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Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

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September 30, 2014

James T. Owens III, Director
Office of Site Remediation and Restoration
U.S. Environmental Protection Agency, Region I
5 Post Office Square Suite 100
Boston, MA 02109-3912

RE: **BOURNE**
Release Tracking Number: 4-0000037
Joint Base Cape Cod (JBCC)
Final Chemical Spill-10 Groundwater Explanation of Significant Differences,
Concurrence

Dear Mr. Owens:

The Massachusetts Department of Environmental Protection (MassDEP) has reviewed the document entitled **"Final Chemical Spill-10 Groundwater Explanation of Significant Differences"** (ESD), dated August 2014. The ESD was prepared by CH2M Hill for the Air Force Civil Engineer Center (AFCEC) Installation Restoration Program (IRP) at the Joint Base Cape Cod (JBCC), formerly the Massachusetts Military Reservation (MMR). The ESD was completed to update the Chemical Spill-10 (CS-10) groundwater conceptual site model (CSM), modify the selected remedy for CS-10 groundwater described in the 2009 CS-10 Record of Decision (CS-10 ROD), and amend the estimated aquifer restoration timeframe presented in the CS-10 ROD.

Recent data gap investigations for the CS-10 groundwater plume identified areas of trichloroethylene (TCE) contamination in the aquifer associated with the CS-10 plume that were previously uncharacterized. This necessitated updating the CS-10 CSM and the predicted aquifer restoration timeframe. The discovery of areas of previously uncharacterized TCE contamination resulted in an increase of the estimated aquifer restoration timeframe presented in the ROD from 2094 to greater than 2113 under existing operational conditions. The AFCEC installed two new extraction wells and two reinjection wells, and made operational modifications to the existing CS-10 extraction, treatment and infiltration system to optimize system performance and remove contaminants from the aquifer in a manner that reduces the estimated aquifer restoration timeframe to 2060.

MassDEP concurs with the ESD. The ESD does not fundamentally change the groundwater remedy identified in the CS-10 ROD, which is continued operation of the (expanded) CS-10 groundwater remedial systems with long term monitoring (LTM) and land use controls (LUCs), and does not fundamentally alter the groundwater remedy selected in the CS-10 ROD with respect to scope, performance, or cost. However, the remedial system has been modified to more aggressively remove contaminants from the aquifer to significantly shorten the aquifer remediation timeframe and allows for

the possibility of modifying the treatment system in the future to optimize the efficiency of the systems and aquifer restoration timeframe. The ESD modified groundwater remedy is protective of human health and the environment and complies with Commonwealth of Massachusetts requirements that are legally applicable or relevant and appropriate to the remedial action.

MassDEP's concurrence with the ESD is based upon representations made to MassDEP by the AFCEC and assumes that all information provided is substantially complete and accurate. Without limitation, if MassDEP determines that any material omissions or misstatements exist, if new information becomes available, if land-use controls (LUCs) are not properly implemented, monitored and/or maintained or if conditions within any of the IRP groundwater plumes change, resulting in potential or actual human exposure or threats to the environment, MassDEP reserves its authority under M.G.L. c. 21E, CERCLA, the MCP, the NCP and any other applicable law or regulation to require further response actions including, without limitation, additional investigation, remedial measures, and the implementation of LUCs. MassDEP will review relevant information as it becomes available, including, without limitation, new regulatory requirements or changes in the environmental conditions, to determine if additional investigative and/or remedial measures are necessary for the protection of public health, safety, welfare or the environment.

Please incorporate this letter into the Administrative Record for Chemical Spill-10 groundwater. If you have any questions regarding this matter, please contact Leonard J. Pinaud, Chief, State & Federal Site Management, Bureau of Waste Site Cleanup, in the MassDEP's Southeast Regional Office at (508) 946-2871 or Millie Garcia-Serrano, Deputy Regional Director for the Bureau of Waste Site Cleanup in the MassDEP's Southeast Regional Office at (508) 946-2727.

Sincerely,

Benjamin Ericson
Assistant Commissioner
Bureau of Waste Site Cleanup

BE/lp

File : 4-0000037 CS-10 ESD Concurrence Letter 09-2014

Ec: Gary Moran, Deputy Commissioner
Philip Weinberg, Regional Director
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1748 West Truck Road
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30 September 2014

Ms. Rose H. Forbes, P.E.
Remediation Program Manager
AFCEC/JBCC
322 East Inner Road
Otis ANG Base, MA 02542-5028

SUBJECT: AFCEC 4P FA8903-08-D-8769; Task Order 0365
JBCC SPEIM/LTM, Evaluation and Optimization Program
CDRL #A001o
Chemical Spill-10 Explanation of Significant Differences

Dear Mr. Davis:

As directed by the Air Force Civil Engineer Center, CH2M HILL is hereby distributing copies of the *Final Chemical Spill-10 Explanation of Significant Differences* dated September 2014. Enclosed are four bound copies, one unbound copy, and four compact disc (CD) copies. Copies are also being sent to the appropriate agencies.

Sincerely,

CH2M HILL

Nigel Tindall, P.G.
Project Manager

Enclosures: (4 bound, 1 unbound & 4 CDs)

c. 772d ESS/PKJ (1 w/o attach.)
Bob Lim, EPA (1 bound, 1 CD)
Lynne Jennings, EPA (1 CD)
Erin Sanborn, EPA/OSSR RIC (1 bound, 1 CD)
Leonard Pinaud, MassDEP (1 bound, 1 CD)
Henry Ciu, MassDEP
Elliot Jacobs, MassDEP
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CH2M HILL Document Control & Distribution

Joint Base Cape Cod

Final Chemical Spill-10 Groundwater Explanation of Significant Differences

September 2014

Prepared for:
AFCEC/JBCC
Installation Restoration Program
322 E. Inner Road
Otis ANGB, MA 02542

Prepared by:
CH2M HILL
1748 West Truck Road
Otis ANGB, MA 02542

TABLE OF CONTENTS

Figures

Appendix

ACRONYMS AND ABBREVIATIONS

AFCEC	Air Force Civil Engineer Center
AFCEE	Air Force Center for Engineering and the Environment
ANG	Air National Guard
AOC	Area of Concern
ARNG	Army National Guard
BOMARC	Boeing Michigan Aerospace Research Center
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
cis-1,2-DCE	cis-1,2-dichloroethene
COC	contaminant of concern
CS	Chemical Spill
CSM	conceptual site model
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Differences
ETI	extraction, treatment, and infiltration
ETR	extraction, treatment, and reinjection
FFA	Federal Facility Agreement
FS	Fuel Spill
ft	foot or feet
IP	In-Plume
IROD	Interim Record of Decision
IRP	Installation Restoration Program
JBCC	Joint Base Cape Cod
lbs	pounds
LTM	long term monitoring

ACRONYMS AND ABBREVIATIONS

LUCs	land use controls
MassDEP	Massachusetts Department of Environmental Protection
MCL	Maximum Contaminant Level
MMR	Massachusetts Military Reservation
MNA	monitored natural attenuation
MTU	mobile treatment unit
NCL	North Central Lobe
NCP	National Contingency Plan
NGB	National Guard Bureau
NL	Northern Lobe
NPL	National Priorities List
PCE	tetrachloroethene
RAOs	Remedial Action Objectives
RI	remedial investigation
ROD	Record of Decision
SI	site inspection
SL	Southern Lobe
SPEIM	System Performance and Ecological Impact Monitoring
SVE	soil vapor extraction
TCE	trichloroethene
USAF	U.S. Air Force
USCG	U.S. Coast Guard
UST	underground storage tank
UTES	Unit Training Equipment Site
UU/UE	unlimited use/unrestricted exposure
VOC	volatile organic compound
µg/L	microgram per liter
1,1,1-TCA	1,1,1-trichloroethane

1.0 INTRODUCTION

This *Final Chemical Spill-10 Groundwater Explanation of Significant Differences* (ESD) has been prepared to document changes to the Chemical Spill-10 (CS-10) conceptual site model (CSM), modify the remedy to more aggressively remove contaminants from the aquifer, and amend the predicted aquifer restoration timeframe at the CS-10 groundwater site. Recent data gap investigation activities led to the identification of previously uncharacterized trichloroethene (TCE) contamination in the CS-10 plume which necessitated an update to the CSM and a modification to the remedial action for the CS-10 plume. The *Final Record of Decision for Chemical Spill-10 Groundwater* (AFCEE, 2009a) was signed on 02 August 2009 by the Air Force Center for Engineering and the Environment (AFCEE)[1] and on 19 August 2009 by the U.S. Environmental Protection Agency (EPA). CS-10 is an Installation Restoration Program (IRP) site, associated with the Joint Base Cape Cod (JBCC)[2]; formerly known as the Massachusetts Military Reservation [MMR]), located on Cape Cod, Massachusetts (**Figures 1-1** and **1-2**). The Comprehensive Environmental Response, Compensation, and Liability Information System number for the MMR site is MA2570024487.

This ESD was prepared in accordance with *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents* (EPA, 1999). In accordance with Executive Order 12580, the U.S. Air Force (USAF) is the lead agency for remedial actions at the MMR and this document is being issued by the USAF as the lead agency. The MMR was added to the National Priorities List (NPL) in 1989. A Federal Facility Agreement (FFA), which provided the legal framework for investigating and remediating numerous operable units at the MMR, was signed in 1991 (EPA, et al. 1991). In 1996, the FFA was amended to add the USAF as the lead agency for the cleanup at MMR (EPA, et al. 2002). The FFA, as amended, requires the USAF to implement Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requirements at

[1] In October 2012 AFCEE adopted a new organizational name, Air Force Civil Engineer Center (AFCEC). Therefore, the AFCEE and AFCEC acronyms refer to the same entity, but are used in this document in relation to the date of a specific topic or document.

