6 that will assist in the completion of the Revised Draft Final ESDs to the Final ROD/RAP and Revised Draft Final LUC RD Amendment No. 1. The final VI ICs, ARICS, and implementation and maintenance thereof will be presented in the Final ESDs to the Final ROD/RAP and Final LUC RD Amendment No. 1, as appropriate."
7.	Section 6.4.4.4: IC Compliance Data: See comment #1 associated with LUC/IC for properties that have been previously transferred.	Comment noted. The Navy will continue to confirm that ICs are maintained at Operable Unit (OU)-4B in accordance with the agency-concurred-upon Final LUC RD (AIS-TN&A JV, 2015).

Document Title: DRAFT CERCLA Five-Year Review Report, Operable Units 1A, 1B North, 1B South, 3, and 4B, Former Marine Corps Air Station Tustin, Tustin, California, July 2016.

Comments by: *Kimberly C. Gettmann, Ph.D., DTSC Human and Ecological Risk Office (HERO). Letter dated September 13, 2016.*

No.	Comment	Response
	General Comments – Human Health Risk Assessment	
1.	Sections 3.2.3, 3.3.3, and 3.4.3 Reuse. The proposed vapor intrusion (VI) area requiring institutional controls (ARIC) is discussed for OU-1A in Section 3.2.3 and Figure 2 is referenced. The VI ARIC shown on Figure 2 also covers OU-1B North; yet, there is no mention of the VI ARIC in Section 3.3.3, which discusses the reuse of OU-1B North. Additionally, the reuse of OU-1B South is discussed in Section 3.4.3 but there is no mention of the VI ARIC shown on Figure 3.	The Revised Draft Final Explanation of Significant Differences (ESD) to the Final ROD/RAP for OU-1A include the proposed VI Area Requiring Institutional Controls (ARIC) which coincides with the Carve Out (CO)-5 boundary. OU-1B North is located within CO-5 and is therefore included within the proposed VI ARIC. However, the Navy is working with the regulatory agencies to conduct a VI assessment for CO-5 and CO-6. The results of this VI assessment will be used to provide multiple lines of evidence to refine the VI ICs and ARICs to finalize the Revised Draft Final ESDs to the Final ROD/RAP and Revised Draft Final LUC RD Amendment No. 1. To address the comment on the OU-1B South VI ARIC, The following text will be added to Section 3.4.3: "Reuse of this area will comply with the LUC RD (ERRG, 2007) and the Revised Draft Final LUC RD Amendment No. 1 (Navy, 2014c), once finalized. The Revised Draft Final LUC RD Amendment No. 1 (Navy, 2014c) proposes a VI ARIC that covers the entire area of CO-6. The Navy is working with the regulatory agencies to conduct a VI assessment in CO-6 to provide multiple lines of evidence to support VI ICs. Proposed VI ARICs for OU-1B South are presented in Figure 3."
2.	Section 3.2.6.3 Conclusions. The first full paragraph on page 3-8 states, "Under this scenario, the total cancer risk in the source area (area with highest concentrations) was reduced to 1.0×10^{-5}; therefore, ICs [institutional controls] would be an effective component of the remedy for protecting human health, and would allow for the reuse of existing and newly constructed buildings within the site boundary prior to completion of	This section summarizes the basis for initial remedial action at OU-1A; as such the ICs referenced here are those restricting use of groundwater in accordance with the LUC RD (ERRG, 2007). The proposed VI ICs per the ESD to the Final ROD/RAP for OU-1A are yet to be finalized pending the results of the VI assessment in CO-5.

Document Title: DRAFT CERCLA Five-Year Review Report, Operable Units 1A, 1B North, 1B South, 3, and 4B, Former Marine Corps Air Station Tustin, Tustin, California, July 2016.

Comments by: *Kimberly C. Gettmann, Ph.D., DTSC Human and Ecological Risk Office (HERO). Letter dated September 13, 2016.*

