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Five-Year Review Report

Peterson/Puritan, Inc. Superfund Site
Cumberland and Lincoln, Rhode Island

First Five-Year Review Report

September 2002

Prepared By:

United States Environmental Protection Agency
Region 1-New England
Boston, Massachusetts

Approved By:

Richard Cavagnero, Acting Director
Office of Site Remediation and Restoration

Date: 9-26-02

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Executive Summary

The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. EPA Region 1, New England (EPA-NE) has conducted a first five-year review for the Peterson/Puritan, Inc. Superfund Site in Cumberland and Lincoln, Rhode Island (the Site), and specifically with regards to the remedy implemented at Operable Unit 1 of the Site.

The assessment of this five-year review for Operable Unit 1 found that: 1) the remedy was constructed in accordance to the requirements of the Record of Decision, 2) institutional controls have not been implemented on all affected properties, 3) remediation of the ground water at the PAC source area to drinking water standards for arsenic within the ROD-designated cleanup time frames will not likely be achieved, and 4) further assessment of the ground water is necessary.

The remedy for OU1 currently protects human health and the environment in the short term, however, the remedy can not be deemed protective in the long term until followup actions are taken.

Until additional information becomes available through the Remedial Investigation and Feasibility Study, the protectiveness determination for OU2 is deferred.

For the Mackland Farm/Kelly House property, further consideration for investigation into the nature and extent of the ground water contamination as a potential OU3 remains in the planning stage and EPA no longer considers the Ashton Mill Property to be a part of the Peterson/Puritan Superfund Site.

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Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Peterson/Puritan, Inc. Superfund Site		
EPA ID: RID055176283		
Region: 1	**State:** Rhode Island	**City/County:** Cumberland and Lincoln/Providence
SITE STATUS		
NPL Status: Final		
Remediation Status: OU 1 Construction Complete		
Multiple OUs?* Yes		**Construction Completion date:** N/A
Has the Site been put into reuse? Yes-portions (see Preliminary Reuse Plan, March 2002)		
REVIEW STATUS		
Lead Agency: EPA, Region 1-New England		
Author Name: David J. Newton		
Author Title: Remedial Project Manager		**Author Affiliation:** U.S. EPA, Region 1-New England
Review Period: 10/21/1999 to 9/20/2002		
Date of Site Inspection: November 28, 2000		
Type of Review: Post-SARA		
Review Number: First five-year review		
Triggering Action: RA Start at OU#1 (PAC Remediation Area)		
Triggering Action date: August 23, 1996		
Date due: September 30, 2002		

* ["OU" refers to operable unit]

Issues:

1.	PAC ODS remediation system has failed to reduce arsenic concentrations in source area ground water to protective levels.
2.	PAC Remediation Area BTEX concentrations are increasing (slightly) in a portion of the Site, and more data concerning the source strength of BTEX at the former UST is needed.
3.	PAC Remediation Area response action for CVOCs is not expected to achieve cleanup levels within designated time frame. PAC believes that source(s) of CVOC contamination in the PAC Downgradient Area are likely attributable to off-site non-PAC related operations.
4.	Institutional Controls are not in place at all affected properties within OU1
5.	Promulgated revisions to RI Water Quality Regulations upgrading designated use goals for the Blackstone River.
6.	Conduct a timely investigation into the nature and extent of the contamination at OU2 (J.M. Mills Landfill and surrounding areas)
7.	The source of the ground water contamination found at the Mackland Farm/Kelly House property remains unknown.

Recommendations and Follow-up Actions:

Issue	Recommendations and Follow-up Actions	
1. Arsenic	A.	Perform a background study for arsenic concentrations in soil (leachability) and ground water. (helps determine how localized the elevated levels of arsenic contamination are and therefore the feasibility of active cleanup measures).
	B.	Demonstrate and provide a point of compliance boundary in OU1 for the new 10 ppb concentration standard for arsenic in ground water.
	C.	Further document by modeling/monitoring the evidence for natural attenuation of arsenic in ground water.
	D.	Working in concert with the Town, determine and document the RAFLU of the Property.
	E.	Demonstrate and provide documentation in support of a Technical Impractibility (TI) Waiver of the Arsenic ARAR: 1. Spacial area over which a TI decision will apply. 2. Conceptual model describing Site geology, hydrology, source strength, fate and transport. 3. Evaluation of restoration potential (data and analyses that support assertion for TI waiver)
2. BTEX	A.	Conduct continued ground water monitoring of the BTEX within the south-west portion of the PAC Remediation Area to ascertain whether future response actions may be needed.
	B.	Provide further trend analyses incorporating JGWMP data to resolve BTEX concentrations at the former UST location within the PAC Remediation Area.

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Issue	Recommendations and Follow-up Actions	
3. CVOCs	A.	Expand the CCL/PAC well monitoring network including, but not limited to, nested (shallow/deep) wells on the Okonite property that provide vertical profiling coverage south and west of MW-307 to demonstrate the assumption that source(s) of CVOCs contamination in the PAC Downgradient Area are likely attributable to off-site non-PAC related operations. Understanding the strength of the source will allow EPA to determine whether MNA is an appropriate remedy for the PAC-downgradient CVOCs.
	B.	Provide further trend analyses incorporating latest JGWM data and new monitoring stations to postulate source strength and MNA for CVOCs
4. ICs	A.	Complete and record ICs for all properties within OU1 for which (a) there is no need for condemnation actions and (b) subordination agreements can be obtained.
	B.	Complete condemnation actions or problematic subordination agreements.
5. OU2	A.	Increased frequency in recreational use of the river in the vicinity of OU 2 may increase the threat of exposure to contaminated soils and sediments along the bank of the river. Increase the public's awareness through frequent notice and additional sign postings along the river until potential risks are further evaluated and physical hazards are known.
	B.	Complete the OU2 RI/FS such that any/all potential risks are identified to the public in a timely manner and whenever possible, conduct ground water data collection commensurate with that of OU 1.
6. "OU3"	Continue data review and initiate further collaborative planning to assess the need for additional response actions at OU3.	

Protectiveness Statements:

The remedy for OU1 currently protects human health and the environment in the short term, however, the remedy can not be deemed protective in the long term until followup actions are taken.

Until additional information becomes available through the Remedial Investigation and Feasibility Study, the protectiveness determination for OU2 is deferred.

For the Mackland Farm/Kelly House property, further consideration for investigation into the nature and extent of the ground water contamination as a potential OU3 remains in the planning stage and EPA no longer considers the Ashton Mill Property to be part of the Peterson/Puritan Superfund Site.

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List of Acronyms

AOC	Administrative Order on Consent
AOC	Areas of Concern
ARARs	Applicable or Relevant and Appropriate Requirements
BETX	Benzene, Toluene, Ethylbenzene, and Xylene
CA	Chloroethane
CCL	CCL Custom Manufacturing
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COCs	Contaminants of Concern
Cu	Copper
CVOCs	Chlorinated Volatile Organic Compounds
CWA	Clean Water Act
DCA	Dichloroethane
DCE	Dichloroethene
DNAPL	Dense, Non-Aqueous Phase Liquids
DO	Dissolved Oxygen
DOJ	Department of Justice
ELUR	Environmental Land Use Restriction
EM	Environmental Monitoring
EPA	US Environmental Protection Agency
EPA-NE	US Environmental Protection Agency, Region 1, New England
FI	Focused Investigation
FS	Feasibility Study
GAC	Granular Activated Carbon
gpm	Gallons Per Minute
GWTS	Ground Water Treatment System
HQ	Headquarters (EPA)
IC(s)	Institutional Control(s)
IFR	Industrial Factory Rentals
JGWMP	Joint Ground Water Monitoring Program
MA	Massachusetts
MW	Monitoring Well
NBC	Narragansett Bay Commission
MCL(s)	Maximum Contaminant Level(s)
MNA	Monitored Natural Attenuation
NCP	National Contingency Plan
mg/L	Milligrams per Liter
NPL	National Priorities List
ODS	Oxident Delivery System
O&M	Operation and Maintenance
OU(s)	Operable Unit(s)
OU1	Operable Unit 1 (consisting of PAC and CCL Remediation Areas)

List of Acronyms (continued)

OU2	Operable Unit 2 (consisting of J. M. Mills Landfill and vicinity)
OU3	Operable Unit 3 ("Potential" OU consisting of Mackland Farm/Kelly House property and vicinity)
PAC	Pacific Anchor Chemical
Pb	Lead
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenols
PCE	Tetrachloroethene
PID	Photo Ionization Detector
POP	Project Operations Plan
POTW	Publicly Owned Treatment Works
PRPs	Potentially Responsible Parties
PW-3	Production Well # 3 (formerly Owens Corning)
RA	Remedial Action
RAFLU	Reasonably Anticipated Future Land Use
RAOs	Remedial Action Objectives
RD	Remedial Design
RD/RA	Remedial Design/Remedial Action
RI	Remedial Investigation
RI	Rhode Island
RIDEM	Rhode Island Department of Environmental Management
RI/FS	Remedial Investigation/Feasibility Study
RIDOT	Rhode Island Department of Transportation
RI WQR	Rhode Island Water Quality Regulations
ROD	Record of Decision
RPM	Remedial Project Manager
Site	Peterson/Puritan Inc. Superfund Site
SFI	Supplemental Focused Investigation
SFI II	Supplemental Focused Investigation, Phase II
SVE	Soil Vapor Extraction
SVOCs	Semi-volatile Organic Compounds
TBC	To Be Considered
TCA	Trichloroethane
TCE	Trichloroethene
TI	Technical Impractability
TOC	Total Organic Carbon
TTO	Total Toxic Organics
ug/L	Micrograms per Liter
UST(s)	Underground Storage Tank(s)
VC	Vinyl Chloride
VOCs	Volatile Organic Compounds

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Peterson/Puritan, Inc. Superfund Site
Cumberland and Lincoln, RI
First Five-Year Review Report
September 2002

I. Introduction

The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify deficiencies found during the review, if any, and identify recommendations to address them.

The Agency is preparing this Five-Year Review report pursuant to CERCLA Section 121 and the National Contingency Plan (NCP). CERCLA Section 121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.*

The Agency interpreted this requirement further in the NCP; 40 CFR Section 300.430 (f)(ii) states:

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

EPA Region 1, New England (EPA-NE) has conducted a five-year review of the remedial actions implemented at the Peterson/Puritan, Inc. Superfund Site in Cumberland and Lincoln, Rhode Island (the Site). This review was predominantly conducted from October 1999 through December 2001 when the Settling Defendants for the Operable Unit 1 (OU 1) remedy submitted, and EPA reviewed, detailed treatment system evaluation, trend analyses, and data summary reports in support of the review. The review was extended through July 2002 during which time EPA has grappled with how the new Safe Drinking Water Act standard for arsenic would affect the Operable Unit 1 remedy. During this time, EPA undertook various measures to inform the public and community stakeholders of the five year review process. EPA also continued to identify and to support emerging community needs and issues, and has supported stakeholder initiatives concerning reuse throughout the Site. This report documents the results of these efforts as it relates to the five-year review. This report is also meant to summarize the elements of the Settling Defendant's submittals specifically for OU 1.

This is the first five-year review for the Site. The triggering action for this review is the initiation of the remedial action on August 23, 1996. A five-year review is required because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unrestricted use and unlimited exposure.

II. Site Chronology

Table 1 presents a chronology of significant events for the Peterson/Puritan Site.

Table 1 - Snapshot Chronology of Significant Site Events

DATE	***EVENT***
1950's	Blackstone River valley first developed as a municipal water supply source for the town of Cumberland along its east bank (Martin St. Well).
1957	Town of Lincoln installs first of three municipal wells on a parcel in Quinnville next to the west bank of the Blackstone River (the "Quinnville Wellfield").
1959	The former Peterson/Puritan plant was constructed as a packager of aerosol consumer products on Martin Street in Cumberland.
1964	Town of Cumberland installs Lenox Street Well a mile south of Martin Street for additional water service.
1967	Martin St. Well closed by municipality due to iron and manganese fouling.
1970-1975	Lincoln adds two more wells at the Quinnville Wellfield to service community. The Wellfield serves 45% of the community's water.
1974	Peterson/Puritan experiences a spill of approximately 6200 gals. of solvent from a rail car and tankage incident during a delivery within the plant's tank farm. The spill is handled locally and not reported to State or Federal authorities.
1976	The Peterson/Puritan facility experiences a fire and explosion, which required the plant to undergo new construction and modifications.
1979	During routine statewide sampling, Rhode Island Department of Health discovers chlorinated volatile organic compounds exceeding drinking water standards and orders the Quinnville Wellfield and Lenox Street well closed.
1980-1984	A series of initial investigative studies into the source of the contamination is conducted. Lincoln initiates a search for a new water supply, constructs two new wells in the Blackstone Valley aquifer, and later connects to the City of Providence water system. Cumberland offsets its loss of water service though other Town-owned water resources.
12/30/1982	Site proposed on National Priorities List (NPL).
1982-1987	EPA negotiates with Potentially Responsible Party to conduct and finance the Remedial Investigation/Feasibility Study (RI/FS).