[2] In July 2013, the Massachusetts Military Reservation (MMR) adopted a new name, the Joint Base Cape Cod (JBCC). Therefore, the MMR and JBCC acronyms refer to the same location, but are used in this document in relation to the date of the specific topic/document.

MMR. In addition to the USAF, the EPA and National Guard Bureau (NGB) are parties to the FFA for the MMR. The Massachusetts Department of Environmental Protection (MassDEP) is not a signatory of the FFA, but is an active participant in the clean-up process and provides guidance and direction to the remedy selection and oversight process.

The selected remedy for CS-10 groundwater as specified in the Record of Decision (ROD) consists of continued operation of the CS-10 remedial system plus expansion of the system through the addition of an extraction well (03EW2112) and reinjection well (03RI2112) to address the portion of the CS-10 plume in the southern trench area that has migrated beyond the base boundary (AFCEE, 2009a). The new extraction well (03EW2112) and reinjection well (03RI2112) were installed in 2008 and became operational in February 2009 (AFCEE, 2010). In 2011, an ESD was issued that clarified the inclusion of monitored natural attenuation (MNA) as a component of the selected remedy for CS-10 and several other JBCC IRP groundwater sites, revised the land use controls (LUCs), slightly modified the phrasing of the remedial action objectives (RAOs), and added text regarding the three-step process to achieve site closure (AFCEE, 2011a).

The remedial system is performing as expected and the LUCs are in place and are functioning as intended. Through the combination of the active treatment by the remedial systems and natural attenuation processes, groundwater cleanup levels are expected to be achieved. However, based on results of a data gap investigation completed in 2012 that updated the CS-10 CSM, the timeframe for aquifer restoration under current[3] operating conditions was predicted to be longer than expected at the time of remedy selection (AFCEC, 2013d). In response, an optimization evaluation was completed that considered several different pumping scenarios to improve plume capture and reduce aquifer restoration timeframe compared to current operating conditions (AFCEE, 2013 and AFCEC, 2013c). Aquifer restoration timeframe would be significantly reduced under the selected optimized scenario, optimized Scenario 7 identified in this ESD, which would under this ESD be predicted to meet cleanup standards in 2060 compared to current operating conditions (predicted to meet standards after 2113) and compared to operating conditions for the

[3] Remedial system operation has been optimized several times since the ROD was signed in 2009 and current operating conditions for this optimization evaluation refers to 2012 Scenario 01 operating conditions.

selected remedy in the ROD, Alternative 10, which used the previous, 2007 version of the TCE plume shell which predicted cleanup levels would be achieved by 2094 (AFCEC, 2014 and 2013b). Optimized Scenario 7 as identified in this ESD includes two new extraction wells, two new reinjection wells, a mobile treatment unit (MTU), and modified flow rates and modified, effective screen intervals at selected existing wells. This optimization is scheduled to be implemented in May 2014. Since the LUCs are in place and are functioning as intended to prevent exposure, the remedy remains protective of human health and the environment (AFCEC, 2013a). This ESD is being completed in order to update the CS-10 CSM, amend the estimate of aquifer restoration timeframe at CS-10, and modify the remedy to more aggressively remove contaminants from the aquifer so that cleanup levels can be achieved sooner.

1.1 STATEMENT OF PURPOSE

The AFCEC is issuing this ESD in accordance with §117(c) of CERCLA and 40 Code of Federal Regulations (CFR) Section 300.435(c)(2)(i) of the National Contingency Plan (NCP) which requires the publication of an ESD if the remedial action taken differs significantly from the remedy selected in the ROD with respect to scope, performance, or cost but does not fundamentally alter the remedy selected in the ROD with respect to scope, performance, or cost. As required by Section 300.825(a)(2) of the NCP, this ESD will become part of the Administrative Record for the CS-10 IRP site at the JBCC. The Administrative Record is available for public review by appointment at the AFCEC IRP Office (322 East Inner Road, Otis ANG Base, Massachusetts, 02542) Monday - Friday, 8 a.m. to 4 p.m., excluding federal and state holidays, and is also available on-line at http://afcec.publicadmin-record.us.af.mil.

1.2 AUTHORIZING SIGNATURES

The following signatures represent the decision to authorize this ESD for the CS-10 Groundwater IRP site at the JBCC.

U.S. AIR FORCE

Marilyn C Croach, PhD, SES

Date: 18 August 2014

MARILYN C. CROACH, PhD, SES
Deputy Director
Air Force Civil Engineer Center

U.S. ENVIRONMENTAL PROTECTION AGENCY

Date: 9/30/14

JAMES T. OWENS III
Director
Office of Site Remediation and Restoration

2.0 SITE HISTORY, SITE CONTAMINATION, AND SELECTED REMEDY

This section presents background information on the CS-10 IRP groundwater site, including an overview of the physical and chemical characteristics, history, and selected remedy.

2.1 INSTALLATION LOCATION AND HISTORY

The JBCC, listed on the NPL as Otis Air National Guard/Camp Edwards, is located on upper Cape Cod, Massachusetts (**Figure 1-1**). The JBCC comprises approximately 22,000 acres on Cape Cod and provides facilities for several operating command units: the Air National Guard (ANG), the Massachusetts Army National Guard, the USAF, the U.S. Coast Guard (USCG), and the Veterans Affairs. Past military training, maneuvers, and aircraft operations, maintenance and support activities at the JBCC have resulted in releases of hazardous substances, wastes, and materials that contaminated soil in source areas and generated plumes of contaminated groundwater in the unconfined sand and gravel aquifer that underlies the JBCC and the surrounding towns.

The CS-10 groundwater plume is located in the southeast area of the JBCC, extending off-base into the towns of Falmouth and Mashpee (**Figures 1-2** and **2-1**). The plume is defined as the extent of groundwater contaminated with TCE and tetrachloroethene (PCE), the CS-10 plume contaminants of concern (COCs), at concentrations exceeding the federal Maximum Contaminant Level (MCL) of 5 micrograms per liter (µg/L) for both compounds. There are four separate areas in the CS 10 plume: (1) the In-Plume (IP) area (2) the Sandwich Road lobe (3) the southern trench area (4) and the leading edge area which is comprised of three lobes: the Northern lobe (NL); North-Central lobe (NCL); and Southern lobe (SL). The CS-10 plume is approximately 3.6 miles long and 1.3 miles wide (**Figure 2-1**).

2.2 CS-10 SOURCE AREA HISTORY, CONTAMINATION, AND REMEDIAL ACTIONS

The main source of the CS-10 groundwater plume is referred to as Area of Concern (AOC) CS-10/Fuel Spill-24 (FS-24). AOC CS-10/FS-24 occupies approximately 38 acres at the eastern boundary of the JBCC to the west of Snake and Weeks ponds (**Figure 2-1**). Originally, the AOC CS-10/FS-24 consisted of a number of buildings constructed as part of the Boeing Michigan Aerospace Research Center (BOMARC) site by the USAF.

Construction of the BOMARC missile site began in 1958. Between 1960 and 1973, the USAF maintained approximately 56 BOMARC ground-to-air missile launcher systems in a state of operational readiness. Maintenance operations involved the use of cleaning solvents [methylene chloride, 1,1,1-trichloroethane (1,1,1-TCA), TCE, PCE, and Freon]. BOMARC fuels included Jet Fuel-4, Aerozine-50, red fuming nitric acid, and hydrazine. Fuels used for power and heat generation included No. 2 fuel oil and diesel fuel. Several buildings had floor drains connected to leaching wells, building sumps, oil interceptors, and other drainage structures; some of these drainage structures were connected to the site storm drain system. In 1973, the facility was no longer needed by the USAF (AFCEE, 2008a). Shelters utilized by the missile launcher systems along with a subsurface utility corridor connecting the shelters (utilidor system) were removed from the site in 2005.

In 1978, the ARNG incorporated the empty missile facility into Camp Edwards and began limited use of the buildings for equipment maintenance and storage. The Unit Training Equipment Site (UTES) facility has been in operation at this site since 1978 and is currently used by the Massachusetts Army National Guard (ARNG) as the UTES facility for maintenance and storage of vehicles. UTES personnel are responsible for maintaining vehicles used for Camp Edwards ARNG training activities. Motor oil, hydraulic fluid, battery electrolyte, PCE, PD-680 Safety Clean, paints, and paint removers have been used on-site (AFCEE, 2008a). Although the BOMARC and UTES facilities are considered the primary sources of contamination to the CS-10 plume,

numerous other sources of contamination are presumed to have contributed to the CS-10 plume as it traveled beneath the JBCC (E.C. Jordan Co., 1989 and 1990).

A ROD for AOC CS-10/FS-24 source areas was finalized in 1999 (AFCEE, 1999). Nine discrete areas (Details) within the source area were identified in the ROD as requiring remedial action (**Figure 2-2**). All known sources for the CS-10 plume have been addressed by remedial actions. Under the IRP, a sump removal action program was conducted, which included phased investigations consisting of collection and analysis of structure contents and surrounding soils (ABB-ES 1992). In 1995, drainage structures were either closed in place with concrete fill, delisted as a result of conditions encountered in the field or removed and the site closed based on post-excavation confirmation sampling. As part of the entire drainage structure removal program, which included structures outside of CS-10, 31,550 gallons of liquids and 700 cubic yards of soils were removed (AFCEE, 2008a).

