

EXPLANATION OF SIGNIFICANT DIFFERENCES

ZONE 3: SITE 49 (SS049)

FORMER PEASE AIR FORCE BASE PORTSMOUTH, NEW HAMPSHIRE

INTRODUCTION AND STATEMENT OF PURPOSE

This Explanation of Significant Differences (ESD) identifies the rationale behind implementation of a supplemental remedial action to the existing corrective measures in place for Site 49, located in Zone 3, for contaminated groundwater at the former Pease Air Force Base (AFB) National Priorities List site in Portsmouth, New Hampshire. The Air Force proposes this supplement to the current remedial action in order to accelerate the existing biological and chemical processes responsible for reducing the contaminants at the site. The supplemental remedial action described herein (in-situ enhanced bioremediation [ISEB]) is designed to work in conjunction with the existing permeable reactive barrier (PRB) to shorten the duration of remediation activities at Site 49.

The United States (U.S.) Air Force is the lead agency, with oversight from the U.S. Environmental Protection Agency (EPA) and the New Hampshire Department of Environmental Services (NHDES), for cleanup of sites at the former Pease AFB under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as modified by the Superfund Amendments and Reauthorization Act. The U.S. Air Force is issuing this ESD as part of the public participation requirements under Section 117(c) of CERCLA (42 USC §9617(c)), Section 300.435(c)(2)(i) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and the U.S. Air Force Installation Restoration Program (IRP). In accordance with Section 300.825(a)(2)

of the NCP, this ESD will become part of the administrative record for the facility. The administrative record also contains background information that was used to determine the original remedy, as documented in the December 2003 Record of Decision (ROD) Amendment (MWH Americas, Inc. [MWH], 2003). The administrative record for the former Pease AFB is available for review at the following location:

Shaw Environmental & Infrastructure, Inc.
(A CB&I Company)
20 Short Street
Portsmouth, New Hampshire
(603) 334-6430
Hours: 8:00 a.m. to 4:00 p.m.
Monday through Friday
And online at:

<http://afcec.publicadmin-record.us.af.mil/>

In addition, a notice that briefly summarizes this ESD will be published in the *Fosters Daily Democrat*, in the *Portsmouth Herald*, and at SeacoastOnline.com.

This ESD documents the rationale behind the implementation of anaerobic in situ enhanced bioremediation (ISEB) technology as a supplemental remedial action to the zerovalent iron (ZVI) PRB in place at Site 49.

SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

Site Description and History

The former Pease AFB is located in southeastern New Hampshire and is within the city of Portsmouth and the town of Newington. The

former Pease AFB is located on a peninsula bounded by the Great Bay to the west and southwest, by the Little Bay on the northwest, and by the Piscataqua River on the north and northeast (**Figure 1**). The former Pease AFB comprises 4,365 acres located in the center of the peninsula.

In 1951, the U.S. Air Force took possession of an airport located at the former Pease AFB location, and construction of the facility was completed in 1956. The former Pease AFB was historically used by the U.S. Air Force to maintain a combat-ready force capable of long-range bombardment operations. Various quantities of fuels, oils, lubricants, solvents, and protective coatings were used to support the missions; as a result, contaminants from those substances were released into the environment. At Site 49 in Groundwater Management Zone 3, hazardous substances entered the environment through the use of trichloroethene (TCE) and tetrachloroethene (PCE) as solvents and degreasers at Building 22.

Under the U.S. Department of Defense's IRP, the U.S. Air Force initiated activities to identify, evaluate, and remediate sites contaminated with hazardous substances. Because of the contamination discovered under the IRP, the former Pease AFB was placed on the National Priorities List in 1990, and the U.S. Air Force, EPA, and NHDES agreed to remediate it in accordance with the Federal Facility Agreement (FFA) signed in 1991 (EPA and U.S. Air Force, 1991). Following the signing of the FFA, the former Pease AFB was placed on the Base Closure List by the U.S. Congress and was closed in March 1991.

Site 49 is located in the eastern portion of the former Pease AFB at the intersection of Pease Boulevard and International Drive (**Figure 2**) and is approximately 5 acres in size. Previous activities resulting in the release of hazardous materials include the use of solvents and degreasers.

Site 49—Basis for the Document

The 2012 annual sampling event identified that the TCE plume boundary was located southeast of former Building 22 and extended to International Drive (**Figure 3**). The data also indicate that part of the TCE plume is passing through and around the south side of the PRB; however, natural attenuation processes appear to be addressing this portion of the downgradient area of the plume (URS, 2010b).

Groundwater monitoring conducted in accordance with the performance and long term monitoring (P<M) plan (URS, 2010a) indicates that contaminants are bypassing the PRB both horizontally around the southern end of the PRB and vertically through the fractured shallow bedrock (SBR). The TCE contamination bypassing the ZVI PRB vertically through the SBR is found almost exclusively within the deep overburden (DOB) and fractured SBR horizons (URS, 2010a).

