

**FY2016**

**COLD REGIONS RESEARCH AND ENGINEERING  
LABORATORY**

**Army Defense Environmental Restoration Program**

**Installation Action Plan**

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## Table of Contents

Statement Of Purpose.....	1
Acronyms.....	2
Installation Information.....	4
5-Year / Periodic Review Summary.....	5
Cleanup Program Summary.....	6
Installation Restoration Program.....	7
IRP Summary.....	8
IRP Contamination Assessment.....	9
IRP Previous Studies.....	10
Installation Restoration Program Site Descriptions.....	12
CECRL-002 FORMER TCE AND FUEL OIL USTS.....	13
CECRL-009 RESEARCH ICE WELL.....	14
CECRL-013 OPEN STORAGE AREA.....	15
CECRL-015 FORMER GREENHOUSE FUEL OIL UST.....	16
Installation Restoration Program Site Closeout (No Further Action) Sites Summary.....	17
IRP Schedule.....	18
Installation Restoration Program Milestones.....	18
IRP Schedule Chart.....	20

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## Statement of Purpose

The purpose of the Installation Action Plan (IAP) is to outline the total multiyear cleanup program for an installation. The plan identifies environmental cleanup requirements at each site or area of concern (AOC), and proposes a comprehensive, installation-wide approach, along with the costs and schedules associated with conducting investigations and taking the necessary remedial actions (RA).

In an effort to coordinate planning information between the restoration manager, the US Army Installation Management Command (IMCOM), the US Army Environmental Command (USAEC), Cold Regions Research and Engineering Laboratory (CRREL), the executing agencies, regulatory agencies, and the public, an IAP was completed. The IAP is used to track requirements, schedules, and tentative budgets for all major Army installation cleanup programs.

All site-specific funding and schedule information has been prepared according to projected overall Army funding levels and is; therefore, subject to change.

## Acronyms

AEDB-R	Army Environmental Database-Restoration
AOC	Area of Concern
AST	Above Ground Storage Tank
CECRL	AEDB-R abbreviation for Cold Regions Research and Engineering Laboratory site ID
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CRREL	Cold Regions Research and Engineering Laboratory
cy	cubic yard
DD	Decision Document
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
EPIC	Environmental Photographic Interpretation Center
ERDC	Engineer Research and Development Center
FRA	Final Remedial Action
FS	Feasibility Study
ft	feet
FY	Fiscal Year
GWMP	Groundwater Monitoring Permit
IAP	Installation Action Plan
IMCOM	Installation Management Command
IRA	Interim Remedial Action
IRP	Installation Restoration Program
K	thousand
LTM	Long-Term Management
MCL	Maximum Contaminant Level
N/A	Not Applicable
NFA	No Further Action
NH	New Hampshire
NHDES	New Hampshire Department of Environmental Services
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
PA	Preliminary Assessment
RA	Remedial Action
RA(C)	Remedial Action (Construction)
RA(O)	Remedial Action (Operation)
RAB	Restoration Advisory Board
RC	Response Complete
RD	Remedial Design
RI	Remedial Investigation
RIP	Remedy-in-Place
ROD	Record of Decision
RRSE	Relative Risk Site Evaluation
SARA	Superfund Amendments and Reauthorization Act
SI	Site Inspection
TAPP	Technical Assistance for Public Participation
TCE	Trichloroethylene

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## Acronyms

TRC	Technical Review Committee
USACE	US Army Corps of Engineers
USAEC	US Army Environmental Command
USEPA	US Environmental Protection Agency
UST	Underground Storage Tank
VI	Vapor Intrusion
VOC	Volatile Organic Compound
VT	Vermont

# Installation Information

## Installation Locale

**Installation Size (Acreage):** 30.22

**City:** Hanover

**County:** Grafton

**State:** New Hampshire

## Other Locale Information

Cold Regions Research and Engineering Laboratory (CRREL) is located on 30 acres of land in Hanover, Grafton County, New Hampshire (NH). The site is roughly rectangular, measuring 1,360 feet east to west and 970 feet north to south at its maximum extent. Residential housing is planned for the property to the north of CRREL. Student housing for Dartmouth College is located adjacent to the site along the south property boundaries. Highway 10 forms the eastern boundary of the site and the Connecticut River is located immediately west of the CRREL property. CRREL is 1.5 miles north of the town of Hanover (population 10,500) and 1.75 miles northeast of Norwich, Vermont (VT) (population 3,100).

## Installation Mission

The mission of CRREL is to solve interdisciplinary, strategically important problems of the US Army Corps of Engineers (USACE), Army, Department of Defense (DoD), and the nation by advancing and applying science and engineering to complex environments, materials, and processes in all seasons and climates, with unique core competencies related to the Earth's cold regions.

