

**U.S. ENVIRONMENTAL PROTECTION AGENCY
EPA NEW ENGLAND**

RECORD OF DECISION SUMMARY

**EASTLAND WOOLEN MILL
OPERABLE UNIT I**

SEPTEMBER 2002

**Record of Decision
Table of Contents**

PART 1: THE DECLARATION

- A. SITE NAME AND LOCATION
- B. STATEMENT OF BASIS AND PURPOSE
- C. ASSESSMENT OF SITE
- D. DESCRIPTION OF SELECTED REMEDY
- E. STATUTORY DETERMINATIONS
- F. SPECIAL FINDINGS
- G. ROD DATA CERTIFICATION CHECKLIST
- H. AUTHORIZING SIGNATURES

PART 2: THE DECISION SUMMARY

- A. SITE NAME, LOCATION AND BRIEF DESCRIPTION
- B. SITE HISTORY AND ENFORCEMENT ACTIVITIES
 - 1. History of Site Activities
 - 2. History of Federal and State Investigations and Removal and Remedial Actions
 - 3. History of CERCLA Enforcement Activities
- C. COMMUNITY PARTICIPATION
- D. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION
- E. SITE CHARACTERISTICS
- F. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES
- G. SUMMARY OF SITE RISKS
 - 1. Human Health Risk Assessment
 - 2. Ecological Risk Assessment

**Record of Decision
Table of Contents**

- 3. Basis for Response Action
- H. REMEDIATION OBJECTIVES
- I. DEVELOPMENT AND SCREENING OF ALTERNATIVES
- J. DESCRIPTION OF ALTERNATIVES
- K. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES
- L. THE SELECTED REMEDY
- M. STATUTORY DETERMINATIONS
- N. DOCUMENTATION OF NO SIGNIFICANT CHANGES
- O. STATE ROLE

PART 3: THE RESPONSIVENESS SUMMARY

APPENDICES

- Appendix A: Tables and Figures not included in the text of the ROD
- Appendix B: State of Maine DEP Letter of Concurrence
- Appendix C: Administrative Record Index

**Record of Decision
Part 1: The Declaration**

DECLARATION FOR THE RECORD OF DECISION

A. SITE NAME AND LOCATION

**Eastland Woolen Mill Superfund Site
Corinna, Penobscot County, Maine
MED980915474
Site ID No: 0101043
EPA Lead
Operable Unit I**

B. STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for Operable Unit I (OU I) at the Eastland Woolen Mill Superfund Site in Corinna, Maine (the Site). The remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA), 42 USC § 9601 *et seq.*, and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300 *et seq.*, as amended. The Director of the Office of Site Remediation and Restoration (OSRR) has been delegated the authority to approve this Record of Decision (ROD).

This decision is based on the Administrative Record, which has been developed in accordance with Section 113(k) of CERCLA, and which is available for review at the Stewart Public Library, Corinna, Maine, and at the United States Environmental Protection Agency (EPA) EPA New England, OSRR Records Center in Boston, Massachusetts. The Administrative Record Index (Appendix C to the ROD) identifies each of the items comprising the Administrative Record upon which the selection of the remedial action is based.

The State of Maine concurs with the selected remedy.

C. ASSESSMENT OF THE SITE

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

D. DESCRIPTION OF THE SELECTED REMEDY

This ROD sets forth the selected remedy for OU I of the Site. The remedy involves the restoration of contaminated groundwater through treatment using both extraction and ex-situ treatment and the application of in-situ reagents. Treatment of the groundwater will be accomplished in two ways: (1) groundwater will be extracted from the ground and treated to

Record of Decision Part 1: The Declaration

reduce the concentration of contaminants to levels that are protective of human health and the environment and achieve the applicable criteria for discharge into either the East Branch of the Sebasticook River or the groundwater; and (2) in-situ reagents will be used to facilitate the removal of contamination (via in-situ oxidation and in-situ surfactant addition, in combination with the addition of bio-stimulants as a polishing step). The remedy includes institutional controls to restrict the future use of the Site to prevent ingestion of groundwater and disruption of the groundwater extraction and treatment system. This cleanup approach is expected to control the off-site migration of contaminated groundwater and restore the aquifer to drinking water standards.

OU I also addresses the soil contamination remaining after the non-time-critical removal action that was initiated at the Site in 1999 (the NTCRA). The early soil cleanup conducted under the NTCRA removed all soil contamination above the water table and most soil contamination, including the Dense Non Aqueous Phase Liquid (DNAPL) below the water table, except in a few areas under the former Eastland Woolen Mill complex, the underground storage tank (UST) Area and Building 14 that were not accessible during the NTCRA. OU I addresses the remaining contaminated soils and DNAPL that represent a continuing source of groundwater contamination through the use of the in-situ reagents to destroy and facilitate the removal of the remaining mass of contamination in the soil and bedrock fractures.

The selected remedy for OU I is the first remedial action for the Site. A NTCRA was initiated in 1999 to remove the contaminated soils in an area known as “downtown Corinna” that were acting as a source of groundwater, surface water and sediment contamination. A cleanup proposal for Operable Unit II (OU II), whose focus is downstream sediments and floodplain soils and the “Old Dump,” is expected in calendar year 2003. OU I was developed to be a comprehensive approach that addresses all current and potential future risks in the “downtown Corinna” area. Following the NTCRA, the contaminated groundwater and the remaining contaminated soils beneath the water table are the only media in the “downtown Corinna” area requiring remedial action.

Specifically, the OU I remedial action includes the following major components:

- Extraction and treatment of the contaminated overburden and bedrock groundwater. The extraction system will be designed to prevent off-site migration of contaminated groundwater and restore the aquifer to federal and state MCLs, federal non-zero MCLGs and more stringent State MEGs.
- In-situ treatment of the contaminated overburden and bedrock groundwater and remaining areas of contaminated soil/DNAPL. A chemical reagent (e.g., Fenton’s Reagent or another oxidizing agent) will be added to the overburden and bedrock aquifer to reduce the mass of contaminants in the system. If the mass reduction is not sufficient to achieve cleanup levels, then enhanced flushing (using surfactants/solvents) and

Record of Decision
Part 1: The Declaration

biological degradation (using bio-stimulants) will be attempted to further reduce the mass of contamination.

- Connection of certain residences to the water supply lines to prevent their wells from becoming contaminated, and to prevent expansion of the contamination in the groundwater.
- Implementation, monitoring and maintenance of institutional controls (*i.e.*, deed restrictions) in the form of groundwater use restrictions (*e.g.*, easements or restrictive covenants) to prevent ingestion of groundwater and disturbance of the groundwater extraction and treatment system.
- Long-term monitoring of groundwater, surface water and sediments to evaluate the success of the remedial action.
- Implementation of five-year reviews to assess the protectiveness of the remedy until cleanup goals have been met.

The selected remedy addresses principal and low-level threat wastes at the Site by both reducing the mass of contamination, including DNAPL, in the soil and bedrock fractures and containing and treating the contaminated groundwater to achieve groundwater restoration.

E. STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action (unless justified by a waiver), is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

The remedy also satisfies the statutory preference for treatment as a principal element of the remedy (*i.e.*, reduce the toxicity, mobility, or volume of materials comprising principal threats through treatment).

Because this remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure (and groundwater use restrictions are necessary), a review will be conducted within five years after initiation of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

F. SPECIAL FINDINGS

None.

**Record of Decision
Part 1: The Declaration**

G. ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this Record of Decision. Additional information can be found in the Administrative Record file for this Site.

1. Chemicals of concern (COCs) and their respective concentrations.
2. Baseline risk represented by the COCs.
3. Cleanup levels established for COCs and the basis for the levels.
4. How source materials constituting principal threats are addressed.
5. Current and reasonably anticipated future land assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and ROD.
6. Potential land and groundwater use that will be available at the Site as a result of the selected remedy.
7. Estimated capital, operation and maintenance (O&M), and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected.
8. Key factor(s) that led to selecting the remedy (i.e. describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria; highlighting criteria key to the decision).

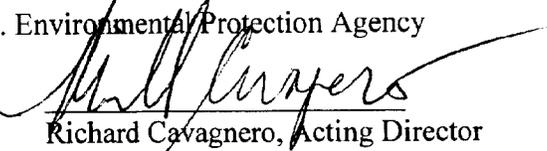
H. AUTHORIZING SIGNATURES

This ROD documents the selected remedy for the groundwater at the Eastland Woolen Mill Superfund Site. The State of Maine Department of Environmental Protection (the MEDEP) concurs with the remedy.

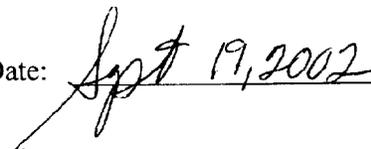
Concur and recommended for immediate implementation:

U.S. Environmental Protection Agency

By:


Richard Cavagnero, Acting Director
Office of Site Remediation and Restoration
EPA New England

Date:



Record of Decision
Part 2: The Decision Summary

RECORD OF DECISION SUMMARY

A. SITE NAME, LOCATION AND BRIEF DESCRIPTION

Eastland Woolen Mill Superfund Site
Corinna, Penobscot County, Maine
MED980915474
Site ID No: 0101043
EPA Lead
Operable Unit I

The Eastland Woolen Mill Superfund Site (Site) is located in the Town of Corinna, Penobscot County, Maine, approximately six miles north of Newport and 25 miles northwest of Bangor, Maine (see Figure 1). Approximately 800 persons live within one mile of the Site and 2,500 within four miles. The Site was formerly dominated by buildings of the Eastland Woolen Mill (Mill), which before its demolition in 2000 comprised a large manufacturing building and several side buildings with a total area of 250,000 square feet. These buildings stood on both sides of and over the East Branch of the Sebasticook River, a State-designated Class C water that runs north to south through the center of Corinna (see Figure 2).

Corinna is located within the East Branch of the Sebasticook River watershed, which drains to Sebasticook Lake approximately three miles south of the town. Topography within the watershed is typified by gently rolling hills to steeply sloping ridges, varying from narrow valleys to fairly expansive low-lying floodplains. Elevations within the immediate vicinity of Corinna range from 200 to 320 feet above mean sea level (msl). The Site is at an elevation of 220 to 230 feet above msl.

A more complete description of the Site can be found in Section 1 of the Remedial Investigation Report prepared by Harding ESE, Inc., a MACTEC Company (Harding ESE) for EPA New England and released in July 2002 (RI).

B. SITE HISTORY AND ENFORCEMENT ACTIVITIES

1. History of Site Activities

Over the years of the Mill's operation, the locations of storage, handling and use of chemicals varied with facility expansions. The first buildings (*i.e.*, Buildings 1 and 2) were constructed about 1912. A 1916 map of Corinna showed the presence of the Mill Pond dam (now demolished) just north of Building 1. Building 1A was added in 1939, according to Factory Mutual Engineering Division maps. In 1950, a significant expansion of the Mill occurred with the construction of Buildings 3 and 4. In 1952, Building 5 was added, and between 1958 and 1960, large additions included Buildings 20, 21, 23, and 25A. Building 25B was added in 1965. After Building 25B, the next significant recorded construction did not occur

Record of Decision
Part 2: The Decision Summary

until 1977, when the new Dye House (sometimes referred to as the Beam Dye House) was constructed.

Liquid wastes from the mill were discharged directly into the East Branch of the Sebasticook River via the Mill Pond dam tailrace, which was located below the western half of Building 1 prior to construction of the Corinna Wastewater Treatment Plant in 1969 (See Figure 2). These wastes included sanitary and chemical wastes as well as wool floc. Wool floc has been observed in downstream sediments and is likely associated with the discharge of chemical wastes from the dye kettles. MEDEP's Eastland Woolen Mill Company (Eastland Woolen) files contained reference to a record search for an on-site sanitary subsurface wastewater disposal system. The search concluded that there was no such facility associated with the mill, and that sanitary wastes and other liquid wastes generated through operation of the Mill were discharged to the East Branch of the Sebasticook River until 1969.

An area just south of the Mill complex and Main Street was reported to have contained three fuel oil USTs: one 110,000-gallon UST, one 90,000-gallon UST, and one of unknown size. These USTs were installed in the 1970s to store fuel oil for use at the Mill (See Figure 3). The tanks were reportedly removed, but the date(s) of their removal(s) is not known.

The Mill complex also contained several USTs, some of which have been documented to have leaked. The east side of the complex had two 30,000-gallon USTs that contained No. 6 oil and fuel oil (assumed to be No. 2). Three other smaller USTs on the east side of the Mill, removed in 1993 by Eastland, contained various products over their history of use, including sulfuric acid, "dye-aid" and sodium hydroxide. The west side of the Mill complex had two tanks used for fuel oil storage: one of 10,000 gallons and one of 250 gallons. Two 100-gallon gasoline tanks were also located on the west side of the Mill, according to a 1962 map. See Figure 3 for the location of the USTs and the Corinna Waste Water Treatment Plant.

According to Eastland Woolen's self-described history, recycled wool products always accounted for a portion of the manufacturing activities at the Mill. Virgin wool was also processed there. The James Striar Family Foundation, which owned the Mill, also operated a mill in Orono, Maine. At the Mill in Corinna, the primary operations were yarn and fabric manufacturing and fabric finishing.

According to Eastland Woolen accounts, six specific operations were conducted at the two mills:

Fiber preparation and blending. Virgin and recycled fibers were blended and dyed as needed. This operation appears to have been conducted principally at the Orono mill. Prepared fibers were then trucked to the Mill in Corinna.

Yarn manufacturing. This involved "carding" and spinning fiber to form yarn. It appears to have been a "dry" operation that did not involve chemical processes.

Record of Decision

Part 2: The Decision Summary

Fabric manufacturing. This involved weaving yarn into fabric. It also appears to have been a “dry” operation that did not involve chemicals.

Fabric finishing. This involved fulling, scouring, carbonizing, dyeing, drying and pressing of the fabric to meet product or customer requirements. It utilized various chemicals, including dyes and “dye-aid,” which was applied to the fabric to facilitate the absorption of dye. “Dye-aid” was mixed with heated water to prepare fabric for dyeing. Soap compounds were also used to wash the fabric before and after dyeing. Thus, this operation was considered a “wet” process.

Final inspection and packaging. This was another “dry” operation that involved rolling, inspection, counting and invoicing of fabric product.

Blanket manufacturing. This was a “dry” operation that involved cutting and stitching fabric for use as blankets. The blankets were then packaged for sale. Blankets were the only finished product that Eastland Woolen Mill sold. All other product was in the form of bulk fabric that was purchased and used by other manufacturers for product production (e.g., clothing).

Although many of the operations were “dry” processes, some were mechanized and may have involved use of fuel and lubricants and solvents for powering, oiling and cleaning machinery.