Approximately 250 cubic yards of contaminated soil were removed from the CS-10 Details A, B, E and H and transported off site. A soil vapor extraction (SVE) system was constructed and operated in the CS-10 source area at Detail C from 2002 to 2005 and during that time the system removed approximately 5 pounds (lbs) of volatile organic compounds (VOCs) from the vadose zone associated with a former 300-gallon jet propellant fuel underground storage tank (AFCEE, 2005a). FS-24 was Detail G, which consisted of subsurface soil contamination associated with a former 25,000-gallon underground storage tank (UST) located off the northeast corner of Building 4606 (AFCEE, 2008a). For CS-10 Details A, B, D, E, G, H, and I; the remedial actions have been completed and are functioning as intended by the ROD as modified by the ESD (AFCEE, 2011b) and supports the unlimited use/unrestricted exposure (UU/UE) determinations for these details. For Detail C and F, the remedy is functioning as intended under current land use. However, residual contamination remains and these data are being further assessed to determine whether UU/UE closure can be reasonably achieved at these two details (AFCEE, 2011a).

Site-specific removal/remedial activities have also been conducted for many other identified sources believed to have contributed to the CS-10 plume (**Figure 1-2**). At CS-4, 13,235 tons of soil were excavated and thermally treated to eliminate sources of contamination to groundwater. Activities at FS-19 included emptying and removing six underground storage tanks. A 3,000-gallon underground storage tank was removed from USCG/ FS-26. Sumps were removed at CS-1 and CS-2 (ABB-ES 1992).

In 1985, during an investigation of the possible impact of UTES/BOMARC activities on local groundwater quality, several chlorinated organic compounds were detected in the groundwater (E.C. Jordan Co., 1986). A site inspection (SI) conducted from 1986 to 1988 identified numerous contamination sources in the BOMARC area and detected contaminants in the soil (fuel- and oil-related polynuclear aromatic hydrocarbons, pesticides, polychlorinated biphenyls, and inorganics) and groundwater (halogenated solvents cis-1,2-dichloroethene [cis-1,2-DCE], TCE, and PCE) (E.C. Jordan Co. 1989, and 1990). Based on the results of the SI, a remedial investigation (RI) was performed. An interim RI (ABB-ES 1992) and final RI (CDM, 1997) conducted in 1989 and 1990 characterized potential sources of groundwater contamination, confirmed conceptual models, and delineated the extent of contaminant source areas (i.e., leaching pits, oil/water interceptors, residual soil).

An RI was conducted for the UTES/BOMARC area fuel spill area of concern CS-10/FS-24 source operable units (CDM, 1997) and a separate RI was conducted for the groundwater plume (CDM, 1996) which, at the time, was only defined north of Ashumet Pond.

In 1995, the NGB, Department of Defense, EPA, MassDEP, and local communities approved a Plume Response Plan that presented an accelerated effort toward "simultaneous containment" of seven groundwater plumes including CS-10. An Interim ROD (IROD) for the seven groundwater plumes emanating from the MMR was signed on 25 September 1995 (ANG 1995). The IROD stated that groundwater extraction and treatment systems should be designed, installed, and operated until a final remedy for the

site is chosen. For CS-10, the interim remedy included active treatment for the plume upgradient of Ashumet Pond.

The Sandwich Road extraction, treatment, and reinjection (ETR) system and the CS-10 IP extraction, treatment, and infiltration (ETI) system were installed under the IROD. The Sandwich Road ETR system began operation on 18 May 1999 and the CS-10 IP ETI system began operation on 24 June 1999. On 27 April 2000, the CS-10 IP system was supplemented with the start-up of the Southwest/Southern system (AFCEE, 2001b).

Leading edge investigations of the CS-10 plume began in 1997, the first of which determined that the CS-10 plume had migrated beneath Ashumet Pond and that the plume (primarily TCE) was detected between Ashumet and Johns ponds. The NL was initially identified in 1998 through a vapor diffusion survey in Johns Pond followed by on-pond and land-based drilling programs. In 1999 and 2000, the nature and extent of the CS-10 plume under Ashumet Pond was further investigated through diffusion sampling and on-pond drilling. The NCL and SL were initially delineated as part of the RI conducted in 2000 and 2001; this RI focused on the leading edge of the CS-10 plume downgradient of Sandwich Road. The baseline human health risk assessment conducted during the RI indicated there was no current risk but that a potential future risk to human health existed through exposure to contaminated groundwater (AFCEE, 2001a).

In 2000, a time-critical removal action was completed for the NL due to high TCE concentrations in groundwater potentially discharging to Johns Pond surface water. The action consisted of the installation of one extraction well which began operation in January 2000 to prevent discharge of TCE into Johns Pond (AFCEE, 2000).

In 2004, extraction well 03EW2111 was added to the IP system as part of an optimization effort to address contamination in the southern trench area (AFCEE, 2005b). A southern trench data gap investigation was completed between 2005 and 2007 to further delineate contamination located outside of the remedial system capture zone (AFCEE, 2008c). As a result of this investigation the TCE and PCE plume shells and the CS-10 groundwater flow model were revised to more accurately represent aquifer conditions in the area, and

to predict future contaminant migration under current CS-10 remedial system operating conditions (AFCEE, 2009b). The optimized pumping condition determined during this evaluation was presented as Alternative 10 in the *Final Supplement to the Chemical Spill-10 Groundwater Feasibility Study Addendum* (AFCEE, 2008b) and is the selected alternative in the *Final Record of Decision for Chemical Spill-10 Groundwater* (AFCEE, 2009a). This alternative included the installation of a new extraction well (03EW2112) at the leading edge of the Southern Trench lobe, the installation of a new reinjection well (03RI2112) southeast of 03EW2111, and modification of the Sandwich Road and CS-10 IP extraction and reinjection/infiltration well flow rates. The new extraction well (03EW2112) and reinjection well (03RI2112) were installed in 2008 and the system optimization was implemented in February 2009.

2.3 CS-10 GROUNDWATER EXISTING SELECTED REMEDY

The selected remedy in the ROD (AFCEE, 2009a) included the following components:

- Continued operation of the existing optimized IP ETI system, NL ETR system, and the Sandwich Road ETR system with system expansion into the Southern Trench area with an additional extraction well (03EW2112) and an additional reinjection well (03RI2112) to improve capture of the plume in that area. The flow from the new extraction well is treated at the SRTF and returned to the aquifer through the CS-10 and Storm Drain-5 reinjection wells. The flow to the new reinjection well comes from the CS-10 IP treatment facility via the Southern Infiltration Trench. The contaminated groundwater is removed from the aquifer through extraction wells and piped to the treatment plants. Contaminants are removed from the groundwater through GAC filtration. The treated groundwater is returned to the aquifer via infiltration trenches or reinjection wells.

- Implementation of LUCs with the performance objectives of:

    - Preventing access to, or use of, contaminated groundwater from the CS-10 plume (both off-site and on-site) until the groundwater no longer poses an unacceptable risk, and

    - Maintaining the integrity of the current or future remedial or monitoring system such as the treatment systems and monitoring wells.

- Chemical and hydraulic monitoring of the plume under the System Performance and Ecological Impact Monitoring (SPEIM) program, as long as active remediation continues, and chemical monitoring of the plume until the RAOs are met.

- Completion of CERCLA reviews every five years throughout the lifetime of the remedial action.

Since the groundwater remedy was selected in 2009, the following changes have occurred:

- The 2011 ESD for the IRP groundwater plumes (AFCEE, 2011a) clarified the inclusion of MNA as a component of the selected remedy for CS-10, slightly modified the phrasing of the RAOs, and added text regarding the MMR three-step process to achieve site closure.
- A data gap investigation completed in 2012 identified previously uncharacterized TCE contamination in the IP area at higher concentrations and deeper in the aquifer where hydraulic conductivities are lower than previously assumed at the time of remedy selection. This contamination is located outside the capture zone for the existing remedial system and increases the predicted aquifer restoration timeframe presented in the ROD, from 2094 to greater than 2113 (AFCEC, 2013d). In response, an optimization evaluation was completed and the selected scenario (optimized Scenario 7) reduces the predicted aquifer restoration timeframe to 2060 (AFCEC, 2014). This optimized scenario is scheduled to be implemented in May 2014.

3.0 BASIS FOR THE DOCUMENT

Data gap investigation activities were completed between 2008 and 2012 to further assess the extent of contamination in the IP and Sandwich Road areas. Significant updates were made to the CSM related to the nature and extent of previously uncharacterized TCE contamination in the CS-10 plume and the TCE plume shell and groundwater flow model were revised to more accurately represent hydrogeologic conditions and contaminant distribution at CS 10 (AFCEC, 2013d). The updated 2012 CS-10 groundwater flow model and 2012 TCE plume shell were used to evaluate optimized operating scenarios for the CS-10 IP remedial system and the CS-10 Sandwich Road extraction fence to improve plume capture and reduce aquifer restoration timeframe compared to current operating conditions. Aquifer restoration timeframe was significantly reduced under the selected optimized scenario, optimized Scenario 7, (2060) compared to current operating conditions (>2113), and compared to operating conditions for the selected remedy in the ROD, Alternative 10, which used the previous, 2007 version of the TCE plume shell (2094) (AFCEC, 2014 and 2013b). This optimized scenario includes two new extraction wells (03EW2113 and 03EW2114), two new reinjection wells (03RI2113 and 03RI2114), an MTU, and modified flow rates and effective screen intervals at selected existing wells. This optimization is scheduled to be implemented in May 2014 (AFCEC, 2014).

