COLD REGIONS RESEARCH & ENGINEERING LAB

Army Cleanup Program

Installation Action Plan Final

June 2024

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STATEMENT OF PURPOSE

The Installation Action Plan (IAP) provides evidence that the Army is firmly committed to expeditious identification and cleanup of environmental contamination, and that the installation has a credible, organized program to carry out that commitment. The IAP provides an outline of the total multi-year environmental cleanup program for each site with ongoing or future planned restoration activity and includes the (1) environmental restoration requirements, (2) the rationale for the selected technical approach, and (3) foundation to develop corresponding financial needs for each cleanup site.

INSTALLATION OVERVIEW

Installation Name: COLD REGIONS RESEARCH & ENGINEERING LAB

Installation City: HANOVER

Installation County: GRAFTON

Installation State: New Hampshire

Regulatory Participation - Federal: N/A

Regulatory Participation - State: NH Department of Environmental Services (NHDES) and Vermont Department of Environmental Conservation (DEC)

ACRONYMS

Acronym	Definition
AST	Aboveground Storage Tank
CC	Compliance-related Cleanup
CECRL	Cold Regions Research and Engineering Laboratory
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
COC	Contaminant of Concern
CRL	Cleanup Restoration & Liabilities
CRREL	Cold Regions Research and Engineering Laboratory
DD	Decision Document
ENV	Environmental
FS	Feasibility Study
FY	Fiscal Year
FYR	Five-Year Review
g/l	Gallons per Liter
HRS	Hazardous Ranking Score
IAP	Installation Action
ID	Identification
IR	Installation Restoration
IRA	Interim Remedial Action
IRP	Installation Restoration Program
LTM	Long-Term Management
LUC	Land Use Control
LUCIP	Land Use Control Implementation Plan
MCL	Maximum Contaminant Level
MR	Munitions Response
MRSPP	Munitions Response Site Prioritization Protocol
N/A	Not Applicable
NFA	No Further Action
NHDES	New Hampshire Department of Environmental Services
NPL	National Priorities List
PA	Preliminary Assessment
ppm	parts per million
ppt	parts per trillion
RA	Remedial Action
RAB	Restoration Advisory Board
RA(C)	Remedial Action (Construction)
RA(O)	Remedial Action (Operations)
RC	Response Complete
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design

Acronym	Definition
RFA	RCRA Facility Assessment
RI	Remedial Investigation
RIP	Remedy-in-Place
RRSE	Relative Risk Site Evaluation
SC	Site Closeout
SI	Site Inspection
TAPP	Technical Assistance for Public Participation
TBD	To Be Determined
TCE	Trichloroethylene
ug/L	micrograms per liter
UST	Underground Storage Tank
UU/UE	Unlimited Use/Unlimited Exposure
VI	Vapor Intrusion

PHASE TRANSLATION TABLE

CERCLA Phase	RCRA Phase	RCRA UST Phase
Preliminary Assessment (PA)	RCRA Facility Assessment (RFA)	Initial Site Characterization (ISC)
Site Inspection (SI)	Confirmation Sampling (CS)	Investigation (INV)
Remedial Investigation/ Feasibility Study (RI/FS)	RCRA Facility Investigation/Corrective Measures Study (RFI/CMS)	Corrective Action Plan (CAP)
Remedial Design (RD)	Design (DES)	Design (DES)
Interim Remedial Action (IRA)	Interim Measure (IM)	Interim Remedial Action (IRA)
Remedial Action (Construction) (RA(C))	Corrective Measures Implementation (Construction) (CMI(C))	Implementation (Construction) (IMP(C))
Remedial Action (Operations) (RA(O))	Corrective Measures Implementation (Operations) (CMI(O))	Implementation (Operations) (IMP(O))
Long-Term Management (LTM)	Long-Term Management (LTM)	Long-Term Management (LTM)