The principal operation that generated liquid wastes at the Mill was the fabric finishing operation. According to layout plans of the Mill, a majority of the “wet” processes (e.g., dyeing and washing of the fabric) occurred in the basements of Buildings 1, 1A, 3, and 4 (see Figure 2). In 1977, the new Dye House was constructed; however, the existing dye kettles were still used after the completion of the new Dye House. Reportedly, the dyeing of fabrics occurred in dye kettles, which were essentially large vats cast into the poured concrete basement. Dye mixtures consisted of varying amounts of the following constituents: water, dye (coal-tar derivative), “dye-aid” (e.g., Carolid MXS or Carolid EWS), acid, caustic and ammonia.

Dye-aid was a component of the dyeing process that was used to improve absorption of dye by wool fabric. It contained chlorinated benzene compounds. The time of dye-aid use by the Mill has not been documented, although it may have been from as early as the 1950s through the closing of the Mill in 1996. Carolid MXS reportedly contained approximately 65 percent dichlorobenzene and approximately 35 percent biphenyl. Carolid EWS contained up to 31 percent chlorinated benzene compounds, including 1,2-(ortho), 1,4-(para), and 1,3-(meta) dichlorobenzene, and 1,2,4-trichlorobenzene. The 1991 Spill Containment and Prevention Plan prepared by Acheron, Inc. for Eastland Woolen indicates that at that time, approximately 50 gallons of Carolid MXS were being used every day. A monochlorotoluene-based dye-aid reportedly was also used at the Mill but was not as effective as the dye-aids containing chlorinated benzene compounds and therefore was not used as extensively.

Record of Decision
Part 2: The Decision Summary

Lot 88, owned by the Mill, was the site of former storage Building No. 12. Lot 88 is located approximately 800 feet east of the Mill along Routes 7 and 11 (see Figure 3). Building No. 12 was used to store powdered dye and other chemicals. Reportedly, wool was stored in the southern end, and drums were stored in the north end. The building had a wood floor, so any spills of chemicals could infiltrate into underlying soil. According to a former employee, chemical spills in Building No. 12 were common. After the building was demolished, a heavy rain reportedly caused colored dye to surface from the ground; the dye was then seen to migrate with surface water runoff.

Several other areas were associated with Mill activities. Fire protection maps from 1955 indicate that chemicals and dyes were also stored in Building No. 14, located on the east side of the mill complex. The School Street Yard, which included four buildings, was used as a carpentry area and contained a painting shop (See Figure 3). According to fire protection maps, the Moosehead Mill was used to store fiber and dry supplies; Eastland Woolen drawings indicate the presence of a fuel oil and kerosene storage tank at this location (See Figure 3).

Eastland Woolen also owned some property along the Sebasticook River approximately one mile downstream of the Mill. This area is referred to as the "Old Dump" in this document and was used for disposal of solid waste from the Mill (See Figure 4). MEDEP observations of the area indicated the presence of wool scrap and 55-gallon drums. Interpretation of a 1970 aerial photograph indicates that the lateral extent of landfill is approximately 5.2 acres. Exposed refuse was observed in the photograph, and the western edge of the landfill was estimated to be about 10 to 40 feet away from the East Branch of the Sebasticook River. The Old Dump is included in the scope of OU II at the Site.

A more detailed description of the Site history can be found in Section 1 of the RI Report.

2. History of Federal and State Investigations and Removal and Remedial Actions

Groundwater contamination was first documented in Corinna in 1983, when a MEDEP employee noticed a strange odor and taste in drinking water at the Gallison Restaurant located across the street from the Mill. Several water samples collected from the restaurant showed the presence of monochlorobenzene, dichlorobenzenes and trichlorobenzenes. Later in 1983, granular activated carbon (GAC) filters were installed on five supply wells (residential and business) near the Mill to mitigate exposures to chlorinated benzene compounds.

Eastland Woolen initiated formal environmental investigations in 1984 by performing a preliminary hydrogeologic investigation of the downtown area. The work included the completion of soil borings, installation of monitoring wells and piezometers, sampling and analysis of soil and groundwater and a preliminary fracture-trace analysis. The investigation concluded that additional work was needed to identify a contaminant source area. By 1988, Eastland Woolen had completed a study of residences and businesses at risk from the

Record of Decision
Part 2: The Decision Summary

groundwater contamination, and had investigated potential locations for installation of a public water supply system. It was concluded that contamination had likely spread via bedrock fractures and faults. Five additional private water supply wells were fitted with GAC filters based on results of water supply well sampling performed between 1983 and 1988.

In 1993, Eastland Woolen completed Phase I of a chlorinated benzene contamination investigation in the downtown area. The report identified the tailrace beneath the Mill and the UST area where dye-aid had been stored adjacent to Building 13 as possible source locations. Eastland Woolen removed three USTs from this area (the UST Area) in 1994. Chlorinated benzene compounds were detected in soil samples collected from the bottom of the excavation. An overburden groundwater recovery well (R-1), consisting of a 30-inch-diameter corrugated metal pipe with slits in the bottom five feet and surrounded by crushed stone, was installed at the site after removal of the USTs, because free product was reported in the excavation and soil staining was observed. In addition, a drum containing a dark oil-like substance was unearthed in the UST excavation.

Recovery Well R-1 was pumped to collect chlorinated benzene-contaminated groundwater and flush contaminants from the “smear” zone between August 1994 and sometime in 1995. In conjunction with the pumping of groundwater from Well R-1, Eastland Woolen instituted pumping of groundwater from the bedrock well on Lot 122, south of Main Street, now referenced as Recovery Well R-2. Pumping of Well R-2 occurred from August 1994 until the spring of 1999. Pumping has resumed after closure of the NTCRA excavation in 2001/2002 to prevent the contamination of the clean soil backfilled into the NTCRA excavation.

In the fall of 1995, during the installation of water supply lines to serve contamination-affected residences, personnel working for Eastland Woolen observed excavation activities in the riverbed just downstream of the Main Street bridge. During this excavation, a dense non-aqueous phase liquid (DNAPL) was reportedly observed within the till material beneath the gravel riverbed. The consultant for Eastland Woolen, Acheron, Inc., performed additional sampling of the sediments in the riverbed downstream of the Mill and found chlorinated benzene compounds and petroleum hydrocarbons both within the silty till layer beneath the rocky, gravel riverbed and in a floodplain on the west side of the river.

After closure of the Mill in 1996, MEDEP sampled soils around the former USTs adjacent to Building 13 to evaluate whether residual soil contamination was present and acting as a source of groundwater contamination. This effort was supplemented in 1998 with additional analytical parameters and sampling of a background location. In 1997, MEDEP performed sediment sampling with field chemical screening to gain information on the magnitude of river bottom contamination documented by Acheron, Inc. in 1995. Additional sediment and surface water samples were collected from the river in 1998 for off-site analysis. These investigations confirmed that high concentrations of chlorinated benzenes were present in the riverbed over 1000 feet downstream of the Eastland Woolen Mill. These data were used to prepare the Hazard Ranking System scoring package that was submitted to EPA for placement of the Site on the

Record of Decision
Part 2: The Decision Summary

National Priorities List (the NPL).

In 1997, MEDEP performed an emergency response action to remove 54,673 pounds of various hazardous substances from process pipes, containers and vessels located within the Mill.

The Site was proposed for inclusion on the NPL on April 23, 1999 (64 Fed. Reg. 19968). It was listed for final inclusion on the NPL on July 22, 1999 (64 Fed. Reg. 39878-39885).

EPA began a remedial investigation and feasibility study (RI/FS) at the Site in 1999. After the RI/FS was completed in 2002, EPA issued a Proposed Plan for the OU I remedial action in July 2002.

In addition, in January 1999, following the evaluation of data collected during an 1998 expanded site inspection, EPA signed an Approval Memorandum authorizing the preparation of an Engineering Evaluation and Cost Analysis (EE/CA) to evaluate potential response alternatives for a NTCRA at the Site. The EE/CA recommended demolishing the Eastland Woolen complex buildings to allow for the excavation and treatment of the contaminated soils on the Site. Soil cleanup levels were derived from a streamlined risk assessment and set at levels that would be protective of groundwater and human contact.

Table 1
NTCRA Cleanup Levels

Compound	Soil Clean-up Level, : g/kg
Benzene	30
Chlorobenzene	1,000
1,2-Dichlorobenzene	17,000
1,3-Dichlorobenzene	41,000
1,4-Dichlorobenzene	2,000
1,2,4-Trichlorobenzene	5,000

The buildings within the Mill complex were demolished between November 1999 and April 2000. During 2000, contaminated soil was excavated from the source area along the East Branch of the Sebasticook River (Areas 2 and 3), portions of the source area within the former building complex (Area 1A, Building 4 and Building 9), and the location of a former warehouse for Eastland Woolen (Lot 88). Approximately 25,000 cubic yards of chlorinated benzene-contaminated soils were excavated from these areas and stockpiled on the concrete slab remaining after the demolition of the Mill Complex (the Slab Area) during 2000. Other NTCRA activities completed in 2000 included the following:

- Demolition of five buildings along the former Main Street.
- Relocation of Odd Fellows Hall to Stetson Road.
- Removal of two 10,000-gallon and one 30,000-gallon USTs including 12,000 gallons of #6

Record of Decision
Part 2: The Decision Summary

fuel oil.

- Treatment of 1,224,000 gallons of water generated from the excavation and decontamination activities.
- Relocation of the Town of Corinna water and sewer lines.

The NTCRA continued in 2001 with the excavation of approximately 50,000 cubic yards of soil contaminated with chlorinated benzene compounds from the source area beneath the former Mill complex (Area 1, Building 9) and the UST Area. Other NTCRA activities completed in 2001 included the following:

- Completion of the New Route 7 and bridge.
- Relocation of the new East Branch of the Sebasticook River riverbed.
- Restoration of the former Mill Pond.
- Repair of Corundel Dam.

A total of approximately 75,000 cubic yards (115,000 tons) of contaminated soil were stockpiled at the Site for treatment as of May 2002. Treatment of these soils began in June 2002 and is expected to continue into 2004. Final restoration of the Site and completion of the NTCRA is planned for 2004. Figure 5 provides an overview of the NTCRA, including the areas subject to excavation, the re-alignment of the East Branch of the Sebasticook River and Route 7, and the location of soil treatment and storage areas.

3. History of CERCLA Enforcement Activities

Enforcement activities have been limited by the lack of viable potentially responsible parties (PRPs) at the Site. Eastland Woolen ceased to operate in 1996. The family-owned company is now defunct (it ceased operations shortly after completing a reorganization plan pursuant to Chapter 7 of the Bankruptcy Code), and most of its officers are deceased.

The Site is currently owned in part by numerous entities, including the Town of Corinna and the State of Maine. The State acquired the property via eminent domain, and the Town of Corinna acquired the property via tax foreclosure/eminent domain. There are two private owners of portions of the Mill complex who acquired their respective properties at a creditor's auction.

EPA is continuing to investigate Eastland Woolen with respect to possible PRPs. EPA has issued a General Notice Letter to the Estate of Ralph A. Berg (one of the two private owners of the Mill complex).

Record of Decision
Part 2: The Decision Summary

C. COMMUNITY PARTICIPATION

Throughout the EPA cleanup of the Site, community concern and involvement have been high. The local Selectboard actively sought EPA's involvement at the Site to address the contamination left behind by the closure of the Mill in 1996. EPA has kept the community and other interested parties informed of Site activities through informational meetings, fact sheets, press releases and public meetings. EPA has met regularly with the community and Selectboard to keep them informed and seek their input regarding Site activities. The community has also benefitted from a website (www.cattailpress.com), which was developed and is maintained by a local resident. The website contains daily photographs of Site activities and a forum for community dialogue regarding the Site. EPA's public notices and fact sheets have been posted on this website as well. There have been almost 200,000 hits to this website since 1999.

Below is a brief chronology of public outreach efforts:

- EPA met with the community in March and May of 1999 to present the NTCRA for the Site.
- On August 3, 1999, EPA held an informational meeting in Corinna to describe the plans for the RI/FS.
- On November 16, 1999, July 11, 2000 and June 5, 2002, EPA held informational meetings in Corinna to discuss the results of the RI.
- EPA has released nine public information update fact sheets (December 1998, February 1999, July 1999, November 1999, April 2000, June 2000, April 2001, December 2001 and June 2002). It also issued fact sheets for the NTCRA and the OU I remedial action to provide the community with information relating to the RI/FS and NTCRA between 1999 and September 2002.
- On July 17, 2002, EPA made the administrative record available for public review at EPA's offices in Boston and at the Stewart Public Library in Corinna, Maine. This will be the primary information repository for local residents and will be kept up to date by EPA.
- EPA published a notice and brief analysis of the Proposed Plan in Bangor Daily News and made the plan available to the public by mailing a copy of the Proposed Plan to all postal patrons in the Town of Corinna and making a copy available at the Stewart Public Library in Corinna.
- From July 18, 2002 to August 17, 2002, the Agency held a 30-day public comment period to accept public comment on the alternatives presented in the FS Report and the Proposed Plan and on any other documents previously released to the public.
- On July 17, 2002, EPA held an informational meeting to discuss the results of the RI Report and the cleanup alternatives presented in the FS, and to present the Agency's Proposed Plan to a broader community audience than those that had already been involved at the Site. At this

Record of Decision
Part 2: The Decision Summary

meeting, representatives from EPA answered questions from the public.

- On August 7, 2002, the Agency held a public hearing to discuss the Proposed Plan and to accept any oral comments. A transcript of this meeting and the comments and the Agency's response to comments are included in the Responsiveness Summary, which is part of this ROD.

- EPA provided the community with a Redevelopment Initiative Grant to assess future Site use. EPA has considered the Redevelopment Plan developed pursuant to this grant in developing the cleanup action.

All comments received as part of the public comment period were supportive of the proposed cleanup action.

D. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

The remedy described in this ROD will be the second cleanup action for the Site (the ongoing NTCRA is the first cleanup action). The selected remedy was developed by evaluating a variety of management of migration alternatives to obtain a comprehensive approach for the portion of the Site designated as OU I. The Site, which consists of the former Eastland Woolen Mill complex, the other former Eastland Woolen properties located around town, the Old Dump, and contaminated reaches of the East Branch of the Sebasticook River, has been subdivided into two operable units (OU I and OU II). Figure 4 displays the boundaries of OU I and OU II.

OU I is the groundwater operable unit and includes overburden and bedrock groundwater contamination associated with the Eastland Woolen Mill complex, Building 14 and the UST Area. OU I also includes the soil contamination remaining after the NTCRA. The early soil cleanup conducted under the NTCRA removed all soil contamination above the water table and most soil contamination, including DNAPL, below the water table, except in a few areas under the former Eastland Woolen Mill complex, the UST Area and Building 14. OU I addresses these remaining soils, including the DNAPL, that are a continuing source of groundwater contamination.