No.	Comment	Response
	other components of the remedy." Please clarify in this sentence which ICs are being inferred. HERO assumes it is the VI ICs. Please also clarify what the other components of the remedy are.	Other components of the remedy include the completed soil hot spot excavation, groundwater extraction and treatment, groundwater monitoring, and groundwater ICs, as documented in the Final ROD/RAP for OU-1A (Navy, 2004a).
3.	Section 4.1.2.6 Land Use Controls. The VI ICs are listed on page 4-6 and the text references that the ICs are shown in Figure 3. Figure 2 should also be referenced, as Figure 2 shows the proposed VI ICs for OU-1A and OU-1B North and Figure 3 shows the proposed VI ICs for OU-1B South.	The referenced text on page 4-6 will be revised as follows: "The proposed VI ARICs, shown on Figures 2 and 3, will be finalized in consultation with the FFSRA signatories following the completion of the VI assessment at CO-5 and CO-6. The VI ICs will be documented in the Final LUC RD Amendment No. 1." The same revision will be made in Section 7.1.1.3 on page 7-3.
4.	Section 5.1.2 Progress Since the Previous Five-Year Review. The text on page 5-2 states, "The proposed VI ICs (discussed in Section 4.2.1.6) will be applied to the VI ARIC to ensure protection of human health and the environment until the RGs [remedial goals] for groundwater are achieved". HERO has concerns with this statement since the soil vapor has not been characterized at OU-1A and OU-1B and no RAOs and RGs have been established for the VI pathway. It is unknown whether cleaning up the groundwater to the RG will also meet the requirements to ensure that the potential risk from the VI pathway to indoor air no longer exists.	The OU-1A and OU-1B groundwater Remediation Goals (RGs) are protective of human health and the environment, based on the results of multiple evaluations included in this Five-Year Review, the agency-concurred-upon Final Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Five-Year Review Report Addendum (Navy, 2013a), and the agency-concurred-upon Final 2014-15 Annual Performance Evaluation Report (APER) for OU-4B (RORE, 2016). In addition, in April 2015, Human and Ecological Risk Office (HERO) of the Department of Toxic Substances Control (DTSC) conducted an independent VI evaluation of potential cancer risks and noncancer hazards at several nearby Former Marine Corps Air Station (MCAS) Tustin groundwater sites using trichloroethene (TCE) concentrations in groundwater up to 73 micrograms per liter (µg/L). Potential VI risks were evaluated for both the residential and commercial scenarios using the Johnson & Ettinger model. Cancer risks and noncancer hazards for both residential and commercial scenarios were less than the point of departure and hazard index of 1.0, respectively.

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Comments by: *Kimberly C. Gettmann, Ph.D., DTSC Human and Ecological Risk Office (HERO). Letter dated September 13, 2016.*

No.	Comment	Response
		Therefore, by comparison, the TCE RG of 5 µg/L is protective of human health and the environment. The Navy is working with the regulatory agencies to conduct a VI assessment in CO- 5 and -6 that will assist in the completion of the OU-1A and OU-1B Revised Draft Final ESDs to the ROD/RAP and Revised Draft Final LUC RD Amendment No. 1. The final VI ICs, ARICs, and implementation and maintenance thereof will be presented in the aforementioned documents, as appropriate.
	General Comments – Human Health Risk Assessment	
5.	There is a typo on page 7-3, second to last bullet. The word “are” should be “area”.	The suggested correction has been made to the word “area” on page 7-3.

Document Title: DRAFT CERCLA Five-Year Review Report, Operable Units 1A, 1B North, 1B South, 3, and 4B, Former Marine Corps Air Station Tustin, Tustin, California.

Comments by: *Matthew S. West, Deputy City Manager, City of Tustin. Letter dated August 26, 2016*

No.	Comment	Response
1.	Section 4.1.3 (Page 4-8). The data from the March 2016 sampling event should be available to see if this is truly an anomaly or if it is a trend.	This Five-Year Review Report includes data collected since the previous 2011 Five-Year Review Report through December 2015. The data from the 2016 sampling event has been reviewed and assessed and the groundwater hydraulic containment remedy continues to be protective of human health and the environment. The Operations and Maintenance (O&M) and associated monitoring is being conducted in accordance with the Base Realignment and Closure (BRAC) Cleanup Team (BCT)-concurred Final O&M Plan. The current long-term-monitoring program at MCAS Tustin OU-1A and OU-1B is continually reviewed and optimized (e.g. management of pumping rates, pump set depths, etc.) to ensure plume capture is maintained and the remedy remains protective. Additionally, the Navy has proactively increased monitoring frequency and will continue to evaluate data in accordance with the aforementioned plan and make appropriate recommendations in light of this data.
2.	Section 4.4.2.3 (Page 4-17). The off-site proprietary control language is not correct. There have been multiple comments and lines of correspondence on this issue related to the authority and responsibility of the Navy.	The text from the Draft Five-Year Review Report is accurate and will be retained, because it reflects the language in the agency-concurred-upon Final LUC RD for Installation Restoration Program (IRP) Sites 5S(a), 6, and the Mingled Plumes Area, OU-4B, Former MCAS Tustin, Tustin, California. June 2015. As discussed in the Final APER 2014-2015 and subsequent Annual Reports, the Navy will continue to rely on governmental controls (local well permitting program) to prevent groundwater use in the previously transferred properties associated with the OU-4B moderate concentration sites. Based on evaluation of cancer risks and noncancer hazards associated with potential