## Lead Organization

IMCOM

## Lead Executing Agencies for Installation

USACE/US Army Engineer Research and Development Center (ERDC)-CRREL

## Regulator Participation

<b>Federal</b>	US Environmental Protection Agency (USEPA), Region 1
<b>State</b>	NH Department of Environmental Services (NHDES)

## National Priorities List (NPL) Status

COLD REGIONS RESEARCH AND ENGINEERING LABORATORY is not on the NPL

## Installation Restoration Advisory Board (RAB)/Technical Review Committee (TRC)/Technical Assistance for Public Participation (TAPP) Status

RAB established 201401

## Installation Program Summaries

### IRP

**Primary Contaminants of Concern:** Volatiles (VOC)

**Affected Media of Concern:** Groundwater, Soil

# 5-Year / Periodic Review Summary

## 5-Year / Periodic Review Summary

Status	Start Date	End Date	End FY
Planned	202308	202408	2024

## 5-Year / Periodic Review Details

Associated ROD/DD Name	Sites
REMEDIAL ACTION PLAN FOR US ARMY COLD RE	CECRL-002, CECRL-009, CECRL-013, CECRL-018

# Cleanup Program Summary

## Installation Historic Activity

CRREL is an active sub-installation of the US Army ERDC of the USACE. As the Army's Center of Expertise in cold regions science and engineering, CRREL performs basic and applied research in snow, ice, and frozen ground. CRREL also provides the US Army with practical engineering research to develop equipment and procedures for application in cold regions. Today, land use within one quarter mile is primarily rural and residential, with zones of light industry, commercial/service, cropland/pasture, and deciduous and mixed forest.

Prior to CRREL construction, the land use was primarily agricultural, and gravel was mined on the western edge of the site. In 1960, the US Army leased 19.2 acres of land from Dartmouth College for the purpose of constructing a research facility. On June 15, 1960, the cornerstone for the facility's first building was laid. CRREL was officially established on Feb. 1, 1961 and has been active since its inception. CRREL combined the work of two predecessor organizations previously located in other states: the Snow, Ice, and Permafrost Research Establishment (formed on Aug. 27, 1947) and the Arctic Construction and Frost Effects Laboratory (established on Feb. 25, 1953).

In late-1963, the Main Laboratory Building became fully operational, and several new buildings have been added since that time. The Facilities Engineering building opened in 1968, the Logistics and Supply building (referred to also as the Logistics Management Facility) opened in 1976, the Laboratory Addition opened in 1977, and the Ice Engineering building opened in 1978.

In 1982, 11.02 acres of additional land, located along the western border of the original CRREL tract, was purchased. This purchase expanded CRREL to its current size of 30.22 acres and allowed further construction. The Frost Effects Research Facility opened in 1985, the Cradle and Crayon Child Development Center opened in 1990, the Remote Sensing Facility and the Technical Information Analysis Center opened in 1993, and the trichloroethylene (TCE) Groundwater Treatment Facility opened in 1994.

The Army is investigating all potential AOCs for any detrimental environmental impact, implementing its environmental response authority under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA).

In December 1991, a TRC charter was signed by the USEPA Region 1, the NHDES, the Vermont Department of Environmental Conservation, the town of Hanover, NH, the village of Norwich, Vermont (VT), Dartmouth College, and the US Army. In January 1992, the installation was placed on the federal agency hazardous waste compliance docket due to the release of TCE into the Connecticut River. The TRC has been inactive since 1995 following the last survey of public interest.

In 2003, the NHDES concurred with the Army's remedial action plan. The NHDES concurred that no further action (NFA) was required at all sites except CECRL-002, -009, -013 and -015. The remedial action plan identified the remedy for CECRL-018 which requires the Army to continue to pump groundwater to control the contaminated plume and to treat the groundwater, which is used as non-contact cooling water, and meet state and federal standards before discharge to the Connecticut River. In 2010, the Army evaluated the potential for vapor intrusion (VI) into buildings. Elevated levels of TCE and other contaminants were detected in the indoor air. The Army is evaluating interim measures to address the indoor air contamination and plans on continuing the measures through fiscal year (FY)16. A remedial investigation (RI)/feasibility study (FS) is underway for CECRL-002, -009, -013 and -015 in accordance with the remedial action plan.

## Installation Program Cleanup Progress

### IRP

**Prior Year Progress:** Operation of the TCE groundwater treatment facility continued. Investigations for VI are ongoing for all buildings at the installation. Data collection continued for the RI. Interim measures for VI were installed in several buildings at CRREL.