OU II includes the sediments and floodplain soil of the East Branch of the Sebasticook River beyond the downstream extent of the NTCRA, and the Old Dump. The FS Report to assess cleanup alternatives for OU II is expected to be complete in 2003. EPA also expects to release the cleanup proposal for OU II during 2003.

With respect to the principal threats at the Site, the NTCRA removed the majority of the highly contaminated source materials at the Site. The NTCRA removed 75,000 cubic yards of contaminated soils (including DNAPL) that was acting as the source of groundwater, surface water and sediment contamination. DNAPL is present in some of the deep overburden soil remaining after the NTCRA and in bedrock fractures within the OU I area. As a result, some principal threat wastes remain at the Site and are the subject of the OU I cleanup action. This

Record of Decision
Part 2: The Decision Summary

remedial action targets the groundwater contamination resulting from the infiltration of water through the remaining contaminated soils, and from the contact of groundwater with DNAPL. It also targets the remaining soil and DNAPL contamination by using in-situ reagents to destroy and facilitate the removal of this contamination. EPA has also evaluated the contamination in surface water, sediments, remaining on-site soils and biota within the areal extent of OU I as part of this action and determined that groundwater was the only media that represented an unacceptable threat to human health or the environment.

In summary, the OU I remedy for the Site provides for the restoration and containment of the contaminated groundwater using extraction and treatment. The remedy includes the use of in-situ reagents to decrease the mass of contamination in the groundwater to reduce the time period to achieve cleanup standards. Institutional controls will be implemented to control site use, particularly groundwater ingestion, and environmental monitoring will be implemented to evaluate the success of the cleanup and provide information for the required five-year reviews.

E. SITE CHARACTERISTICS

Chapter 1 of the FS Report contains an overview of the RI. The significant findings of the RI Report are summarized below.

1. General Characteristics

The Site is located in the Town of Corinna, Penobscot County, Maine, approximately six miles north of Newport and 25 miles northwest of Bangor, Maine. Approximately 800 persons live within 1 mile of the site and 2,500 within four miles. The Site was formerly dominated by buildings of the Eastland Woolen Mill, which before its demolition in 2000 comprised a large manufacturing building and several side buildings with a total area of 250,000 square feet. The buildings stood on both sides of and over the East Branch of the Sebasticook River, a state-designated Class C water that runs north to south through the center of Corinna.

The Town of Corinna is located within the East Branch of the Sebasticook River watershed, which drains to Sebasticook Lake approximately three miles to the south of the town. Topography within the watershed is typified by gently rolling hills to steeply sloping ridges, varying from narrow valleys to fairly expansive low-lying floodplains. Elevations within the immediate vicinity of Corinna range from 200 to 320 feet above msl. The former Eastland Woolen Mill straddled the East Branch of the Sebasticook River and the southern portion of Mill Pond.

EPA performed a series of investigations to develop an understanding of the nature and extent of contamination at the Site. Each medium will be discussed separately below.

Record of Decision
Part 2: The Decision Summary

2. Soil

This section describes the nature and distribution of soil contaminants remaining in the former Mill complex after the NTCRA, and at other potential source areas. The soil areas removed under the NTCRA and other site features related to the NTCRA (e.g., soil stockpile and soil treatment areas) are shown in Figure 5. The investigations and results associated with the areas that have been excavated as part of the NTCRA are not discussed in this document.

The nature and distribution of contamination associated with the former Moosehead Mill, School Street Yard, Bulk Fuel Storage Area and Slab Area are discussed in this section. These areas were initially identified as areas used by Eastland Woolen that might contain site-related contamination. Of these areas, only the soils under the large foundation slab (i.e., the Slab Area) in the northwestern portion of the Mill complex contained site-related contaminants.

(a) Nature and Distribution of Contamination Remaining in NTCRA Area 1 Soils

Soils beneath the Mill complex (Area 1 of the NTCRA) were highly contaminated with chlorinated benzene compounds from the ground surface or river bottom to bedrock. This soil contamination was removed to the top of the bedrock surface during the NTCRA. The soil contamination resulted from releases of chlorinated benzenes used in textile dyeing processes (e.g., dye-aid and related chemicals) over a prolonged period of time. These chemicals were discharged from dye-kettles to the underlying soil beneath the basement in the southwest corner of Building 1, to the East Branch of the Sebasticook River behind Middle dam, and to the turbine pit tailrace under Buildings 1 and 3. In certain locations under Building 1 and along the river bottom under Building 3, DNAPL accumulated and then migrated vertically through the entire soil profile to bedrock. DNAPL accumulated above the weathered bedrock and migrated along the bedrock surface, then entered the underlying fractured bedrock along steeply dipping bedding plane fractures. Chemical data from soil samples throughout these areas indicated the presence of low residual concentrations of DNAPL in soil. Pooled DNAPL is not believed to exist currently in any significant volume. See Figure 6 for a conceptual cross section of the contaminant release from the facility.

Volatile Organic Compounds (VOCs). Soil borings SB-99-41, SB-99-42, SB-99-43, IS-00-03, and IS-00-09 shown in Figure 7 and samples from confirmation sampling performed as part of the NTCRA along the southeast wall of Area 1, define the area of deep contamination remaining after the NTCRA. Eleven soil borings (IS-00-01 through IS-00-11) were completed in 2000 to refine the lateral and vertical extent of deep overburden soil contamination observed during the 1999 soil program. Approximately 50 soil samples were collected to document the vertical and lateral extent of deep contamination. This sampling confirmed the presence of soil containing chlorinated benzene compounds in excess of NTCRA soil cleanup levels at elevations ranging between 199 and 185 feet above msl (up to 43 feet below ground surface (bgs) from original grade of Main Street of approximately 228 feet msl). The area of deep contamination above bedrock is approximately 40 to 50 feet wide and 130 feet long and exists at depths ranging

Record of Decision
Part 2: The Decision Summary

from 28 to 43 feet bgs. A cross section of this area is shown in Figure 8. The maximum concentrations of the contamination detected were found at depths of 28 to 43 feet and included:

- 1,2,3-Trichlorobenzene (2,000,000 milligrams per kilogram ($\mu\text{g}/\text{kg}$))
- 1,2,4-Trichlorobenzene (1,2,4-TCB) (6,000,000 $\mu\text{g}/\text{kg}$)
- 1,2-Dichlorobenzene (1,2-DCB) (2,000,000 $\mu\text{g}/\text{kg}$)
- 1,3-Dichlorobenzene (37,000 $\mu\text{g}/\text{kg}$)
- 1,4-Dichlorobenzene (1,4-DCB) (1,000,000 $\mu\text{g}/\text{kg}$)
- Chlorobenzene at (530,000 $\mu\text{g}/\text{kg}$)
- Benzene (15,000 $\mu\text{g}/\text{kg}$)

The soil contamination that resides below the water table will be a long-term source that will cause groundwater to remain above federal and state Maximum Contaminant Levels (MCLs) and/or state Maximum Exposure Guidelines (MEGs) for hundreds of years. This contaminant source also poses risk to benthic macroinvertebrate and aquatic plant receptors that inhabit the stretch of river receiving discharge of contaminated overburden groundwater. The Area 1 deep soil contamination remaining after completion of the NTCRA is included in the cleanup for OU I. Table 5-6 of the RI Report contains the sampling results for VOCs in soils remaining after the NTCRA.

(b) Nature and Distribution of Contamination Remaining in UST Area Soils

The general area surrounding the UST Area has been the location of several gasoline stations from the early 1900s up to approximately the 1960s. Four known USTs were located between the former pump house and southern end of Building 14 (See Figures 2 and 3). Eastland Woolen removed three of these tanks. One of the tanks (Tank 2) was reportedly a mixed-use tank including dye-aid storage from the 1960s up to 1979 and at some point, sulfuric acid. The northernmost UST was abandoned in place in 1989 and reportedly contained No. 6 fuel oil. This tank was removed during NTCRA activities. During removal of the three USTs by Eastland Woolen, an area of residual soil with chlorinated benzene compound contamination was noted at the end of UST No. 2 and attributed to leaking pipe fittings. The depth of the spill was probably close to or at the overburden water table.

VOCs. Benzene was observed in excess of soil cleanup levels in the vadose zone (the water table is at approximately 10 feet bgs) along the Route 7 side of the UST Area. Benzene concentrations ranged from 23 $\mu\text{g}/\text{kg}$ to 7,700 $\mu\text{g}/\text{kg}$ from approximately 6 to 9 feet below

Record of Decision
Part 2: The Decision Summary

ground surface. High concentrations of benzene, toluene, ethylbenzene and xylenes (BTEX) compounds within the vadose zone span an approximate 20-foot length of the excavation wall. BTEX compounds were also detected in vadose zone soils in SB-00-89, SB-01-103, and SB-01-104. Benzene was detected at concentrations ranging from 738 to 12,700 µg/kg. Chlorinated benzenes were detected in excess of NTCRA soil cleanup criteria in the vadose zone at sample location CS-01-A4P037WX at approximately 8 feet bgs. 1,2,4-trichlorobenzene was detected at a concentration of 72,000 µg/kg and 1,4-DCB at 10,000 µg/kg. Another small area of chlorinated benzene contamination was observed in the excavation wall at approximately 6 feet bgs, where 1,4-DCB was detected at 3,000 ug/kg, chlorobenzene at 1,200 ug/kg and benzene at 7,200 ug/kg.

Chlorinated benzenes and BTEX compounds also extend below the water table in soils immediately adjacent to Route 7. Benzene was detected from 31 µg/kg to 300 µg/kg. 1,4-DCB was detected in concentrations ranging from 2,200 µg/kg to 9,500 µg/kg, and 1,2,4-TCB was detected from 10,000 µg/kg to 42,000 µg/kg in saturated soils below the water table. Figures 9 and 10 show the interpreted extent of chlorinated benzene contamination above action levels in plan view and cross section. Table 5-6 of the RI Report contains the sampling results for VOCs in soils remaining after the NTCRA.

Semivolatile Organic Compounds (SVOCs). 2-Methylnaphthalene and naphthalene were detected at 1,500 µg/kg and 2,600 mg/kg, respectively, at 7 to 9 feet bgs in SB-00-91. Soils at this location were removed during NTCRA activities.

Pesticides and Polychlorinated Biphenyls (PCBs). Pesticides and PCBs were non-detect in SB-00-91.

Inorganics. Inorganic analytes were detected in soils collected from SB-00-91 and SB-00-94. Aluminum was detected at 7,000 and 12,000 mg/kg. Arsenic was detected at 16 and 34 mg/kg; these concentrations are consistent with background. Manganese was detected at 300 and 690 mg/kg.

In sum, the chlorinated benzene-contaminated soils extend beneath a limited portion of Route 7, and the concentrations of chlorinated benzenes in certain soil samples exceed cleanup criteria. Contaminated soils left in place remain a continuing source to the overburden aquifer and clean backfill installed during the NTCRA. Therefore, the UST soil contamination remaining after completion of the NTCRA is included in the cleanup for OU I.

Record of Decision
Part 2: The Decision Summary

(c) Nature and Distribution of Contamination Remaining in Other Potential Source Area Soils

Four other potential source areas were identified as possibly having been part of the Mill operations. These include the former Moosehead Mill, School Street Yard, the Bulk Fuel Storage Area and the Slab Area (which is outside of the NTCRA excavation area).

(1) Moosehead Mill

The former Moosehead Mill is located at the end of Mill Street in Corinna, Maine (see Figure 3). The site currently consists of one brick building and one wooden structure. Both are currently used for storage by the current property owner. The former Moosehead Mill was originally the location of the former Kenwood Mill, which burned down in the early 1950s. Eastland Woolen purchased the property and used the facility for storage purposes. It was alleged that the site was also used for disposal purposes.

A high-resolution metal detection survey was conducted at the site to screen for the presence of buried metallic objects. Two areas with elevated EM-61 response values were profiled. Most high amplitude anomalies were attributable to surface metallic debris. Ten test pits were excavated in order to investigate the nature of subsurface high-resolution metal detection survey anomalies, and to screen for the presence or absence of chlorinated benzene contamination in subsurface soils.

Tables 5-3 through 5-5 of the RI Report provide summaries of VOCs, SVOCs, pesticides/PCBs and inorganics detected in site soils. The test pits completed in 1999 encountered only native materials in all but one test pit. The soil varied from olive brown to dark olive brown silty sand, with various amounts of gravel, cobbles and silt. TP-99-01, excavated about 80 feet from the northern end of the existing building, did expose a small area of debris, composed of bottles, metal, and ash from 2 to 3 feet below ground surface. The test pits completed in 2001 generally confirmed these findings, although burned pebbles were noted in TP-01-37 and coal “klinker” were noted in TP-01-39. These materials may be from debris from one of the local fires, including the Kenwood Mill fire.

VOCs. Thirteen samples were collected for VOCs. Chlorinated benzenes were detected in one soil sample at the site. 1,4-DCB (90 µg/kg), 1,2-DCB (74 µg/kg) and 1,2,4- TCB (220 µg/kg) were detected but not in excess of NTCRA soil cleanup criteria in TP-99-01 (3 feet bgs).

SVOCs. One of seven samples collected detected SVOCs. TP-99-01 at 2 feet bgs showed polycyclic aromatic hydrocarbons (PAHs) in excess of EPA Region 9 Preliminary Remediation Goals (PRGs) and included benzo[a]anthracene at 8,400 µg/kg; benzo[a]pyrene at 6,600 µg/kg; benzo[b]fluoranthene at 4,600 µg/kg; benzo[k]fluoranthene at 6,700 µg/kg; dibenz[a,h]anthracene at 1,400 µg/kg; and indeno[1,2,3-cd]pyrene at 3,900 µg/kg. Several other PAHs were also detected in the sample. The presence of these compounds is most likely due to (1) an apartment building that burned down on an adjacent lot and was bulldozed onto

Record of Decision
Part 2: The Decision Summary

Moosehead Mill property; (2) the burning of the old Kenwood Mill; or (3) coal ash disposal.

Pesticides/PCBs. Seven samples were collected for pesticides/PCB analysis. 4,4'-DDD and dieldrin were detected in one sample (TP-99-01) at concentrations below Region 9 PRGs/SSLs.

Inorganics. Arsenic was detected in all seven samples in excess of the EPA Region 9 PRGs. Concentrations ranged between 16.6 mg/kg to 162 mg/kg. Other inorganics were also detected in site soils.