PROGRAM SUMMARY

Number of Open Sites with Response Complete/Total Open IR Sites: 0/4

Number of Open Sites with Response Complete/Total Open MR Sites: 0/0

Number of Open Sites with Response Complete/Total Open CC Sites: 0/0

SITE-LEVEL INFORMATION

1127A.1002_CECRL-002_FORMER TCE AND FUEL OIL USTS

Env Site ID: CECRL-002

Cleanup Site: FORMER TCE AND FUEL OIL USTS

Alias: CECRL-002

Regulatory Driver: CERCLA

RIP Date: 11/15/2030

RC Date: 11/15/2059

RC Reason: Not assigned

SC Date: 11/16/2059

Program: ENV Restoration, Army

Subprogram: IR

NPL Status: No

Hazardous Ranking Score: 0

RRSE: High

MRSPP: N/A

Phase	Start	End
PA:	5/15/1990	11/15/1990
SI:	1/31/1991	5/15/1991
RI/FS:	3/31/1991	11/15/2026
RD:	11/15/2026	11/15/2027
IRA:	6/30/1998	11/15/2030
RA(C):	11/15/2027	11/15/2030
RA(O):	11/15/2030	11/15/2059
LTM:	- -	- -

Site Narrative: Cold Regions Research and Engineering Laboratory (CECRL)-002 is located on the northern side of the main laboratory building and consists of two former underground storage tanks (UST)- one 10,000-gallon tank containing trichloroethylene (TCE) and one 12,000-gallon tank used for fuel oil storage. 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. During the 1992-1993 remedial investigation (RI), TCE contamination up to 100,000 micrograms per liter (ug/L) was found in groundwater. In 2000, the concrete tank pads were removed along with approximately 100 cubic yards of contaminated excavation debris. With state concurrence, this material was sent to an approved waste disposal site. From 2000 to 2003, with state concurrence, a subsurface potassium permanganate injection was conducted to address sites CECRL-002 and CECRL-009. While TCE concentrations in the soil have been reduced concentrations in the 100s of parts per million (ppm) exist which are above state regulatory requirements. In 2003, the Army and NHDES approved a remedial action plan requiring additional work at CECRL-002, CECRL-009, CECRL-0,13, and CECRL-015. In 2010, vapor intrusion (VI) was evaluated and concentrations up to 2.3M parts per trillion (ppt) in soil vapor were found in the main lab adjacent to CECRL-002 and in the soil beneath and around the building. The RI/feasibility study (FS) is complete and included an evaluation of VI. The RI concluded TCE is the primary contaminant of concern (COC). Human health risks are driven by exposure to TCE in the indoor air of four on-site buildings, soil vapor in on-site excavations, and groundwater on-site if it were to be used for drinking water in the future. Outside of the CRREL property, human health risks are driven by potential future residents' exposure to indoor air at the undeveloped property north of the site. Ecological risks related to the site are negligible, but there could be ecological risks if contaminated groundwater were to discharge to the Connecticut River. Interim measures for VI have been

implemented in several buildings at CRREL using sub slab depressurizations including a soil vapor extraction system installed at CECRL-002. Exit Strategy - VI sampling, interim soil vapor extraction, and site monitoring of soil and groundwater will continue until the decision document (DD) is complete. The final remedy for groundwater is expected to be pump and treat to contain the groundwater contamination until maximum contaminant levels (MCL) are met throughout the plume. The final remedy for soil and soil vapor is the continued operation of the sub slab depressurizations systems and operation and expansion of the soil vapor extraction interim measures. The clock for five-year reviews will commence with the remedial action (construction) (RA(C)) phase. Thus, the first five-year review will be completed five years after the start of the RA(C) phase. Because hazardous substances, pollutants, or contaminants will remain at the site at concentrations exceeding levels that allow for unlimited use/ unlimited exposure (UU/UE), five-year remedy reviews will continue until UU/UE is achieved.

1127A.1009_CECRL-009_RESEARCH ICE WELL

Env Site ID: CECRL-009

Cleanup Site: RESEARCH ICE WELL

Alias: CECRL-009

Regulatory Driver: CERCLA

RIP Date: 11/15/2030

RC Date: 11/15/2059

RC Reason: Not assigned

SC Date: 11/16/2059

Program: ENV Restoration, Army

Subprogram: IR

NPL Status: No

Hazardous Ranking Score: 0

RRSE: High

MRSPP: N/A

Phase	Start	End
PA:	5/31/1990	11/30/1990
SI:	1/31/1991	5/31/1991
RI/FS:	3/31/1991	11/15/2026
RD:	11/15/2026	11/15/2027
IRA:	6/30/1998	11/15/2030
RA(C):	11/16/2026	11/15/2030
RA(O):	11/15/2030	11/15/2059
LTM:	- -	- -