Document Title: DRAFT CERCLA Five-Year Review Report, Operable Units 1A, 1B North, 1B South, 3, and 4B, Former Marine Corps Air Station Tustin, Tustin, California.

Comments by: *Matthew S. West, Deputy City Manager, City of Tustin. Letter dated August 26, 2016*

No.	Comment	Response
		exposure to impacted groundwater, there may no longer be a need for proprietary land use restrictions as additional institutional controls given the lack of unacceptable risks or hazards to human health.
3.	Section 7.1.4 (Page 7-5) and Section 9.1 (Page 9-1). Please clarify how the anomaly that is occurring at well IS72MW17S does not alter the protectiveness of the remedy.	See Response to Comment No. 1.

Document Title: DRAFT CERCLA Five-Year Review Report, Operable Units 1A, 1B North, 1B South, 3, and 4B, Former Marine Corps Air Station Tustin, Tustin, California.

The following Revisions 1 through 6 are included to show changes from the Draft Five-Year Review (July 2016) to the Final Five-Year Review (October 2016)

No.	Revision	Details
1.	Revisions based on comments from the Santa Ana Regional Water Quality Control Board (RWQCB) on the Draft 2015 Annual Report for OU-3 (April 2016). Discussion on maximum containment levels (MCLs), were refined in the Draft Five-Year Review Report (July 2016) to state that although MCLs for arsenic and ethylbenzene were revised after remedy selection, and certain toxicity criteria for COCs have changed, the changes do not negatively affect the protectiveness of the remedy at OU-3. The remedy remains protective of human health and the environment.	The following revisions to the Draft Five-Year Review Report (July 2016) were made: • Executive Summary, OU-3 (Page x): The first paragraph under OU-3 was revised to read: "Based on the monitoring data and documents reviewed, site inspection, and interviews, the remedy for OU-3 is functioning as intended by the ROD. Groundwater, surface water, and LFG monitoring data indicate that COCs at the site are being effectively contained by the engineering components of the remedy, as designed. There was no evidence of any activities at the site that are inconsistent with the land use restrictions established in the Land Use Control Implementation and Compliance Plan (LUCICP). The evaluation of the ARARs that were documented in the ROD indicated revised state maximum containment levels in drinking water (MCLs) for arsenic and ethylbenzene; however, this change would not negatively affect the protectiveness of the remedy at OU-3 because the steel-reinforced wall is effective in containing impacted groundwater and existing ICs are effective in restricting exposure to contaminated media. Certain toxicity criteria for COCs have changed; however, these changes do not affect the protectiveness of the remedies at OU-3."

Document Title: DRAFT CERCLA Five-Year Review Report, Operable Units 1A, 1B North, 1B South, 3, and 4B, Former Marine Corps Air Station Tustin, Tustin, California.

The following Revisions 1 through 6 are included to show changes from the Draft Five-Year Review (July 2016) to the Final Five-Year Review (October 2016)

		• Question B Comment (page xi): "The state MCLs for arsenic and ethylbenzene were revised after remedy selection and certain toxicity criteria for COCs have changed. However, these changes do not negatively affect the protectiveness of the remedies at OU-3." • Section 7.2.2.3, second sentence (Page 7-8) was revised to read: "Based on the five-year review evaluation, the state MCLs for arsenic and ethylbenzene were revised to 10 and 300 µg/L, respectively, after remedy selection. The results of the 2015 groundwater and surface water sampling indicate that the OU-3 remedy remains protective even when the concentrations of arsenic and ethylbenzene are evaluated against the revised arsenic and ethylbenzene MCLs. Additionally, the containment wall remedy is effective in containing impacted groundwater, and established ICs restrict exposure to impacted groundwater." • Section 7.2.4 (Page 7-9): "The evaluation of ARARs that were documented in the ROD indicated revised state MCLs for arsenic and ethylbenzene; however, this change would not negatively affect the protectiveness of the OU-3 remedy. No other newly promulgated standards were identified that could negatively affect the protectiveness of the remedy. Certain toxicity criteria for COCs have changed; however,