In sum, chlorinated benzene compounds were detected above soil cleanup criteria at the Site in only one of 13 samples. One of seven samples indicated the presence of PAHs in excess of EPA Region 9 PRGs; these PAHs are attributed to burned fill materials from the former Kenwood Mill or an apartment building that residents reported had burned and was bulldozed in the general area of TP-99-01. Arsenic detected in site soils is generally consistent with background concentration range except soil from one test pit, for which risks have been evaluated. Based on these data, soils at the former Moosehead Mill do not appear to be a source of contamination and pose no risk of groundwater contamination. The risk to human health receptors is not significant. The RI Report concluded that no further action was necessary for these soils.

(2) School Street Yard

The School Street Yard is located along Route 7 in Corinna, Maine (see Figure 3). The site was the former location of a horse stable. The Mill reportedly converted the stable to a lumber storage and wood working facility. The building was demolished (date unknown), and the area is currently vegetated. Although disposal activities and chemical handling were not reported at the site, the Mill did use the site as a storage location. Soil investigation work was initiated at the site to ascertain the presence or absence of contamination. Six test pits (TP-99-06 through TP-99-11) were excavated to determine the presence or absence of soil contamination. Tables 5-2 through 5-4 of the RI Report provide summaries of detected VOCs, SVOCs, pesticides/PCBs and inorganics. Test pits were completed over the footprint of the former building, as described by the property owner. Only native soils were encountered; they included 1-2 feet of sand underlain by olive brown to olive silty sand. A small oil pan was noted on the ground surface and appeared to be from changing of motor oil.

VOCs. Eleven samples were collected for VOC analysis. Chlorinated benzene compounds were not detected in site soils. Toluene was detected 3 feet bgs in TP-99-08 at a concentration of 56 mg/kg.

SVOCs. Two samples were submitted for analysis of SVOCs from TP-99-08 and TP-99-11. Four carcinogenic PAHs were detected at 3 feet bgs in TP-99-08, including

benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene and benzo[k]fluoranthene. These

Record of Decision
Part 2: The Decision Summary

compounds were not detected in excess of EPA Region 9 PRGs.

Pesticides/PCBs. Two samples were collected for pesticides/PCBs analysis from TP-99-08 and TP-99-11. Pesticides and PCBs were not detected in site soils.

Inorganics. Two samples were collected for metals analysis. Several inorganics were detected. Arsenic was detected in excess of EPA Region 9 PRGs in TP-99-08 and TP-99-011 at 17.6 and 17.6 mg/kg, respectively.

In sum, chlorinated benzene compounds were not detected in site soils. The presence of toluene in site soils may be attributable to a pan of used motor oil observed on the ground near TP-99-08. PAHs are attributable to incomplete combustion resulting from local fires. Based on these data, the site is not considered a source of residual soil contamination related to former Eastland Woolen activities. Human health risks are below EPA and MEDEP risk criteria for this area. The RI Report concluded that no further action was necessary for these soils.

(3) Bulk Fuel Storage Area

The Bulk Fuel Storage Area (see Figure 3) was identified as the former site of two Eastland Woolen-owned USTs. The site is located adjacent to the corner of Route 7 and Stetson Road (Route 222). The site is a flat sand and gravel area and was used primarily as a truck turnaround and parking area. The two USTs were reported to have had capacities of 100,000 and 75,000 gallons. They were installed at the site for heating oil storage during the oil crisis of the early 1970s and were anchored to subsurface concrete pads. The Mill apparently removed the tanks; however, the year of removal is not known, since there are no written records documenting excavation of these structures.

A ground-penetrating radar survey was conducted at the site during the Spring of 1999 to screen for the presence or absence of the USTs. GPR data did not indicate the presence of the reported USTs over the area surveyed. Supplemental geophysical screening data was collected at the site in Fall 1999 using an EM-61 high-resolution metal detector. High-amplitude EM-61 response anomalies, indicating the presence of large buried metallic objects, were not observed. Geophysical screening data indicated the large USTs had been removed.

In November 2001, as part of the NTCRA, EPA contractors uncovered a 900-gallon UST approximately 150 feet west of the reported Bulk Fuel Storage Area. The tank was located outside the area previously surveyed. It was removed, and confirmation samples were collected. Two soil borings (SB-99-56 and SB-99-57) were completed to determine the presence or absence of chlorinated benzene and fuel-related compounds potentially associated with the former UST locations. Table 5-2 of the RI Report provides a summary of detected VOC results in site soils.

Record of Decision
Part 2: The Decision Summary

VOCs. Nine soil samples were collected from the two borings for VOC analysis. Chlorinated benzenes were not detected in excess of NTCRA soil cleanup levels. Chlorobenzene was detected at a concentration of 74 : g/kg in the 7 to 9-foot depth interval from SB-99-57. Neither fuel-related nor BTEX compounds were detected in soils in either boring. No visual evidence of stained soil was noted.

Soils at the Bulk Fuel Storage Area were not sampled for SVOCs, pesticides/PCBs or inorganics.

Based on these data, the Bulk Fuel Storage Area is not considered to contain site-related contamination and does not pose a risk to human health. The RI Report concluded that no further action was necessary for these soils.

(4) Slab Area

Five confirmation soil borings (SB-00-95 through SB-00-99) were completed beneath the footprint of Buildings 10, 21 and 23, which collectively are referred to as the "Slab Area." Table 5-3 of the RI Report provides a summary of VOCs detected in these Slab Area soil borings. The purpose of these soil borings was to screen for the presence or absence of site-related soil contamination beneath this area of the Mill complex.

Several floor drains were observed within this area of the facility. Based on a review of facility drawings, it is unclear whether these floor drains are connected to storm sewers, sanitary sewers or other structures beneath the Slab Area (e.g., french drains, dry wells), or whether they simply discharge directly to soils beneath the concrete foundation. USTs are not known to exist beneath the Slab Area. The concrete floor has numerous joints and cracks that could offer vertical migration pathways for chemicals spilled onto the foundation slab during Mill operations. In addition, improper handling of solvents and oils (i.e., direct discharge to the ground) could have occurred outside of doorways, vehicle entrances, and vehicle loading docks associated with these former buildings. After closure of the Mill, drums and other containers with various types of oils, greases, and solvents used by Eastland Woolen were found by MEDEP within the several buildings that collectively make up the Slab Area.

The water table is interpreted at approximately 10 feet bgs in this area. Overburden soils ranged in thickness from 12 feet in the west to 32 feet towards the former Mill Pond.

VOCs. Collectively, the borings show the presence of chlorinated benzene compounds below NTCRA soil cleanup levels. BTEX, 1,1,1-trichloroethane (1,1-TCA), 1,1-dichloroethane (1,1-DCE), trichloroethene (TCE) and cis- and trans- isomers of 1,2-dichloroethene (1,2-DCE) were also detected.

SB-00-95 was advanced in the northwest quarter of the foundation slab and continuously sampled. During drilling operations, soil was screened with a photoionization detector (PID),

Record of Decision
Part 2: The Decision Summary

and no readings were detected above background levels. 1,1-DCE was detected in only one sample at a concentration of 416 : g/kg from 2 to 4 feet bgs. Chlorinated benzene compounds were not detected in this boring.

SB-00-96 was advanced in the northeast portion of foundation slab. Soils were non-detect for target VOC compounds.

SB-00-97 was advanced in the southeast portion of the foundation slab beneath the present location of the contaminated soil stockpile. Benzene was detected in excess of cleanup levels at a concentration of 36 : g/kg in the 4 to 6-foot sample. Meta- and para-xylene concentrations ranged from 190 : g/kg to 240 : g/kg from 6 to 10 feet bgs, and were detected at 41: g/kg from 22 to 24 feet bgs. Ethylbenzene was detected at 1,100 : g/kg from 10 to 12 feet bgs. Chlorinated benzene compounds were not detected.

SB-00-98 was completed southwest of the foundation slab. Chlorinated benzene compounds were not detected. 1,1-DCE was detected from ground surface to 12 feet bgs, at concentrations ranging from 320 : g/kg to 780 : g/kg.

SB-00-99 was completed in the central portion of the Slab Area. 1,1-DCE was detected from 2 to 12 feet bgs at concentrations ranging from 725 : g/kg to 850 : g/kg. Below this depth (from 14 to 20 feet), both 1,2-DCB and 1,4-DCB were detected at concentrations well below NTCRA soil cleanup levels (100 : g/kg to 170 : g/kg and 84 : g/kg to 110 : g/kg, respectively). Benzene was detected at the NTCRA soil cleanup level of 30 : g/kg in the 6 to 8 foot sample. Meta/para-xylene and ortho-xylene both were detected at a concentration of 95 : g/kg in the 4 to 6 foot sample. Other VOCs (including 1,1,1-TCA, 1,1-DCA, TCE, DCE and meta-, para- and ortho-xylenes) were detected in the 4- to 6-foot interval. Within this interval, 1,1,1-TCA was detected at a concentration of 141 : g/kg, 1,1-DCA at 360 : g/kg, and 1,1-DCE at 850 : g/kg. Both 1,1-DCA and 1,1-DCE are well-documented daughter products of TCA, undergoing biologically mediated (co-metabolic) dechlorination under anaerobic conditions. TCE, which also degrades by similar processes under the same conditions, was detected in this interval at a concentration of 61 : g/kg. Cis-1,2-DCE, the predominant daughter product of TCE, was detected at 964 : g/kg, or nearly 16 times the concentration of the TCE. Trans-1,2-DCE, a TCE degradation product typically produced at much lower rates, was present at 64 : g/kg. Collectively, the extensive presence of both TCA and TCE daughter products, relative to the parent solvent concentrations, indicates that favorable conditions appear to be present for biological degradation of these parent-chlorinated solvents under the foundation slab.

SB-01-106 was completed to verify the presence of 1,1-DCE in soil at location SB-00-98 since the highest levels of this compound were detected in the vadose zone. An overburden monitoring well, OM-01-54, was also installed to monitor groundwater quality. VOCs were not detected in soils at this location, and neither 1,1-DCE nor other site-related VOCs were detected in groundwater.

Record of Decision
Part 2: The Decision Summary

The presence of solvent-related compounds such as 1,1,1-TCA, TCE, cis-1,2-DCE, trans-1,2-DCE, and 1,1-DCE in shallow soils immediately below the slab is most likely due to releases of machine cleaning fluids and degreasers in the loom and carding areas of Buildings 10, 22 and 23. Some of these compounds may be biodegradation daughter products. Migration of these fluids most likely occurred through cracks in the concrete foundation, but also perhaps through floor drains located within the foundation slab.

Benzene was detected at and only slightly above the NTCRA soil cleanup levels in the central and southeast portions of the Slab Area (SB-00-99 and SB-00-97, respectively). Benzene soil contamination appears to be in fairly shallow soils (ranging from 4 to 8 feet bgs), which is likely to be near the upper zone of annual fluctuation of the overburden water table.

During the 2000 Slab Area investigation program, VOCs were detected in vadose zone soils and below the water table. Based on a comparison of data to groundwater leaching guidelines and leaching modeling, it appears there may be possible impacts to the overburden groundwater beneath the slab. This groundwater discharges to the nearby East Branch of the Sebasticook River. One well was installed near the maximum 1,1-DCE concentrations detected in soil, to determine if groundwater was impacted. This compound was not detected in groundwater at this location, which suggests that leaching may not be occurring to the degree predicted by the Organic Leaching Model. Comparison of the VOCs detected in soils to regulatory agency groundwater leaching guidelines suggest that there may be possible impacts to the overburden groundwater. The Slab Area is being used as the staging area for the storage and treatment of the soil excavated as part of the NTCRA. The Slab Area is not considered a significant source of groundwater contamination and, therefore, has not been carried into the OU I Feasibility Study. However, the Slab Area was retained in the OU I FS as a area that should be subject to future monitoring.

3. Surface Water

Flow in the East Branch of the Sebasticook River below the former Mill is highly variable and partially a function of the dam at Corundel Lake. Spring flows average about 1,100 cubic feet second (cfs), while average base flow is approximately 89 cfs. The 100-year storm flow in this section of the river was modeled to be approximately 1,650 cfs.

One round of surface water samples was collected from the East Branch of the Sebasticook River during the 1999 investigation. Surface water samples were collected on October 20 and 21, 1999. The river was flowing at approximately 40 cfs to 80 cfs. Water in the river was clear with no discernable suspended solids, as evidenced by maximum turbidity readings of 14 nephelometric turbidity units (NTU).

Chlorobenzene compounds were detected in each of the eight surface water samples collected from the river downstream of the former Mill. Each of the detected concentrations was below the corresponding ecological benchmark. The highest concentrations were at SW-99-03X,

Record of Decision
Part 2: The Decision Summary

where chlorobenzene, 1,4-DCB and 1,2-DCB and 1,2,4-TCB were detected. Each of the concentrations reported was below 1 microgram per liter (: g/L), lower than the respective sample quantitation limits. No chlorobenzene compounds were detected in any of the background samples (i.e., SW-99-90 through SW-99-95). Low concentrations of acetone were detected sporadically in these samples but are likely laboratory handling artifacts.

No SVOCs or pesticides were detected in any of these samples. The concentrations of inorganic analytes detected in each of the eight samples collected downgradient of the former Mill were within the background 95 percent UCL on the mean, with the exception of one concentration of barium detected at 4.8J : g/L in SW-99-07. The background 95 percent UCL on the mean for this compound is 4.4 : g/L, and the 4.8 value is likely not indicative of a significant difference from background.

Prior to the NTCRA, the chlorinated benzene compounds present in sediment were partitioning into the surface water, causing detectable concentrations to be present. The concentrations of contaminants in surface water are expected to be highest in low flow periods of the summer and fall. Therefore, the contaminant concentrations measured during that period are likely the higher end of the annual concentration range in the East Branch of the Sebasticook River. Based on the Ecological Screening Level PRGs established for surface water, the concentrations of contaminants detected in the surface water do not appear to pose a risk to ecological receptors.

4. Sediments

All of the contaminated sediment within the OU I portion of the Site were removed as part of the NTCRA. The river has been restored with clean backfill and substrate. As a result, no sampling or risk evaluations were performed for the sediments in the OU I area.

5. Groundwater

(a) Regional Geological Setting

The Town of Corinna is situated within the Kearsarge Central Maine Synclinorium, which trends northeasterly through the State of Maine. The State of Maine Bedrock and Surficial Geology Maps (MGS, 1985) show that the Site is underlain by glacial till and the Waterville Formation of Silurian age, which consists of shaley metasediments with siltstones. The Waterville Formation trends between N40° E to N50° E through this portion of the State. A metamorphosed limestone member of the Waterville Formation is shown on the bedrock map in close proximity to Corinna, and the contact with the shaley metasediments may be close to the Site. Regional faults or localized fold structures have not been mapped within the immediate area of Corinna; however, review of Spaceborne Imaging Radar C-Band (SIR-C) images and high altitude National Aerial Photogrammetry Program (NAPP) photos show several large-scale lineaments that traverse northwesterly near the general area of Corinna, though not in the

Record of Decision
Part 2: The Decision Summary

immediate vicinity of the Mill complex.