The highest concentrations of TCE found in the DOB (87 ug/l) and fractured SBR (780 ug/l) were located in the immediate vicinity of the PRB, where concentrations did not decrease over the first 10 years of monitoring. These concentrations are compared to the New Hampshire Ambient Groundwater Quality Standards (NHAGQS) of 5 µg/l for TCE. Downgradient concentrations have been slowly trending downward, confirming that the combined effect of the PRB, natural processes and slow groundwater velocities through the treatment area are effectively keeping the contaminants from moving away from the site. However, TCE is still present above the Maximum Contaminant Levels and NHAGQS as far as 450 feet downgradient of the PRB (Well 49-5567D at 7.6 µg/l TCE and 49-5970D at 2.2 µg/l vinyl chloride) (Shaw Environmental & Infrastructure, Inc. [Shaw], 2013a, 2013b).

Site 49—Description of Significant Differences

The U.S. Air Force proposes to accelerate the Site 49 site cleanup time frame by supplementing the existing PRB remedy with the implementation of an anaerobic ISEB remedy. Anaerobic ISEB entails the addition of

electron donors (i.e., carbon source) and an anaerobic bioaugmentation culture within the subsurface to stimulate and enhance the biodegradation of TCE and its degradation products. The implementation of the anaerobic ISEB is designed to complement and enhance the PRB performance and MNA at the site. The ultimate goal in the implementation of anaerobic ISEB is to significantly decrease the time required to meet the groundwater contaminant concentrations specified in Section 3.2.1 – Groundwater Restoration Goals of the 2003 Zone 3 ROD Amendment. For Site 49, the carbon source and bioaugmentation culture will be mixed and into a solution and injected directly in to the DOB and SBR zones. Application of the supplemental anaerobic ISEB remedy is anticipated to reduce the remediation time frame to approximately seven (7) years once implemented. **Table 1** includes a timetable comparison between the existing remedy and the supplemental remedial action.

Table 1

	Estimated Time Until Restoration Goals Are Met	
Existing PRB/MNA	30 years from implementation	~ 2030
Anaerobic ISEB Enhancement	7 years from implementation	~2020

*ISEB denotes in situ enhanced bioremediation
MNA denotes monitored natural attenuation
PRB denotes permeable reactive barrier*

During the injection, emulsified vegetable oil (EVO) will be used to provide a long-lasting carbon source, and Shaw’s Dechlorinating Consortium (SDC-9) will be used as the bioaugmentation culture to increase the degradation rate of the chlorinated VOCs. The ISEB injection is designed to optimize the distribution of EVO and SDC-9 within the DOB and fractured SBR units in the area immediately surrounding the PRB and at select upgradient and downgradient locations where high TCE

concentrations persist in groundwater in the DOB and SBR units. Concurrent with anaerobic ISEB injection operations, the U.S. Air Force will implement additional soil and groundwater contamination characterization studies upgradient of the Site 49 PRB. Ongoing LTM groundwater monitoring to assess the performance of the PRB remedy supports the original U.S. Air Force Site 49 conceptual site model that residual source(s) of contamination likely existed in the subsurface after VOC-contaminated soil was excavated by the Air Force and disposed of off-base as part of early clean up actions in 1997. Upon completion of the source area characterization studies, the U.S. Air Force will develop and implement additional remedial approaches that adequately address these source areas in order to achieve the projected 7- year remediation time-frame.

The spacing between injection points of 15 feet is based on a 7.5-foot radius-of-influence (**Figure 3**). The injection grid was designed with a tight injection pattern to take into account the dense soils at the site and to ensure an even distribution and coverage of the anaerobic ISEB solution within the treatment zone. The injection pattern will span across the areas known to contain chlorinated VOCs, namely TCE, in the DOB and fractured SBR interface.

The annual sampling event conducted in the fall of 2013 (data pending as of this document) will provide the baseline data for the ISEB application, and postinjection performance monitoring sampling will occur approximately 6 months later.

The Zone 3 ROD Amendment (Section 3.2.1) established restoration goals for Site 49 to be achieved through in situ treatment by the ZVI PRB, monitored natural attenuation, and P<M.

Groundwater monitoring conducted to date has identified that a portion of the TCE plume is bypassing the existing corrective measures (PRB) in place at limited locations at Site 49. The addition of anaerobic ISEB as an optimization to the existing remedy will address contaminants bypassing the stationary PRB and

speed the natural attenuation of the TCE plume upgradient and downgradient of the PRB.

As a result, this ESD for Site 49 proposes to add anaerobic ISEB as a supplemental remedial action to eliminate the residual TCE within the DOB and SBR horizons.