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DATE	*EVENT*
9/8/1983	Final listing onto NPL.
5/16/86	Fund lead Site-wide RI/FS commences along a 2 mile segment of the river between the Ashton and Pratt dams.
5/29/87	Administrative Order by Consent is signed with EPA, and the Potentially Responsible Party (PRP) takes over Site-wide RI/FS.
1990	Due to the expansive study area and the number of identified areas of concern, EPA administratively divides the Site into Operable Units. Dexter Quarry is removed from the Site's listing description and is delegated to the State for appropriate response actions. Pacific Anchor facility (PAC Remediation Area) is added to the OU1 investigation. Other portions of the Site, including J. M. Mills Landfill and vicinity to the south, and Mackland Farm (aka: Kelly House property) to the north are identified for potential future response actions. OU1 (area encompassed by the industrial park and the Quinnville Wellfield) is earmarked for continued RI/FS, leading to OU1 Record of Decision.
1991	First Removal Action taken at J. M. Mills Landfill; landfill is secured with a fence.
9/30/1993	Record of Decision for OU1 signed.
4/22/94-7/25/95	EPA conducts negotiations for Remedial Design/Remedial Action.
December 1995	Consent Decree for OU1 entered.
1/29/96	CCL PRPs and the State finalize an agreement compensating the State for oversight costs, compensating the State for ground water natural resource claims, and establishing an interim ground water residual zone under State law within which the parties agree that it may be impossible or impractical to reach ground water clean up standards. The residual zone covers part of the CCL Remediation Area in OU1.
7/31/1996	Peterson/Puritan Site identified by EPA as one of the pilot sites for the Oversight Reform initiative.
8/23/1996	Trigger of five year review; PAC Remediation Area (OU1) Remedial Action start.
1997	EPA's Assessment leads to Second Removal Action at J. M. Mills Landfill; landfill is re-secured by removing identified friable asbestos insulation and by extending the fence.
6/15/97	All OU1 construction complete.
12/31/97	Start of operation and maintenance.
11/25/98-7/13/01	EPA negotiates with Potentially Responsible Parties (PRPs) to conduct OU2 RI/FS.
October 1999	Settling Defendants for OU1initate data gathering and reporting for OU1 to support the first five year review.
October 2000	Owens Corning Fiberglass Co. files for bankruptcy. EPA and Owens Corning meet to discuss potential liability at the Site. Owens Corning offers EPA and RIDEM voluntary limited response actions in support of liability claims.

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DATE	*EVENT*
7/13/01	RI/FS for a re-defined OU2 commences. Work plans for the PRP-lead RI/FS are currently under review. One additional area of potential ground water concern (Mackland Farm/Kelly House property) in Lincoln, RI and the segment of the river and aquifer to the north of OU1 (within Cumberland and Lincoln) remains "the potential OU3."
Fall 2001	A Site Inspection of OU2 is conducted for the planning phase of the RI/FS. Low water levels in the Blackstone River allow access to an unnamed island. Observations include additional locations where disposal practices on the island are identified. A large abandoned excavator, only previously observed at a distance from the location of the bike path, is inspected and found to be partially dismantled, including hydraulic lines severed, and vandalized cab and engine compartments. The excavator is identified as a potential concern to be further reviewed during the RI.
December 2001	EPA's OU2 enforcement investigations identify a significant number of additional parties potentially liable for the future cleanup of this portion of the Site. These enforcement investigations are ongoing.
December 2001	EPA forwards a citizen complaint to RIDEM concerning the large excavator. Complaint includes the concern that fuel tanks and hydraulic lines contain oily fluids which may overtop and cause a release during future flooding events on the island. RIDEM agrees to take the lead and investigate/remove fluids from the excavator.
December 2001	EPA learns that the former Owens Corning Fiberglass Mill (aka: Ashton Mill) in Cumberland, RI (north of OU1 and within the potential OU3 study area) is slated for redevelopment --conversion of historic mill site to residential condominiums.
12/11/01	Industrial Factory Rentals, Inc., current owner of Ashton Mill Property, submits a Hazardous Material Release Notification Form to the Rhode Island Department of Environmental Management (RIDEM) in response to due diligence investigations on the Property. RIDEM places Property under State Brownfields program. EPA initiates discussions with stakeholders concerning the potential OU3 and the planned reuse for the mill property. Owner and developer initiate significant additional investigations and response actions within the property boundary.
March 2002	Site is selected by EPA Region I as a pilot for the Superfund Redevelopment Initiative. Region I publishes the Peterson/Puritan, Inc. Superfund Site Preliminary Reuse Plan and introduces the Plan to the local community and stakeholders.
5/7/2002	RIDEM uses Oil Liability Trust funds to contract for the extraction and disposal of oil-containing fluids from the excavator located on the unnamed island (OU2).
6/5/2002	EPA initiates a limited field investigation on Mackland Farm/Kelly House property to obtain ground water and other supporting environmental media data to aid discussions with the State, Owens Corning, developers and other stakeholders over the prospect of an OU3. To complement the EPA investigation, Owens Corning volunteered to conduct investigations within a small disposal area near to the Kelly House that is suspected of holding previously disposed Owens Corning wastes. At the same time, the Ashton Mill Property developers volunteered to conduct additional ground water sampling on the parcel across the river.

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DATE	*EVENT*
7/12/2002	RI Department of Transportation conducted a series of test pits in Cumberland (150 ft. northeast of the Pratt Dam) to delineate the lateral extent of suspected solid waste landfill operations along the river. This work was conducted as part of the design for Segment 4B of the Blackstone River Bikeway. EPA is consulted regarding a State plan to remove contaminated soils located within the proposed flood plain compensation area for the Bikeway. Final outcomes are pending.
7/26/2002	EPA Administrator Christine Whitman visits the Site and announces a plan to award a $100,000 Superfund redevelopment grant to the towns of Cumberland and Lincoln for reuse planning.
2001 thru Present	EPA conducts first five year review for the whole Site.

III. Background

A. Site Characteristics

The Site is located along the Blackstone River within the Towns of Cumberland and Lincoln, Rhode Island. The Site "study area" occupies 500 acres and is approximately two miles long from the Ashton Dam to the north to the Pratt Dam at its southern end, and extends 2,000 feet to the east and west of the main river channel. The study area comprises a portion of the Blackstone River and aquifer system from the Ashton Dam (northern end) to the Pratt Dam (southern end). Specifically, this area includes an industrial park, incorporating the former Peterson/Puritan, Inc. facility (now known as CCL Custom Manufacturing Inc.), Pacific Anchor Chemical Company, other fully-operational industrial facilities, an inactive landfill known as J. M. Mills Landfill, an inactive solid waste transfer station, sand and gravel operations, a segment of the Providence and Worcester Railroad track, Blackstone River State Park, impacted municipal water supply wells, and numerous interspersed areas of undeveloped land, flood plain, and wetlands. The Site study area contains over 40 separate parcels owned both privately and by local governments and is being addressed under Superfund as a multi-source ground water contamination site with two or more Operable Units (OUs). (See Figure 1, Peterson/Puritan, Inc. Superfund Site Study Area.)

The First Operable Unit

Operable Unit 1 (OU1) consists of the industrial park in the vicinity of Martin St. in Cumberland and the Quinnville Wellfield in Lincoln. The OU1 cleanup addresses the CCL

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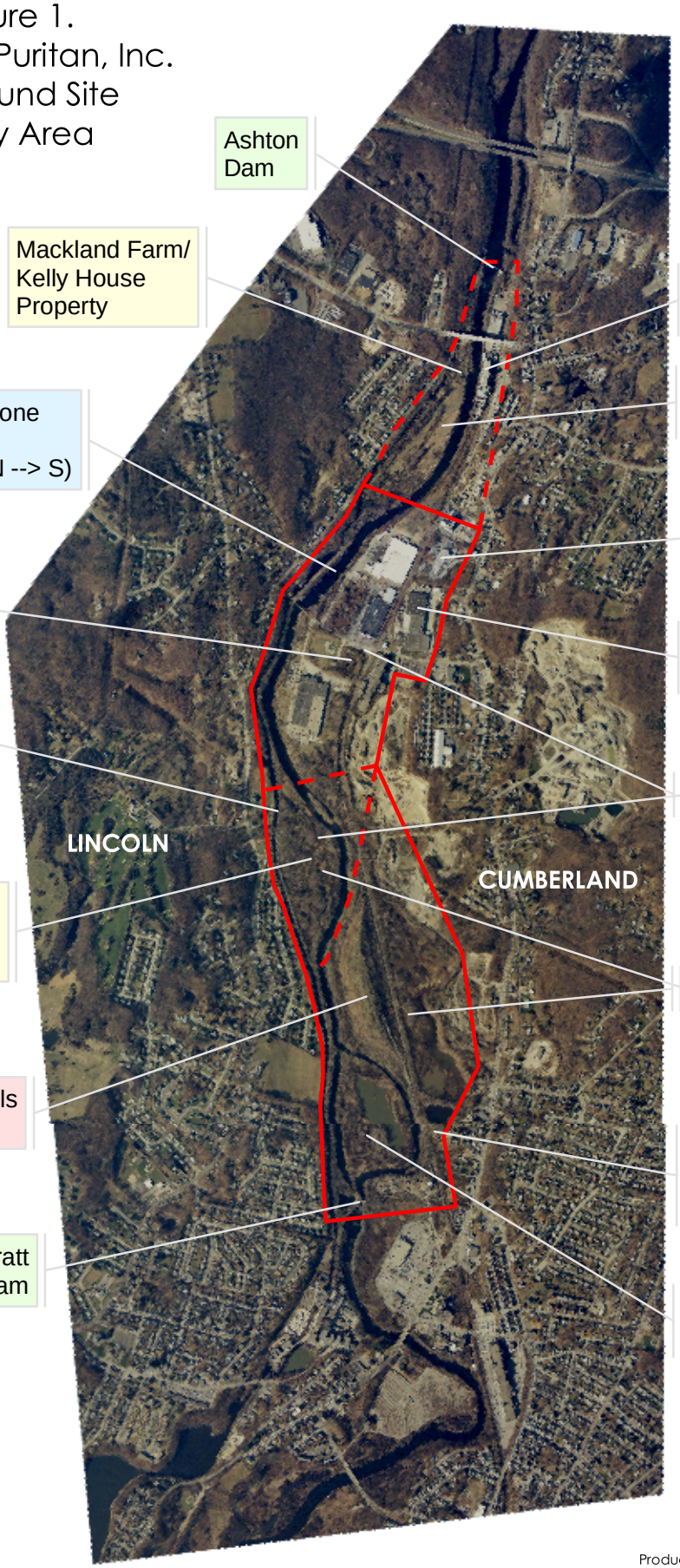
Figure 1. Peterson/Puritan, Inc. Superfund Site Study Area



EPA New England

0 500 1,000 2,000 3,000 4,000 Feet

Produced By The EPA New England GIS Center
17-Oct-2001, last updated 25-Sept-2002

Study area boundaries are approximate and are for presentation purposes only.

* Currently being addressed under State Brownfields Program.

Custom Manufacturing Inc. (formerly Peterson/Puritan, Inc.) facility solvent spill, Pacific Anchor Co. (PAC) leachfields, and contaminated soils and ground water.

The former Peterson/Puritan, Inc. plant was built in 1959 as a packager of aerosol consumer products. A rail car incident resulting in a product tank spill occurred on the facility's property in 1974, releasing an estimated 6000 gallons of solvent. In 1976, following a major fire, the plant was rebuilt and remains in operation. In 1979, volatile organic contaminants were detected in area wells during state-wide sampling. The Martin Street Well and Lenox Street Well in the Town of Cumberland and the Quinnville Wellfield in the Town of Lincoln were closed in 1979 due to contamination, and remain out of service. Attempts to flush contaminants from Lincoln's three wells were abandoned after repeated efforts to remove the contaminants from the aquifer failed. The Town of Lincoln since has been connected to an alternate water supply (through a third party settlement) while the Town of Cumberland absorbed the cost of losing its wells by increasing production from remaining town water supplies.

The PAC facility manufactures specialty chemical materials for use in detergents, cosmetics, agricultural, food, and general industrial chemicals. Pacific Anchor Chemical Corporation, a division of Air Products and Chemicals, Inc., is currently the sole occupant of the PAC Facility, and EPA has learned that this facility will be shutting down its operations in late 2002. The facility originally was operated by Universal Chemicals and subsequently by Lonza Inc. (Lonza), Trimont Chemicals, and Pacific Anchor Chemical Corporation. The PAC Remediation Area also includes a number of separately owned/operated parcels such as a warehouse and a former maintenance garage. This property was formerly owned and operated by Wetterau Incorporated, and is currently owned and operated by Berkeley Acquisition Corp. (d.b.a. Dean Warehouse).

The Peterson/Puritan spill was identified as a primary source of contamination impacting the Quinnville Wellfield. The source of the Lenox St. Well contamination is still under investigation.

The Second Operable Unit

The second Operable Unit of the Site, immediately south of OU1, contains approximately 100 acres. OU2 is located along the Blackstone River and includes the J. M. Mills Landfill, which accepted wastes from 1954 through the early 1980s. The Study Area for OU2 is located predominately in the town of Cumberland (except a small area within the jurisdiction of Lincoln) and is surrounded by industrial, commercial, residential and semi-rural properties. Bordering OU2 to the north is the Hope Webbing Company (aka: Hope Global) property located at 88 Martin Street. Across the river to the north-west is the Quinnville Wellfield. To the south is the Stop and Shop Market (and strip mall) on Mendon Road (Route 122); to the east is the sand and gravel

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operations and wetlands known locally as “New River;” and to the west is the Blackstone River and Canal.