**Future Plan of Action:** An RI/FS is underway for sites CECRL-002, -009, and -013. Decision documents (DD) are planned in FY19. Groundwater treatment will continue.

Groundwater monitoring at sites CECRL-002, -009, and -013 as required by New Hampshire groundwater monitoring permit (GWMP) will continue. VI monitoring will continue in buildings located near sites CECRL-002 and -009.



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**Installation Restoration Program**

# IRP Summary

**Installation Total Army Environmental Database-Restoration (AEDB-R) Sites/Closeout Sites Count:** 18/14

## Installation Site Types with Future and/or Underway Phases

- 1 Spill Site Area  
(CECRL-009)
- 1 Storage Area  
(CECRL-013)
- 2 Underground Storage Tank  
(CECRL-002, CECRL-015)

## Most Widespread Contaminants of Concern

Volatiles (VOC)

## Media of Concern

Groundwater, Soil

## Completed Remedial Actions (Interim Remedial Actions/ Final Remedial Actions (IRA/FRA))

Site ID	Site Name	Action	Remedy	FY
CECRL-015	FORMER GREENHOUSE FUEL OIL UST	FRA	EX SITU SOIL TREATMENT	1999
CECRL-002	FORMER TCE AND FUEL OIL USTS	IRA	CHEMICAL REDUCTION/OXIDATION	2002
CECRL-009	RESEARCH ICE WELL	IRA	CHEMICAL REDUCTION/OXIDATION	2002
CECRL-015	FORMER GREENHOUSE FUEL OIL UST	FRA	SOIL VAPOR EXTRACTION	2002

## Duration of IRP

**Date of IRP Inception:** 199005

**Estimated Date for Remedy-In-Place (RIP)/Response Complete (RC):** 202410/205410

**Date of IRP completion including Long Term Management (LTM):** 205410

# IRP Contamination Assessment

## Contamination Assessment Overview

Since 1960, a total of nine underground storage tanks (UST) have been installed at CRREL. The USTs have been used to store a variety of fuels and chemicals including No. 5 fuel oil, No. 2 fuel oil, gasoline, and TCE. To date, all original USTs have been removed and two new USTs remain and are used for No. 2 fuel oil storage.

From 1960 to 1987, TCE was the refrigerant used in the cooling system in CRREL's Main Laboratory Building. TCE was also used as a degreaser. A preliminary assessment (PA)/site inspection (SI), performed by CRREL and completed in 1991, indicated the presence of TCE in three of the four tested production wells. The production wells, which produce approximately 850,000 gallons of water per day, are the source of cooling system water at the installation. The PA/SI resulted in TCE detections in soil samples collected at several AOCs, in two residential wells on the VT side of the Connecticut River, at the CRREL storm water discharge into the Connecticut River, and infrequently 100 feet downstream of the CRREL storm water discharge. Following these results, CRREL initiated Operation Sweetwater to use CRREL's in-house capabilities to analyze the water supplies of any concerned residents in the site area. TCE was not detected in any other nearby drinking water supply wells. CRREL also provided bottled water to the two owners of the wells containing TCE until the residents were connected to the municipal water supply system. During October and December 1992, sampling events at an additional residential well in VT showed TCE contamination after the first two houses were connected to the municipal water supply system. In spring 1993, this residence was connected to the municipal water supply system.

In 1991, the USAEC (formerly the US Army Toxic and Hazardous Materials Agency) initiated a Phase I RI to define the sources of contamination. The Phase I RI report was provided to the TRC members for review and comment and was approved, with minor revisions, in the fourth quarter of FY92. The Phase I RI examined 18 AOCs. These areas are identified as CECRL-001 through CECRL-018 in AEDB-R and are discussed individually below.

Based on the results of the Phase I RI, a Phase II RI was initiated in the first quarter of FY93. The Phase II RI report was provided to the TRC members for review and comment and was approved, with minor revisions, in the third quarter of FY94. The Phase I and Phase II RIs identified three sites as the primary sources of TCE-contaminated groundwater: CECRL-002, -009, and -013. The proximity of these areas and their alignment with respect to the groundwater flow patterns appear to create a single contamination plume beneath CRREL. Releases of petroleum-related contaminants have also occurred at several of the AEDB-R sites.

In 2003, the state NHDES concurred with the Army's remedial action plan. The State concurred that NFA was required at all sites except CECRL-002, -009, -013 and -015. The remedy action plan identified the remedy for the groundwater which requires the Army to continue to pump groundwater to control the contaminated plume and to treat the groundwater, which is used as non-contact cooling water, and to meet state and federal standards before discharge to the Connecticut River. In 2010, the Army evaluated the potential for VI into buildings. Elevated levels of TCE and other contaminants were detected in the indoor air. The Army has implemented interim measures to address the indoor air contamination and plans on continuing the measures through FY16 and until the source of the vapors has been remediated. An RI/FS is underway for CECRL-002, -009, -013 and -015 in accordance with the remedial action plan. Subsequent action at CECRL-015 will be determined based on the results of the RI.