SUPPORT AGENCY COMMENTS

As part of the Pease Base Realignment and Closure Cleanup Team, EPA and NHDES representatives have had ongoing involvement in the decision-making process associated with the changes in the Site 49 remedies. The U.S. Air Force has obtained concurrence from the EPA and NHDES on the modification to the cleanup approach and the approach to enhance the existing remedy is protective of human health and the environment.

STATUTORY DETERMINATIONS

The proposed change to the selected remedy will continue to satisfy the statutory requirements of CERCLA, Section 121.

The U.S. Air Force estimates the accelerated site closure will save \$300,000 in long-term monitoring costs by shortening the life span of the remedial action.

PUBLIC PARTICIPATION

Public participation requirements as outlined in the NCP, Section 300.435(c)(2)(i), have been met.

FOR MORE INFORMATION

If you have questions or would like further information about this ESD for Site 49 at the former Pease AFB, please contact:

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Limestone, Maine 04750
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Peter.Forbes@us.af.mil

DECLARATION

The issuance of the ESD for Site 49 at the former Pease AFB is approved by:

Department of the Air Force



Connie M. Lotfi, GS-15, DAF Date
Deputy Director, Installations Directorate
Air Force Civil Engineer Center

U.S. Environmental Protection Agency



James T. Owens, III Date
Director, Office of Site Remediation and Restoration
U.S. EPA Region 1

REFERENCES

U.S. Environmental Protection Agency (EPA) and U.S. Air Force, 1991. *Federal Facility Agreement under CERCLA Section 120*, April. [AR 930]

[AR #] indicates the record identifier in the online administrative record file available at <http://afrpaar.lackland.af.mil/ar/>

MWH Americas, Inc. (MWH), 2003. *Zone 3 Record of Decision Amendment, Former Pease Air Force Base, Portsmouth, New Hampshire*, December. [AR 1642]

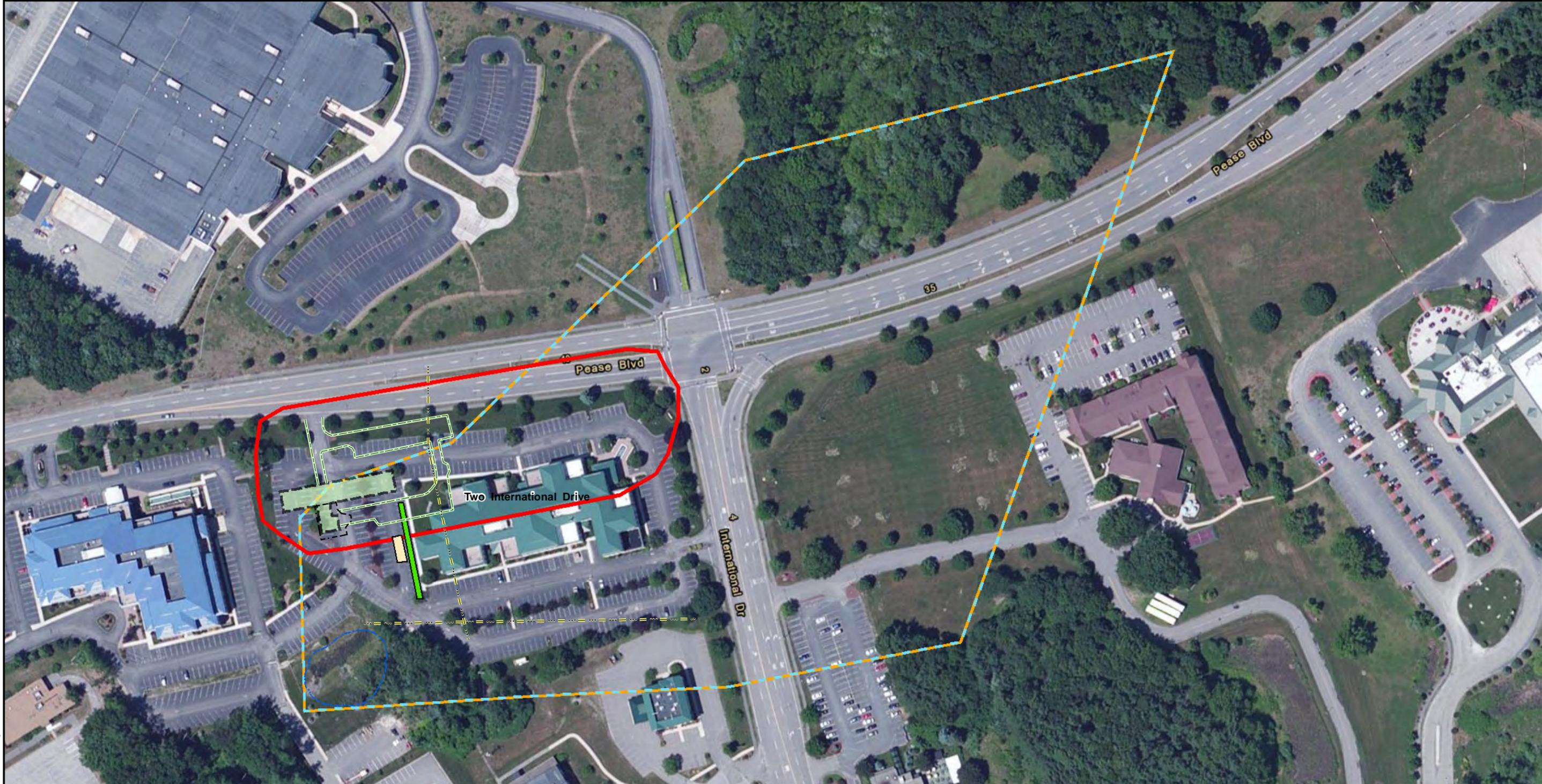
Shaw Environmental & Infrastructure, Inc. (Shaw), 2013a. *2012 Annual Report, Site 49, SS049, Former Building 22, Former Pease Air Force Base, Portsmouth, New Hampshire*, Draft, June. [AR 1764]