OU2 contains many parcels. EPA believes the most contaminated parcel is the privately owned 52 acre J. M. Mills Landfill, which accepted mixed municipal and industrial wastes from 1954 through 1986. Immediately to the south-east of the Landfill is a privately owned 34 acre unnamed island located in the Blackstone River. Down river from the unnamed island is the Pratt Dam, which provides an access point to the island. OU 2 also includes the 26 acre Lincoln “Quinnville” Municipal Wellfield and the Cumberland Lenox Street Municipal Well. These wells were used by the towns of Lincoln and Cumberland as a municipal water supply until 1979 when they were closed by the Rhode Island Department of Health due to the presence of volatile organic contaminants detected in the water. A section of the Providence and Worcester Railroad line runs through OU2 and forms the boundary of the Landfill’s eastern slope while the river forms the Landfill’s western slope. South of the Landfill and within the boundary of OU2, a former privately- owned transfer station operation arranged for waste to be disposed of at the Landfill. Other areas of OU2 include portions of the Blackstone River and an adjacent canal, the Blackstone River Bikeway and a privately owned sand and gravel operation. Access to the OU 2 study area is generally from gravel and paved easements paralleling the Providence and Worcester Railroad tracks in the Town of Cumberland from Martin Street to the north and Route 122 (Mendon Road) to the south.

EPA recently has gathered further information which indicates that the J. M. Mills Landfill was used for disposal of wastes, including wastes containing hazardous substances. This property was primarily used as a privately-owned, co-disposal landfill. Sewer sludge also was disposed at the facility as part of the daily operation. Various types of large, bulky solid materials (including, but not limited to, tanks, crushed drums, pre-formed concrete structures, railroad ties, and demolition debris) are deposited next to the Landfill, along the north and south access roads and along the bank of the river. The now closed Lenox Street Well in Cumberland is located approximately 1000 feet southeast from the flank of the Landfill. The Quinnville Wellfield is immediately across the river in Lincoln.

The unnamed island contains areas of suspect disposal operations, evidence of past sand and gravel extractions, and numerous tires and other bulky wastes are scattered throughout. An abandoned track-mounted Bucycus-Erie excavator remains on the island. This massive excavator is estimated at 118,000 pounds and is partially dismantled in place. Access to the island had been very limited in the past due to high water. In 2001, drought conditions lowered water levels in the river, and this allowed for access on to the island by foot to conduct a series of observations and planing exercises. The excavator and other potential areas of concern were earmarked for further study during the RI. A local resident reported to EPA a concern that the excavator’s fuel tanks and hydraulic lines were still holding potentially hazardous fluids. In the Spring of 2002, RIDEM assumed the lead and conducted the removal of the oil-containing fluids from the machine.

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Within the southern boundary of the OU2, recent test pitting operations conducted by the RI Department of Transportation indicated the presence of solid waste disposal activity along the east bank of the river in proximity to the Pratt Dam and behind the Stop & Shop supermarket. These investigations were conducted for the purpose of delineating a flood plain compensation area for the planned Blackstone River Bikeway (Segment 4B). Soil samples taken from the test pits indicated the presence of lead and arsenic concentrations in soils exceeding RIDEM Direct Exposure Criteria. Semi-volatile organic compounds and other contaminants of concern were also detected above background levels at some sample locations. RIDEM is contemplating a plan to excavate impacted soils associated with the extent of the proposed flood plain compensation area and the Bikeway. EPA is working with RIDEM, and a final outcome for this project is pending.

An investigation into the nature and extent of contamination at the J.M. Mills Landfill and surrounding areas is currently underway. Field work for this remedial investigation/feasibility study (RI/FS) has been initiated as of the spring of 2002 and is currently scheduled for completion in the fiscal year 2005. Following the completion of this study, a final cleanup remedy will be selected; a remedial design (RD) will be completed; and the remedial action (RA) will be initiated. Construction of the selected remedy is anticipated to be completed by fiscal year 2008.

Other Areas of Potential Concern

Other portions of the Site study area remain less defined and may be subject to further investigation. Ground water contamination across the river and to the north from OU1 has led to the consideration of a third (potential) operable unit. This potential OU 3 includes the Mackland Farm/Kelly House property on the Lincoln side of the River and associated pasture and flood plain to the Blackstone River. To the east in Cumberland is the old Ashton Mill complex that was built in 1867. Owens Corning operated the Ashton Mill from 1941 to 1984. The Ashton Mill Property, owned and operated by Industrial Factory Rentals (IFR) since 1984, is used currently for limited multi-use light industrial operations. The ground water contamination, located at the Kelly House property, was identified in 1988 during the site-wide remedial investigation. This ground water contamination includes chlorinated solvents and volatile organic compounds, one or more of these compounds having detectable concentrations above safe drinking water standards. The source of this contamination has not been determined.

The Mackland Farm or the Kelly House property is an elongated island in the Blackstone River in Lincoln, Rhode Island. This area is bounded to the north by the Ashton Dam, to the west by the Blackstone River Canal, and to the east by the Blackstone River. The southern edge of the property meets the narrow strip of land that was formally the canal tow path. Today this area is part of the Rhode Island Blackstone River Bikeway. This property is currently owned and operated by the State of Rhode Island. The property contains a small building dating back to the 1830's, known as the Kelly

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House, and associated farm land. Known easements include utilities to the house, the Route 116 highway overpass, the Narragansett Bay Commission's sewer interceptor, Town of Lincoln Water Department municipal water supply test wells, the bikeway, and the historic canal.

During the 1940's through the early 1950's, a bridge connected the island with the former Owens Corning Ashton Plant (fiberglass manufacturing facility). Approximately 250 feet south of the Kelly House is a suspected area of fill with some visual evidence of fiberglass-like materials protruding from the surface. During the previous site-wide remedial investigations conducted in 1987 and 1988, the Lincoln test wells were sampled and found to contain volatile organic compounds (VOCs). Trichloroethene was detected slightly above health-based levels. Contaminants of concern found in ground water during this early investigation include trace to detectable levels of 1,1 dichloroethane, 1,1,1 trichloroethane, 1,1,2,2 tetrachloroethane, benzene, trans-1,2 dichloroethene, trichloroethene, acetone, chloroform, chromium, copper, lead, nickel, cyanide and arsenic. Additionally, surface water and sediment samples collected in the canal and the river in the immediate vicinity revealed semi-volatile organic compounds and heavy metals at concentrations above background levels. As a result, the Mackland Farm location is an area that requires further characterization to identify the need for any potential future Superfund response actions.

Further investigation into the nature and extent of the ground water contamination as a potential OU3 remains in the planning stage. In the interim, EPA has secured another round of ground water analysis (and also supporting soil, sediment and surface water) from the Mackland Farm/Kelly House property, which also includes the Blackstone River State Park and a portion of the river up to the Ashton Dam. The samples were taken during the summer of 2002. In addition, Owens Corning, working with RIDEM and EPA in a voluntary capacity, assumed the lead to investigate a small solid waste disposal area south of the Kelly House which was known to contain an unknown amount of Owens Corning waste materials. EPA and RIDEM suspected that the small disposal area may be the source of the ground water problem. This investigation has revealed that Owens Corning wastes were deposited in this location, but that this disposal activity is not the source of the ground water problem on the Mackland Farm/Kelly House property. Further investigations concerning ground water are being considered.

Across the river from the Mackland Farm/Kelly House parcel is the Ashton Mill Property (the Property). This Property is under close review because a developer (Forest City) is interested in redeveloping this historic mill site into a 214 unit residential community. Under the supervision of RIDEM, a due diligence site investigation was completed in the Fall of 2001, which included the installation of soil borings and monitoring wells, the sampling and analysis of soil and ground water samples, a site inspection, review of historic property use, and a review of current regulatory status.

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After the investigation identified a release of hazardous materials to the environment at the Property, a Hazardous Material Release Notification Form was submitted to RIDEM by the Property owner. A more detailed site soil and ground water investigation, including the sampling and analysis of soil and ground water samples for VOCs, total petroleum hydrocarbons (TPH), metals, polychlorinated biphenals (PCBs) and semi-volatile organic compounds (SVOCs) was also completed.

In an attempt to better understand the nature and the extent of contamination affecting the ground water in this area, EPA, in partnership with Owens Corning, IFR, Forest City, and RIDEM, completed limited site investigations within this area in the Summer of 2002.

As a result of these site investigations, three principal Areas of Concern (AOCs) were identified on the Ashton Mill Property:

- AOC 1: Petroleum in soil and ground water in the area of a former No. 6 fuel oil underground storage tank (UST).
- AOC 2: Lead, arsenic and polycyclic aromatic hydrocarbons (PAHs) in soil in the area of the former incinerator.
- AOC 3: Separate phase petroleum in soil and ground water between the former Staple Forming Building (Buildings 18/19) and Process Building 20.

Site investigators, the State, and EPA have reviewed the results of the investigation to assess whether chlorinated VOCs were used, stored, or disposed of on the Property. The Ashton Mill complex was built in 1867 by the Lonsdale Company to manufacture cotton goods. Chlorinated VOCs are not associated with the cotton milling operations. The mill was then closed in 1935. In 1941, Owens Corning purchased the Property to manufacture fiberglass products. EPA does not have any evidence that chlorinated VOCs were used in the Owens Corning operations. In the early 1980's, Owens Corning closed the mill. From1984 to the present, the Property has been leased to a number of small businesses. EPA does not have any records of chlorinated VOCs being used or stored at the Ashton Mill Property.

The site investigation did identify an occasional detection of chlorinated VOCs (chloroform, DCE, TCA, DCA, PCE) in soil and ground water at the Property. However, they were detected at very low concentrations (below health-based levels), and neither their random distribution, nor sporadic occurrence appears to be associated with an identifiable source of VOCs at the Ashton Mill. Nor is there any evidence supporting the hypothesis that the chlorinated VOC detections on the property would be related to, or hydrogeologically connected with, either the chlorinated VOC sources(s) and plume(s) found at Operable Unit 1 or the chlorinated VOCs found in ground water at the Mackland Farm/Kelly House parcel across the river.

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RIDEM has approved a series of cleanup measures to address the contamination, including placement of a Environmental Land Use Restriction (ELUR) in the form of a deed restriction on the Ashton Mill Property, soil excavation, ground water extraction and treatment, indoor air sampling, long-term ground water monitoring and potential separate phase product recovery. RIDEM issued a program letter on June 19, 2002, in which they acknowledge that the site investigation activities are complete. Cleanup of the petroleum in soil and ground water at AOC 1 has commenced and is in progress under RIDEM oversight. No remedial actions are required for the limited chlorinated VOCs identified at the Property under State regulations.

The source of the ground water contamination found at the Mackland Farm/Kelly House property remains unknown. Further investigation into the source of the Kelly House property ground water contamination remains in the planning stage with EPA and RIDEM. Based upon available information submitted to EPA concerning the Ashton Mill Property, this Property does not contain contamination related to the release of hazardous substances at the Site and the contamination found on the property is limited to the Property boundary. Thus, EPA no longer considers the Ashton Mill Property[1] to be a part of the Peterson/Puritan Superfund Site. EPA therefore anticipates no need to take any further Superfund enforcement action at the Property unless new information warranting further Superfund consideration or conditions not previously known to EPA regarding the Property are discovered. EPA believes that the planned response actions as outlined in recent State correspondence[2], in compliance with State regulations and cleanup standards, and with State oversight, are the appropriate protective measures to be taken on the Property.

B. Physical Characteristics, Site Use, and Initiatives

Physical Characteristics

The Blackstone River Valley is the most prominent feature of the Site. The River flows in the southeasterly direction through the valley on a comparatively flat flood plain between River terraces. The main channel of the River is approximately 150 feet wide, highly variable in depth, and meanders slightly. Approximately two thirds of the Site lies within the 100-year flood plain of the Blackstone River. In general, the northeast portion of the Site sits at a higher elevation. The J. M. Mills Landfill immediately adjacent to the River rises to over 100 feet above ground level.

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[1] The Ashton Mill Property is further defined as Plat 58, Lots 40, 70 and 71. These parcels are located at 48, 50 and 86 Front Street, Cumberland, Rhode Island and ends at the edge of the Blackstone River.

[2] RIDEM issued a Remedial Decision/Approval Letter to Industrial Factory Rentals Corp. on August 19, 2002, documenting the State's approval of conceptual and actual cleanup actions underway at the Property.

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Ground water generally flows towards the Blackstone River in the southwest direction on the Cumberland side and to the east from the Lincoln side of the River.

Incorporated within the Site, the Blackstone River Valley occupies a bedrock trough filled with kame terrace deposits and glacial/post glacial alluvium. The kame terrace deposits are composed of homogeneous, well sorted fine to coarse sands and gravel. The alluvial sediments are reworked glacial deposits. These unconsolidated deposits are relatively thin (10 to 20 ft.) in the northwestern portion of the Site where the valley is shallow and quite narrow. Deposits thicken to greater than 130 feet to the southeast as the trough widens and deepens to the south end of the Site. Deposits pinch out along the steep bedrock valley walls to the east and west. Till is found at the base of the bedrock trough and is primarily dense with high silt content and somewhat more sandy in some locations. The till also contains boulders of various size, some more then five feet in diameter. The bedrock is comprised primarily of hard quartzite and to a lesser extent a more friable schist. The bedrock exhibits a high variation of fracture density orientation, but some local preferential fracture patterns may be observed.

The Site is situated on one of the State of Rhode Island's most productive aquifers. The majority of the ground water flow occurs in highly transmissive sands and gravels. This flow is minimally augmented by till and bedrock seepage, all of which eventually discharge to the River. Under the Federal classification, the aquifer beneath the Site is designated as a Class IIB aquifer, denoting its potential as a future drinking water resource. The current state-designated ground water classification at the Site is GAA-NA. The GAA classification, as designated by the *Rhode Island Department of Environmental Management Rules and Regulations for Ground Water Quality*, is defined as "those ground water resources which the Director has designated to be suitable for public drinking water use without treatment." The -NA classification is defined as "those areas that have pollutant concentrations greater than the ground water quality standards for the applicable classification." The ground water at and around the Site remain as a valuable potential drinking water resource.[3]

The Blackstone Valley aquifer currently is providing drinking water for the Town of Cumberland from the Manville and Lonsdale Wellfields. Town reservoirs also contribute. The Manville municipal water supply wellfield is located approximately three miles up river from the Site. Manville wells #1 and #2 provide water to approximately 12,000 Cumberland residents.