## Cleanup Exit Strategy

A final DD for the site is expected in 2017. Enhanced in situ bioremediation is the expected remedy for groundwater contamination. Groundwater monitoring, sampling and analysis as required by NHDES GWMP will continue. The groundwater pump and treatment system will continue to operate to remain in compliance with the National Pollutant Discharge Elimination System (NPDES) requirements and the NHDES GWMP.

## IRP Previous Studies

Year	Title	Author	Date
1986	CRREL's First 25 Years, Cold Regions Research and Engineering Laboratory (CRREL), Hanover, New Hampshire	Internal CRREL Publication	JUN-1986
1990	Aerial Topographic Survey Plan	Schofield Bros. Inc., Professional Surveyors, Framingham, Massachusetts.	JAN-1990
	Work Plan, Field Sampling Plan, Health and Safety Plan and Quality Assurance Project Plan for Remedial Investigation, Cold Regions Research and Engineering Laboratory in Hanover, New Hampshire	Ecology and Environment, Inc. (E&E)	JUL-1990
1991	The Fate and Treatment of Trichloroethylene (TCE) in Air, Water, and Soil: A Compilation of References and Abstracts, CRREL Internal Report 1081, Hanover, New Hampshire	Dr. Giles Marion	JAN-1991
	CRREL's Site Investigation and Analysis for Trichloroethylene, CRREL Internal Report, Hanover, New Hampshire	Perry, L.B., et. Al.	JAN-1991
	Site Investigation Report	Internal CRREL Publication	APR-1991
	History of TCE Use and Handling at CRREL, CRREL Internal Report 1084, Hanover, New Hampshire	Karen J. Faran	APR-1991
	Geology and Hydrogeology at CRREL: A Preliminary Site Investigation, CRREL Internal Report 1088, Hanover, New Hampshire	Lawrence W. Gatto and Sally A. Shoop	MAY-1991
	Ground Water Investigation Norwich, Vermont, prepared for the Vermont Department of Environmental Conservation, Waterbury, Vermont	Wehran Engineering Corporation	JUL-1991
	Environmental Photographic Interpretation Center (EPIC), September 1991, Site Analysis of the Cold Regions Research and Engineering Laboratory	USEPA, Las Vegas, Nevada	SEP-1991
	Final Report on the Findings of the Petrex Soil Gas Survey Performed at the US Army CRREL in Hanover, New Hampshire	Northeast Research Institute, Inc.	DEC-1991
1992	Final Remedial Investigation Report for Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire	Ecology and Environment, Inc.	OCT-1992
	Work Plan, Field Sampling Plan, Health and Safety Plan and Quality Assurance Project Plan for Remedial Investigation, Cold Regions Research and Engineering Laboratory in Hanover, New Hampshire	Ecology and Environment, Inc. (E & E)	OCT-1992
1993	Final Report for Bedrock Aquifer Contamination Study - Norwich, Vermont	Johnson Company	JUL-1993
	Process Responsible for Continued TCE Presence in CRREL Production Wells	Pravda	DEC-1993
1994	Work Plan, Quality Control Plan, and Health and Safety Plan for Phase II Remedial Investigation, Cold Regions Research and Engineering Laboratory in Hanover, New Hampshire	Arthur D. Little, Inc. (A.D. Little)	JAN-1994

## IRP Previous Studies

	<b>Title</b>	<b>Author</b>	<b>Date</b>
<b>1994</b>	Hampshire		
	Final Report, Phase II Remedial Investigation for Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire	A.D. Little	MAR-1994
<b>1995</b>	Site Investigation and Monitoring at CRREL to support Groundwater Modeling Systems	Waterways Experiment Station	OCT-1995
<b>1996</b>	Optimization of Pumping to Control TCE Migration at CRREL	Hsieh and Richards	MAY-1996
<b>2000</b>	TCE Source Area Treatment Progress Report	Daniel McKay	JAN-2000
<b>2002</b>	A comparison of Permanganate Delivery Methods in an Unsaturated Setting	Daniel McKay and C. Berini	MAR-2002
<b>2003</b>	Final Remedial Action Plan	CRREL/NHDES	MAR-2003
<b>2005</b>	High Delivery of Permanganate Solution to Oxidize TCE	Daniel McKay and C. Berini	FEB-2005
<b>2006</b>	CRREL Site Investigation AOC 2 and AOC 9	Stanley	NOV-2006
<b>2008</b>	Annual Monitoring Reports (2005 - 2008)	Nobis Engineering	SEP-2008
<b>2009</b>	Annual Monitoring Report 2009	Pathways Consulting	DEC-2009
<b>2012</b>	Interim Vapor Intrusion Report	AECOM	JUL-2012
	Annual Monitoring Report (2010 - 2012)	Watermark, LLC	DEC-2012