This ESD documents changes to the CS-10 plume CSM, amends the estimate of aquifer restoration timeframe, and modifies the remedy presented in the ROD. There is no fundamental change to the groundwater remedy that was identified in the CS-10 ROD, which is continued operation of the (expanded) CS-10 remedial systems with long term monitoring (LTM) and LUCs (AFCEE, 2009a), but the remedial system is being modified to more aggressively remove contaminants from the aquifer to shorten aquifer restoration timeframe.

The remedy presented in the ROD leaves open the possibility of modifying the treatment system to optimize the efficiency of the systems and the aquifer restoration timeframe.

4.0 DESCRIPTION OF SIGNIFICANT DIFFERENCES AND EXPECTED OUTCOMES

This section describes the changes to the CSM related to the nature and extent of previously uncharacterized TCE contamination in the CS-10 plume, presents the modified remedial system based on an optimization evaluation, and updates the prediction for aquifer restoration timeframe that was originally presented in the CS-10 ROD (AFCEE, 2009a).

The 2007 groundwater flow model and 2007 TCE plume shell were used to evaluate alternatives in the feasibility study (AFCEE, 2008b) and Alternative 10 was the selected alternative presented in the CS-10 ROD (AFCEE, 2009a). Fate and transport modeling completed in support of remedy selection indicated that remedial system shutdown would occur by approximately 2055 and aquifer restoration would be achieved by approximately 2094 in a scenario where Alterative 10 operating conditions ran for the duration of the simulation (AFCEE, 2009a).

4.1 SIGNIFICANT DIFFERENCES FROM THE SELECTED REMEDIES

The JBCC SPEIM program was developed to monitor plume changes and to ensure the effective operation of the AFCEC groundwater remediation systems at the JBCC. Performance monitoring data collected under the CS-10 SPEIM/LTM program indicated the potential for optimization of the IP extraction wells but additional data were needed to evaluate optimized operational scenarios. In addition, TCE concentrations exceeding the MCL of 5 µg/L were detected in offline Sandwich Road extraction well 03EW2177. Based on a review of these data, a data gap investigation was completed at CS-10 to: (1) address data gaps associated with the nature and extent of contamination in the CS-10 IP area (north of the southern trench and 03EW2109) and the CS-10 Sandwich Road area (in the vicinity of 03EW2176 and 03EW2177), (2) update the CS-10 TCE and PCE plume shells, (3) update the CS-10 groundwater flow model to more accurately represent hydrogeologic conditions at CS-10, and (4) predict future contaminant migration under current CS-10 remedial system operating conditions using the updated groundwater model and plume shells. The results of this data gap investigation were presented in the

Final CS-10 2012 Data Gap Investigation Technical Memorandum which was submitted in January 2013 (AFCEC, 2013d).

Changes to the CS-10 CSM based on the data gap investigation included a more thorough understanding of the nature and extent of contamination in the IP and Sandwich Road areas. The CS-10 2012 plume boundary was extended approximately 1,200 feet (ft) to the north, 1,500 ft to the east, and 800 ft to the west to encompass recently delineated contamination located outside the previous plume boundary (**Figure 4-1**). TCE contamination was also detected to the east of the Sandwich Road lobe, in the vicinity of extraction wells, 03EW2176 and 03EW2177. This eastern Sandwich Road lobe is approximately 1,250 ft long and 550 ft wide (**Figure 4-1**). The volume of TCE contamination in the CS-10 2012 TCE plume shell, based on the 2012 characterization, is 6,042 million gallons, which is approximately thirty-six percent greater than the volume of the 2007 plume shell that was used to support remedy selection (AFCEC, 2009).

In addition to the increase in the extent of TCE contamination in the CS-10 plume, the data gap investigation identified higher TCE concentrations within the plume boundary and contamination that was located deeper in the aquifer, outside the existing remedial system capture zone. **Figure 4-2** presents a comparison of the 2007 and 2012 TCE plume shells and illustrates the difference in the TCE concentration ranges and distribution of contaminant mass before and after the data gap investigation in the main body (north of Ashumet Pond) of the CS 10 plume. The highest TCE concentrations, up to 3,880 µg/L, are located to the north and upgradient of 03EW2102. Contamination in this area is up to 180 ft thick and extends over 2,500 ft in length. Several distinct high TCE concentration lobes have also been delineated north and/or upgradient of extraction wells 03EW2103, 03EW2104, 03EW2105, and 03EW2110. There are 2,270 lbs of dissolved phase TCE mass in the 2012 TCE plume shell, which is approximately 103 percent more mass than what was identified at the time of remedy selection using the 2007 TCE plume shell. The highest concentration in the 2007 TCE plume shell was 450 µg/L and the highest concentration in the 2012 TCE plume shell was 3,880 µg/L.

Significant updates were also made to the 2007 groundwater flow model to more accurately represent hydrogeologic conditions including groundwater flow at CS-10 (AFCEC, 2013d). In the 2012 groundwater flow model the overall transmissivity of the simulated aquifer was reduced, particularly deeper in the aquifer. Past contaminant transport simulations show high concentration areas of the plume dissipating relatively quickly which was not considered realistic when compared to monitoring data. This may have been because many of the newly delineated fine sand lenses (with lower hydraulic conductivities) were not represented in the 2007 model. These lower hydraulic conductivity units slow down advective flow and plume migration as well as the simulated effects of hydrodynamic dispersion.

Using the CS-10 2012 TCE plume shell and the updated 2012 CS-10 groundwater flow model, transport modeling predicts that most of the TCE contamination will be contained under current operating conditions. Groundwater modeling results indicate that the newly defined eastern lobe of contamination (located near Generals Boulevard) will be contained in the future at Sandwich Road under current system operating conditions, but modeling suggests this remedial strategy would prolong the operation of the Sandwich Road remedial system up to 25 years (i.e., from 2030 to 2055). Contamination located in the vicinity of extraction wells 03EW2102, 03EW2104, and 03EW2107 persists the longest and dictates the aquifer restoration timeframe under current operating conditions (i.e., beyond 2113). TCE concentrations in this area remain above the MCL after the last extraction well is taken out of operation (estimated to be 2065) but the contamination is located deep in the aquifer and essentially attenuates in place to concentrations below the MCL over time without continued migration. Modeling completed at the time of the ROD predicted that remedial system shutdown would occur by approximately 2055 and aquifer restoration would be achieved by approximately 2094 (AFCEE, 2009a). The primary reason for the increase in the model-predicted operational timeframe (2065) and restoration timeframe (>2113) is due to a change in the CSM where previously uncharacterized TCE contamination has been identified in the IP area at higher concentrations and deeper in the aquifer where hydraulic conductivities are lower than previously depicted in the model simulations available at the time of remedy selection.

An optimization evaluation was completed for the CS-10 IP and Sandwich Road systems with the objective of reducing the system operational timeframe, the aquifer restoration timeframe, and improving plume capture by the system (AFCEC, 2013c and AFCEE, 2013). The most significant improvement in plume capture and in reducing aquifer restoration timeframe would be achieved with optimized Scenario 7 which includes: a new deep screened extraction well in the 03EW2102/03EW2104 area (03EW2113), a new reinjection well (03RI2113) to accommodate increased flow to the IP remedial system, a new extraction well in the Eastern IP lobe (03EW2114) piped to an MTU with treated water discharged using a new reinjection well (03RI2114), and modified flow rates and effective screen intervals at selected existing wells. Further delineation of contamination in the Eastern IP lobe area was needed prior to finalizing the well field design layout. The 2012 TCE plume shell data set was supplemented with this new data and the 2013 TCE plume shell was used to determine the final design (AFCEC, 2014). A comparison of the steady-state composite extent of hydraulic capture to the 2013 TCE plume shell, for the current operating condition and for optimized Scenario 7 is shown on **Figure 4-3**. The final locations for the new infrastructure included in optimized Scenario 7 are presented in **Figure 4-4**.

Aquifer restoration timeframe was significantly reduced under optimized Scenario 7 (2060) compared to current operating conditions (>2113) and compared to Alternative 10 operating conditions using the 2007 TCE plume shell (2094). This improvement in aquifer restoration timeframe was expected because remaining mass located deep in the aquifer that was outside the capture zone of the current infrastructure is captured as a result of the simulated operation of the new deep screened IP extraction well (03EW2113). Remedial system operation timeframe under optimized Scenario 7 (2055) is consistent with Alternative 10 operating conditions using the 2007 TCE plume shell (2055) and is an improvement compared to current operating conditions (2065). Installation of the Eastern IP extraction well (03EW2114) in optimized Scenario 7 significantly reduced Sandwich Road remedial system operation timeframe from 2055 under current operating conditions to 2035.