Site Narrative: Site CECRL-009 is located approximately 60 feet west of the northwest corner of the main laboratory building and consists of a former ice well where a steel-cased 200-foot-deep hole in which TCE was used for experiments. This area contains TCE-contaminated soils resulting from the 1970 explosion of the former TCE tank in site CECRL-001 and from operation of the ice well. During the 1992-1993 RI, extensive TCE contamination was found in the groundwater up to concentrations of 100,000 ug/L. 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 from 100s ppm, they are not yet below state regulatory requirements. In 1994, Army started operating a groundwater pump-and-treat system. The system treats groundwater pumped from the existing production well network 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. CECRL-018, was historically used to account for the cost of the operations of this pump-and-treat system. Beginning in fiscal year (FY)14, the cost for the operation of the system is captured under the interim remedial action (IRA) phase. 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 in soil vapor at concentrations up to 2.3M ppt. 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. The RI/FS is complete and included an evaluation of VI. The RI concluded TCE is the primary COC. Human health risks are driven by exposure to TCE in the indoor air of four on-site buildings, soil vapor in on-site excavations and groundwater on-site if it were to be used for drinking water in the future. Outside of the CRREL property human health risks are driven by potential future residents' exposure to indoor air at the undeveloped property north of the site. Ecological risks related to the site are negligible, but there could be ecological risks if contaminated groundwater were to discharge to the Connecticut River. Exit Strategy- VI sampling, interim soil vapor extraction, interim sub slab depressurization of several buildings, and site monitoring of soil and groundwater will continue until the DD is complete. The final remedy for groundwater is

expected to be pump and treat to contain the groundwater contamination until MCLs are met throughout the plume. The final remedy for soil and soil vapor is the continued operation of the sub slab depressurizations systems and operation and expansion of the soil vapor extraction interim measures. The clock for five-year reviews will commence with the RA(C) phase. Thus, the first five-year review will be completed five years after the start of the RA(C) phase. Because hazardous substances, pollutants, or contaminants will remain at the site at concentrations exceeding levels that allow for UU/UE, five-year remedy reviews will continue until UU/UE is achieved.

1127A.1013_CECRL-013_OPEN STORAGE AREA

Env Site ID: CECRL-013

Cleanup Site: OPEN STORAGE AREA

Alias: CECRL-013

Regulatory Driver: CERCLA

RIP Date: 11/15/2030

RC Date: 11/15/2059

RC Reason: Not assigned

SC Date: 11/16/2059

Program: ENV Restoration, Army

Subprogram: IR

NPL Status: No

Hazardous Ranking Score: 0

RRSE: High

MRSPP: N/A

Phase	Start	End
PA:	5/31/1990	11/30/1990
SI:	1/31/1991	5/31/1991
RI/FS:	3/31/1991	11/15/2026
RD:	11/15/2026	11/15/2027
IRA:	6/30/1998	11/15/2030
RA(C):	11/16/2026	11/15/2030
RA(O):	11/15/2030	11/15/2059
LTM:	- -	- -

Site Narrative: 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 complete which included an evaluation of VI. The RI concluded TCE is the primary COC. Human health risks are driven by exposure to TCE in the indoor air of four on-site buildings, soil vapor in on-site excavations, and groundwater on-site if it were to be used for drinking water in the future. Outside of the CRREL property, human health risks are driven by potential future residents' exposure to indoor air at the undeveloped property north of the site. Ecological risks related to the site are negligible, but there could be ecological risks if contaminated groundwater were to discharge to the Connecticut River. Exit Strategy - VI sampling, interim soil vapor extraction, interim sub slab depressurization of several buildings, and site evaluation will continue until the DD is complete. The interim systems will continue to operate until the final remedies are operational. The final remedy for groundwater is expected to be pump and treat to contain the groundwater contamination until MCLs are met throughout the plume. The final remedy for soil and soil vapor is the continued operation of the sub slab depressurizations systems and operation and expansion of the soil vapor extraction interim measures. The clock for five-year reviews will commence with the RA(C) phase. Thus, the first five-year review will be completed five years after the start of the RA(C) phase. Because hazardous substances, pollutants, or contaminants will remain at the site at concentrations exceeding levels that allow for UU/UE, five-year remedy reviews will continue until UU/UE is achieved.