**COLD REGIONS RESEARCH AND ENGINEERING  
LABORATORY**

**Installation Restoration Program**

**Site Descriptions**

**Site ID: CECRL-002**

**Site Name: FORMER TCE AND FUEL OIL USTS**

**STATUS**

**Regulatory Driver:** CERCLA

**RRSE:** HIGH

Contaminants of Concern: Volatiles (VOC)

Media of Concern: Groundwater, Other (Indoor air), Soil

Phases	Start	End
PA.....	199005.....	199011
SI.....	199101.....	199105
RI/FS.....	199108.....	202008
RD.....	202002.....	202108
IRA.....	199806.....	202409
RA(C).....	202106.....	202409
RA(O).....	202410.....	205410
<b>RIP Date:</b>	202410	
<b>RC Date:</b>	205410	

**SITE DESCRIPTION**

CECRL-002 is located along the northern side of the Main Laboratory Building. This site is the location of two former USTs: one 10,000-gallon tank containing TCE and one 12,000-gallon tank used for fuel oil storage. The interior TCE supply lines leaked from the TCE UST into the main lab. An unknown quantity of TCE was lost and presumably went down the floor drains and other floor penetrations. Approximately 6,000 gallons of TCE was recovered and placed in an aboveground storage tank (AST). This AST was subsequently destroyed in an explosion in 1970 due to a welding operation. In 1972, the TCE UST was removed and replaced with another 12,000-gallon fuel oil tank. In 1989, both fuel oil tanks were removed. At the time the TCE tank was removed, solvent odors were noted but no sampling was conducted.

During the 1992-1993 RI, extensive TCE contamination was found in the groundwater. In 2000, the concrete pads where the tanks had been located were removed, along with approximately 100 cubic yards (cy) of contaminated excavation debris, and relocated to an approved location on the CRREL property. With state concurrence, this material was removed to an approved waste disposal site.

From 2000 to 2003, again with state concurrence, subsurface potassium permanganate injection was conducted to address TCE in the remaining soil at both CECRL-002 and -009. While TCE concentrations in the soil have been reduced, they are not yet below state regulatory requirements throughout the entire site. In 2003, the Army and NHDES approved a remedial action plan that required additional work at CECRL-002, -009, -013 and -015.

In 2010, VI was evaluated and concentrations above standards were found in the main lab adjacent to CECRL-002. An RI/FS is underway to include a thorough evaluation of VI. Interim measures for the VI are also being evaluated and were installed in several buildings at CRREL. VI sampling and site evaluation will continue until the RI is complete.

**CLEANUP/EXIT STRATEGY**

An RI/FS is underway and a final DD is expected to be completed in FY19. The final remedy for CECRL-002, -009 and -013 is expected to be in situ bioremediation; however, site hydrogeological conditions make cleanup of the site to unrestricted use standards likely impracticable. CECRL-002 is contributing to site-wide groundwater contamination. Therefore, the pump-and-treat system will continue to operate to contain the groundwater contamination until maximum contaminant levels (MCL) are met throughout the plume. Sub-slab depressurization systems will be utilized for indoor air TCE contaminant management. Additionally, a pilot study of a soil vapor extraction system in the vicinity of CECRL-002 will be conducted to evaluate the effectiveness of SVE at remediating TCE vapors in the subsurface.

**Site ID: CECRL-009**  
**Site Name: RESEARCH ICE WELL**

**STATUS**

**Regulatory Driver:** CERCLA

**RRSE:** HIGH

Contaminants of Concern: Volatiles (VOC)

Media of Concern: Groundwater, Other (indoor air), Soil

Phases	Start	End
PA.....	199005.....	199011
SI.....	199101.....	199105
RI/FS.....	199108.....	202008
RD.....	202002.....	202108
IRA.....	199303.....	202409
RA(C).....	202106.....	202409
RA(O).....	202410.....	205410
<b>RIP Date:</b>	202410	
<b>RC Date:</b>	205410	

**SITE DESCRIPTION**

Site CECRL-009 is located approximately 60 feet north of the westernmost side of the Main Laboratory Building. This is the location of the former ice well, a steel-cased 200-foot-deep cylinder in which TCE was used in refrigeration lines and drilling fluid mixtures. This area contains TCE-contaminated soils resulting from the 1970 explosion of the former TCE tank in site CECRL-001 and from the operation of the ice well.