4.2 EXPECTED OUTCOMES

The purpose of this ESD is to document the changes in the CS-10 CSM, the modification of the remedy with the implementation of optimized Scenario 7 operating conditions, and the change in aquifer restoration timeframe compared to expectations at the time of remedy selection in 2009 (AFCEE, 2009a). There is no fundamental change to the groundwater remedy or to the RAOs (AFCEE, 2009a, 2011) but the remedial system is being modified to more aggressively remove contaminants from the aquifer. Since the LUCs are in place and are functioning as intended and there are no current plans to use this portion of the aquifer for water supply, the remedy remains protective (AFCEC, 2013a). Monitoring will continue under the CS-10 SPEIM/LTM program to provide the necessary data to manage potential exposure risks, determine when RAOs have been met, and to evaluate future optimization opportunities.

The estimated lifecycle cost for optimized Scenario 7 ($47.6 million) is lower than the 2012 Scenario 01 cost estimate ($52.7 million) and is also lower than the total post-ROD cost ($50.2 million) that was included in the Interim Remedial Action Report (AFCEE, 2010) for Alternative 10 operating conditions. The additional years of LTM required under 2012 Scenario 01 and Alternative 10 operating conditions result in approximately $5.6 to $7.2 million in increased lifecycle costs, which are greater than the additional costs required to install the infrastructure associated with optimized Scenario 7 and the resulting annual electrical costs to operate the two new extraction wells (AFCEC, 2014). These future lifecycle cost estimates do not include all anticipated costs to run the remedial systems (such as labor and materials for operation and maintenance, the cost of granular activated carbon, data analysis and reporting), but do, however, provide a metric to compare the relative cost to implement each scenario based primarily on electrical usage, LTM costs, and implementation costs.

The difference in the CSM, the modification of the remedy with the implementation of optimized Scenario 7 operating conditions, and the updated aquifer restoration timeframe presented in Section 3.1 of this ESD does not fundamentally alter the groundwater remedy selected in the CS-10 ROD with respect to scope, performance, or cost.

5.0 STATUTORY DETERMINATION

This ESD documents changes to the CS-10 CSM and updates the prediction for aquifer restoration timeframe at the CS-10 groundwater site from 2094 presented in the ROD (AFCEE, 2009a) to 2060 under optimized Scenario 7 operating conditions. The modified CS-10 groundwater remedy is protective of human health and the environment, complies with federal and Commonwealth of Massachusetts requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. The modified CS-10 groundwater remedy utilizes permanent solutions to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, in accordance with Section 121 of CERCLA. While the changes and clarifications contained in this ESD are significant, none of these revisions fundamentally change the CS-10 groundwater remedy with respect to scope, performance, or cost.

6.0 STATE AGENCY COMMENTS AND PUBLIC PARTICIPATION ACTIVITIES

As part of the ESD review process, the regulatory agencies (EPA and MassDEP) were given the opportunity to comment on the draft version of this ESD. Responses to the regulatory agency comments were documented in the 20 May 2014 Response to Comments Letter. The EPA and MassDEP concurred with the AFCEC's responses on 27 May 2014 and 21 May 2014, respectively.

6.1 COMMENTS FROM THE MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION

MassDEP concurrence with this ESD can be found in **Appendix A**.

6.2 PUBLIC PARTICIPATION ACTIVITIES

In accordance with Section 117(d) of CERCLA, 42 United States Code §9617(D), AFCEC will publish a notice in the Cape Cod Times, the Falmouth Enterprise, and the Mashpee Enterprise that describes this ESD and its availability in the Administrative Record. In accordance with 40 CFR Section 300.435(c)(2)(i) and 300.825(a)(2), this ESD and all documents that support the changes and clarifications are contained in the Administrative Record for the IRP at JBCC.

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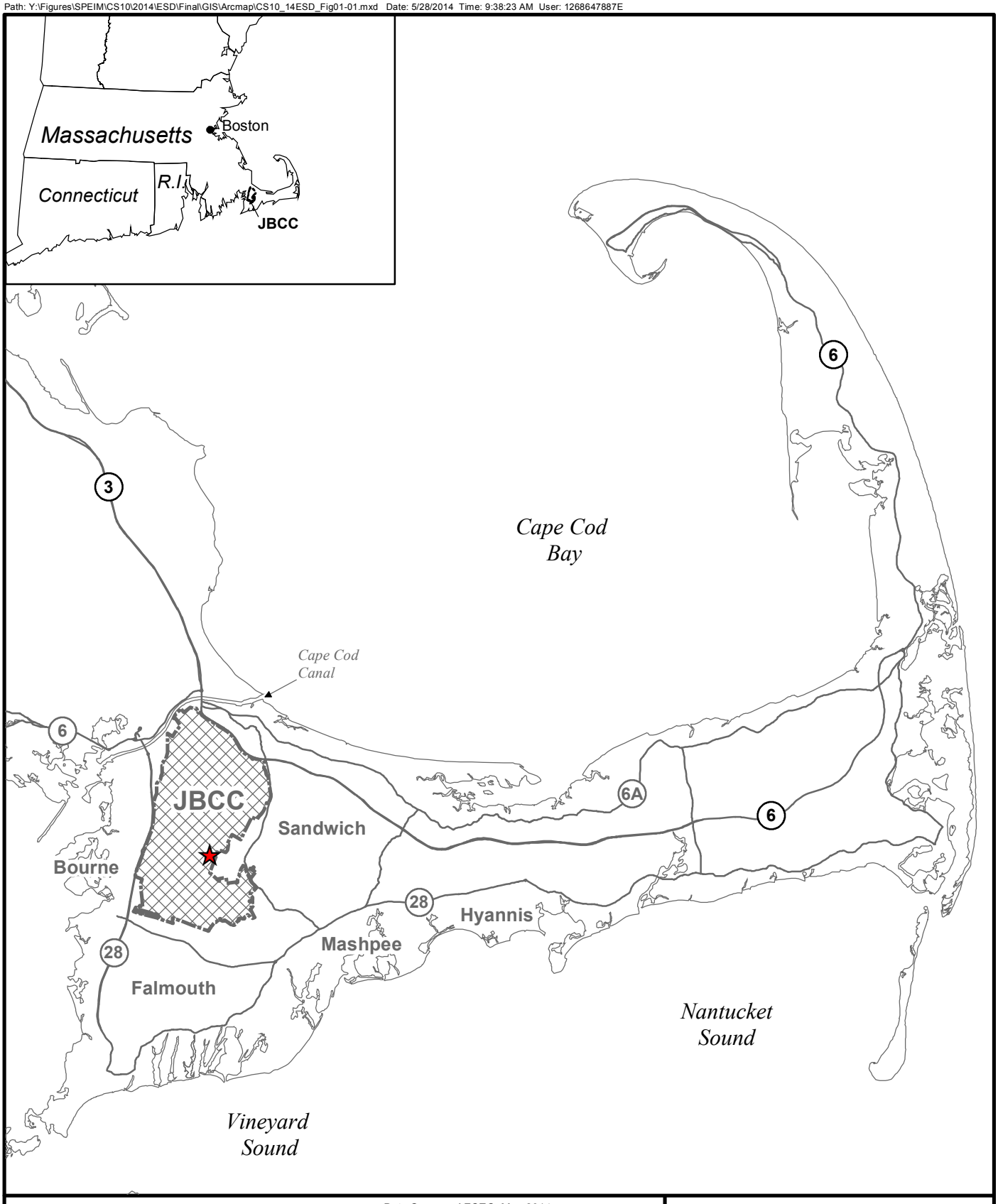
FIGURES