1127A.1015_CECRL-015_FORMER GREENHOUSE FUEL OIL UST

Env Site ID: CECRL-015

Cleanup Site: FORMER GREENHOUSE FUEL OIL UST

Alias: CECRL-015

Regulatory Driver: CERCLA

RIP Date: 11/15/2026

RC Date: 11/15/2026

RC Reason: Not assigned

SC Date: 11/16/2026

Program: ENV Restoration, Army

Subprogram: IR

NPL Status: No

Hazardous Ranking Score: 0

RRSE:

MRSPP: N/A

Phase	Start	End
PA:	5/31/1990	11/30/1990
SI:	1/31/1991	5/31/1991
RI/FS:	8/31/1991	11/15/2026
RD:	- -	- -
IRA:	10/31/1998	7/31/2002
RA(C):	- -	- -
RA(O):	- -	- -
LTM:	- -	- -

Site Narrative: This is the location of the former fuel oil UST at the greenhouse research facility. The site had shallow benzene, toluene, ethylbenzene, and xylenes 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 site was in the long-term management (LTM) phase without a DD and was prematurely response complete (RC). The site was moved from LTM to RI/FS. The remedial design, RA(C), remedial action (operations), and LTM phases were deleted. The final remedial actions were IRAs. The RC date coincided with the completion of the FS. The RI found no indication of contamination at this site and the FS recommended a no further action (NFA) outcome. Exit Strategy - Complete the NFA documentation for this site during the proposed plan/record of decision phase and obtain NHDES concurrence.

SITE SUMMARY

SITE CLOSEOUT SUMMARY

CRL ID	Site Name	Site Closeout Date
1127A.1001	CECRL-001_SPILL SITE FROM FORMER AG STOR	4/15/1994
1127A.1003	CECRL-003_FORMER FUEL OIL UST	10/15/1992
1127A.1004	CECRL-004_CURRENT FUEL OIL UST (6,000 GA	10/15/1992
1127A.1005	CECRL-005_ABOVE GROUND FUEL STORAGE TANK	10/15/1992
1127A.1006	CECRL-006_FORMER GASOLINE USTS	10/15/1992
1127A.1007	CECRL-007_CURRENT FUEL OIL UST (1974) (2	10/15/1992
1127A.1008	CECRL-008_ABOVE GROUND WASTE OIL TANK	10/15/1992
1127A.1010	CECRL-010_FORMER OPEN STORAGE AREA	10/15/1992
1127A.1011	CECRL-011_CONCRETE STORAGE PAD	10/31/1992
1127A.1012	CECRL-012_EXTERIOR TEST POND	10/15/1992
1127A.1014	CECRL-014_MAIN LABORATORY MACHINE ROOM	10/15/1992
1127A.1016	CECRL-016_FORMER TCE OPEN STORAGE AREA	10/15/1992
1127A.1017	CECRL-017_POND NEAR WELL 3	10/15/1992
1127A.1018	CECRL-018_COOLING WATER DISCHARGE TO CON	6/30/1992

COMMUNITY INVOLVEMENT

Community Involvement Plan (Date Last Reviewed):	1/15/2018
Technical Review Committee Establishment Date:	12/15/1992
Restoration Advisory Board (RAB) Establishment Date:	1/15/2014
RAB Adjournment Date:	N/A
RAB Adjournment Reason:	N/A
Reasons for Not Establishing RAB:	N/A
RAB Date of Solicitation from Community:	01/06/2024
RAB Results of Solicitation:	No additional community response from 01/06/2024 RAB solicitation. Another RAB solicitation planned for 2026.
Current Technical Assistance for Public Participation (TAPP):	N/A
TAPP Title:	N/A
Potential TAPP:	N/A
Administrative Record Location:	ERDC-CRREL 72 Lyme Rd. Hanover, NH 03755, (603) 646-4602
Information Repository Location:	Howe Public Library 13E South St. Hanover, NH 03755, (603) 643-4120

FIVE-YEAR / PERIODIC REVIEW SUMMARY

Status	Review Type	Start Date	End Date	Plans Narrative	Actions Narrative	Results Narrative
Future	FYR	11/15/2030	11/15/2031	TBD	TBD	TBD
N/A	N/A	N/A	N/A	N/A	N/A	N/A