(b) Local Geology

Vertically from ground surface, soils consist of locally derived fill, fluvio-glacial deposits including a glacial till, a thinly bedded silty fine sand, lower glacial till and a weathered shaley-siltstone of the Waterville Formation. Soil thickness ranges from 17.7 to 41.5 feet in the immediate area of the Mill. Soils within the vicinity of the Mill appear to thicken towards the east and southeast.

(c) Regional Hydrogeological Setting

The bedrock groundwater aquifer underlying Corinna is used as the primary drinking water source for residents of the Corinna area. A bedrock well is the source of water for the water line was installed in 1995 to serve those locations whose water was contaminated by activities at the former Mill. The majority of the residences in the vicinity of the Site are not connected to the water line and rely on the bedrock aquifer for their drinking water.

The groundwater conditions at Corinna are typical of local groundwater settings along many small New England river valleys situated between adjacent upland highs. Areal recharge from infiltrating precipitation within upland areas replenishes upland bedrock groundwater, which then flows downward and laterally toward the river valley, where ultimately it discharges to overburden groundwater and surface water. Based on numerical simulation results, most of the areal recharge falling between the groundwater divides, represented by the hill tops, eventually discharges to the East Branch of the Sebasticook River or is removed by residential wells. Very little of this recharge contributes to lateral flow moving out of the local hydrologic systems through the overburden and bedrock aquifers. Bedrock groundwater moves through a network of fractures composed of eastward trending bedding plane and axial plane fractures and north to northwesterly trending joints. As bedrock groundwater approaches the river channel and begins to pass underneath, vertical head differentials rapidly turn upwards. The vertical extent of capture appears to be the entire active thickness of the fractured bedrock aquifer, which extends over three hundred feet bgs or more than 100 feet below mean sea level.

The bedrock groundwater system responds in a strongly anisotropic manner to groundwater pumping stresses because of the dominance of the fracture network on groundwater movement. This high degree of anisotropy allows distant pumping stresses of sufficient magnitude to pull deep and shallow bedrock groundwater outward from the Mill Source Area if the pumping sources are aligned parallel to the source area along the direction of these bedding plane fractures. In this manner, contaminated groundwater was pulled approximately 550 feet to the southwest from the source area beneath the former Mill by pumping from water supply wells in the Sunshine Village apartment complex.

A groundwater pumping test was performed in 1999. The data evaluation calculated an

Record of Decision
Part 2: The Decision Summary

angle of maximum transmissivity of roughly North 50° East. The similarity between the orientation of the drawdown ellipse and this “average direction” of fracture bearings indicates that groundwater, while under a hydraulic stress, moves preferentially along an interconnected network of fractures dominated by bedding plane fractures that is weakly cross-connected by other joints. Based on drilling observations and open borehole drilling yields (observed formation water flows during drilling), local wells typically yield less than one to more than six gallons per minute (gpm) in the Corinna area. A ten gpm drilling yield is unusual. These variations provide a reasonable bracket on the expected variability in bulk transmissivity of the bedrock. This observation may aid in evaluation of the magnitude of expected future stresses that can reasonably be applied to the bedrock aquifer. Bedrock boreholes installed along the eastern side of East Branch of the Sebasticook River tend to have slightly higher yields.

In the absence of pumping-induced gradients (most of the water supply wells near the Site are no longer in use, and the locations are served by the water line), groundwater in the vicinity of the Site is expected to continue to flow laterally in the overburden and discharge laterally and upward to the new river channel created as part of the NTCRA. If pumping stresses from nearby residential and business (e.g., Family Affair Restaurant or Sunshine Village) bedrock wells were to resume, the groundwater contamination could be drawn to these wells.

(d) Groundwater contamination

Contamination was found in the overburden and bedrock groundwater at the Site. The chlorinated benzene compounds are the primary contaminants in the groundwater at the Site. Sporadic levels of other organic compounds (benzene, methylene chloride, tetrachloroethene, bis(2-ethylhexyl)phthalate and inorganic constituents (arsenic, lead, manganese) were also detected during the RI groundwater monitoring program. Only benzene, arsenic and manganese were found at a frequency of occurrence and distribution that suggested that these constituents may be related to the release at the Site. Arsenic and manganese are widespread in the area and may be related to naturally occurring background levels; however, the highest levels of these constituents were identified within the groundwater plume.

Overburden groundwater with Site-related contamination above federal and state drinking water standards (i.e., federal and state MCLs and more stringent State MEGs) are associated with the shallow soil at the UST/Building 14 area (NTCRA Area 4), and the deep overburden soil at the former location of Buildings 1, 1A and 3 (NTCRA Area 1). In addition, bedrock groundwater is contaminated both directly under the former Mill and laterally as a result of migration of groundwater in response to past pumping of private bedrock water supply wells. Figure 11 shows the plan view of the overburden and groundwater contamination at the Site. Table 2 summarizes the overburden groundwater contamination and presents a comparison of the overburden contamination to MCLs/MEGs and risk based levels. The groundwater systems at the Site are described separately recognizing that they are related because of interactions between bedrock, overburden and surface water systems.

Record of Decision
Part 2: The Decision Summary

An area of fuel-related groundwater contamination associated with former gas station locations on the east side of Route 222 (Spring Street) and Route 7 (Center Street) is present both north and south of the three-way intersection with Route 11 and 43 (Exeter Road). The fuel-related plume is centered near OM-01-52, where samples also contain 1,2-dichloroethane (1,2-DCA) at 361 : g/L. 1,2-DCA was not detected in wells at the UST/Building 14 area. Benzene was not detected at new wells installed at the UST Area and was detected only once, at 2 : g/L, in the current monitoring well network at Building 14 (OM-01-51). The DCA and fuel contamination in overburden groundwater at this location (OM-01-52) do not appear to be the result of operations attributable to the Mill, and this area of fuel-related contamination is not included within the scope of OU I. See Figure 12 for the plan view of this area.

Groundwater contamination at the UST Area is primarily in the shallow overburden groundwater around the perimeter of the NTCRA excavation. The area of overburden groundwater with contaminants above federal and state MCLs and state MEGs is interpreted to be continuous between Building 14 and the UST Area because of the direction of groundwater flow. This area is approximately 200 feet in length and 50 feet in width. Uncertainty exists regarding the southwestern extent of concentrations greater than federal and state MCLs and state MEGs. Overburden groundwater within the Building 14 and UST Area migrates toward and discharges to the new East Branch of the Sebasticook River channel located approximately 175 feet to the west/southwest. The primary contaminants above federal and state MCLs and state MEGs in groundwater at the UST/Building 14 area are chlorinated benzene compounds. See Figure 12 for a plan view of the UST groundwater contamination.

An overburden plume with concentrations of chlorinated benzene compounds above federal and state MCLs and state MEGs is present around Area 1 with approximate dimensions of 200 feet in width and 100 feet in length (see Figures 11 and 12). The Source Area overburden chlorinated benzene plume extends downgradient along the old river channel segment excavated as part of the NTCRA, (approximately 300 feet to the location of the former railroad trestle), similar to the bedrock plume. Because of the extensive contamination in the river channel, shallow groundwater directly under the river channel was extensively contaminated. The NTCRA significantly reduced these impacts.

A plume with high concentrations of chlorinated benzene compounds exists in bedrock groundwater to depth in excess of 300 feet bgs. The bedrock plume extends 1,200 feet laterally along a southwest-northeast axis and approximately 400 feet downgradient from the source area. Maximum concentration of VOCs detected in bedrock groundwater are above federal and state MCLs and state MEGs. As a result of the discharge conditions at the site, the bedrock plume discharges to overburden and surface waters and rapidly diminishes downgradient. Based on chemical data collection and groundwater modeling, the plume appears to be in a stable configuration with respect to downgradient migration. Eastland Woolen operated a deep water supply well on the immediate upgradient side of the source area. This well has been packer sampled to a depth of 354 feet bgs and does not show significant contaminant concentrations. These data, and the limited extent of downgradient migration, suggest the aquifer is not well-

Record of Decision
Part 2: The Decision Summary

connected across the structural geologic fabric of the bedrock, which trends east-west. Figure 13 provides a plan view of the bedrock plume and Figure 14 provides a cross-section. Table 3 summarizes the bedrock groundwater contamination and presents a comparison of the bedrock contamination to MCLs/MEGs and risk based levels.

6. DNAPL Distribution

The release of chlorinated benzenes at the Site resulted in extensive contamination to saturated soil and bedrock underlying the Site. Chlorinated benzene compounds in pure form are DNAPLs and have potential to migrate vertically through the water table regardless of the direction of groundwater flow. Bedrock groundwater flow under the Mill under ambient conditions is vertically upward, meaning that the contaminants had to move counter to the direction of groundwater flow for the observed deep penetration in bedrock directly under the Mill to have occurred. It is believed that the deep penetration of DNAPLs along fracture planes in bedrock underlying the Site accounts for the observed vertical distribution of contaminants.

The FS Report provided an estimate of the potential volume of DNAPL in the fractured bedrock system. Although considerable uncertainty is likely in any attempt to estimate DNAPL volume in fractured rock, some rudimentary estimate of DNAPL mass is necessary as a basis to estimate aquifer restoration time frames. Appendix A of the FS Report also contains an estimate of DNAPL mass in bedrock based on assumptions concerning levels of residual saturation and the distribution down dip in the fracture system. The volume estimate presumes that the highest levels of DNAPL residual saturation do not exceed those in the overburden (7 percent), and that this saturation decreases with depth to a maximum depth of 350 feet into bedrock. The estimate calculates available water volume in the fracture system based on observed frequency of fractures and estimated aperture openings; this information is used to calculate a potential DNAPL volume based on residual saturation assumptions. This estimation approach yields a volume of 54 gallons of DNAPL in the fractured bedrock system. Approximately 95 percent of the DNAPL would be distributed in the top 200 feet of the bedrock system.

NTCRA soil confirmation sample results and prior drilling data from the RI investigations provide a basis to estimate the residual mass contained in soil and along the weathered bedrock surface in Area 1. Appendix A of the FS Report also contains estimates of the mass remaining in the overburden soils above bedrock and along the bedrock surface along the bottom of the Area 1 excavation. Calculated residual saturations for DNAPL range from 0.4 to 7 percent (as a percentage of available pore space). The area of highest residual saturation (7 percent) appears to be of limited size and volume but contains approximately half the mass remaining in the system. These estimates provided a range of remaining DNAPL in Area 1 soil and shallow weathered bedrock between 271 and 322 gallons. The higher of these estimates distributed the DNAPL mass as follows:

Soil Area (See Figure 7)	Soil Volume	DNAPL Volume
Soil hot spot (RS of 7 %)	950 cubic feet	124 gallons DNAPL
Soil with lower RS (0.5 to 1.5 %)	6,100 cubic feet	95 gallons DNAPL

Record of Decision
Part 2: The Decision Summary

Soil Area (See Figure 7)	Soil Volume	DNAPL Volume
Weathered bedrock (RS 0.5 to 1.5 %)	5,915 cubic feet	103 gallons DNAPL

Note: RS = residual saturation

The remaining mass of sorbed contaminants, at concentrations that do not indicate the presence of residual DNAPL saturation, was estimated to be 124 lbs distributed over approximately 33,400 cubic feet of soil. Although these estimates are subject to uncertainty, they do illustrate the significance of the DNAPL residual sources compared to the sorbed contaminant sources. Figure 7 shows the plan view of the areas of residual saturation and Figures 13 and 14 shows the relationship of this contamination to the groundwater contamination..

7. Air

Sampling of the ambient air was performed daily during the NTCRA excavation program. Significant concentrations of site-specific contaminants were not detected in the ambient air samples along the perimeter of the Site even under worst case (excavation of DNAPL areas) conditions.

8. Historic Resources

An assessment for the presence of historic resources was performed as part of the RI and NTCRA. There are two structures within the OU I area that are considered eligible for the National Register of Historic Places. One structure was the subject of a Memorandum of Agreement for Mitigation of Adverse Effect (MOA) between EPA and the State Historic Preservation Officer. The structure was re-located as part of the NTCRA. The other structure was not impacted by the NTCRA. No historic or cultural resources are expected to be affected by the OU I cleanup action.

9. Conceptual Site Model

The Conceptual Site Model (CSM) is a diagram of the sources of contamination, release mechanisms and exposure pathways to receptors for the groundwater, as well as other site-specific factors. The CSM is a three-dimensional “picture” of Site conditions that illustrates contaminant sources, release mechanisms, exposure pathways, migration routes and potential human and ecological receptors. It documents current and potential future Site conditions and shows what is known about human and environmental exposure through contaminant release and migration to potential receptors. Site receptors include individuals and organisms who may come into contact with contaminated soils; ingest contaminated soil; consume the groundwater; come into contact with or ingest surface water, sediment interstitial (pore) water or sediment; or consume organisms that have accumulated contamination. The risk assessment and response action for the Site are based on this CSM as described below. Figure 15 shows the conceptual model for OU I developed for the Site risk assessments.

Record of Decision
Part 2: The Decision Summary

The CSM for the Site identifies the DNAPL and highly contaminated soils beneath and in the vicinity of the Mill as the primary sources of contamination. The soil contamination resulted from releases of chlorinated benzene compounds that were used in textile dyeing processes (e.g., dye-aid and related chemicals) over a prolonged period of time. These chemicals were discharged from dye-kettles to the underlying soil beneath the basement in the southwest corner of Building 1, to the river behind Middle dam, and to the turbine pit tail race under Buildings 1 and 3 (See Figure 6). In certain locations under Building 1 and along the river bottom under Building 3, DNAPL accumulated and then migrated vertically through the entire soil profile to bedrock. DNAPL accumulated above the weathered bedrock, migrated along its surface and subsequently entered the underlying fractured bedrock along steeply dipping bedding plane fractures. Chemical data from soil samples throughout the areas beneath the former Mill indicated the presence of low residual concentrations of DNAPL in soil. Chemical data from soil samples and groundwater contamination in the UST Area does not indicate the presence of residual DNAPL in this area after removal of the underground storage tanks and highly contaminated soil.

Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. The manner in which principal threats are addressed generally will determine whether the statutory preference for treatment as a principal element is satisfied. Wastes generally considered to be principal threats are liquid, mobile and/or highly-toxic source material. The majority of the principal threat wastes at the Site have been removed as a result of the NTCRA; however, some principal threat wastes (including DNAPL) are present in the overburden and the bedrock groundwater system. These principal threat wastes have been addressed as part of the remedial action for OU I.

Low-level threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. Wastes that are generally considered to be low-level threat wastes include non-mobile contaminated source material of low to moderate toxicity, surface soil containing chemicals of concern that are relatively immobile in air or ground water, low leachability contaminants, or low toxicity source material.

F. CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

The most recent land use of the OU I Site area was industrial (i.e., as a textile mill complex), residential and light commercial. The current use is restricted as a result of the cleanup action. The land use of the area surrounding the Site is mixed residential, light industrial and agricultural. EPA provided the Town of Corinna with a Redevelopment Initiative Grant, the outcome of which was the Reuse Plan for Corinna Village Center, January 2002 (the Reuse Plan). This plan has been endorsed by the Town of Corinna Selectboard. The future use goal outlined in the Reuse Plan is to revitalize Corinna by bringing commercial enterprises back into the downtown along with other (e.g., residential, recreational) activities.

Record of Decision
Part 2: The Decision Summary

The NTCRA resulted in the demolition of the former Mill and seven other structures along the former Main Street. In addition, it required relocation of the East Branch of the Sebasticook River as well as Main Street (Route 7). EPA worked with the Town of Corinna, the Maine Department of Transportation and several other state agencies and stakeholder groups to implement these activities in a manner that fit the future vision for the community while achieving the objectives of the cleanup. As a result, after completion of the NTCRA and construction of the OU I treatment system, the area will be ready for redevelopment.

The future land use assumptions for the Site and surrounding areas are based on the reuse assumptions developed as part of the Reuse Plan. The potential beneficial future use of the Site is well-defined in the Reuse Plan. The large land area in the center of town, currently occupied by the Site, has been targeted for a mix of commercial, residential and mixed-use development. Figure 16 presents the plan view for of redevelopment plan for the Site, post-cleanup. An expansion of the water supply is being implemented by the local water district to support future growth. The surface water at the Site is planned for recreational use and is not expected to be a future water supply; this is based on the classification of the East Branch of the Sebasticook River as a Class C river.

Table 4

	Current On-Site Use	Current Adjacent Use	Reasonable Potential Beneficial Use of Site	Basis for Potential Beneficial Use of Site	Time Frame to Achieve Potential Beneficial Use
Land	cleanup/ commercial	residential/ commercial/ recreational	commercial/ recreational/ residential	Town redevelopment assessment	Upon completion of NTCRA and OU I
Shallow Groundwater	none	dug wells for water supply	none until aquifer restoration is complete	institutional controls (i.e.deed restrictions)	45-60 years within area of contamination
Deep Groundwater	none	drilled wells for water supply	none until aquifer restoration is complete	institutional controls (i.e.deed restrictions)	45-60 years within area of contamination
Surface Water	fishing, seasonal swimming	fishing, seasonal water supply, swimming	fishing, seasonal water supply, swimming	current use	present

Community and stakeholder input was sought and incorporated through active outreach during the RI/FS. EPA held numerous meetings, held private discussions with local residents

Record of Decision
Part 2: The Decision Summary

and Town officials and solicited the views of the PRPs. As noted above, the local community was provided an EPA Redevelopment Initiative Grant.

G. SUMMARY OF SITE RISKS

A baseline risk assessment was performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the Site assuming no remedial action was taken. The results of the human health risk assessment provide the basis for taking action and identify the contaminants and exposure pathways that need to be addressed by the remedial action. The human health and ecological risk assessments followed a four step process: (1) hazard identification, which identified those hazardous substances which, given the specifics of the Site, were of significant concern; (2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations and determined the extent of possible exposure; (3) effects assessment, which considered the types and magnitude of adverse effects associated with exposure to hazardous substances; and (4) risk characterization and uncertainty analysis, which integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the Site, including carcinogenic and non-carcinogenic risks and a discussion of the risk at background levels of contamination and the uncertainty in the risk estimates.

A summary of those aspects of the human health risk assessment that support the need for remedial action is discussed below, followed by a summary of the environmental risk assessment. It is important to note that the NTCRA resulted in the excavation of 75,000 yards of contaminated soil from the Site prior to the completion of the ROD. As a result, only those soils outside the NTCRA excavation areas were considered in the risk evaluation (*i.e.*, the risk assessment did not evaluate the soil removed under the NTCRA). As of June 2002, three areas of soil with contaminant concentrations above NTCRA cleanup levels remained for consideration as part of OU I.

1. Human Health Risk Assessment

Of the 47 chemicals detected in the bedrock groundwater plume at the Site, 22 were chosen as chemicals of potential concern (COPCs) for evaluation in the human health risk assessment. Of the 26 chemicals detected in the overburden groundwater plume at the Site, ten were selected as COPCs. (COPCs were also selected for soil, sediments, surface water and fish tissue. These COPCs, as well as COPCs for soil and groundwater at the Old Dump, will be presented in the ROD for OU II.)

The OU I COPCs were selected to represent potential site-related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment. They can be found in Tables 4.1 - 4.17 of the Human Health Risk Assessment. From this, a subset of the chemicals were identified as presenting a significant current or future risk. These

Record of Decision
Part 2: The Decision Summary

chemicals are referred to as the chemicals of concern (COCs) in this ROD and are summarized in Tables 5 and 6 below. These tables contain the exposure point concentrations used to evaluate the reasonable maximum exposure scenario (RME) in the baseline risk assessment for the COCs. Estimates of average or central tendency exposure concentrations for the COCs and all COPCs can be found in Tables 4.22 - 4.44 of the Human Health Risk Assessment.

Table 5 Summary of COCs and Medium-Specific Exposure Point Concentrations (EPCs)								
Scenario Timeframe:		Future						
Exposure Medium:		Groundwater (bedrock plume)						
Exposure Point	COC	Concentration Detected		Units	Frequency of Detection	EPCs	EPC Units	Statistical Measure
		Min	Max					
Ingestion of groundwater	Arsenic	4	217	ug/l	41/49	217	ug/l	max
	Manganese	21	2,240	ug/l	49/49	2,240	ug/l	max
	Benzene	5	5	ug/l	9/96	5	ug/l	max
	Chlorobenzene	0.5	6,300	ug/l	66/92	6,300	ug/l	max
	1,2-Dichlorobenzene	0.8	3,700	ug/l	53/92	3,700	ug/l	max
	1,3-Dichlorobenzene	0.7	180	ug/l	41/92	180	ug/l	max
	1,4-Dichlorobenzene	1.3	2,700	ug/l	50/92	2,700	ug/l	max
	1,2,4-Trichlorobenzene	0.5	4,800	ug/l	55/92	4,800	ug/l	max

Key
ug/l: microgram per liter or parts per billion
max: maximum concentration

The table presents the COCs and the Exposure point concentration for each of the COCs detected in groundwater (*i.e.*, the concentration that will be used to estimate the exposure and risk from each COC in the groundwater). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (*i.e.*, the number of times the chemical was detected in the samples collected at the Site), the exposure point concentration and how the Exposure point concentration was derived. The table indicates that the chlorinated benzene compounds, arsenic, and manganese were the most frequently detected COCs in the groundwater at the Site.

Record of Decision
Part 2: The Decision Summary

Table 6
Summary of COCs and Medium-Specific EPCs

Scenario Timeframe: Future
Exposure Medium: Groundwater (overburden plume)

Exposure Point	COC	Concentration Detected		Units	Frequency of Detection	EPCs	EPC Units	Statistical Measure
		Min	Max					
Ingestion of groundwater	arsenic	4	13	ug/l	3/3	13	ug/l	max
	manganese	163	236	ug/l	3/3	236	ug/l	max
	benzene	2	40	ug/l	2/5	40	ug/l	max
	chlorobenzene	110	19,000	ug/l	4/5	19,000	ug/l	max
	1,2 dichlorobenzene	160	6,000	ug/l	4/5	6,000	ug/l	max
	1,3 dichlorobenzene	42	380	ug/l	2/5	380	ug/l	max
	1,4 dichlorobenzene	32	2,900	ug/l	4/5	2,900	ug/l	max
	1,2,4 trichlorobenzene	18	7,400	ug/l	4/5	7,400	ug/l	max

Key

ug/l: microgram per liter or parts per billion
max: maximum concentration

The table presents the chemicals of concern (COCs) and exposure point concentration for each of the COCs detected in groundwater (*i.e.*, the concentration that will be used to estimate the exposure and risk from each COC in the groundwater). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (*i.e.*, the number of times the chemical was detected in the samples collected at the Site), the exposure point concentration and how the Exposure point concentration was derived. The table indicates that the chlorinated benzene compounds, arsenic, and manganese were the most frequently detected COCs in the groundwater at the Site

Potential human health effects associated with exposure to the COCs were estimated quantitatively or qualitatively through the development of several hypothetical exposure pathways. These pathways were developed to reflect the potential for exposure to hazardous substances based on the present uses, potential future uses and location of the Site. The Site is a former textile mill. The area surrounding the Site is mixed residential, light industrial and agricultural. There were no restrictions in place prior to the RI/FS that would have prevented future residential reuse of the land. The Site is located in a desirable location along Route 7, and future use of the Site area is to be expected.

The following is a brief summary of just the exposure pathways that were found to present a significant risk. A more thorough description of all exposure pathways evaluated in the risk assessment including estimates for an average exposure scenario can be found in Chapters 4.2 of the Human Health Risk Assessment.

Record of Decision
Part 2: The Decision Summary

For contaminated groundwater, ingestion of two liters/day, 350 days/year for 24 years was assumed for an adult. The same assumptions over a six-year period was used for a child exposure except that a child was assumed to ingest only one liter/day of water. For dermal exposures to contaminated groundwater, it was assumed that an adult and child would contact groundwater while showering or bathing. For both a child and adult, the entire surface area was assumed to contact groundwater. The surface area exposed for an adult was 18,000 cm² and for a child was 6600 cm². The frequency and duration of exposure for an adult was 350 days/year for 24 years. For a child, the frequency and duration was 350 days/year for six years.

Excess lifetime cancer risks were determined for each exposure pathway by multiplying a daily intake level with the chemical specific cancer potency factor. Cancer potency factors have been developed by EPA from epidemiological or animal studies to reflect a conservative “upper bound” of the risk posed by potentially carcinogenic compounds. That is, the true risk is unlikely to be greater than the risk predicted. The resulting risk estimates are expressed in scientific notation as a probability (e.g., 1×10^{-6} for 1/1,000,000) and indicate (using this example), that an average individual is not likely to have greater than a one in a million chance of developing cancer over 70 years as a result of site-related exposure (as defined) to the compound at the stated concentration. All risks estimated represent an “excess lifetime cancer risk,” or the additional cancer risk on top of that which we all face from other causes such as cigarette smoke or exposure to ultraviolet radiation from the sun. The chance of an individual developing cancer from all other (non-site-related) causes has been estimated to be as high as one in three. EPA’s generally acceptable risk range for site-related exposure is 10^{-4} to 10^{-6} . Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances.

A summary of the cancer toxicity data relevant to the chemicals of concern is presented in Table 7 below.

**Record of Decision
Part 2: The Decision Summary**

Table 7 Cancer Toxicity Data Summary						
Pathway: Ingestion, Dermal						
Chemical of Concern	Oral Cancer Slope Factor	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence/Cancer Guideline Description	Source	Date (MM/DD/YYYY)
arsenic	1.5	1.5	(mg/kg)/day	A	IRIS	05/04/99
benzene	0.055	0.055	(mg/kg)/day	A	IRIS	July 2000
1,4- dichlorobenzene	0.024	0.024	(mg/kg)/day	C	HEAST	1997

Key

EPA Group:

IRIS: Integrated Risk Information System, U.S. EPA

- A - Human carcinogen
- B1 - Probable human carcinogen - Indicates that limited human data are available
- B2 - Probable human carcinogen - Indicates sufficient evidence in animals and inadequate or no evidence in humans
- C - Possible Human Carcinogen
- D - Not classifiable as a human carcinogen
- E - Evidence of noncarcinogenicity

This table provides carcinogenic risk information which is relevant to the contaminants of concern in ground water. At this time, slope factors are not available for the dermal route of exposure. In the absence of dermal toxicity factors, EPA has devised a simplified paradigm for making route-to-route (oral-to-dermal) extrapolations for systemic effects. This process is outlined in Appendix A of the Risk Assessment Guidance for Superfund (U.S. EPA, 1989). Primarily, it accounts for the fact that most oral RfDs and slope factors are expressed as the amount of substance administered per unit time and body weight, whereas exposure estimates for the dermal pathway are expressed as an absorbed dose. To address this, EPA uses the dose-response relationship obtained from oral administration studies and makes an adjustment for gastrointestinal (GI) absorption efficiency to represent the toxicity factor in terms of an absorbed dose. If GI absorption is less than 50%, adjustment of the oral toxicity value is not recommended because this comparatively small adjustment impacts a level of accuracy that is not supported by the scientific literature. Slope factors for COCs detected at this Site do not need to be adjusted for absorption efficiency and thus oral slope factors are equal to dermal slope factors.

In assessing the potential for adverse effects other than cancer, a hazard quotient (HQ) is calculated by dividing the daily intake level by the reference dose (RfD) or other suitable benchmark. Reference doses have been developed by EPA, and they represent a level to which an individual may be exposed that is not expected to result in any deleterious effect. RfDs are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. A $HQ \leq 1$ indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic noncarcinogenic effects from that chemical are unlikely. The Hazard Index (HI) is generated by adding the HQs for all

Record of Decision
Part 2: The Decision Summary

chemical(s) of concern that affect the same target organ (e.g., liver) within or across those media to which the same individual may reasonably be exposed. A $HI \leq 1$ indicates that toxic noncarcinogenic effects are unlikely. A summary of the noncarcinogenic toxicity data relevant to the chemicals of concern is presented in Table 8 below.

Table 8
Non-Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal									
Chemical of Concern	Chronic/ Sub-chronic	Oral RfD Value	Oral RfD Units	Dermal RfD	Dermal RfD Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (MM/DD/YYYY)
arsenic	chronic	0.0003	mg/kg-day	0.0003	mg/kg-day	skin	3	IRIS	July 2000
manganese	chronic	0.024	mg/kg-day	0.00096	mg/kg-day	CNS	1	IRIS	July 2000
benzene	chronic	0.003	mg/kg-day	0.003	mg/kg-day	blood		NCEA	October 1999
chlorobenzene	chronic	0.02	mg/kg-day	0.02	mg/kg-day	liver	1,000	IRIS	July 2000
1,2 dichlorobenzene	chronic	0.09	mg/kg-day	0.09	mg/kg-day		1000	IRIS	July 2000
1,3 dichlorobenzene	chronic	0.0009	mg/kg-day	0.0009	mg/kg-day	liver		NCEA	October 1999
1,4 dichlorobenzene	chronic	0.03	mg/kg-day	0.03	mg/kg-day	liver/kidney		NCEA	October 1999
1,2,4 trichlorobenzene	chronic	0.01	mg/kg-day	0.01	mg/kg-day	endocrine	1,000	IRIS	July 2000

Key

IRIS: Integrated Risk Information System, U.S. EPA
 NA: not applicable
 CNS: central nervous system
 HEAST: Health Effects Assessment Summary Tables
 EPA/NCEA: National Center for Environmental Assessment

This table provides non-carcinogenic risk information which is relevant to the contaminants of concern in groundwater. Oral RfDs (generally based on an administered dose) are adjusted for GI absorption efficiency to represent a toxicity factor which is based on an absorbed dose (called the Dermal RfD here). Absorption efficiency factors are presented in Table 4-20 of the Baseline Risk Assessment.