During the 1992-1993 RI, extensive TCE contamination was found in the groundwater. From 1999 to 2002, with state concurrence, subsurface potassium permanganate injection was conducted to address TCE in the remaining soil at both CECRL-002 and -009. While TCE concentrations in the soil have been reduced, they are not yet below state regulatory requirements throughout the entire site.

In 1994, the Army started operating a groundwater pump-and-treat system. The system treats groundwater pumped from the existing production well network that is used to supply water for the CRREL refrigeration systems. The Army uses the same network to maintain hydraulic control of the TCE plume beneath CRREL. AEDB-R site, CECRL-018, was historically used to account for the cost of the operations of this pump-and-treat system. Beginning in FY14, the cost for the operation of the system are captured under the IRA phase at this AEDB-R site.

In 2010, VI was evaluated. Elevated levels of TCE were found in the main lab and the lab addition which are adjacent to CECRL-009. Interim measures to address the VI in the main lab and lab addition have been installed and VI sampling continues. The RI was reopened because of the vapor exceedances. An RI/FS is underway.

**CLEANUP/EXIT STRATEGY**

An RI/FS is underway and a final DD is expected to be completed in FY19. The final remedy for CECRL-002, -009 and -013 is expected to be in situ bioremediation; however, site hydrogeological conditions make cleanup of the site to unrestricted use standards likely impracticable. CECRL-009 is contributing to site-wide groundwater contamination. Therefore, the pump-and-treat system will continue to operate to contain the groundwater contamination until MCLs are met throughout the plume. Sub-slab depressurization systems will be utilized for indoor air TCE contaminant management.



**Site ID: CECRL-013**  
**Site Name: OPEN STORAGE AREA**

**STATUS**

**Regulatory Driver:** CERCLA

**RRSE:** HIGH

**Contaminants of Concern:** Other (TCE)

**Media of Concern:** Groundwater, Other (indoor air), Soil

<b>Phases</b>	<b>Start</b>	<b>End</b>
PA.....	199005.....	199011
SI.....	199101.....	199105
RI/FS.....	199108.....	202008
RD.....	202002.....	202108
IRA.....	199806.....	202409
RA(C).....	202106.....	202409
RA(O).....	202410.....	205410
<b>RIP Date:</b>	202410	
<b>RC Date:</b>	205410	

**SITE DESCRIPTION**

CECRL-013 is the location of the former gravel pad used for the storage of spent TCE. This site is adjacent to the Logistic Management Office/Warehouse building. VI was evaluated in 2010. Because of the elevated TCE in indoor air the RI/FS was reopened and is underway.

**CLEANUP/EXIT STRATEGY**

An RI/FS is underway and a final DD is expected to be completed in FY19. The final remedy for CECRL-002, 009 and 013 is expected to be in situ bioremediation; however, site hydrogeological conditions make cleanup of the site to unrestricted use standards likely impracticable. CECRL-013 may be contributing to site-wide groundwater contamination. Therefore, the pump-and-treat system at will continue to operate to contain the groundwater contamination until MCLs are met throughout the plume. Sub-slab depressurization systems will be utilized for indoor air TCE contaminant management.

Site ID: CECRL-015

Site Name: FORMER GREENHOUSE FUEL OIL UST

## STATUS

Regulatory Driver: CERCLA

RRSE: MEDIUM

Contaminants of Concern: Semi-volatiles (SVOC)

Media of Concern: Soil

Phases	Start	End
PA.....	199005.....	199011
SI.....	199101.....	199105
RI/FS.....	199108.....	199306
RD.....	199509.....	199809
RA(C).....	199810.....	200207
RA(O).....	200208.....	200309
LTM.....	201310.....	202008
<b>RIP Date:</b>	200208	
<b>RC Date:</b>	200309	

## SITE DESCRIPTION

This is the location of the former fuel oil UST at the greenhouse research facility. The site had shallow soil contamination beneath the greenhouse and sewer pipeline bedding. The contaminated soils were excavated and treated at the surface before proper disposal. Soil vapor extraction was attempted and was not effective. The 2003 remedial action plan required additional samples to be collected at this site. These samples were collected in 2013 and no contaminants were found. This data will be included in the site-wide RI report.

The LTM phase was open to complete the NFA DD documentation for this site.

## CLEANUP/EXIT STRATEGY

An NFA DD is expected in FY17.