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The following Revisions 1 through 6 are included to show changes from the Draft Five-Year Review (July 2016) to the Final Five-Year Review (October 2016)

		these changes do not affect the protectiveness of the remedies at OU-3. • Table 7-2, Question B Comment (Page 7-10): "The state MCLs for arsenic and ethylbenzene were revised after remedy selection. Certain toxicity criteria for COCs have changed. These changes do not negatively affect the protectiveness of the remedies at OU-3."
2.	OU-4B site definitions warranted further refinement when referenced in the Draft Five-Year Review (July 2016). In addition, OU-4B figures did not correctly depict site boundaries in the Draft Five-Year Review (July 2016).	The following non-substantive technical changes were made throughout the document and are included below for full transparency: • Executive Summary, OU-4B Low Concentration Sites Technical Assessment Summary Table (page xiv), the comment in response to Question A was changed from "OU-4B" to "OU-4B low concentration sites". • Executive Summary, OU-4B Moderate Concentration Sites Technical Assessment Summary Table (page xvi), the comment in response to Question A was changed from "OU-4B" to "OU-4B moderate concentration sites". • Executive Summary under the heading "OU-4B Low Concentration Sites" (page xiv), "OU-4B" was changed to "OU-4B low concentration sites". • Executive Summary under the heading "OU-4B Moderate Concentration Sites" (page xv), "OU-4B"

Document Title: DRAFT CERCLA Five-Year Review Report, Operable Units 1A, 1B North, 1B South, 3, and 4B, Former Marine Corps Air Station Tustin, Tustin, California.

The following Revisions 1 through 6 are included to show changes from the Draft Five-Year Review (July 2016) to the Final Five-Year Review (October 2016)

		was changed to “OU-4B moderate concentration sites”. • Section 7.3.1, last sentence (page 7-10), “OU-4B” was changed to “OU-4B low concentration sites.” • Section 7.3.2.2, last sentence, first paragraph, (page 7-11), “OU-4B” was changed to “OU-4B low concentration sites.” • Section 9.3, first sentence (page 9-1) “OU-4B” has been changed to “OU-4B low concentration sites” • Section 7.4.1, last sentence of the second to the last paragraph (page 7-13), “OU-4B” was changed to “OU-4B moderate concentration sites.” • Section 7.4.2.2, last sentence in the first paragraph (page 7-13), “OU-4B” was changed to “OU-4B moderate concentration sites.” • Section 9.4, first sentence (page 9-1), “OU-4B” was changed to “OU-4B moderate concentration sites”. • Section 7.4.2.2, last sentence of the second to the last paragraph (page 7-14) was changed from “parcels-4B” to “portions of OU-4B” in accordance with the noted reference.

Document Title: DRAFT CERCLA Five-Year Review Report, Operable Units 1A, 1B North, 1B South, 3, and 4B, Former Marine Corps Air Station Tustin, Tustin, California.

The following Revisions 1 through 6 are included to show changes from the Draft Five-Year Review (July 2016) to the Final Five-Year Review (October 2016)

		The boundaries of the MPA were corrected to show DSS-01, DSS-02, MMS-05, ST-67, and MDA-02 on the following figures: • Figures 1, 2, 5, 13, 14, 15, 18, 19, 28, 32, and 33. The boundary for IRP-5S(a) was corrected on the following figures: • Figures 1, 2, 5, 7, 12, and 31. The boundary for IRP-6 was corrected on the following figures: • Figures 1, 5, 6, 9, and 12.
3.	The protectiveness of the Sites covered by the Revised Draft Final LUC RD Amendment No. 1 were listed incorrectly in the Executive Summary, Technical Assessment Summary (page ix).	The following revisions were made in the Draft Five-Year Review (July 2016): • Executive Summary under the section heading OU-1A, OU-1B North, and OU-1B South, the second paragraph (page ix) was revised to read: "With current land use, the remedies at OU-1A, OU-1B North, and OU-1B South are protective. The remedy at OU-1B North is protective in the long-term. The remedies at OU-1A and OU-1B South will be protective in the long-term with finalizing the Revised Draft Final LUC RD Amendment No. 1 (Navy, 2014c) to establish and implement additional vapor intrusion (VI)-specific ICs in accordance with the Revised Draft Final ESDs to the Final ROD/RAP for OU-1A/OU-1B (Navy, 2014a and 2014b)."
4.	The Technical Assessment Summaries were not consistent throughout the document.	The following revisions were made to the Draft Five-Year Review (July 2016): • Executive Summary OU-3 Technical Assessment Summary table and in Table 7-2, the comment in