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[3] Note, however, that on January 29, 1996, RIDEM reached a separate agreement with CCL Remediation Area PRPs establishing, under state regulations, an interim residual zone within a portion of the CCL Remediation Area (OU1). The agreement indicates that RIDEM and the PRPs believe that this portion of the aquifer may not be restored to state drinking water standards due to the high potential for the presence of DNAPL. This agreement alone does not change the Federal classification for ground water at the Site; nor does it supplant EPA's risk based cleanup goals for ground water as presented in the OU1 ROD.

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Manville wells #3, #5, and #10 temporarily have been taken out of service due to various contaminants at levels above drinking water standards. The Providence Water Authority supplies water to much of the population of Lincoln through the Scituate Reservoir. Lincoln also maintains wells within the aquifer about one mile south of the Site, in Lonsdale, as an additional water supply source providing approximately 10 percent of the Town's water supply on an annual basis.

Much of the Blackstone River and its tributaries, including the area within the Site, are impaired due to biodiversity impacts, pathogens, hypoxia, nutrients, ammonia (un-ionized), and metals (Cu, Pb). The river is a Class B1[4] stream throughout the Site which has an established goal of "fishable and swimmable," and the State of Rhode Island has an overall objective to "restore impaired sections of the Blackstone River and its tributaries" *(Source: Draft Blackstone River Action Plan, Rhode Island Department of Environmental Management (RIDEM), September 2001).*

Land Use

Land uses surrounding the Site comprise a mixture of industrial, commercial, residential and recreational parcels. Immediately to the north and west of the Site is predominately residential. To the east is commercial/residential and to the south predominately commercial. There are over 1000 residences within a one-mile radius, and 12,000 people live within a 4-mile radius of the Site. The nearest residence is less than 1/4 mile away.

Over the course of the past five years, new concepts and developments in land use, planning, and resource protection have changed the appearance of the Site. EPA Region I recently instituted a new policy under the Superfund Redevelopment Initiative intended to provide a documented process for determining the Reasonably Anticipated Future Land Use (RAFLU) for listed sites. Coinciding with the initiation of the RI/FS for OU2, EPA undertook this opportunity to publish the Region's first Preliminary Reuse Plan[5] which explores in further detail the current and future potential land uses under consideration for the Peterson/Puritan Site.

Blackstone River recently was designated as an "American Heritage River." In addition, the Blackstone River and nearly 400,000 surrounding acres in central Massachusetts and northern Rhode Island make up the Blackstone River Valley National Heritage Corridor.

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[4] The B1 classification indicates that while all Class B uses must be supported by water quality, primary contact recreation may be "impacted due to pathogens from approved wastewater discharges" (RI WQR, Rule 8(B)(1)).

[5] The Peterson/Puritan, Inc. Superfund Site Preliminary Reuse Plan, March, 2002 can be accessed at EPA Region 1's web site at the following address: http://www.epa.gov/ne/superfund/sites/peterson/29550.pdf.

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The Peterson/Puritan, Inc. Superfund Site occupies a key location along the Blackstone River, and the Site lies within a well developed portion of the Heritage Corridor. The Heritage Corridor was designated by an Act of Congress in 1986 to "...preserve and interpret for present and future generations the unique and significant value of the Blackstone Valley." The Corridor is a collaboration of the National Park Service, Massachusetts and Rhode Island state governments, dozens of local communities, businesses, non-profit historical and environmental organizations, educational institutions, many private citizens, and a unifying commission. Among the many diverse projects initiated under the Heritage Corridor umbrella is the Blackstone River Canoe Trail (along the main stem of the River), the Blackstone River Canal in Lincoln, RI, and the Blackstone River Bikeway that runs through and along the entire length of the Site. It is estimated that an average of 25,000 visitors utilize this bike path yearly. This number is expected to increase over time as more people invest time exploring the Bikeway, the Canal, and the River throughout the Blackstone River Valley.

The American Heritage Rivers initiative was established by executive order on September 11, 1997 to protect and restore rivers and their adjacent communities. The executive order called for the preparation and implementation of plans to achieve these goals. The action plan subsequently created for the Blackstone River has four principal elements: 1) environmental restoration and land-use planning, 2) recreational development, 3) historic preservation and cultural conservation and economic development, and 4) interpretation and education. The American Heritage Rivers initiative is intended to coordinate the activities and resources of various federal agencies with those of State, local, tribal, community and other non-governmental entities. Future remedial decision makers may need to consult the elements of these action plans during the future remedy selection process for additional OUs.

Additional Initiatives

The Site has been featured in national and regional Superfund Initiatives. The Site was one of the national pilot sites for the Oversight Reform (one of EPA's administrative reforms to the Superfund Program). Working with the OU1 Potentially Responsible Parties (PRPs), EPA achieved significant efficiencies in site oversight without sacrificing environmental protection. Steps included setting qualitative goals for construction (and post construction) oversight expectations, reducing man hours for contracted oversight, reducing monitoring requirements as appropriate, modifying oversight billing practices to enable PRPs to gather a better understanding of oversight expenditures, and streamlining reporting obligations.

The Site currently is a pilot for the Superfund Redevelopment Initiative and has the attention of Region I and EPA Headquarters administrations as a lead site for more formally including reuse assessments in site data collection and in the decision making processes. EPA Region I introduced a Preliminary Reuse Plan to the public in March of 2002 coinciding with the

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start of the remedial investigation process for OU2. The information gathered should help EPA better determine what response actions are appropriate for OU2 (and possibly the potential OU3 area). This effort also induced EPA Headquarters to consider (and the towns of Cumberland and Lincoln to apply for) a grant for $100,000 under the Superfund Redevelopment Initiative, which makes it possible for these communities to have a strong voice in local land use decisions that affect them and the Site. The towns have prepared a work plan, and the application and award process for the grant is underway.

C. Initial (Removal) Actions Taken at Operable Unit 2

In 1990, EPA administratively subdivided the Site into Operable Units. EPA conducted a removal action at the Site in 1992 by (a) constructing a fence around the former J. M. Mills Landfill (within OU 2) to restrict access and (b) removing drums containing hazardous substances from the base of the landfill. In November 1997, a second removal action was conducted at OU 2 to address recently disposed asbestos-containing wastes found outside of the fenced in area of the Landfill. The security fence was extended to limit further dumping and maintain access restrictions at this portion of the Site. EPA and State personnel conduct frequent inspections, including monitoring the integrity of the fence and maintaining communication with local officials concerning security, occasional trespass, and solid waste disposal issues on OU 2.

Based upon sampling information supplied to EPA through limited investigations of this portion of the Site, hazardous substances have been detected and may be impacting area ground water and surface water resources. These hazardous substances include, but are not limited to, volatile organic contaminants such as trichloroethylene, freon 11, 1,2-dichloroethene, 1,1,1-trichloroethane, benzene, and metals such as chromium, nickel and lead in ground water. Hazardous substances detected in soils and sediments include, but are not limited to, benzo(a)pyrene, chrysene, indeno(1,2,3+cd)pyrene, bis(2hexyl)phthalate, PCBs, and asbestos insulation/transite.

EPA initiated negotiations with PRPs for conducting and funding the RI/FS under an Administrative Order by Consent (AOC) on April 15, 1999. Negotiations were completed on July 13, 2001 with the signing of the AOC. The RI/FS is a PRP-lead study. Currently, the PRP is developing site-specific planning documents, such as the RI/FS work plan, with EPA oversight and field work is anticipated to commence in the Fall of 2002 following Agency approval of these plans.

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D. Basis for Taking Remedial Action at Operable Unit 1

Contaminants Identified

Hazardous substances, in concentrations above health based levels, were identified during the Remedial Investigation and Feasibility Study (RI/FS), conducted from 1986 to 1993. The RI identified contaminants of concern that have been released at the Site in each media for OU 1, and these are identified in Table 2.

EPA completed a baseline human health risk assessment for OU1 in June 1993. Using EPA's risk assessment guidance, potential human health effects associated with exposure to

Table 2 - Operable Unit 1 Contaminants of Concern

SOILS:	**GROUND WATER:**
1,1 dichloroethene	1,1 dichloroethene
1,2 dichloroethene	1,2 dichloroethene
methylene chloride	methylene chloride
tetrachloroethene	tetrachloroethene
1,1,1 trichloroethene	1,1,2 trichloroethene
ethylbenzene	trichloroethene
styrene	benzene
toluene	vinyl chloride
xylenes	bis(2ethylhexyl)phthalate
	chlordane
	acetone
	cadmium
	copper
	arsenic

contaminants of concern were estimated for various exposure scenarios. Calculated risks for some exposure scenarios fell outside EPA's acceptable range, which formed the basis for the OU1 response actions. An ecological risk assessment conducted within the same time period determined that it was not likely that the contaminants associated with OU1 would cause significant ecological impacts.

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IV. Remedial Actions

A. Remedy Selection

The Record of Decision (ROD) for OU 1 of the Site was signed on September 30, 1993. Remedial Action Objectives (RAOs) were developed as a result of data collected during the Remedial Investigation to aid in the development and screening of remedial alternatives to be considered for the Record of Decision. The RAOs for OU1 were:

Remedial Action Objectives:

- minimize/mitigate the mass of contaminants at the source;
- prevent further migration of contaminants from the sources to potential receptors and down gradient areas, including the Blackstone River;
- prevent ingestion of/contact with ground water contaminated with carcinogens at levels in excess of Maximum Contaminant Levels (MCLs) and a total excess cancer risk of greater than $1x10^{-4}$ to $1x10^{-6}$;
- prevent ingestion of/contact with ground water contaminated with non carcinogens at levels greater than MCLs, health-based ARARs, and a Total Hazard Index greater then 1;
- restore the contaminated ground water in the aquifer, from the source to the outer boundary of the contaminant plumes, to a level protective of human health and the environment, as soon as practicable;
- prevent the leaching of contaminants from the soil that would result in ground water contamination in excess of health and risk-based ARARs, and
- ensure a coordinated remediation between all points of source contamination, such that restoration of OU 1 is achieved as soon as practicable.

The goal of the remedial action, as defined in the ROD, is to restore the area's ground water to its beneficial use which is, at OU1, a potential drinking water source. OU1, which was identified as a primary source of ground water contamination, was further defined in the ROD as having two remediation areas: 1) The CCL Remediation Area and, 2) the PAC Remediation Area. As a result, the major components of the OU1 comprehensive remedy selected in the ROD included:

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A. For the CCL Remediation Area:

- Excavation (manholes and catch basins),
- Capping,
- Soil venting of source area soils,
- Source area ground water extraction, treatment and discharge to the POTW sewer,
- Downgradient area ground water extraction with direct discharge to the POTW sewer,
- Natural attenuation of ground water at the Quinnville Wellfield,
- Institutional controls throughout the CCL Remediation Area,
- Environmental monitoring.

2. For the PAC Remediation Area:

- Excavation and disposal of the leachfields and related soils,
- In-situ oxidation treatment of the PAC Source Area,
- Natural attenuation of the PAC Downgradient Area,
- Institutional Controls throughout the PAC Remediation Area,
- Focused investigation of the PAC Downgradient Area,
- Environmental monitoring.

The selected remedy included provisions for a statutory review of the remedy every five years after the initiation of the remedial action for OU1. Additionally, the ROD called for the monitoring of the treatment system's performance on a regular basis, to apply modifications as necessary to enhance, facilitate and accelerate the cleanup of the contaminant plume, and to periodically re-evaluate remedial technologies for ground water restoration to ensure that the remedy remains protective of human health or the environment. If, following a reasonable period of system operation, EPA determines that the selected remedy cannot meet cleanup levels, EPA may elect to consider contingency measures as a modification to the selected remedy. Any such changes will be documented with notice to the public.

B. Remedy Implementation

In a Consent Decree (CD) entered by the Court on December 13, 1995, the Settling Defendants agreed to perform the remedial design/remedial action (RD/RA). The RD/RA was conducted in conformance with the ROD. The RD was approved by EPA in phases between July, 1995 and July, 1996.

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The RA also took place in several phases commencing with the CCL parties taking initial actions within the former Peterson/Puritan, Inc. tank farm to excavate, cleanse and secure catch basins and manholes during July 1995, followed by construction of the soil vapor extraction and ground water pump and treat systems in the Spring of 1996. The PAC area construction, completed by April 1997, included excavation of leach fields 1 and 2 and constructing an innovative In-situ oxidation ground water treatment system in response to ground water contaminated with liberated arsenic from the area's leachfields.

EPA and RIDEM personnel conducted Final Inspections of each of the construction activities and assembly of the treatment systems. The Final Inspection for the PAC Remediation Area was conducted on March 27, 1997, followed by inspection of the CCL Remediation Area on August 6, 1997. EPA and RIDEM concluded that all RA construction activities, except the implementation of institutional controls, were performed according to specifications. EPA accepted the PRPs' Interim Remedial Action Reports for each remediation area under OU 1. These reports, as well as the Administrative Record for the Record of Decision, are available to the public for review at the EPA Records Center, in Boston, MA, or at the Department of Environmental Management in Providence, RI, by appointment, or at the Lincoln and Cumberland town libraries.

The remedy, as implemented for OU 1, is a comprehensive remedy in that it provides for both source control and management of ground water migration. The approximate clean up time frames for the selected remedy are as follows: Twelve years in the CCL Source Area, six years in the CCL Downgradient Area, six years to naturally attenuate contaminants at the PAC Downgradient Area and one year for source control measures at the PAC Source Area. The Quinnville Wellfield ground water, currently estimated to be within acceptable contaminant levels under non-pumping conditions, is expected to continue to attenuate throughout the duration of the cleanup. After ground water cleanup levels have been met at this OU, remedial actions at all subsequent OU's are complete, and cleanup levels have been met, EPA will issue a Final Close Out Report.