Tables 9 - 12 depict the carcinogenic risk summary for the COCs in groundwater evaluated to reflect present and potential ingestion of the groundwater by future residents corresponding to the RME scenario. Tables 13 - 16 depict the non-carcinogenic risk summary for the COCs in groundwater evaluated to reflect present and potential ingestion of the

Record of Decision
Part 2: The Decision Summary

groundwater by future residents corresponding to the RME scenario. Only those exposure pathways deemed relevant to the remedy being proposed are presented in this ROD. Unacceptable risks were not identified for the surface water, soil, sediment and air pathways for OU I. Readers are referred to Chapter 4.2 of the Human Health Risk Assessment for a more comprehensive risk summary of all exposure pathways evaluated for all chemicals of potential concern and for estimates of the central tendency risk.

Table 9
Risk Characterization Summary - Carcinogens

Scenario Timeframe:		Future				
Receptor Population:		Resident				
Receptor Age:		Adult				
Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk		
				Ingestion	Dermal	Exposure Routes Total
groundwater	groundwater	bedrock used as tap water	arsenic	3.1×10^{-03}	6.9×10^{-06}	3.1×10^{-03}
			benzene	1.4×10^{-06}	1.4×10^{-07}	1.5×10^{-06}
			1,4 chlorobenzene	6.1×10^{-04}	2.8×10^{-04}	8.9×10^{-04}
			(Total)	3.7×10^{-03}	3.4×10^{-04}	4.0×10^{-03}
Groundwater Risk Total =						4.0×10^{-03}
Total Risk =						4.0×10^{-03}

Key

This table provides risk estimates for the significant routes of exposure. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of a child and adult's exposure to ground water, as well as the toxicity of the COCs. The total risk level is estimated to be 4×10^{-03} . This risk level indicates that if no cleanup action is taken, an individual would have an increased probability of 4 in 1000 of developing cancer as a result of site-related exposure to the COCs.

**Record of Decision
Part 2: The Decision Summary**

**Table 10
Risk Characterization Summary - Carcinogens**

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk		
				Ingestion	Dermal	Exposure Routes Total
groundwater	groundwater	bedrock used as tap water	arsenic	1.8×10^{-03}	3.9×10^{-06}	1.8×10^{-03}
			benzene	7.9×10^{-07}	6.9×10^{-08}	8.6×10^{-07}
			1,4 chlorobenzene	3.6×10^{-04}	1.4×10^{-04}	4.9×10^{-04}
			(Total)	2.2×10^{-03}	1.7×10^{-04}	2.4×10^{-03}
Groundwater Risk Total =						2.4×10^{-03}
Total Risk =						2.4×10^{-03}

Key

This table provides risk estimates for the significant routes of exposure. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of a child and adult's exposure to ground water, as well as the toxicity of the COCs. The total risk level is estimated to be 2×10^{-03} . This risk level indicates that if no cleanup action is taken, an individual would have an increased probability of 2 in 1000 of developing cancer as a result of site-related exposure to the COCs.

**Record of Decision
Part 2: The Decision Summary**

**Table 11
Risk Characterization Summary - Carcinogens**

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk		
				Ingestion	Dermal	Exposure Routes Total
groundwater	groundwater	overburden used as tap water	arsenic	1.8×10^{-04}	4×10^{-07}	1.4×10^{-04}
			benzene	1.1×10^{-05}	1.1×10^{-06}	1.2×10^{-05}
			1,4 dichlorobenzene	6.5×10^{-04}	3.0×10^{-04}	9.6×10^{-04}
			(Total)	8.9×10^{-04}	3.1×10^{-04}	1.2×10^{-03}
Groundwater Risk Total =						1.2×10^{-03}
Total Risk =						1.2×10^{-03}

Key

This table provides risk estimates for the significant routes of exposure. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of a child and adult's exposure to ground water, as well as the toxicity of the COCs. The total risk level is estimated to be 1×10^{-3} . This risk level indicates that if no cleanup action is taken, an individual would have an increased probability of 1 in 1000 of developing cancer as a result of site-related exposure to the COCs.

**Record of Decision
Part 2: The Decision Summary**

**Table 12
Risk Characterization Summary - Carcinogens**

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk		
				Ingestion	Dermal	Exposure Routes Total
groundwater	groundwater	overburden used as tap water	arsenic	1×10^{-04}	2.3×10^{-07}	1.0×10^{-04}
			benzene	6.4×10^{-06}	5.5×10^{-06}	6.9×10^{-06}
			1,4 dichlorobenzene	3.8×10^{-04}	1.5×10^{-04}	5.3×10^{-04}
			(Total)	5.2×10^{-04}	1.5×10^{-04}	6.7×10^{-04}
Groundwater Risk Total =						6.7×10^{-04}
Total Risk =						6.7×10^{-04}

Key

This table provides risk estimates for the significant routes of exposure. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of a child and adult's exposure to ground water, as well as the toxicity of the COCs. The total risk level is estimated to be 6.7×10^{-04} . This risk level indicates that if no cleanup action is taken, an individual would have an increased probability of 7 in 10000 of developing cancer as a result of site-related exposure to the COCs.

**Record of Decision
Part 2: The Decision Summary**

**Table 13
Risk Characterization Summary - Non-Carcinogens**

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient		
					Ingestion	Dermal	Exposure Routes Total
groundwater	groundwater	bedrock plume - tap water	arsenic	skin	20	0.045	20
			manganese	CNS	0.44	0.025	0.47
			benzene	hematological	0.046	0.0047	0.05
			chlorobenzene	liver	8.6	2.1	10.7
			1,2 dichlorobenzene		1.1	0.5	1.6
			1,3 dichlorobenzene	Liver	5.5	3.5	9
			1,4 dichlorobenzene	Liver/Kidney	2.5	1.1	3.6
			1,2,4 trichlorobenzene	endocrine	13	12	25
			(Total)		58	20	78

Skin Hazard Index = 20

Hematological Hazard Index = 0.05

CNS Hazard Index = 0.5

Endocrine Hazard Index = 25

Kidney Hazard Index = 3.8

Liver Hazard Index = 24

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of hazard quotients) for all routes of exposure. The estimated HIs for most organ endpoints exceeds a hazard index of concern and indicates that the potential for adverse noncancer effects could occur from exposure to contaminated groundwater. CNS - central nervous system.

**Record of Decision
Part 2: The Decision Summary**

**Table 14
Risk Characterization Summary - Non-Carcinogens**

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient		
					Ingestion	Dermal	Exposure Routes Total
groundwater	groundwater	bedrock plume - tap water	arsenic	skin	46	0.1	46
			manganese	CNS	1	0.05	1.1
			benzene	hematological	0.11	0.0093	0.12
			chlorobenzene	liver	20	4.2	24.2
			1,2 dichlorobenzene		2.6	1	3.6
			1,3 dichlorobenzene	Liver	13	6.9	20
			1,4 dichlorobenzene	Liver/Kidney	5.8	2.2	8
			1,2,4 trichlorobenzene	endocrine	31	24	55
			(Total)		120	38	158

Skin Hazard Index = 46

Hematological Hazard Index = 0.4

CNS Hazard Index = 1.1

Endocrine Hazard Index = 55

Kidney Hazard Index = 8.4

Liver Hazard Index = 54

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of hazard quotients) for all routes of exposure. The estimated HIs for most organ endpoints exceeds a hazard index of concern and indicates that the potential for adverse noncancer effects could occur from exposure to contaminated groundwater. CNS - central nervous system.

**Record of Decision
Part 2: The Decision Summary**

**Table 15
Risk Characterization Summary - Non-Carcinogens**

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient		
					Ingestion	Dermal	Exposure Routes Total
groundwater	groundwater	overburden plume - tap water	arsenic	skin	2.7	0.006	2.7
			manganese	CNS	0.63	0.034	0.66
			benzene	hematological	0.85	0.074	0.93
			chlorobenzene	liver	61	13	74
			1,2 dichlorobenzene		4.3	1.6	5.9
			1,3 dichlorobenzene	Liver	27	15	42
			1,4 dichlorobenzene	Liver/Kidney	6.2	2.4	8.6
			1,2,4 trichlorobenzene	endocrine	47	37	84
			(Total)		149	69	218
Skin Hazard Index =						2.7	
Hematological Hazard Index =						0.9	
CNS Hazard Index =						0.6	
Endocrine Hazard Index =						84	
Kidney Hazard Index =						8.6	
Liver Hazard Index =						120	

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of hazard quotients) for all routes of exposure. The estimated HIs for most organ endpoints exceeds a hazard index of concern and indicates that the potential for adverse noncancer effects could occur from exposure to contaminated groundwater.
CNS - central nervous system.

**Record of Decision
Part 2: The Decision Summary**

**Table 16
Risk Characterization Summary - Non-Carcinogens**

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient		
					Ingestion	Dermal	Exposure Routes Total
groundwater	groundwater	overburden plume - tap water	arsenic	skin	1.1	0.003	1.2
			manganese	CNS	0.27	0.015	0.28
			benzene	hematological	0.37	0.038	0.4
			chlorobenzene	liver	26	6.4	30
			1,2 dichlorobenzene		1.8	0.83	2.7
			1,3 dichlorobenzene	Liver	12	7.4	19
			1,4 dichlorobenzene	Liver/Kidney	2.6	1.2	3.8
			1,2,4 trichlorobenzene	endocrine	20	19	39
			(Total)		63	35	98
Skin Hazard Index =							1.2
Hematological Hazard Index =							0.4
CNS Hazard Index =							0.3
Endocrine Hazard Index =							39
Kidney Hazard Index =							3.9
Liver Hazard Index =							56

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of hazard quotients) for all routes of exposure. The estimated HIs for most organ endpoints exceeds a hazard index of concern and indicates that the potential for adverse noncancer effects could occur from exposure to contaminated groundwater.
CNS - central nervous system.

Record of Decision

Part 2: The Decision Summary

The only pathways that exceed EPA's acceptable cancer risk range and/or a hazard quotient of concern are ingestion of groundwater in the overburden and bedrock plumes by a future resident. The lifetime cancer risk estimate for a combined child and adult exposure to the bedrock plume groundwater is 6×10^{-3} . Seventy-five percent of this risk is due to arsenic with twenty-five percent attributable to the 1,4-DCB. EPA's hazard index of concern is exceeded for children and adults for several target organs. The major contributors to these exceedances are chlorobenzene, 1,2-DCB, 1,3-DCB, 1,4-DCB, 1,2,4-TCB and arsenic. These COCs also were detected at concentrations above federal and state MCLs and more stringent State MEGs.

The lifetime cancer risk estimates for the overburden plume groundwater is 2×10^{-3} . Sixty-seven percent of this risk is attributable to 1,4-DCB with arsenic contributing the remainder of the cancer risk. EPA's hazard index of concern is exceeded for children and adults for several target organs. The major contributors to these exceedances are chlorobenzene, 1,2-DCB, 1,3-DCB, 1,4-DCB, 1,2,4-TCB and arsenic. These COCs also were detected at concentrations above federal and state MCLs and more stringent State MEGs.

The Baseline Human Health Risk Assessment concluded that the estimated risk for the post-NTCRA media (soils, surface water, or sediments) remaining within the area included within OU I do not represent an unacceptable threat to human health. The Baseline Human Health Risk Assessment conclusions regarding downstream sediments, floodplains soils, fish tissue, and the Old Dump will be addressed as part of the OU II cleanup decision.

There are several uncertainties associated with any risk assessment. Some uncertainties bias risk estimates low while others bias risk high. EPA's general approach is to choose conservative but reasonable values for exposure variables so that true risks are unlikely to be higher than risks estimated by the baseline risk assessment. Below is a brief discussion of the major uncertainties associated with the risk assessment for this Site. A more complete discussion can be found in Chapter 4.4 of the Human Health Baseline Risk Assessment.

- Some of the analytical results used for the exposure point concentration in the risk assessment are isolated, elevated detections of chemical that may not be representative of the typical chemical concentration that a receptor is exposed to. For instance, some of the metals detected in groundwater and surface water samples may be the result of suspended solids and fines entrained in samples as a result of the sampling technique and thus not be representative of true exposures. This uncertainty is likely to contribute to an overestimation of health risks.

- In evaluating potential risks associated with exposure to groundwater, the data sets were limited to groundwater samples that were located within a contaminant plume. This obviously reduces the size of the data set being evaluated and elevates the exposure point concentrations by eliminating the relatively unaffected samples from the data set. Exposure to groundwater is a point source exposure. Therefore, evaluating risks

Record of Decision

Part 2: The Decision Summary

associated with the contaminated zone may overestimate risks to the typical receptor but reduce the likelihood of declaring the water safe for use when it may actually be unsafe for some users.

- For media at some study areas, fewer than ten samples were available. As a result, maximum values rather than 95% upper confidence limits on the mean were used for exposure point concentrations. This is likely to result in an overestimate of the concentration to which individuals are typically exposed and an overestimation of the risk since it is unlikely that an individual would be exposed to the maximum concentration over the entire exposure period.

1. Ecological Risk Assessment

The objective of the ecological risk assessment was to identify and estimate the potential ecological impacts associated with the COCs at the Site with respect to the area of focus for OU I. The majority of the ecological receptor areas will be included in the ROD for OU II. Under the NTCRA, the section of the East Branch of the Sebasticook River within the OU I focus area was removed in its entirety (bank to bank to bedrock, including the floodplain). New substrate was placed in the restored river channel. Surface water within the East Branch of the Sebasticook River did not contain COCs above levels of concern. The only pathway of concern was the exposure of sediment organisms to the contaminated water in the groundwater-surface water transition zone. Readers are referred to the Ecological Risk Assessment (Mactec 2002) for a more comprehensive risk summary of all exposure pathways and estimates. The technical guidance for performance of the ecological risk assessment comes primarily from the following sources: *Framework for Ecological Risk Assessment* (U.S. EPA, 1992), the *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (U.S. EPA, 1997); and the *Guidelines for Ecological Risk Assessment* (U.S. EPA, 1998).

a. Identification of COCs

In the Baseline Ecological Risk Assessment (BERA), COPCs were selected for the surface water, sediment, floodplain surface soil, upland surface soil, and groundwater media. COPCs were selected for each identified exposure area grouping within the sediment and floodplain soil media (as defined in Sections 5.2.1.2.1 and 5.2.1.2.2 of the BERA), as well as surface soil and overburden groundwater associated with the Old Dump, East Branch of the Sebasticook River surface water, and overburden groundwater associated with the Mill Source Area. Tables K-1 through K-6 of the BERA present the list of analytical samples that were used in the BERA. The COPC selection process consisted of a comparison of maximum detected analyte concentrations

Record of Decision
Part 2: The Decision Summary

to conservative screening benchmark values. An analyte, whose maximum concentration within a given medium/exposure area grouping, exceeded screening benchmarks by less than an order of magnitude and which was detected in less than five percent of the samples was generally not retained as a COPC. However, if a particular analyte potentially poses a known ecological concern (e.g., pesticide compounds), this criterion was not employed. In addition, detected chlorobenzene compounds were retained in all data sets regardless of their frequency of detection. Essential nutrients, including calcium, magnesium, potassium, and sodium were not selected as COPCs and iron was not selected as a COPC in sediment for the purposes of characterizing risks to wildlife receptors. Upon completion of the BERA, those COPCs identified as having the potential to create an unacceptable impact to ecological receptors were identified as COCs.