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		response to Question B was revised to state the following: "The state MCLs for arsenic and ethylbenzene were revised after remedy selection and certain toxicity criteria for COCs have changed. However, these changes do not negatively affect the protectiveness of the remedies at OU-3." • Executive Summary OU-4B Low Concentration Sites Technical Assessment Summary table, the comment in response to Question A has been modified to state "OU-4B low concentration sites". The comment in response to Question B was revised to state that the remedy in place at the "low concentrations sites" remains protective. • Executive Summary OU-4B Moderate Concentration Sites Technical Assessment Summary table, the comment in response to Question A has been modified to state "OU-4B moderate concentration sites". The comment in response to Question B was revised to replace "COC" with "TCE" and remove "the": from before "changes" to be consistent with Table 7-4. • Table 7-1 the comment in response to Question A, the definition of ARICs has been replaced by the acronym and the last sentence was modified to match the corresponding Executive Summary table: "The remedy of ICs, proposed in the 2014 Revised Draft Final ESDs to the Final ROD/RAP for OU-1A/OU-1B and implemented in the Revised Draft Final LUC RD Amendment No. 1 (Navy, 2014c), once finalized, will be effective in addressing potential VI from VOC-impacted groundwater within the VI ARICs". In the comment

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		in response to Question B, “COC” was replaced by “TCE”. • In Table 7-3 the comment in response to Question B, “COC” was replaced by “TCE” and the following phrase was added to the last sentence to be consistent with the corresponding Executive Summary table: “and demonstrate that the remedy in place at the low concentration sites remains protective”. • In Table 7-4, the last sentence in the comment in response to Question B was replaced with the following: “Changes in exposure assumptions were addressed for IRP-5S(a) and IRP-6 in the 2015 Annual Performance Evaluation Report (RORE, 2016a) and demonstrate that the remedy in place at those moderate concentration sites remains protective. A qualitative assessment of VI pathway risk at the MPA indicates that the remedy in place remains protective.” • The following sentence was added to the second paragraph of Section 7.2.4: “Certain toxicity criteria for COCs have changed; however, these changes do not affect the protectiveness of the remedies at OU-3.” Also in Section 7.2.4, the second to last sentence was replaced with the following sentence: “Per- and polyfluoroalkyl substances (PFASs) are an emerging contaminant and will be addressed accordingly.” • Section 7.4.4, first two sentences of the second paragraph was replaced by the following sentence: “Groundwater monitoring data indicate that TCE groundwater concentrations are low and relatively stable.”

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5.	The reference to the Revised Draft Final LUC RD Amendment No. 1 and the Draft Final ESDs to the ROD/RAP was incorrectly included in Table 2-3.	The following revision was made in the Draft Five-Year Review (July 2016): • The reference to the Revised Draft Final LUC RD Amendment No. 1 and the Draft Final ESDs to the ROD/RAP will be removed from Table 2-3.
6.	The protectiveness of the Sites covered by the Revised Draft Final LUC RD Amendment No. 1 were listed incorrectly in Section 7.1.4 (page 7-6).	The following revision was made in the Draft Five-Year Review (July 2016): • Section 7.1.4, second paragraph (page 7-6), OU-1B North was removed from the last sentence to state “The remedies at OU-1A and OU-1B South will be protective in the long-term with finalizing the Revised Draft Final Land Use Control Amendment No. 1 (Navy, 2014c) to establish and implement additional VI-specific ICs in accordance with the Revised Draft Final ESDs to the Final ROD/RAP for OU-1A/OU-1B (Navy, 2014a and 2014b).
7.	The Draft Five-Year Review (July 2016) was revised to correctly present ESDs to ROD/RAP and LUC RD Amendment No. 1 as not finalized.	Revisions, where applicable were made to the Draft Five-Year Review (July 2016).
8.	Reference to “LUC RD Amendment No. 1 (Navy 2014c) was revised to “Revised Draft Final LUC RD Amendment No. 1 (Navy 2014c)” and reference to the “ESD” was revised to “Draft Final ESDs to ROD/RAP for OU-1A/OU-1B” for consistency.	Revisions, where applicable, were made to the Draft Five-Year Review (July 2016).

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