C. System Operation/Operation and Maintenance

The Settling Defendants for the CCL and PAC Remediation Areas are conducting long term monitoring and maintenance activities according to the operation and maintenance (O&M) plans initiated on March 17, 1998 with two exceptions:

1) The PAC Source Area in-situ oxidation system installed and operated for a time to reduce liberated arsenic concentrations in ground water is not functioning as designed. Thus the system has been turned off (as of March 2000) and a contaminant rebound study was performed by the PAC Settling Defendants.

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2) The PAC and CCL institutional controls are not fully implemented.

These deficiencies will be discussed in greater detail below.

Those operation and maintenance activities that are being implemented are described below:

- operation of the CCL Source Area soil venting and ground water extraction and treatment systems.
- maintenance of the CCL Remediation Area treatment systems.
- periodic inspections of the bituminus and concrete caps at PAC and CCL Source Areas.
- periodic inspection of the ground water monitoring wells throughout OU 1.
- periodic environmental monitoring throughout OU 1.
- continued progress towards finalizing/implementing all required Institutional Controls.

Actual cost summaries for the OU1 remedy were supplied to EPA by the PAC and CCL Settling Defendants. Combined capital costs for the construction of the OU1 remedy was approximately $4.5 million. Operation and maintenance costs for each remediation area are as follows:

Table 3 - Average Annual Operation & Maintenance Costs for OU 1

PAC Remediation Area	$ 440,000[6]
CCL Remediation Area	$ 245,000[7]

[6] Further breakdown and explanation of the PAC area remediation costs is documented in the Peterson/Puritan Superfund Site, Cumberland, RI, First Operable Unit, PAC Remediation Area Five-Year Review Report, March 2001 and includes the operation of the Oxidant Delivery System (ODS). With the ODS system shut down as of March, 2000, O&M costs are expected to decline unless or until a new active remediation system for the presence of arsenic in ground water is activated. This cost does not include the additional expenditures related to long-term monitoring, focused investigations, nor the cost associated with contemplated future assessments addressing arsenic concentrations in ground water.

[7] Further breakdown and explanation of the CCL area remediation costs is documented in the Peterson/Puritan Superfund Site, Cumberland, RI, First Operable Unit, CCL Remediation Area Five-Year Review Report, November 2000. This cost does not include long-term monitoring nor any additional investigative expenditures.

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V. Progress Since the Last Five Year Review

This is the first five-year review for the Site.

VI. Five-year Review Process

A. Administrative Components

Inspections conducted at the Site were led by David J. Newton, the EPA Remedial Project Manager (RPM) for the Site on November 28, 2000. Louis Maccarone, RIDEM Project Manager for the Site assisted in the review as the representative for the support agency. The inspections included review and observations of the OU 1 treatment systems, observation of the integrity and wear of the protective bituminus and concrete caps over source area soils, piping, manways, security, and daily operations and functionality of the remedial systems. Interviews with on-site workers and plant managers at both the CCL and PAC Remediation Areas also took place at this time, and meetings with the PRP representatives for OU1 occurred periodically. In addition, the OU 2 fence line was inspected for security breaches and/or trespassing. Inspections such as this also are conducted frequently. During the spring of 2002, a series of site inspections for the Mackland Farm/Kelly House property (the potential OU 3) were performed by EPA and RIDEM followed in July by a limited field sampling event.

B. Community Involvement

Recently, public interest in the Site has increased significantly. EPA released the Peterson/Puritan Inc. Preliminary Reuse Plan in March 2002, which has sparked interest in land use and planning at the Site.

On April 18, 2002, the RPM sent a cover letter with enclosures to over 100 interested parties informing them of EPA's efforts and schedule for performing a Five Year Review. This was shortly followed by a press release on May 16, 2002.

Local citizen-supported environmental groups with interests in the River, the watershed, and the heritage of the Blackstone Valley have been more attentive to the overall environmental progress and ongoing resource improvement projects taking place throughout the vicinity of the Site. A number of large-scale projects along the Blackstone River have been initiated such as:
1) the Superfund response actions, 2) construction of the Bikeway, 3) formation of the Heritage Corridor (including National Park Service-led walking, cycling and paddling tours), 4) the Army Corps' reclamation of the Lonsdale Twin Drive-in to increase wetland and flood plain habitat,

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5) development of the Central Falls Landing and the Explorer boat tours through Lonsdale Marsh, and 6) the State's initiation of three major watershed planning efforts (Total Mass Daily Limit (TMDL) study for the Blackstone River, the Blackstone River Fisheries Restoration Plan, and the Blackstone River Draft Action Plan). These efforts have also prompted renewed interest in local activities and events such as river cleanups, sanctioned trout stocking and sport fishing, citizen storm water and river monitoring programs, and public paddling events.

Throughout the review period, no formal public meetings were held regarding the Site. However, the EPA RPM for the Site did meet with town officials for Lincoln and Cumberland on several occasions, held meetings with PRP groups, and has conducted numerous briefings for RIDEM, RIDOT, the Blackstone River Watershed Council, the Blackstone River Valley National Heritage Corridor Commission, and Senator Lincoln Chafee. Most recently, the RPM briefed staff for EPA Administrator Gov. Christine Todd Whitman in advance of her visit to the Site this past July, 2002. EPA-NE will plan and hold a public "kick-off" meeting to announce the start of the field work for OU 2 later this year. EPA-NE will also publish a notice of the completion of the Five-Year Review in the local paper and will distribute copies of the document to the Towns, RIDEM, and the local libraries.

C. Document Review

This Five-Year Review consisted of a review of relevant OU1 post construction technical and data summary documents prepared by the CCL and PAC Remediation Area Settling Defendants, including but not limited to, OU 1 remediation area-specific five year review reports documenting each of the two (CCL and PAC) remediation area cleanup efforts. EPA also reviewed applicable ground water cleanup standards and consulted with EPA risk assessment personnel.

In addition, planning documents, such as draft work plans and project operations plans for the RI/FS were reviewed by EPA and RIDEM for OU 2. These documents are the initial approval steps that are required in order for the OU2 PRP to begin to perform a comprehensive remedial investigation and feasibility study. In the next five year review, a more complete discussion of the RI/FS findings is anticipated.

During the spring and summer of 2002, a number of technical assessment reports and data summary documents concerning the potential OU 3 area were also reviewed by EPA and RIDEM. With respect to the Ashton Mill Property, RIDEM has assumed regulatory control of the response actions being performed by third parties on the Property. For the Mackland Farm/Kelly House property, further consideration for investigation into the nature and extent of the ground water contamination as a potential OU3 remains in the planning stage.

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VII. Technical Assessment of the OU1 Remedy

A. CCL Remediation Area

The remedial components for the CCL Remediation Area include: 1) excavation (manholes and catch basins); 2) capping; 3) soil venting (soil vapor extraction-SVE) of source area soils; 4) source area ground water extraction, treatment, and discharge to the Publicly Owned Treatment Works (POTW) via the Narragansett Bay Commission (NBC) sewer; 5) downgradient area ground water extraction with direct POTW discharge via the NBC sewer; 6) natural attenuation of ground water at the Quinnville Wellfield; 7) environmental monitoring, and 8) institutional controls (ICs) throughout the CCL Remediation Area. All components, except institutional controls, have been implemented.

The Record of Decision (ROD) objective of manhole and catch basin sediment excavation was to remove sediments that are a continuing source of ground water contamination. The excavations have been successfully completed and the sediments are no longer a potential source of ground water contamination. The CCL tank farm manhole and catch basin excavation has been completed with the removal and off-site disposal of eight cubic yards of sediment, and 1,035 gallons of liquid. This remedial action has successfully met the ROD objectives.

Source area soils at the CCL Remediation Area were capped to enhance the SVE system operation. After the installation of the SVE wells and tank farm extraction wells, concrete and bituminous concrete pavements were used to cap the tank farm area and the former O'Toole property. The steep slope between the tank farm and the former O'Toole property was not specified for capping due to minimal infiltration expected. A majority of this capping was completed in December 1996, and the installation was completed in August 1997. Approximately 26,000 ft^2 of cap was installed. This remedial action is complete and in compliance with the ROD objectives. Monthly inspections of the cap integrity and access restrictions to capped areas ensure that the cap is maintained and continues to meet the ROD objective.

The ROD objective for the SVE system is to reduce the residual VOC contamination in soil above the water table near the tank farm. The SVE system includes ground water depression wells that lower the water table to expose and increase the volume of the unsaturated zone and soil vapor extraction wells that remove VOC vapors. The ROD estimated a two-year operational period for the SVE system. However, the system remains online currently and continues to be effective in reducing VOC concentrations within the source area. The SVE system, combined with the source area ground water stripping process, is responsible for recovering as much as 161,000 pounds of solvent/condensate (based on CCL documentation through September 2000).

Air monitoring of the Granulated Activated Carbon (GAC) (with on-site regeneration capability) has shown that the GAC system removes more than 95 percent of the VOCs and, therefore, complies with RIDEM's air regulations. The soil vapor extraction system has been designed and will continue to be operated so that effluent air emissions meet all ARARs.

The ground water depression wells associated with the SVE system have been in operation since March 1998. The ground water depression wells have successfully lowered the water table in the area of the SVE system to meet their design objectives.

The ROD objectives for the source area Ground water Extraction and Treatment System (GWTS) are to capture and treat ground water within and immediately downgradient of the source area to prevent migration of contaminated ground water from the source. The operation of the GWTS was evaluated in several of its components: the operation and maintenance routine; ground water pumping rate achievement; NBC discharge flow rates; discharge permit compliance; and treatment system air emissions. The compliance status of each component is discussed below.

Ground water pumping rates are monitored to ensure complete capture of the plume emanating from the tank farm area. Performance modeling conducted at system start-up suggested that a combined flow rate of 65 gpm for the GWTS was a conservative target. Since this performance modeling was completed, a combined flow rate of 65 gpm has been used as an operational target. The only operational problem that has a potential to impact flow rates from the GWTS is iron and bacterial fouling. Several operation and maintenance measures have been instituted to reduce this iron and bacterial fouling. These include: periodic cleaning of treatment plant piping and equipment as necessary, routine acid washing of the extraction wells, and well cleaning and redevelopment when well yields decline and/or when flow between the wells and the GWTS declines.

The GWTS influent and effluent streams are sampled on a monthly basis in order to ensure compliance with the NBC discharge permit (NBC, 1995 (original), 1999 (renewed)). NBC Total Toxic Organics (TTO) limits are 2.13 ppm with a single compound maximum of 1.0 ppm. Except for samples collected on October 18, 1996 and December 4, 1996 that exceeded the TTO limit, all effluent samples collected since start-up have complied with the permit. These exceedances occurred following the manual transfer of water from the solvent storage tank. Procedures were implemented to prevent this from re-occurring.

The ROD objective for the downgradient area ground water extraction wells is to reduce the time required to meet ground water standards by supplementary mass removal. The downgradient system operation is also expected to recover the contaminant plume that has migrated from the CCL Remediation Area toward the Blackstone River. The ground water from the downgradient extraction wells is discharged directly to the NBC sewer system without treatment, so the well

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system effluent is sampled on a monthly basis in order to ensure compliance with the NBC discharge permit (NBC, 1995 (original), 1999 (renewal)). NBC TTO limits are 2.13 ppm with a single compound maximum of 1.0 ppm. The downgradient well system operates at a maximum flow rate of 200 gpm (per NBC permit) with all wells pumping. The flow rates from the seven extraction wells are adjusted to provide the maximum mass removal rate possible while maintaining the NBC Discharge Permit effluent limits. The downgradient well system has been in compliance since startup.

The remedy selected and described in the ROD for restoration of the Quinnville Wellfield was natural attenuation. Additionally, the ROD states that natural attenuation is occurring within portions of the remediation area and that with aggressive source removal and control, the COC concentrations in the plume downgradient of the source area are expected to decrease with time.

EPA has prepared a scoring system to assess if reductive dechlorination of chlorinated ethenes and ethanes is occurring at a contaminated site. This scoring system awards points based on the presence of biodegradation products and geochemical parameters which indicate that methanogenic conditions exist in the aquifer. The EPA scoring system was applied to the analytical results from the ground water samples collected in the CCL Remediation Area through the Joint Ground water Monitoring Plan (JGWMP) and the Environmental Monitoring (EM) programs.

In summary, reductive dechlorination is occurring in the downgradient COC plume in the CCL Remediation Area. Generally, anaerobic conditions in the deep aquifer are promoting the breakdown of PCE and TCA and aerobic conditions in the shallow aquifer adjacent to the Blackstone River are promoting the breakdown of VC. Monitoring in the downgradient area shows the increasing concentrations of daughter compounds in relation to parent compounds.

Based on this review of ground water analytical and field data, there is adequate to strong evidence (based on EPA classification guidelines) that natural attenuation is occurring in the downgradient area and that downgradient water quality is improving as a result of source control measures and natural attenuation processes. No COC concentrations have been detected in wells monitored at the Quinnville Wellfield above interim ground water cleanup levels.

Of consequence to the findings of overall long-term protectiveness throughout OU1, further investigation is needed to better characterize the nature, aerial and vertical extent of the CVOC contaminant plume in the PAC Remediation Area. Such an investigation should include but not be limited to a network of wells (shallow and deep) to the south and west of the tank farm, across the Okonite property, and into the PAC Remediation Area. This vertical profiling would assist in determining if the source(s) of CVOCs in wells located in PAC Downgradient Area are attributable to non-PAC sources.