Legend

Joint Base Cape Cod

CS-10 Source Area

Data Source: AFCEC, May 2014

0 3 6 Miles

FIGURE 1-1

JOINT BASE CAPE COD, MASSACHUSETTS

AFCEC - Joint Base Cape Cod

Final Chemical Spill-10 Groundwater Explanation of Significant Differences

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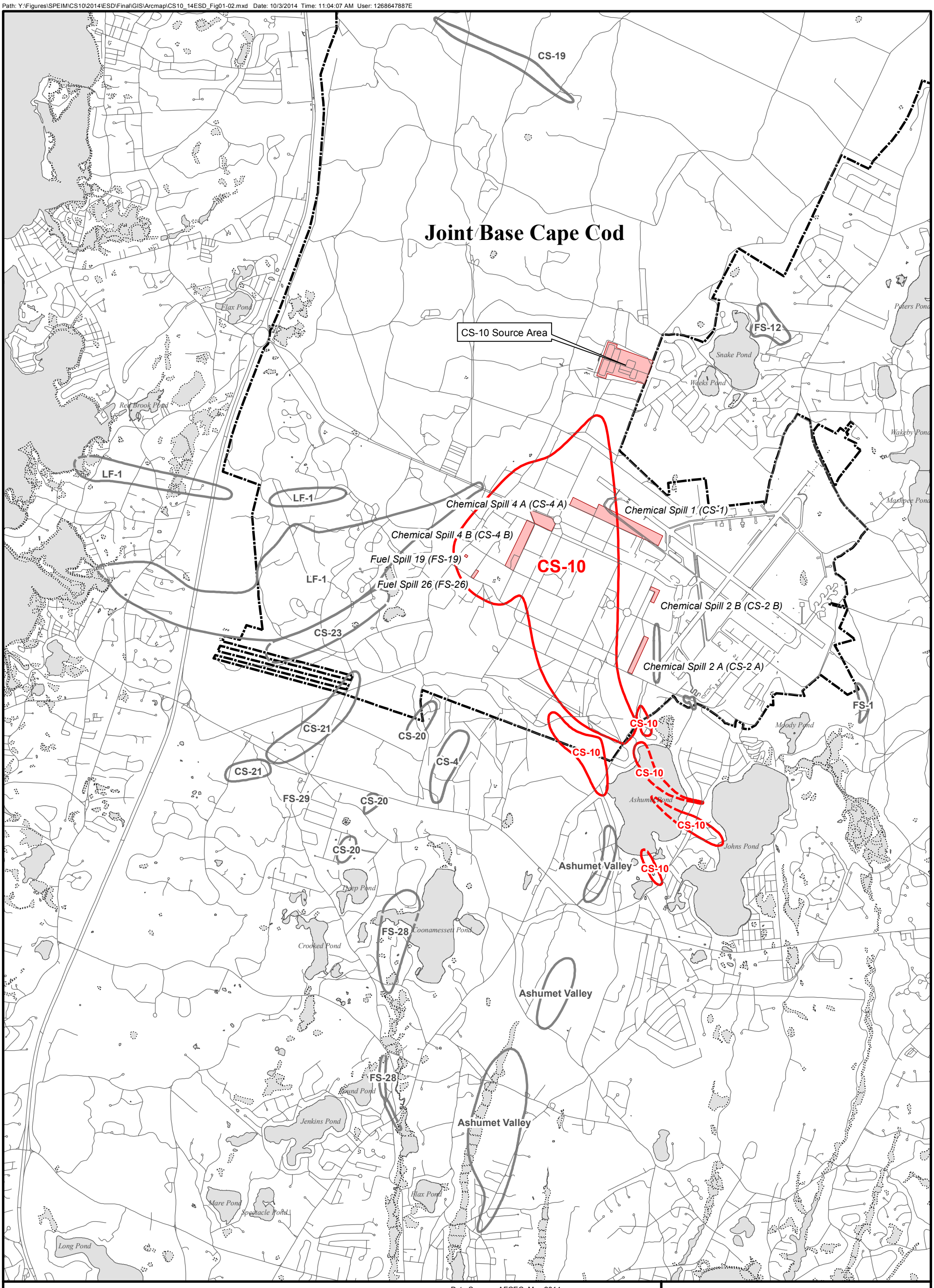

Legend

- Joint Base Cape Cod Boundary
- Other AFCEC Current Plume Boundary (Dashed Where Inferred)
- CS-10 Plume Boundary
- Bog/Wetland
- Source Area

Data Source: AFCEC, May 2014
JBCC Boundary from Massachusetts Air National Guard 2011

0 1,900 3,800 Feet

FIGURE 1-2

JBCC IRP PLUMES AND CS-10 PLUME BOUNDARY

AFCEC - Joint Base Cape Cod

Final Chemical Spill-10 Groundwater Explanation of Significant Differences

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Snake Pond
Weeks Pond
Snake Pond Road
Greenway Road
Trowbridge Road
Connery Avenue
Sandwich
Bourne
CS-10/FS-24 Source Area (BOMARC/UTES)
CS-10 In-Plume Treatment Facility
03EW2110
03EW2102
03EW2104
03EW2105
03EW2106
03EW2107
Osborn Pond
Edmunds Pond
CS-10
03EW2103
Joint Base Cape Cod
28RIW0005
28RIW0006
28RIW0007
28RIW0008
Sandwich Road Treatment Facility
03EW2109
03EW2111
03RI2112
JBCC Boundary
CS-10
CS-10
28RIW0001
28RIW0002
28RIW0003
28RIW0004
Moody Pond
Southern Trench Lobe
Falmouth
Northern Lobe
Ashumet Pond
00EW0001
Sandwich Road Extraction Fence (03EW2170 - 03EW2177 and 03RI2180 - 03RI2185)
Northern Lobe Extraction Well
03EW2112
Route 151
81RIW0004
North Central Lobe
Plume Flows Under Pond
Johns Pond
Southern Lobe
Mashpee
Mashpee Public Water Supply Well
N
0
1,400
2,800
Feet

Data Source: AFCEC, May 2014

Legend

- CS-10 Plume Boundary = Concentrations exceeding drinking water standards or Maximum Contaminant Level (MCL), dashed where inferred. Represents an exceedance of trichloroethene (TCE) and/or tetrachloroethene (PCE). (TCE MCL = 5 µg/L) (PCE MCL = 5 µg/L)
- Joint Base Cape Cod Boundary
- Town Boundary
- Treatment System Piping
- Infiltration Trench
- Public Water Supply Well
- Extraction Well (On)
- Extraction Well (Off)
- Reinjection Well (On)
- Reinjection Well (Off)
- Treatment Facility
- Source Area

FIGURE 2-1

CS-10 GROUNDWATER PLUME AND TREATMENT SYSTEMS

AFCEC - Joint Base Cape Cod

Final Chemical Spill-10 Groundwater Explanation of Significant Differences

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Legend

- Soil Vapor Extraction Well
- Direct Push Location
- Joint Base Cape Cod
- Soil Vapor Extraction System Pipeline
- Source Area
- Source Area Detail
- Soil Vapor Extraction System Treatment Facility

N

0 125 250

Feet

Data Source:
AFCEC, May 2014
JBCC Boundary from Massachusetts Air National Guard 2011
2009 Aerial Photography from MassGIS

FIGURE 2-2

CS-10/FS-24 SOURCE AREA

AFCEC - Joint Base Cape Cod

Final Chemical Spill-10 Groundwater Explanation of Significant Differences

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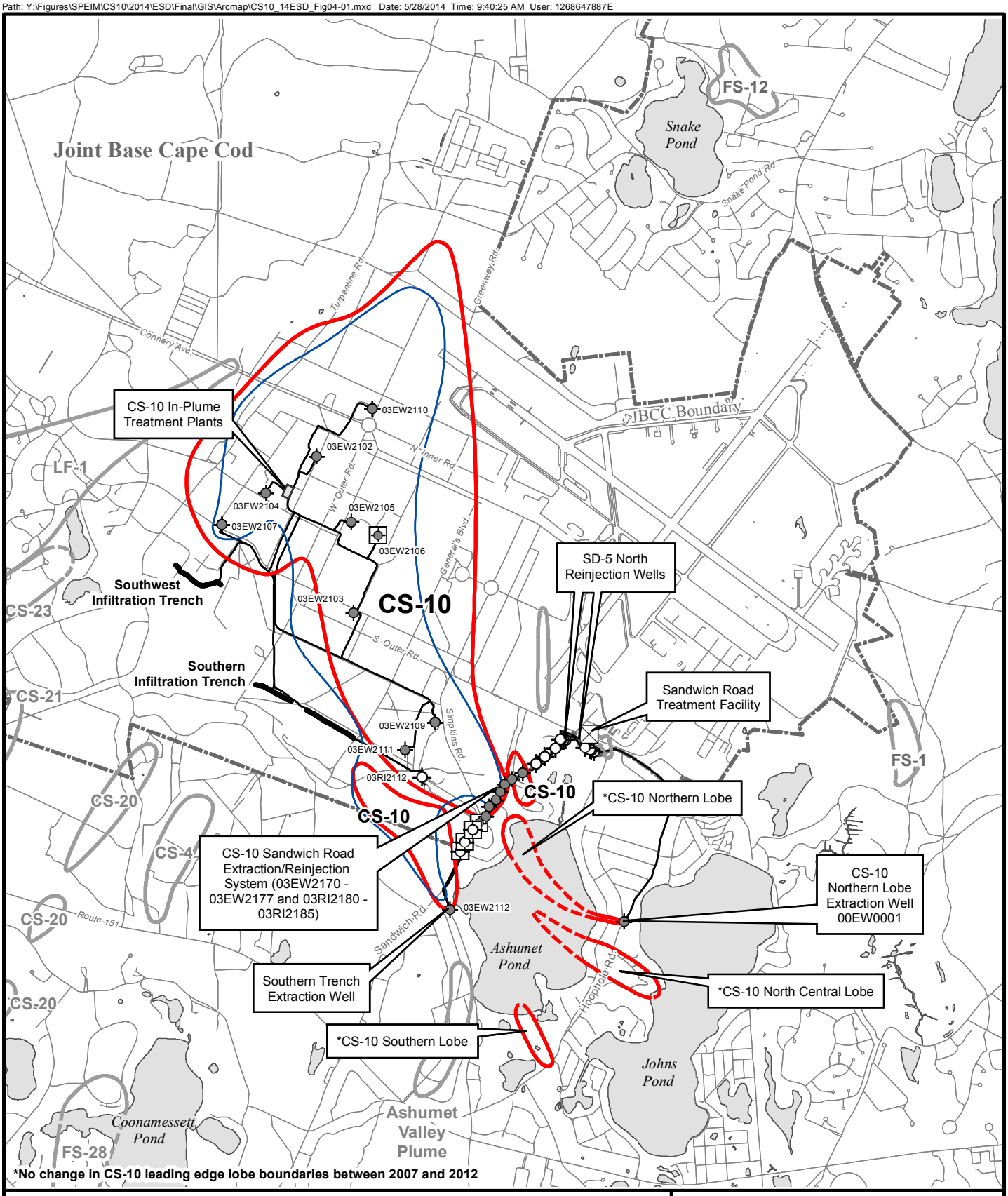