## Site Closeout (No Further Action) Summary

Site ID	Site Name	NFA Date	Documentation
CECRL-001	SPILL SITE FROM FORMER AG STORAGE TANKS	199404	The Phase 2 RI report completed in 1994 determined NFA was required for this site. The State concurred with NFA in the 2003 Remedial Action Plan.
CECRL-003	FORMER FUEL OIL UST	199210	The Phase 1 RI report completed in 1992 determined NFA was required for this site. The State concurred with NFA in the 2003 Remedial Action Plan.
CECRL-004	CURRENT FUEL OIL UST (6,000 GALS) (1989)	199210	This is an active site under the UST Program currently being managed by the State Oil Remediation and Compliance Bureau (NHDES). There is no known release. Not eligible for DERP.
CECRL-005	ABOVE GROUND FUEL STORAGE TANKS	199210	Phase 1 RI determined NFA required. State concurred with NFA in the 2003 Remedial Action Plan.
CECRL-006	FORMER GASOLINE USTS	199210	Phase 1 RI determined NFA required. State concurred in the 2003 Remedial Action Plan.
CECRL-007	CURRENT FUEL OIL UST (1974) (2,000 GALS)	199210	Phase 1 RI determined NFA required. State concurred in the 2003 Remedial Action Plan.
CECRL-008	ABOVE GROUND WASTE OIL TANK	199210	Phase 1 RI determined NFA required. State concurred in the 2003 Remedial Action Plan.
CECRL-010	FORMER OPEN STORAGE AREA	199210	Phase 1 RI determined NFA required. State concurred in the 2003 Remedial Action Plan.
CECRL-011	CONCRETE STORAGE PAD	199210	Soil contamination found here was below relevant standards and was not thought to be a source of groundwater contamination. Phase 1 RI determined NFA required. State concurred in the 2003 Remedial Action Plan.
CECRL-012	EXTERIOR TEST POND	199210	Phase 1 RI determined NFA required. State concurred in the 2003 Remedial Action Plan.
CECRL-014	MAIN LABORATORY MACHINE ROOM	199210	Phase 1 RI determined NFA required. State concurred in the 2003 Remedial Action Plan.
CECRL-016	FORMER TCE OPEN STORAGE AREA	199210	Phase 1 RI determined NFA required. State concurred in the 2003 Remedial Action Plan.
CECRL-017	POND NEAR WELL 3	199210	Phase 1 RI determined NFA required. State concurred in the 2003 Remedial Action Plan.
CECRL-018	COOLING WATER DISCHARGE TO CONN. RI	200303	Final remediation decision for NFA based on continued operation of pump-and-treat system and requirements outlined in GWMP #199101025-H-001 July 9, 2004.

# IRP Schedule

**Date of IRP Inception:** 199005

**Past Phase Completion Milestones**

**1991**

SI (CECRL-001 - SPILL SITE FROM FORMER AG STORAGE TANKS, CECRL-002 - FORMER TCE AND FUEL OIL USTS, CECRL-003 - FORMER FUEL OIL UST, CECRL-004 - CURRENT FUEL OIL UST (6,000 GALS) (1989), CECRL-005 - ABOVE GROUND FUEL STORAGE TANKS, CECRL-006 - FORMER GASOLINE USTS, CECRL-007 - CURRENT FUEL OIL UST (1974) (2,000 GALS), CECRL-008 - ABOVE GROUND WASTE OIL TANK, CECRL-009 - RESEARCH ICE WELL, CECRL-010 - FORMER OPEN STORAGE AREA, CECRL-011 - CONCRETE STORAGE PAD, CECRL-012 - EXTERIOR TEST POND, CECRL-013 - OPEN STORAGE AREA, CECRL-014 - MAIN LABORATORY MACHINE ROOM, CECRL-015 - FORMER GREENHOUSE FUEL OIL UST, CECRL-016 - FORMER TCE OPEN STORAGE AREA, CECRL-017 - POND NEAR WELL 3, CECRL-018 - COOLING WATER DISCHARGE TO CONN. RI)

PA (CECRL-001 - SPILL SITE FROM FORMER AG STORAGE TANKS, CECRL-002 - FORMER TCE AND FUEL OIL USTS, CECRL-003 - FORMER FUEL OIL UST, CECRL-004 - CURRENT FUEL OIL UST (6,000 GALS) (1989), CECRL-005 - ABOVE GROUND FUEL STORAGE TANKS, CECRL-006 - FORMER GASOLINE USTS, CECRL-007 - CURRENT FUEL OIL UST (1974) (2,000 GALS), CECRL-008 - ABOVE GROUND WASTE OIL TANK, CECRL-009 - RESEARCH ICE WELL, CECRL-010 - FORMER OPEN STORAGE AREA, CECRL-011 - CONCRETE STORAGE PAD, CECRL-012 - EXTERIOR TEST POND, CECRL-013 - OPEN STORAGE AREA, CECRL-014 - MAIN LABORATORY MACHINE ROOM, CECRL-015 - FORMER GREENHOUSE FUEL OIL UST, CECRL-016 - FORMER TCE OPEN STORAGE AREA, CECRL-017 - POND NEAR WELL 3, CECRL-018 - COOLING WATER DISCHARGE TO CONN. RI)