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B. PAC Remediation Area

The remedial components for the PAC Remediation Area include: 1) excavation of Leachfields #1 and #2 in the PAC Source Area; 2) in-situ oxidation in the area of PAC Source Area leachfields to lower arsenic ground water concentrations; 3) monitored natural attenuation of contaminants in the PAC Downgradient Area; 4) a Focused Investigation to determine the extent and source of contaminants in the PAC Downgradient Area; 5) institutional controls to prevent use or hydrologic alteration of contaminated ground water as well as to prevent direct exposure to contaminated soils; and 6) environmental monitoring in the entire PAC Remediation Area.

Excavation of Leachfields #1 and #2 in the PAC Source Area was required by the ROD for two reasons: 1) to prevent leaching of organic compounds from contaminated soils into the ground water, and 2) to eliminate a source of oxidizable carbon which may contribute to the reducing aquifer conditions responsible for arsenic mobilization. In March and April, 1995, six test pits were dug, eleven soil borings advanced, and an examination of the leachfield areas performed using ground-penetrating radar. These activities were performed to determine the extent and location of the leachfields and identify buried structures. Actual excavation of the leachfields occurred between September and December 1996. The excavation included removal of soils, structures, and piping from the leachfields. From Leachfields #1 and #2, a combined 3,158 tons of leachfield materials and contaminated soils were removed from the ground and disposed of off-site. Details of the leachfield excavation are described in the Remedial Action Report.

The area excavated from Leachfield #1 was approximately 148 feet long, 10 to 42 feet wide, and 3.5 to 14 feet deep. Soils and structures from Leachfield #1 were removed to a depth of 3.5 to 14 feet below ground surface (bgs). At this same time, two satellite dry wells associated with Leachfield #1 were abandoned in accordance with Rhode Island Department of Environmental Protection (RIDEM) regulations.

Leachfield #2 did not contain an actual leachfield, but consisted instead of a number of cesspools, dry wells, and associated piping. To remove structures and contaminated soils from Leachfield #2, two areas, the first roughly 30 feet long, 12 feet wide, and 6 to 8 feet deep and the second roughly 25 feet long, 12 feet wide, and 8 to 12 feet deep, were excavated. Concrete structures, including dry wells and cesspools, and piping were removed from Leachfield #2. Most of the excavated soil passed screening tests for contamination and was used as backfill. To ensure that all contaminated soils were removed from the leachfield areas, soil samples were collected from the bottom and sides of the excavated pits. These samples were analyzed for the five compounds with ROD-specified soil cleanup levels in the PAC Source Area: ethylbenzene, styrene, toluene, tetrachloroethene, and xylenes. Soil samples from the leachfields were also

analyzed for acetone, 2-propanol, and total organic carbon. Samples from Leachfield #2 were also analyzed for total petroleum hydrocarbons. If soil contaminant levels exceeded ROD-specified cleanup limits, additional soil was removed from the pit at the Site of the exceedence and new soil samples collected. Several sludge and water samples from pipes and an underground concrete tank were also analyzed for organic compounds and metals. After excavation, sampling, and backfilling of the leachfields were complete, most of the former leachfield area was capped with an asphalt cover. The purpose of the asphalt cover was to minimize further leaching of the vadose zone soils to the ground water.

Part of the remedy also included the design, installation, and operation of an in-situ oxidation treatment system at Leachfield #1. This system was researched and recommended by the PAC PRPs as an acceptable alternative and was considered by EPA to be an Innovative Technology in the treatment of arsenic concentrations in ground water. In October 1996, in accordance with the 100% Design Plan, the infiltration gallery for the Oxidant Delivery System (ODS) was installed at the bottom of a pit created by excavation of Leachfield #1. The ODS consists of two major components: 1) a gas removal system, followed by 2) an oxygen dissolution system. The gas removal system, which de-gases the feed water (public water supply) to prevent bubble formation during oxygenation, consists of four Membran7 VMD-40-2 membrane gas removal modules installed in series in a recycling line to a 275-gallon water tank. The oxygen dissolution system (which adds oxygen to the water) consists of one Membran7 BMA-41-2 module containing two membrane units in series installed in a recycle line to a second 275-gallon water tank. Each oxygen dissolution module contains bundles of sealed, hollow gas-permeable fibers that are filled with pure oxygen under pressure. Oxygenated water flows by gravity from the oxygen dissolution water tank to a manifold for distribution to the ODS infiltration gallery. The manifold distributes water to pipes that run into the 35-feet-wide by 65-feet-long infiltration gallery that is located 14 feet bgs. The distribution system in the infiltration gallery consists of four 2-inch slotted PVC pipes running the length of the gallery, bedded in a 2-foot layer of crushed stone. A layer of geotextile fabric was installed above and below the crushed stone. A 3-foot layer of sand was placed above the infiltration gallery prior to backfilling. The area above the infiltration gallery is paved with asphalt.

To monitor aquifer conditions within the infiltration gallery and ODS treatment area, fourteen monitoring wells were installed. During November and December 1996, three wells were installed beneath the infiltration gallery, three wells were screened in the gallery itself, one well was subsequently damaged and not used, and eight wells were installed in the area surrounding and downgradient of the gallery.

A pilot test of the ODS was performed from January 22 through February 26, 1997. ODS operation began on April 9, 1997 and initially included only operation of the de-gas portion of the treatment system. On May 6, 1997, the oxygen dissolution portion of the system was brought on-

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line. The system operated almost continuously after May 1997, except for power outages and operation and maintenance (O&M) activities, injecting approximately seven gallons of water per minute (gpm) containing over 25 mg/L dissolved oxygen (DO). Routine O&M activities included weekly and twice-monthly inspections, as well as scheduled and "as-needed" system maintenance.

During the third year of operation, between June 1999 and March 2000, the DO in the infiltrated water began to decline from the target concentration of 25 mg/L. Consultation with former Membran scientist, Dr. Charles Gantzer, indicated that the degradation in performance was irreversible due to chemical alteration of the membranes. Rinsing the membranes with a chlorine solution to oxidize the organic compounds did not significantly improve system performance.

Addition of a third oxygen dissolution module in September 1999 appeared to reverse the steady decline of the DO concentration in the injected water. However, further investigation of DO in the water exiting the vacuum degassing system showed that the system was removing only approximately 10% of the naturally dissolved gases compared to approximately 50% of the dissolved gases in previous years. Thus, it became apparent that, even though the ODS was delivering between 20 and 25 mg/L DO in the winter of 1999/2000, the total pressure of gases dissolved in the delivered water was greater than 1 atmosphere (atm). Therefore, the system could no longer deliver bubbleless supersaturated water. There is no method available to repair the ODS membrane units, and additional membrane units of the same design are not commercially available. Restoring system operation would, therefore, require adoption of alternative membrane-based systems or alternative oxidation technologies. On March 14, 2000, with EPA and RIDEM approval, operation of the ODS was suspended to monitor rebound of the geochemical conditions in order to evaluate the efficacy of the system.

The ROD required that additional studies or “focused investigations” be performed at the PAC Downgradient Area to fully characterize the source and extent of VOC contamination. To date, three separate studies have been performed: 1) Focused Investigation (FI); 2) Supplemental Focused Investigation Phase I (SFI); and, 3) Supplemental Focused Investigation Phase II (SFI II)[8]. The first study, the FI, included site inspections, document reviews, and installation of additional monitoring wells. The PAC Downgradient Area, (which also includes the Former Owens Corning Property and the Triangular Parcel) were inspected to identify potential past and present sources of ground water contamination. Present and former employees at these sites were interviewed and state and local government records, consultants reports, and old aerial photographs reviewed for evidence of contamination sources. In April 1996, eleven additional

[8] Documentation of these studies are on file at EPA and RIDEM and may be reviewed by appointment at the EPA, Region I Record Center or at the RIDEM Office of Waste Management, Providence, RI.

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monitoring wells were installed in the PAC Downgradient Area. Results from samples collected from these wells in May and July 1996, together with samples from existing wells at the site, were used to characterize the nature and extent of contaminants in the PAC Downgradient Area and to prepare a conceptual model of contaminant fate and transport.

The purpose of the second study, the SFI, was to more precisely delineate the extent and sources of contamination throughout the extent of the PAC Downgradient Area. In June and July 1998, a geophysical survey was performed at the PAC Downgradient Area. The purpose of the geophysical survey was to confirm the former tank locations and removal of the former USTs and associated piping. The approximate locations of the six USTs were previously identified as part of a file inspection during the FI. The geophysical survey was intended to identify sewer lines, a reported dry well, buried pipes, areas of former excavations or "disturbed soils," subsurface anomalies, and any additional subsurface structures which could represent potential contamination sources or pathways for preferential contaminant migration.

Locations of soil borings and soil gas nodes (grid locations) were identified and samples were collected and analyzed as part of the SFI. Sixteen soil borings were advanced during July 1998, primarily in the areas where USTs had previously been buried. Soil samples collected from the borings were analyzed for petroleum hydrocarbons and in some cases for metals, SVOCs, and CVOCs. During July and August 1998, a passive soil gas survey was also conducted to investigate potential near-surface contaminant sources within the PAC Downgradient Area.

Finally, the former Wetterau maintenance building on the PAC Downgradient Area and the Former Owens Corning Production Well (PW-3) were inspected. Review of historical information regarding hazardous material usage was considered when evaluating the likelihood of historic (or recent) releases of material or identifying potential contamination sources. Since the production well pump house for PW-3 had been razed by Dean Warehouse before the well house was inspected, emergency provisions were required and instituted by ENSR to secure the exposed production well and vault entrance. The pump was subsequently removed from the production well. The well was also examined, its depth measured, and water samples collected. Samples of concrete, standing water, sediment, and fiberboard material were collected from and within the concrete well vault. Samples collected from the well and well vault were analyzed for VOCs, metals, petroleum hydrocarbons and arsenic, although not every sample was analyzed for all parameters. The well was then abandoned in accordance with modified RIDEM-approved well abandonment procedures, and a steel plate was used to secure the vault entryway.

The objectives of the third study, the SFI II, were to complete the characterization of the nature and extent of soil contamination in the PAC Downgradient Area, to perform additional investigations to identify potential source areas, and to perform limited removal of contaminated

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materials as necessary. Based on the results of the earlier studies, four areas warranted further investigation: 1) the soil adjacent to and underlying USTs #3 and #4 on the PAC Downgradient Area; 2) a buried storm drain line located along the the northern extent of the PAC Downgradient Area; 3) potential source areas associated with the former maintenance building on the PAC Downgradient Area; and 4) the former Owens Corning production well and vault for PW-3.

In November and December 1999, thirteen test pits were dug where USTs #3 and #4 were previously located and in the vicinity of several stormwater catch basins immediately south and east of the former USTs. Soils from the test pits were screened for the presence of petroleum hydrocarbons, and samples were collected for analysis of diesel and gasoline hydrocarbons. Two additional test pits were dug to investigate the source of elevated hydrocarbon concentrations in soil gases near the northern storm drain line. This pipe carries storm water from Mendon Road and the Former Owens Corning Property to the Blackstone River. Soils from the test pits were screened for the presence of petroleum hydrocarbons using a jar-headspace screening procedure. Samples from the second pit were collected for analysis of diesel and gasoline hydrocarbons.

At the former maintenance building on the PAC Downgradient Area, several possible sources of contamination were investigated. Two dry wells connected to two floor drains in the building were removed and samples from soils beneath the dry wells submitted for analysis of hydrocarbons and metals. The floor drains leading to the dry wells were checked for leaks. In addition, two test pits were excavated along the northern side and northeast corner of the maintenance building to ensure that no potential contamination sources were present in this area. The PW-3 well vault and conduits to the subsurface (wells, pipes, etc.) were inspected for evidence of contamination. Two 2-inch observation wells, gravel pack fill ports, a buried water pipe, and a buried electrical conduit were identified and properly abandoned. Since elevated headspace readings had been observed in soils collected near the well vault, test pits were excavated along the vaults perimeter. Four soil borings were also advanced and soil samples were collected and analyzed for organic compounds and metals. After the abandonment procedures were completed, the well vault was demolished and the area regraded.

The Joint Ground water Monitoring Program (JGWMP) was established in 1995, in accordance with the requirements set forth by the EPA in the Remedial Design/Remedial Action (RD/RA) Statement of Work (SOW) for OU1 of the Peterson/Puritan Superfund Site, to monitor the ground water quality in the PAC and CCL Remediation Areas. On October 24, 1995, the PRPs submitted the JGWMP and Project Operations Plan (POP) to EPA and RIDEM. EPA has approved several modifications to the POP since inception of the JGWMP concerning frequency of sample collection, sampling procedure, analytes to be sampled, and other matters. These modifications are detailed in the Joint Ground water Monitoring Report and documents referenced therein. Twelve rounds of ground water sampling have been conducted at the PAC Remediation Area between October 1995 and October 1999 as part of the JGWMP. Synoptic

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depth to water measurements were collected in each of the twelve JGWMP events. Ground water surface elevations were calculated by subtracting the depth to water measurements from surveyed elevations at each well using a standard reference point (i.e., top of casing). Ground water elevation data was collected in accordance with the POP. Ground water surface elevation data collected by the Settling Defendants was pooled to create a consistent map of water table elevations across OU1.

Based on monitoring data compiled through 1999, a total of nine monitoring well locations within the PAC Source Area exceed the ROD interim ground water cleanup level of 50 ppb for arsenic. Arsenic concentrations in PAC Downgradient Area wells do not currently exceed the interim ground water level of 50 ug/L. However, with the promulgation of the new arsenic MCL of 10 ug/L in February 2002, six wells in the PAC Downgradient Area exceed the new drinking water standard.