Legend

- 2012 CS-10 Plume Boundary (Dashed Where Inferred)
- 2007 CS-10 Plume Boundary (Dashed Where Inferred)
- Other Plume Boundary (Dashed Where Inferred)
- Joint Base Cape Cod Boundary
- Treatment System Piping
- Infiltration Trench
- Extraction Well (On)
- Extraction Well (Off)
- Reinjection Well (On)
- Reinjection Well (Off)
- Treatment Facility

Data Source: AFCEC, May 2014
JBCC Boundary from Massachusetts Air National Guard 2011

0 1,700 3,400 Feet

FIGURE 4-1

COMPARISON OF CS-10 2007 AND 2012 PLUME BOUNDARIES

AFCEC - Joint Base Cape Cod
Final Chemical Spill-10 Groundwater Explanation of Significant Differences

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2007

2012

03EW2110
03EW2102
03EW2104
03EW2105
03EW2106
03EW2107
03EW2103
03EW2109
03EW2111
03EW2176
03EW2174
03EW2177
03EW2175
03EW2172
03EW2173
03EW2171
03EW2170
03EW2112
00EW0001

Osborn Pond
Edmunds Pond
Ashumet Pond
Johns Pond
Flint Pond

Legend

- Joint Base Cape Cod Boundary
- Plume Boundary (Dashed Where Inferred)
- Infiltration Trench/Gallery
- Treatment System Pipeline
- Bog/Wetland
- Treatment Facility
- Extraction Well (On)
- Reinjection Well (On)
- Extraction Well (Off)
- Reinjection Well (Off)

TCE Plume Shell

- 5 ≤ TCE < 25 µg/L
- 25 ≤ TCE < 50 µg/L
- 50 ≤ TCE < 100 µg/L
- 100 ≤ TCE < 300 µg/L
- TCE ≥ 300 µg/L*

*Maximum TCE concentration in the 2007 TCE plume shell dataset is 450 µg/L at 03MW1024D
Maximum TCE concentration in the 2012 TCE plume shell dataset is 3880 µg/L at 03MW1069A

Data Source: AFCEC, May 2014
JBCC Boundary from Massachusetts Air National Guard 2011

N

0 1,000 2,000 Feet

FIGURE 4-2

COMPARISON OF CS-10 2007 AND 2012 TCE PLUME SHELLS

AFCEC - Joint Base Cape Cod
Final Chemical Spill-10 Groundwater Explanation of Significant Differences

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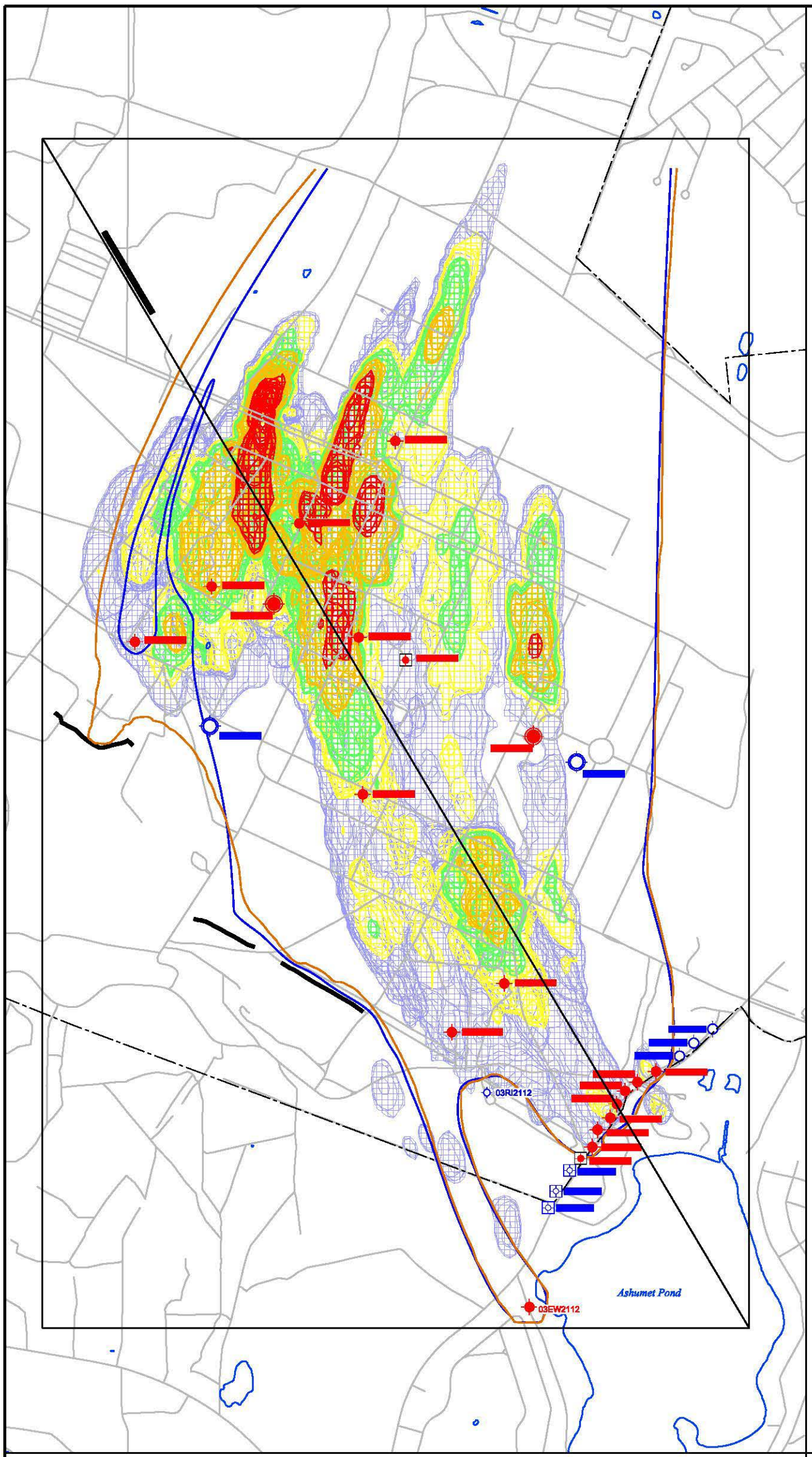
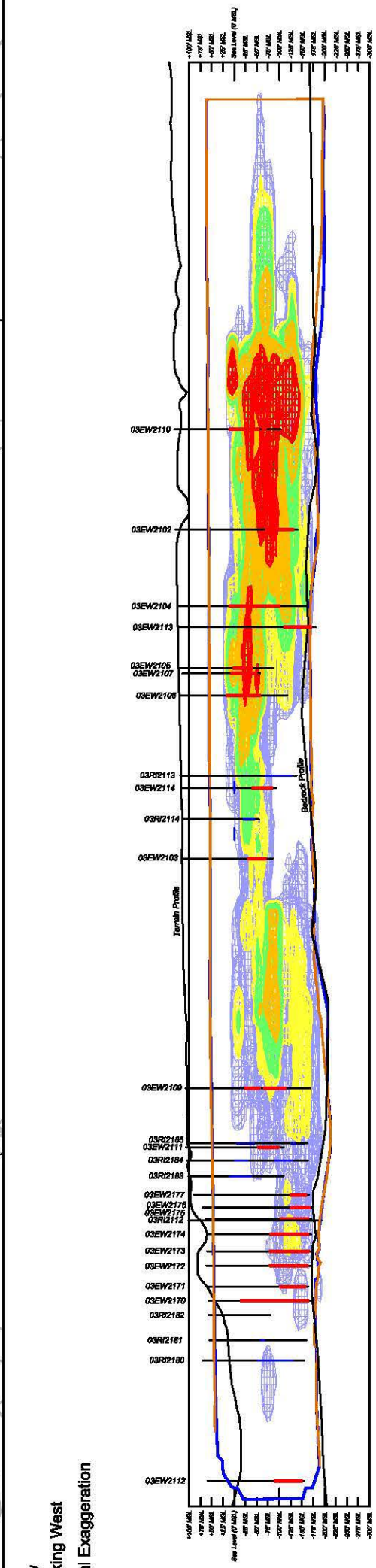


Front View
South Looking North
5x Vertical Exaggeration



Side View
East Looking West
5x Vertical Exaggeration

2013 TCE Plume Shell:

- 5 ≤ TCE < 25 µg/L
- 25 ≤ TCE < 50 µg/L
- 50 ≤ TCE < 100 µg/L
- 100 ≤ TCE < 300 µg/L
- TCE ≥ 300

*Maximum TCE Concentration in the TCE plume shell dataset is 3880 µg/L at 03MW1069A

Legend

- Extraction Well (On)
- Extraction Well (Off)
- Extraction Well (Proposed)
- Reinjection Well (On)
- Reinjection Well (Off)
- Reinjection Well (Proposed)
- Infiltration Trench

Extent of Model-Predicted Capture Zones

- Current Operating Conditions (2012 Scenario 01)
- Scenario 7 Operating Conditions