Shaw, 2013b. *Investigation Work Plan, Site 49, SS049, Former Building 22, Former Pease Air Force Base, Portsmouth, New Hampshire*, Final, October. [AR 1777]

URS Group, Inc. (URS), 2010a. *Site 49 Performance and Long-Term Monitoring Sampling and Analysis Plan, Revision 3, Former Pease Air Force Base, Portsmouth, New Hampshire*, June. [AR 1776]

URS, 2010b. *Site 49 Permeable Reactive Barrier, 2009 Annual Report, Former Pease Air Force Base, Portsmouth, New Hampshire*, June. [AR 1624]

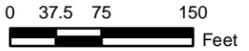
Versar, Inc. (Versar), 2000. *Site 49 Shallow and Deep PRB Construction Installation Report, Pease Air Force Base*, November. [AR 1593]



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- Site 49 Boundary
- Storm Water Basin
- GMZ Boundary
- Former Asphalt Paving Area
- Permeable Reactive Barrier (Shallow)
- Permeable Reactive Barrier (Deep)
- Historical Excavation Area

Notes:
 1) Ft. AMSL = Feet Above Mean Sea Level
 2) GMZ = Groundwater Management Zone

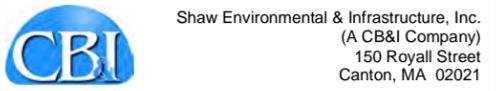


PROJECTION: NAD_1983_StatePlane_New_Hampshire_FIPS_2800_Feet



SITE 49 EXPLANATION OF SIGNIFICANT DIFFERENCES

FIGURE NUMBER	SITE FEATURES SITE 49 FORMER PEASE AIR FORCE BASE PORTSMOUTH, NEW HAMPSHIRE
2	



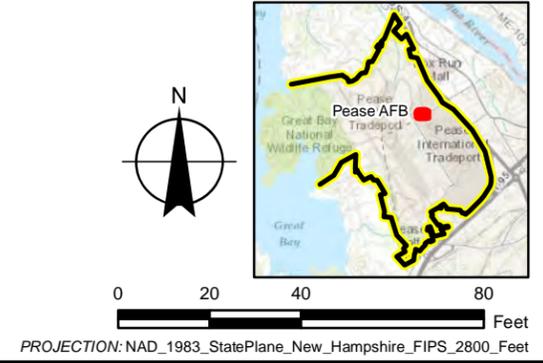


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- Site 49 Boundary
- Former Building 22
- Storm Water Basin
- Groundwater Management Zone
- Permeable Reactive Barrier (Shallow)
- Permeable Reactive Barrier (Deep)
- Trichloroethene Plume Boundary (May 2012)
- Buildings
- Historical Excavation Area

- Shallow Overburden Wells
- Deep Overburden Wells
- ▲ Shallow Overburden Piezometers
- ▼ Deep Overburden Piezometers
- Shallow Bedrock Wells
- ▲ Shallow Bedrock Piezometers
- Deep Bedrock Wells
- Surface Water Sample Locations
- Proposed DOB Injection Locations
- Proposed SBR Injection Locations



U.S. AIR FORCE SITE 49 EXPLANATION OF SIGNIFICANT DIFFERENCES	
FIGURE NUMBER 3	ISEB INJECTION LAYOUT SITE 49 FORMER PEASE AIR FORCE BASE PORTSMOUTH, NEW HAMPSHIRE
Shaw Environmental & Infrastructure, Inc. (A CB&I Company) 150 Royall Street Canton, MA 02021	