Overall, arsenic levels at the PAC Remediation Area have not changed significantly during the course of the sampling period (1993-1999, based on PAC documentation submitted in support of this review), and the spatial extent of arsenic concentrations appears to be stable within the confines of the established monitoring network. Based on the observations available, it is difficult to predict with certainty the rates of natural attenuation for liberated arsenic in the subsurface. Despite this uncertainty, recent (through 1999) historical trends in the decline of Chemical Oxygen Demand (COD) in ground water at the Site can be used to roughly estimate the time expected to return the aquifer to iron-oxidizing conditions and lower arsenic concentrations. This is an empirical approach that uses the observed trends in the Site data to predict future Site conditions. Using this approach, the PAC Settling Defendants estimate that arsenic remediation will be complete within approximately 10 to 30 years.

In addition, the FI and SFI found that: 1) slowly increasing BTEX levels in wells in the southwest corner of the PAC Property warrant additional VOC monitoring as part of the JGWMP; 2) CVOCs detected in wells in PAC Downgradient Area are believed to originate from off-site sources; 4) additional source characterization (across the Okonite Company parcel) and the PAC Downgradient Area are recommended to ensure protectiveness of the remedy; 5) long-term monitoring to verify Monitored Natural Attenuation (MNA) of arsenic in the PAC Source Area as a protective remedial measure; and 6) long-term monitoring of BTEX concentrations in the PAC Downgradient Area to ensure benzene concentrations remain below interim ground water cleanup standards.

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

All aspects of the CCL Remediation Area remedy, except the (ICs) institutional controls, have been implemented, in accordance with the 1993 ROD, and are operating and functioning as designed.

The remedial components specified in the ROD for the PAC Remediation Area, in accordance with the ROD, have all been implemented, except that not all of the necessary ICs are in place. In addition, the three year operation of the Oxidant Delivery System (ODS) has failed to lower arsenic ground water levels in all wells below the interim ground water cleanup level of 50 ppb as specified in the ROD. This innovative technology is not operating and functioning as designed (see Section VII, Issues). Moreover, the adoption of the new lower Maximum Concentration Level (MCL) standard for arsenic in ground water (changing the standard from 50 ppb to 10 ppb) has further complicated the performance of this remedial component for ground water (see Question B below).

Institutional Controls:

The remedy for OU1 calls for restrictive covenants and access easements on at least fourteen properties to accomplish the following goals:

- restrict use of ground water
- provide access
- restrict activities that could disturb the remedial measures, unless EPA gives approval for the activities (e.g., disturbing ground water monitoring wells, excavating soils down to, or below, ground water level, and changing the ground water flow pattern); and
- on the PAC and CCL Custom Manufacturing properties only, require cap maintenance.

EPA and the State will be co-grantees of these restrictive covenants and access easements.

The ICs are in place at the Pacific Anchor Chemical property but are not yet in place on the other OU1 properties, although EPA-NE and the Settling Defendants actively have been involved in securing the ROD-required institutional controls (ICs) for several years. Major changes in EPA's process for acquiring restrictive covenants and easements took place in the last several years – changes which have made the Consent Decree's short deadlines for IC implementation unrealistic. The major reason for delay is that, since EPA is a co-grantee, we must follow the federal property acquisition process. All parties have found this process to be

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unduly burdensome, prone to major delays (because of the number of different steps and parties involved), and frustrating because of the lack of clear guidance on how to proceed.

Fortunately, this situation does not impact the short-term protectiveness for the OU1 remedy because everyone in the area is on public drinking water, and we have taken steps to make property owners aware of the restrictions to which their property will be subject. However, the ICs must be established to ensure long term protectiveness. Below is a list of the steps that have been taken for each property and the steps that remain to be taken before IC implementation is complete.

1. Settling Defendants have submitted draft easements and restrictive covenants.

2. Instead of using the Settling Defendant's draft easements and restrictive covenants, EPA prepared a "Blueprint" Declaration of Environmental Easement and Restrictive Covenants (Declaration) to be consistent with new model Department of Justice (DOJ) easement and Rhode Island law. This Blueprint would serve as the starting point for property-specific Declarations.

3. After negotiations, EPA-NE received Settling Defendants, State, EPA Headquarters (HQ), and DOJ approval of the draft "Blueprint" Declaration.

4. EPA-NE sought and obtained HQ approval for federal acquisition of easement/restrictive covenants.

5. EPA-NE sought and obtained CERCLA 104(j) letter from Rhode Island Department of Environmental Management.

6. Settling Defendants obtained title reports for all properties.

7. EPA-NE requested and received preliminary title opinions from DOJ for most properties.

8. In response to DOJ's preliminary title opinions, the Settling Defendants sent EPA (a) new title reports for *all* properties and (b) Declarations for each specific property (based on the original "Blueprint" but revised to fit site-specific needs). The new title documentation both has answered some of DOJ's questions and raised new questions about title issues.

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9. EPA-NE reviewed the new property-specific Declarations and sent comments to the Settling Defendants. The Settling Defendants are in the process of revising the Declarations to address EPA comments (very minor).

10. EPA-NE is in the process of reviewing the new title documentation and resolving title issues with DOJ, the PRPs, and the title company. This is a major task that will take many months to resolve particularly as it has became apparent that surveys will be needed to answer some of the title questions. This process is completed for the Pacific Anchor Chemical property.

11. Settling Defendants have obtained independent third party appraisals of the value of the easements/Declarations.

12. Settling Defendants have commenced negotiations with non-PRP property owners on some properties.

13. EPA-NE is sending detailed letters to the property owners to inform them about the institutional controls to which they will be subject so that they do not inadvertently "violate" ICs before they are put in place.

14. Once negotiations are complete, the Settling Defendants will record the Declarations, and EPA will request final title opinions from DOJ. EPA will also need to perform site inspections and interviews to produce "Certificates of Inspection and Possession" for DOJ.

15. In addition to the IC implementation, the parties have given some thought to long-term monitoring of ICs. The parties have agreed that ENSR, the PRP's contractor, will monitor for IC compliance every time ENSR goes to the Site to take ground water samples. In addition, before taking samples, ENSR sends a letter notifying each property owner of when the sampling will take place. Once the ICs are in place, this letter will contain boilerplate language reminding the property owner of their IC obligations.

<u>Question B</u>: Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

There have been no remarkable changes in physical conditions of the OU1 that would affect the protectiveness of the remedy.

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Changes in Standards and To Be Considereds

Although numerous changes have occurred in the Applicable, Relevant, or Appropriate Requirements (ARARs) and To Be Considereds (TBCs) since the ROD was signed, most of those changes do not affect remedy protectiveness[9]. However, two assumptions used at the time of the remedy selection have since been modified and do affect remedy protectiveness.

- the adoption of the new lower Maximum Concentration Level (MCL) standard for arsenic in ground water (changing the standard from 50 ppb to 10 ppb);

- promulgated revisions to Rhode Island's Water Quality Regulations reassessing the Blackstone River from a Class C to a Class B1 rating (the classification was not a listed ARAR or TBC, but it was one of the assumptions used in calculating risk).

At the time of the remedy selection in September, 1993, EPA concluded that a Risk Management Factor for arsenic was appropriate. At the time, recent studies indicated that many skin tumors arising from oral exposures to arsenic are non-lethal and that the dose-response curve for the skin cancers may be sublinear (in which case the cancer potency factor used to generate risk estimates may be overestimated). It was Agency policy to manage these risks downward by as much as a factor of ten. As a result, the carcenogenic risk for arsenic at this Site has been managed as if it were one order of magnitude lower than the calculated risk. Consequently, the interim cleanup level for arsenic was calculated as 50 ppb in ground water.

The interim ground water cleanup level as presented in the ROD was in large part based upon the arsenic standard in drinking water of 50 µg/l established in 1975, which was based on a U.S. Public Health Service standard originally established in 1942. In 1988, EPA conducted a risk assessment for arsenic in drinking water. The Safe Drinking Water Act, as amended in 1996, required EPA to review current drinking water standards for arsenic, propose a maximum contaminant level (MCL) for arsenic by January 1, 2000, and issue a final regulation by January, 2001.

EPA published a new standard for arsenic in drinking water of 10 µg/l on January 22, 2001 that would require public water supplies to reduce arsenic to 10 µg/l by 2006. EPA withdrew this standard in March 2001 for review. On May 22, 2001 EPA extended the previous

[9] A complete description of the ARARs, and any modifications noted, are presented in two documents: 1) Peterson/Puritan Superfund Site, Cumberland, RI, First Operable Unit, CCL Remediation Area Five-Year Review Report, November, 2000, or 2) Peterson/Puritan Superfund Site, Cumberland, RI, First Operable Unit, PAC Remediation Area Five-Year Review Report, March 2001.

delay of the rule's effective date to February 22, 2002 but did not change the compliance date (2006) for systems.

EPA requested three independent, expert panels to conduct three studies as part of its reassessment of the January 22 rule; the National Research Council undertook an expedited review of EPA's arsenic risk analysis and recent health effects research, the National Drinking Water Advisory Council reassessed the rule's cost, and the Agency's Science Advisory Board reviewed its benefits.

The risks, cost, and benefits reviews are completed. EPA decided that the additional information has reinforced the basis for significant reductions of the standard. On October 31, 2001, EPA affirmed the appropriateness of an MCL or regulatory level of 10 µg/l for arsenic in drinking water in its press release. As required by the Safe Drinking Water Act, a standard of 10 µg/l protects public health based on the best available science and ensures that the cost of the standard is achievable. This arsenic drinking water rule became effective on February 22, 2002 and by January 23, 2006, both community water systems and non-transient, non-community water systems must comply with the new 10 µg/l standard. Additionally, Superfund must also adopt this new standard and treat it as it would any other MCL-based contaminant concentration level in its decision making process for ground water cleanups.

Therefore, the arsenic cleanup level must be reviewed and a determination made as to whether the OU1 remedy remains protective in light of the revised cleanup goals. The ROD's goal of cleaning up arsenic to drinking water levels is unlikely to be met in light of (a) the revised MCL for arsenic (10 ppb), and (b) the current lack of viable cleanup technology for arsenic in ground water. However, risks to human health can be controlled as long as the ground water in the immediate vicinity of the contaminated portions of the Site is not used for drinking water.

All other risk based cleanup goals as presented in the ROD remain substantively unchanged.

At the time of the remedy selection in September, 1993, the surface water classification for Blackstone River was understood to be a Class C stream. Since that time, the State of Rhode Island promulgated revisions to its Water Quality Regulations on August 6, 1997. Among these revisions was an upgrade of all waters that had previously been Class C to Class B or higher. While Class C waters were suitable as fish and wildlife habitat and for boating and other secondary recreational activities, these waters did not have swimming or other forms of primary contact recreation as a designated use goal. With this change, the water quality goal for all Rhode Island waters became consistent with the national goal expressed in the federal Clean Water Act for all waters to provide water quality that allows for recreation in and on the water (CWA Sec. 101(a)). For the Blackstone River, the Class C segment that ran from the MA-RI border to

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Central Falls and encompasses the Site was reclassified from Class C to Class B1. The B1 classification indicates that while all Class B uses must be supported by water quality, primary contact recreation may be "impacted due to pathogens from approved wastewater discharges" (RI WQR, Rule 8(B)(1)).

The remedy selection process for OU1 did not anticipate a change in designated use goals for the River, and because the contamination on OU1 does not pose a risk for primary contact recreation, the change in classification does not materially affect the OU1 remedy. However, decision makers involved with ongoing response actions for the Site will contemplate primary contact recreation as a designated use goal for the River in developing potential exposure pathways and formulating remedial action objectives for future remedial decisions.

<u>Question C:</u> Has any other information come to light that could call into question the protectiveness of the remedy?

On occasion, the Blackstone River will flood its banks. The CCL Downgradient Area ground water extraction wells are within the 5 to 10 year flood plain. The design of the downgradient pumping system called for water-tight electrical components within below ground vaults. In the fall of 1996, a flood along the Blackstone River occurred and shorted out the electrical systems within the vaults. To prevent future electrical shorts during the occasional flooding of the individual well vaults, each well's electrical systems were removed from the well vaults to above grade electrical panels. These system modifications were completed in July 1997. The occasional river flooding has had little to no observable consequence on the overall protectiveness of the OU1 remedy.

Technical Assessment Summary

This section summarizes the technical findings above. As previously explained, the CCL Remediation Area remedy components include: 1) excavation (manholes and catch basins); 2) capping; 3) soil venting of source area soils; 4) source area ground water extraction, treatment, and discharge to the Publicly Owned Treatment Works (POTW); 5) downgradient area ground water extraction with direct POTW discharge; 6) natural attenuation of ground water at the Quinnville Wellfield; 7) institutional controls throughout the CCL Remediation Area; and 8) environmental monitoring, including the Joint Ground water Monitoring Program (JGMP) of the plume, and other associated environmental monitoring for operation and maintenance of the

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treatment systems. With the exception of the ICs, these remedy components have been completed or are currently operating within normal limits as specified in the ROD[10].

As previously explained, the remedial components specified in the ROD for the PAC Remediation Area were: 1) excavation of Leachfields #1 and #2 in the PAC Source Area; 2) in-situ oxidation in the area of PAC Source Area leachfields to lower arsenic ground water concentrations; 3) monitored natural attenuation of contaminants in the PAC Downgradient Area; 4) a Focused Investigation to determine the extent and source of contaminants in the PAC Downgradient Area; 5) institutional controls to prevent use or hydrologic alteration of contaminated ground water as well as to prevent direct exposure to contaminated soils; and 6) environmental monitoring in the entire PAC Remediation Area.