**1993**

RI/FS (CECRL-003 - FORMER FUEL OIL UST, CECRL-004 - CURRENT FUEL OIL UST (6,000 GALS) (1989), CECRL-005 - ABOVE GROUND FUEL STORAGE TANKS, CECRL-006 - FORMER GASOLINE USTS, CECRL-007 - CURRENT FUEL OIL UST (1974) (2,000 GALS), CECRL-008 - ABOVE GROUND WASTE OIL TANK, CECRL-010 - FORMER OPEN STORAGE AREA, CECRL-011 - CONCRETE STORAGE PAD, CECRL-012 - EXTERIOR TEST POND, CECRL-014 - MAIN LABORATORY MACHINE ROOM, CECRL-015 - FORMER GREENHOUSE FUEL OIL UST, CECRL-016 - FORMER TCE OPEN STORAGE AREA, CECRL-017 - POND NEAR WELL 3)

**1994**

RI/FS (CECRL-001 - SPILL SITE FROM FORMER AG STORAGE TANKS)

**1998**

RD (CECRL-015 - FORMER GREENHOUSE FUEL OIL UST)

**2002**

RA(C) (CECRL-015 - FORMER GREENHOUSE FUEL OIL UST)

**2003**

RA(O) (CECRL-015 - FORMER GREENHOUSE FUEL OIL UST)

RI/FS (CECRL-018 - COOLING WATER DISCHARGE TO CONN. RI)

**Projected Phase Completion Milestones**

See attached schedule

**Projected Record of Decision (ROD)/Decision Document (DD) Approval Dates**

Site ID	Site Name	ROD/DD Title	ROD/DD Date
CECRL-009	RESEARCH ICE WELL	REMEDIAL ACTION PLAN FOR US ARMY COLD RE	20190830
CECRL-018	COOLING WATER DISCHARGE TO CONN. RI	REMEDIAL ACTION PLAN FOR US ARMY COLD RE	20190830
CECRL-013	OPEN STORAGE AREA	REMEDIAL ACTION PLAN FOR US ARMY COLD RE	20190830
CECRL-002	FORMER TCE AND FUEL OIL USTS	REMEDIAL ACTION PLAN FOR US ARMY COLD RE	20190830

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## IRP Schedule

**Final RA(C) Completion Date:** 202409

**Schedule for Next Five-Year Review:** 2024

**Estimated Completion Date of IRP at Installation (including LTM phase):** 205410

## COLD REGIONS RESEARCH AND ENGINEERING LABORATORY IRP Schedule

  = phase underway

SITE ID	SITE NAME	PHASE	FY17	FY18	FY19	FY20	FY21	FY22+
CECRL-002	FORMER TCE AND FUEL OIL USTS	RI/FS						
		RD						
		IRA						
		RA(C)						
		RA(O)						
CECRL-009	RESEARCH ICE WELL	RI/FS						
		RD						
		IRA						
		RA(C)						
		RA(O)						
CECRL-013	OPEN STORAGE AREA	RI/FS						
		RD						
		IRA						
		RA(C)						
		RA(O)						
CECRL-015	FORMER GREENHOUSE FUEL OIL UST	LTM						

## Community Involvement

**Technical Review Committee (TRC):** 199212

**Community Involvement Plan (Date Published):** 201304

**Restoration Advisory Board (RAB):** RAB established 201401

**RAB Adjournment Date:** N/A

**RAB Adjournment Reason:** None

### **Additional Community Involvement Information**

Several sites at CRREL have been reopened because VOCs were found in indoor air. Because the RI phase was reopened, CRREL has solicited the community and determined that there is sufficient interest in a RAB. The RAB was restarted in 2014 and meets quarterly. The most recent RAB meeting was in March 2016. The community involvement plan has updated with this new information.

### **Administrative Record is located at**

ERDC-CRREL  
72 Lyme Rd.  
Hanover, NH 03755  
(603) 646-4602

### **Information Repository is located at**

Hanover Howe Public Library  
13E South St.  
Hanover, NH 03755  
(603) 643-4120

**Current Technical Assistance for Public Participation (TAPP):**N/A

**TAPP Title:** N/A

**Potential TAPP:** N/A