0 1600 Feet

Data Source: AFCEC, May 2014

FIGURE 4-3

CS-10 2013 TCE PLUME SHELL AND MODEL-PREDICTED EXTENT OF CAPTURE ZONES

AFCEC - Joint Base Cape Cod

Final Chemical Spill-10 Groundwater Explanation of Significant Differences

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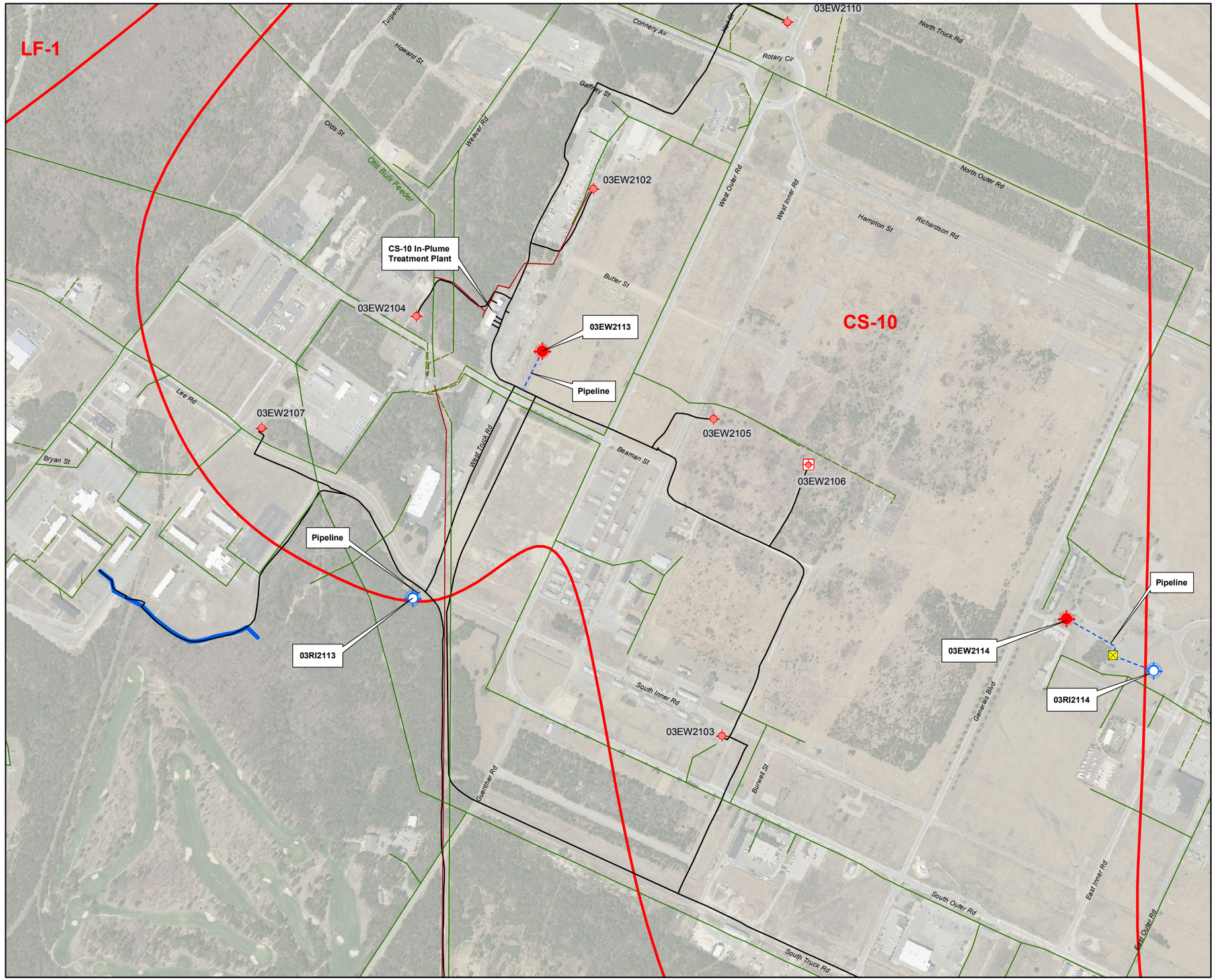

Legend

- Plume Boundary (Dashed Where Inferred)
- Treatment System Pipeline
- Treatment System Pipeline (Proposed)
- Base CE Electric Line (Above Ground)
- Base CE Electric Line (Below Ground)
- NSTAR Electric Line (Above Ground)
- NSTAR Electric Line (Below Ground)
- Infiltration Trench
- Extraction Well (On)
- Extraction Well (Off)
- Mobile Treatment Unit
- Proposed Extraction Well
- Proposed Reinjection Well

The bulk feeder is owned by the 102nd IW (Otis ANG Base) but the supplied electricity is metered by NSTAR

N

0 330 660

Feet

Data Source:
AFCEC, May 2014
2009 Aerial Photography from MassGIS
Electric Utility Data from 102IW MA ANG

FIGURE 4-4

CONCEPTUAL LAYOUT FOR OPTIMIZED SCENARIO 7

AFCEC - Joint Base Cape Cod

Final Chemical Spill-10 Groundwater Explanation of Significant Differences

CH2MHILL

APPENDIX A

MassDEP Concurrence Letter

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

One Winter Street Boston, MA 02108 • 617-292-5500

DEVAL L. PATRICK
Governor

MAEVE VALLELY BARTLETT
Secretary

DAVID W. CASH
Commissioner

September 30, 2014

James T. Owens III, Director
Office of Site Remediation and Restoration
U.S. Environmental Protection Agency, Region I
5 Post Office Square Suite 100
Boston, MA 02109-3912

RE: **BOURNE**
Release Tracking Number: 4-0000037
Joint Base Cape Cod (JBCC)
Final Chemical Spill-10 Groundwater Explanation of Significant Differences,
Concurrence

Dear Mr. Owens:

The Massachusetts Department of Environmental Protection (MassDEP) has reviewed the document entitled **"Final Chemical Spill-10 Groundwater Explanation of Significant Differences"** (ESD), dated August 2014. The ESD was prepared by CH2M Hill for the Air Force Civil Engineer Center (AFCEC) Installation Restoration Program (IRP) at the Joint Base Cape Cod (JBCC), formerly the Massachusetts Military Reservation (MMR). The ESD was completed to update the Chemical Spill-10 (CS-10) groundwater conceptual site model (CSM), modify the selected remedy for CS-10 groundwater described in the 2009 CS-10 Record of Decision (CS-10 ROD), and amend the estimated aquifer restoration timeframe presented in the CS-10 ROD.

Recent data gap investigations for the CS-10 groundwater plume identified areas of trichloroethylene (TCE) contamination in the aquifer associated with the CS-10 plume that were previously uncharacterized. This necessitated updating the CS-10 CSM and the predicted aquifer restoration timeframe. The discovery of areas of previously uncharacterized TCE contamination resulted in an increase of the estimated aquifer restoration timeframe presented in the ROD from 2094 to greater than 2113 under existing operational conditions. The AFCEC installed two new extraction wells and two reinjection wells, and made operational modifications to the existing CS-10 extraction, treatment and infiltration system to optimize system performance and remove contaminants from the aquifer in a manner that reduces the estimated aquifer restoration timeframe to 2060.

MassDEP concurs with the ESD. The ESD does not fundamentally change the groundwater remedy identified in the CS-10 ROD, which is continued operation of the (expanded) CS-10 groundwater remedial systems with long term monitoring (LTM) and land use controls (LUCs), and does not fundamentally alter the groundwater remedy selected in the CS-10 ROD with respect to scope, performance, or cost. However, the remedial system has been modified to more aggressively remove contaminants from the aquifer to significantly shorten the aquifer remediation timeframe and allows for

the possibility of modifying the treatment system in the future to optimize the efficiency of the systems and aquifer restoration timeframe. The ESD modified groundwater remedy is protective of human health and the environment and complies with Commonwealth of Massachusetts requirements that are legally applicable or relevant and appropriate to the remedial action.

MassDEP's concurrence with the ESD is based upon representations made to MassDEP by the AFCEC and assumes that all information provided is substantially complete and accurate. Without limitation, if MassDEP determines that any material omissions or misstatements exist, if new information becomes available, if land-use controls (LUCs) are not properly implemented, monitored and/or maintained or if conditions within any of the IRP groundwater plumes change, resulting in potential or actual human exposure or threats to the environment, MassDEP reserves its authority under M.G.L. c. 21E, CERCLA, the MCP, the NCP and any other applicable law or regulation to require further response actions including, without limitation, additional investigation, remedial measures, and the implementation of LUCs. MassDEP will review relevant information as it becomes available, including, without limitation, new regulatory requirements or changes in the environmental conditions, to determine if additional investigative and/or remedial measures are necessary for the protection of public health, safety, welfare or the environment.

Please incorporate this letter into the Administrative Record for Chemical Spill-10 groundwater. If you have any questions regarding this matter, please contact Leonard J. Pinaud, Chief, State & Federal Site Management, Bureau of Waste Site Cleanup, in the MassDEP's Southeast Regional Office at (508) 946-2871 or Millie Garcia-Serrano, Deputy Regional Director for the Bureau of Waste Site Cleanup in the MassDEP's Southeast Regional Office at (508) 946-2727.

Sincerely,

Benjamin Ericson
Assistant Commissioner
Bureau of Waste Site Cleanup

BE/lp

File : 4-0000037 CS-10 ESD Concurrence Letter 09-2014

Ec: Gary Moran, Deputy Commissioner
Philip Weinberg, Regional Director
Millie Garcia-Serrano, Deputy Regional Director
Leonard J. Pinaud, Chief, State & Federal Site Management
Dawn Stolfi Stalenhoef, Chief Regional Counsel
Mark Begley, Environmental Management Commission
MassDEP Southeast Region
MMR Plume Cleanup Team
Upper Cape Boards of Selectmen
Upper Cape Boards of Health
Lara Goodine [RAONR ADQREG]