The remedial components specified in the ROD, excepting Institutional Controls, have all been implemented at the PAC Remediation Area. However, during the last year of operation, the ODS did not operate in accordance with design specifications, and its actual performance level decreased over time. Key components of the ODS are irreparably damaged, and the operation of the system has been suspended in order to evaluate the rebound of the aquifer. Startup of the system would require retrofitting of the existing unit and/or adoption of a new technology, since replacement parts are no longer commercially available.

During the environmental monitoring throughout the review period, slightly increasing BTEX concentrations in ground water in the southwest corner of the PAC property were observed. Additionally, residual soil contamination in the vicinity of the previously excavated USTs is observed to be acting as a continuing source of BTEX to the ground water in a limited location within the PAC Downgradient Area. Benzene, previously in exceedence of interim ground water cleanup levels at this former UST location, has recently been recorded below such levels. One reason for this occurrence may be that the residual contamination is found in the subsurface within a smear zone at the nominal water table elevation. Recent monitoring (2000-2001) has been conducted in the fall months where it could be expected that the watertable is lower and not in contact with the smear zone. The JGWMP will continue to include VOC monitoring in these areas, and will attempt to further resolve the observed downward trend of the benzene concentrations at the former UST location in accordance with the PAC monitoring obligations defined in the Plan.

[10] A further description of the CCL Remediation Area response actions is documented in the Peterson/Puritan Superfund Site, Cumberland, RI, First Operable Unit, CCL Remediation Area Five-Year Review Report, submitted in support of this five year review by the CCL PRPs in November 2000.

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Thus, for the PAC Remediation Area, all ICs are not in place and the ODS is not functioning as designed. However, all other components of the remedy have been completed, or are in progress, as required by the ROD[11].

VIII. Issues

Table 4 outlines a number of issues to be addressed.

The newly promulgated arsenic cleanup level must be reviewed against known Site conditions and a determination made as to whether achieving the ROD's goal of cleaning up the ground water to drinking water standards remains feasible in areas where the ground water is contaminated with elevated levels of arsenic.

At the PAC Remediation Area, excavation of Leachfield #1, natural attenuation processes occurring at the Site, and operation of the Oxidant Delivery System (ODS) for three years have failed to lower arsenic ground water levels in all wells below the 50 ppb interim ground water cleanup level. Further understanding of aquifer geochemistry, upgradient water quality, and residual carbon at the PAC Source Area has changed significantly since remedy selection and design. The ODS itself cannot be repaired without significant redesign, and retrofitting of components would be required since crucial components utilized in its design are no longer commercially available. Remediation of the ground water at the PAC Source Area to drinking water standards for arsenic within the ROD-designated cleanup time frames will not likely be achieved. The adoption of the newly-promulgated 10 ug/L arsenic MCL has further complicated the cleanup response for ground water at the PAC Remediation Area. The area of arsenic contamination is not expanding, and early post remedy evaluations of the natural aquifer processes appear to be moving towards a more oxygen rich, low arsenic state. The PAC Settling Defendants have evaluated whether the arsenic can naturally attenuate and have estimated that such attenuation may occur within 10-30 years. Further data collection and evaluations will be needed to further validate this process and estimated cleanup time frame.

Slightly increasing concentrations of BTEX within the southwest portion of the PAC Remediation Area warrants further monitoring. Should the positive trend continue, additional response actions may be needed. Also, additional monitoring of the former UST location is required to further illustrate a continued decline in concentration of BTEX below health-based levels.

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[11] A further description of the PAC Remediation Area response actions is documented in the Peterson/Puritan Superfund Site, Cumberland, RI, First Operable Unit, PAC Remediation Area Five-Year Review Report, March 2001

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Table 4 - Issues

	Issues	**Currently Affects Protectiveness** (**Y**es/**N**o)	**Affects Future Protectiveness** (**Y**es/**N**o)
1.	PAC ODS remediation system has failed to reduce arsenic concentrations in source area ground water to protective levels.	**N**	**Y**
2.	PAC Remediation Area BTEX concentrations are increasing (slightly) in a portion of the Site, and more data concerning the source strength of BTEX at the former UST is needed.	**N**	**Y**
3.	PAC Remediation Area response action for CVOCs is not expected to achieve cleanup levels within designated time frame. PAC believes that source(s) of CVOC contamination in the PAC Downgradient Area are likely attributable to off-site non-PAC related operations.	**N**	**Y**
4.	Institutional Controls are not in place at all affected properties within OU1	**N**	**Y**
5.	Promulgated revisions to RI Water Quality Regulations upgrading designated use goals for the Blackstone River.	**N**	**N**[12]
6.	Conduct a timely investigation into the nature and extent of the contamination at OU2 (J.M. Mills Landfill and surrounding areas)	**N**	**TBD**
7.	The source of the ground water contamination found at the Mackland Farm/Kelly House property remains unknown.	**N**	**TBD**

The source of the chlorinated CVOC contamination in the PAC Downgradient Area is now considered by PAC to be likely attributable to off-site non-PAC related operations within the industrial park. Further evaluation by CCL and PAC of this hypothesis coupled with the completion of the ICs process would bring closure to this issue. By determining the source strength of the CVOCs, EPA can better determine if the current remedy for those contaminants, Monitored Natural Attenuation (MNA), is appropriate, or whether other response actions are necessary.

EPA has learned that the PAC facility operations will shortly be discontinued at the Site. Thus, this property may be available for reuse in the near term. The future use of the property will be a key

[12] While this change is unlikely to have an effect on the long-term protectiveness for OU1, future decision documents (such as for OU2) will reflect this upgrade of a designated use goal for the river.

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consideration in conducting any future assessment of the risks posed by the contamination in the PAC Remediation Area. The PAC PRPs may play a definitive role in assisting local government in determining and documenting the Reasonably Anticipated Future Land Use (RAFLU) of the Property.

The ground water contamination does not pose an immediate risk to human health nor the environment in the short term because no one is currently consuming this water within the immediate vicinity of the impacted aquifer area. However, over the long term, the ground water contamination does pose a risk because in the future, it may be necessary to use the Blackstone aquifer as a water supply to satisfy increased demand for water. Thus, it is reasonable to maintain the goal of the remedial action, which is to meet long term protectiveness standards and eventually attain ground water cleanup standards throughout the Site. Additional periodic ground water monitoring and assessment within OU 1 remains necessary as a tool to measure compliance with the Record of Decision and as an indicator to observe the progress in attaining ground water cleanup standards throughout the Site.

In addition, a complete and timely investigation into the nature and extent of the contamination at OU 2 is prudent. It is known that there is an increased frequency in recreational use along the river in the vicinity of OU 2. Until further information becomes available, certain informational measures should be implemented to increase public awareness until potential risks are further evaluated and physical hazards are known. Ground water data collection at OU2 should be commensurate and comparable with the ongoing JGWMP ground water data collection from OU1 whenever possible. This will enable reviewers to gather a more comprehensive understanding of the ground water flow and contaminant concentration trends throughout a larger portion of the Site.

Lastly, EPA and RIDEM concur that the source of the ground water contamination found at the Mackland Farm/Kelly House property remains unknown. EPA and RIDEM will review the ground water and other media data obtained during 2002 and pursue further collaborative planning to decide whether future response actions under Superfund are appropriate.

IX. Recommendations for Follow-up Actions

Table 5 identifies a list of action items based upon the list of issues presented in Section VIII above.

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Table 5 - Recommendations and Follow-up Actions[13]

Issue	Recommendations and Follow-up Actions	Party Responsible	O/S Agency	Milestone Date (due by)	Affects Protectiveness ---------- Current / Future
1. Arsenic	A. Perform a background study for arsenic concentrations in soil (leachability) and ground water -(helps determine how localized the elevated levels of arsenic contamination are and therefore the feasibility of active cleanup measures).	PAC	EPA & RIDEM	10/1/05	N / Y
	B. Demonstrate and provide a point of compliance boundary in OU1 for the new 10 ppb concentration standard for arsenic in ground water.			12/31/04	
	C. Further document by modeling/monitoring the evidence for natural attenuation of arsenic in ground water.			10/1/05	
	D. Working in concert with the Town, determine and document the RAFLU of the Property.			12/31/03	
	E. Demonstrate and provide documentation in support of a Technical Impractibility (TI) Waiver of the Arsenic ARAR: 1. Spacial area over which a TI decision will apply. 2. Conceptual model describing Site geology, hydrology, source strength, fate and transport. 3. Evaluation of restoration potential (data and analyses that support assertion for TI waiver)			12/31/06	

[13] Note that upon reviewing a draft of this Report, the OU1 PRPs disagreed with some aspects of the recommendations listed above. This report does not preclude further planning discussions for attaining the goals underlying the above recommendations.

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Issue	Recommendations and Follow-up Actions	Party Responsible	O/S Agency	Milestone Date (due by)	Affects Protectiveness ---------- Current / Future
2. BTEX	A. Conduct continued ground water monitoring of the BTEX within the south-west portion of the PAC Remediation Area to ascertain whether future response actions may be needed. B. Provide further trend analyses incorporating JGWMP data to resolve BTEX concentrations at the former UST location within the PAC Remediation Area.	PAC	EPA & RIDEM	12/31/04 12/31/06	N / Y
3. CVOCs	A. Expand the CCL/PAC well monitoring network including, but not limited to, nested (shallow/deep) wells on the Okonite property that provide vertical profiling coverage south and west of MW-307 to demonstrate the assumption that source(s) of CVOCs contamination in the PAC Downgradient Area are likely attributable to off-site non-PAC related operations. Understanding the strength of the source will allow EPA to determine whether MNA is an appropriate remedy for the PAC-downgradient CVOCs. B. Provide further trend analyses incorporating latest JGWM data and new monitoring stations to postulate source strength and MNA for CVOCs	CCL & PAC	EPA & RIDEM	12/31/04 12/31/06	N / Y
4. ICs	A. Complete and record ICs for all properties within OU1 for which (a) there is no need for condemnation actions and (b) subordination agreements can be obtained. B. Complete condemnation actions or problematic subordination agreements.	CCL & PAC	EPA & RIDEM	9/30/03 9/30/04	N / Y

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Issue	Recommendations and Follow-up Actions	Party Responsible	O/S Agency	Milestone Date (due by)	Affects Protectiveness ---------- Current / Future
5. OU2	A. Increased frequency in recreational use along the river in the vicinity of OU 2 may increase the threat of exposure to contaminated soils and sediments along the bank of the river. Increase the public's awareness through frequent notice and additional sign postings along the river until potential risks are further evaluated and physical hazards are known.	OU2 PRP Group	EPA	3/31/03	N / TBD[14]
	B. Complete the OU2 RI/FS such that any/all potential risks are identified to the public in a timely manner and whenever possible, conduct ground water data collection commensurate with that of OU 1.	OU2 PRP Group	EPA	12/31/04	
6. "OU3"	Continue data review and initiate further collaborative planning to assess the need for additional response actions at OU3.	EPA and State	----	12/31/04	N / TBD[15]

X. Protectiveness Statement

Operable Unit 1:

The remedy for OU1 currently protects human health and the environment in the short term because: 1) alternative water supplies are available to meet current demand, so no one is using the contaminated ground water, and 2) all OU1 property owners who will be subject to institutional controls are receiving, or have received, information about the institutional controls to which they will be subject. However, the remedy can not be deemed protective in the long term until followup actions are taken. This is because: 1) the arsenic remedy at the PAC Remediation Area will not be able to meet the 50 ppb standard for arsenic in ground water as specified in the ROD, let alone the new 10 ppb standard now applied, and 2) institutional controls are not in place at all affected properties throughout OU1.

[14] Protectiveness statement concerning OU2 is deferred until additional data can be obtained.

[15] Protectiveness statement concerning "Potential" OU3 is deferred until additional data can be obtained.

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Operable Unit 2:

An investigation into the nature and extent of contamination at the J. M. Mills Landfill and its surroundings is currently underway. Until this information becomes available, the protectiveness determination for OU2 cannot be made at this time. An Administrative Order by Consent was signed on July 13, 2001 with a performing party to conduct the Remedial Investigation and Feasibility Study with field work to be commencing in the Fall of 2002 for this portion of the Site. In the interim, and specifically due to the increase in recreational use along the river and in the immediate vicinity of OU2, EPA will initiate increased surveillance of the fenced-in portion of the Site, provide additional measures to increase public awareness of the potential concerns within OU2, and require additional postings at portions of the Site to deter trespassing and egress onto portions of OU2 until further assessment of the risks are evaluated. Following the completion of this study, a final cleanup remedy will be selected. It is anticipated that the RI/FS for OU2 will be complete prior to the next Five Year Review.

"Potential" Operable Unit 3:

Ground water contamination north and across the river from OU1 has led to the consideration of a third operable unit. This ground water contamination appears to be unrelated to OU1 and unrelated to the Ashton Mill Property. The Agency has secured another round of ground water (and other media) analyses from this area (which includes the Mackland Farm/Kelly House property) during 2002, which will help EPA and RIDEM decide whether future response actions under Superfund are appropriate. Thus, for the Mackland Farm/Kelly House property located on the Lincoln side of the Blackstone River, further consideration for investigation into the nature and extent of the ground water contamination as a potential OU3 remains in the planning stage. For the Ashton Mill Property, located on the Cumberland side of the Blackstone River, EPA no longer considers this Property to be part of the Peterson/Puritan Superfund Site.

XI. Next Review

Five-year reviews are conducted every five years at sites where contaminant levels remain at concentrations that prevent unlimited, unrestricted use of the site. The next five-year review for the Peterson/Puritan Superfund Site should be conducted by 2007. By that time, more will be known of the progress of the ground water cleanup at OU1, and the nature and extent of contamination regarding other areas of concern within the boundary of the Site.

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XII. References

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