Only the COCs related to the discharge of the overburden groundwater from the Mill Source Area in the East Branch of the Sebasticook River are considered relevant to OU I. The COCs relating to the surface water, sediments, floodplains soils, fish tissue, and groundwater discharging from the Old Dump will be presented in the cleanup decision for OU II. Chemicals selected as COCs in overburden groundwater at the Eastland Woolen Mill Source Area include chlorobenzene, 1,2-DCB, 1,4-DCB, and 1,2,4-TCB.

Table 17
Distribution and Selection of Chemicals of Concern (COC),
East Branch of the Sebasticook River (groundwater - surface water transition zone)

COC (ug/L)	Groundwater Concentration			frequency of detect	Benchmark ug/L	Benchmark Reference	Max > Benchmark	UCL > Benchmark
	Maximum	Average	95% UCL					
chlorobenzene	19,000	7,400	17,000	4/5	50	a	yes	yes
1,2 dichlorobenzene	6,000	2,300	4,900	4/5	763	a	yes	yes
1,4 dichlorobenzene	2,900	1,100	2,400	4/5	763	a	yes	yes
1,2,4 trichlorobenzene	7,400	2,100	2,700	4/5	50	a	yes	yes

a - Federal Ambient Water Quality Criteria (AWQC) (USEPA 1998, 1991)- value is equal to the chronic 4-day average concentration that should not be exceeded more than once every three years. The MEDEP Numerical Water Quality Criteria (NWQC) for freshwater are equal to the federal AWQC (MEDEP, Chapter 530.5 A(2)(a)(i)).

b- chronic ecotox thresholds (ETs) as presented by the EPA OEER guidance (USEPA 1996). ETs were developed for use as screening values for ecological risk assessment.

Record of Decision
Part 2: The Decision Summary

b. Exposure Effects Assessment

Aquatic and semi-aquatic organisms, such as plants, invertebrates, amphibians, and fish are exposed to contaminants through direct uptake from water, uptake from sediment, and/or uptake via food. Exposure is dependent upon timing (e.g., life-stage), feeding preferences, and length of time of exposure. Organisms exposed to contaminants primarily via the water column include lower trophic level pelagic or planktonic species that live suspended or swimming in the water column. Uptake of the COCs from sediment is dependent on a number of factors including contaminant and organic carbon concentrations (i.e. bioavailable fraction of the total COC concentration). With respect to OU I, the exposure pathway of concern was limited to organisms in the groundwater - surface water transition zone (in or against the bottom sediments) that may be impacted by the discharge of contaminated water from the groundwater into the East Branch of the Sebasticook River.

All of the floodplain and sediment habitat within OU I was either upgradient of the contamination or had been removed and replaced by clean fill as part of the NTCRA.

c. Ecological Effects Assessment

The potential effects associated with the future discharge of contaminated overburden groundwater originating from deep soils in Area 1 on aquatic plant and benthic macroinvertebrate receptors in the groundwater - surface water transition zone in the East Branch of the Sebasticook River were evaluated in the BERA. The maintenance of aquatic plant and benthic macroinvertebrate community structure and function assessment endpoints were evaluated by comparing predicted groundwater discharge concentrations of selected COPCs to aquatic life criteria, surface water benchmarks and site-specific concentration response data. The site-specific effects thresholds were derived from an in-situ groundwater - surface water transition zone toxicity study performed in the vicinity of the Mill Source Area in 1999.

**Record of Decision
Part 2: The Decision Summary**

**Table 18
Hazard Quotients
Groundwater - Surface Water Transition Zone**

COC	Exposure Point Concentration Reasonable Maximum Exposure (RME) ug/l	Exposure Point Concentration Central Tendency (CT) ug/l	TRV ug/l	Adjusted TRV (c) ug/l	Hazard Quotient RME	Hazard Quotient CT
chlorobenzene	19,000	7,400	50 (a)	940	20	7.9
1,2 dichlorobenzene	6,000	2,300	14 (b)	260	23	8.7
1,4 dichlorobenzene	2,900	1,100	15 (b)	280	10	4
1,2,4 trichlorobenzene	7,400	2,100	50 (a)	940	7.9	2.2

(a) - Federal Ambient Water Quality Criteria (AWQC) (USEPA 1998, 1991)- value is equal to the chronic 4-day average concentration that should not be exceeded more than once every three years. The MEDEP Numerical Water Quality Criteria (NWQC) for freshwater are equal to the federal AWQC (MEDEP, Chapter 530.5 A(2)(a)(i))

(b) - chronic ecotox thresholds (ETs) as presented by the USEPA OEER guidance (USEPA 1996). ETs were developed for use as screening values for ecological risk assessment.

(c) - the adjusted TRV is developed by multiplying the TRV by a dilution factor of 18.8 to produce a number that is comparable to the groundwater concentrations.

**Record of Decision
Part 2: The Decision Summary**

**Table 19
Hazard Quotients
Groundwater - Surface Water Transition Zone**

COC	Exposure Point Concentration Reasonable Maximum Exposure (RME) ug/l	Exposure Point Concentration Central Tendency (CT) ug/l	TRV ug/l	Adjusted TRV (d) ug/l	Hazard Quotient RME	Hazard Quotient CT
chlorobenzene	19,000	7,400	0.8 (a)	15	1,300	490
1,2 dichlorobenzene	6,000	2,300	14 (b)	260	23	8.7
1,4 dichlorobenzene	2,900	1,100	1.2 (a)	23	130	49
1,2,4 trichlorobenzene	7,400	2,100	50 (c)	940	7.9	2.2

(a) - No Observed Effect Concentration (NOEC) derived using a 4-day in-situ midge survival bioassay conducted in the EBSR in 1999. See Section 5.4 of the BERA for further discussion on the development of these benchmarks.

(b) - chronic ecotox thresholds (ETs) as presented in EPA OERR guidance (USEPA 1996). Ets were developed for use as screening values for ecological risk assessment.

(c) - Federal Ambient Water Quality Criteria (AWQC) (USEPA 1998, 1991)- value is equal to the chronic 4-day average concentration that should not be exceeded more than once every three years. The MEDEP Numerical Water Quality Criteria (NWQC) for freshwater are equal to the federal AWQC (MEDEP, Chapter 530.5 A(2)(a)(i)

(d) - the adjusted TRV is developed by multiplying the TRV by a dilution factor of 18.8 to produce a number that is comparable to the groundwater concentrations

Record of Decision
Part 2: The Decision Summary

d. Ecological Risk Characterization

The conclusions of the BERA are summarized below.

- Potential adverse effects to aquatic plant community structure and function (e.g., phytoplankton) are likely to occur as a result of exposure to chlorinated benzene compounds.

- Potential adverse effects to benthic macroinvertebrate community structure and function, particularly in the hyporheic zone, are likely to occur as a result of exposure to chlorinated benzene compounds.

While the BERA did not evaluate potential ecological effects from discharge of Area 1 bedrock groundwater to the East Branch of the Sebasticook River; a comparison of COPC CT concentrations in bedrock to site-specific concentration thresholds indicates HQs of 1.7 for 1,2,4-TCB, 6.2 for 1,2-DCB, 4.0 for 1,4-DCB, and 2.9 for chlorobenzene. Therefore, discharge of bedrock groundwater is predicted to have a significant yet slightly less potential adverse effect on ecological receptors than overburden groundwater. The above comparison assumes the absence of overburden groundwater contamination and an 18.8 fold dilution of bedrock groundwater by overburden groundwater.

An important uncertainty that may lead to an over-estimate in the exposure assessment is the assumption that groundwater is discharging to surface water throughout the OU I section of the East Branch of the Sebasticook River. The site-specific groundwater - surface water transition zone in-situ toxicity tests indicated that toxicity was not observed in a downwelling section of the East Branch of the Sebasticook River. In sections of the East Branch of the Sebasticook River within OU I where the surface water is recharging the groundwater as opposed to the groundwater discharging into the East Branch of the Sebasticook River, the risk to organisms in the groundwater - surface water transition zone may be substantially overestimated since the COCs will not be present under such conditions.

In summary, contaminant levels in surface waters, surface soils and sediments within the OU I area of the East Branch of the Sebasticook River are not sufficiently elevated to pose a substantial risk to invertebrates, fish and wildlife through direct contact and dietary exposure to the site-related COCs; however, exposure to the contaminated water at the groundwater - surface water interface could result in an unacceptable risk to those organisms dwelling in this zone.

3. Overall Risk Assessment Conclusion--Basis for Response Action.

Record of Decision
Part 2: The Decision Summary

The baseline Human Health Risk Assessment revealed that an unacceptable human health risk would exist as a result of ingestion of groundwater contaminated with Site COCs when that water was used for drinking water by a future resident. The BERA revealed that unacceptable risk would exist for benthic organisms from the discharge of contaminated groundwater to the East Branch of the Sebasticook River. As such, actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

H. REMEDIATION OBJECTIVES

Based on preliminary information relating to the types of contaminants, environmental media of concern and potential exposure pathways, response action objectives (RAOs) were developed to aid in the development and screening of alternatives. These RAOs were developed to mitigate, restore and/or prevent existing and future potential threats to human health and the environment. The RAOs for the selected remedy for the Site are:

- Prevent the ingestion of groundwater containing contaminants that exceed federal or state MCLs, federal non-zero MCL Goals (MCLGs) and more stringent State MEGs, or in their absence, an excess cancer risk of 1×10^{-6} or a hazard quotient of 1;
- Prevent, to the extent practicable, the off-site migration of groundwater containing contaminants at a concentration above Site cleanup levels;
- Prevent, to the extent practicable, the discharge of groundwater containing contaminants at a concentration above levels that could impact ecological receptors to the East Branch of the Sebasticook River;
- Restore groundwater to meet federal or state MCLs, federal non-zero MCLGs or State MEGs (whichever is most stringent), or in their absence, an excess cancer risk of 1×10^{-6} or a hazard quotient of 1; and
- Perform long-term monitoring of surface water, sediments and groundwater to verify that the cleanup actions at the Site are protective of human health and the environment.

Record of Decision
Part 2: The Decision Summary

I. DEVELOPMENT AND SCREENING OF ALTERNATIVES

1. Statutory Requirements/Response Objectives

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences, including: a requirement that EPA's remedial action, when complete, must comply with all federal and more stringent state environmental and facility siting standards, requirements, criteria or limitations, unless a waiver is invoked; a requirement that EPA select a remedial action that is cost-effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a preference for remedies in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances is a principal element over remedies not involving such treatment. Response alternatives were developed to be consistent with these Congressional mandates.

2. Technology and Alternative Development and Screening

CERCLA and the National Contingency Plan (NCP) set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a range of alternatives were developed for the Site.

With respect to the groundwater response action, the RI/FS developed a limited number of remedial alternatives that attain Site cleanup levels within different time frames using different technologies, as well as a no-action alternative.

As discussed in Section 4 of the FS, groundwater treatment technology options were identified, assessed and screened based on implementability, effectiveness and cost. Section 5 of the FS Report presented the remedial alternatives developed by combining the technologies identified in the previous screening process in the categories identified in Section 300.430(e)(3) of the NCP. The purpose of the initial screening was to narrow the number of potential remedial actions for further detailed analysis while preserving a range of options. Each alternative was then evaluated in detail in Section 6 of the FS.

Record of Decision
Part 2: The Decision Summary

J. DESCRIPTION OF ALTERNATIVES

This Section provides a narrative summary of each management of migration (MM) alternative evaluated.

MM alternatives address contaminants that have migrated into and with the groundwater from the original source of contamination. At the Site, contaminants have migrated from the floor drains and shallow soils beneath the Mill into the deep overburden soil and bedrock. The entire Mill complex as well as the majority of the highly contaminated soils were removed as part of the NTCRA. The MM alternatives analyzed for the Site include:

- No Further Action
- Limited Action/Institutional Controls
- Hydraulic Containment (Groundwater Extraction With On-Site Treatment)
- Hydraulic Containment with Mass Reduction (Groundwater Extraction With On-Site Treatment Along With Enhanced Flushing and/or Chemical Oxidation)

Each of the four MM alternatives is summarized below. A more complete, detailed presentation of each alternative is found in Section 5 of the FS.

MM Alternative GW-1 (No Further Action). This alternative would not include additional work beyond the cleanup action currently under way. There would be no further cleanup actions for groundwater or soil. EPA would leave the OU I portion of the Site as it is, and no efforts would be made to control the migration of the contaminants in groundwater or to restore the groundwater.

Capital Costs: none
Present Worth of Long Term Monitoring: none

MM Alternative GW-2 (Limited Action/Institutional Controls). This alternative would rely on natural attenuation processes to restore the groundwater. The major components of this alternative are:

- Implementation of restrictions (easements or restrictive covenants) to prevent use of the groundwater
- Expansion of the public water supply to four - six residences
- Long-term monitoring of surface water, groundwater and sediments

This alternative assumes that natural degradation and dilution processes will cause the levels of contamination to drop below Site cleanup levels. For this alternative, no efforts would be made to

Record of Decision
Part 2: The Decision Summary

control the migration of groundwater. As a result, contaminated groundwater would continue to discharge into the East Branch of the Sebasticook River.

Institutional controls (i.e. deed restrictions) would target those properties with contaminated groundwater and those whose water supply wells could draw the contaminated water to that property in the future. Long-term monitoring would be performed to detect any change in concentrations of contaminants in the groundwater and to protect local water supply wells.

The FS Report estimates a time period of 600 years before cleanup levels are achieved in the aquifer. Five-year reviews would be performed to assess the Site conditions and determine if the cleanup approach is protective of public health and the environment.

Capital Costs:	\$588,397
Present Worth of Long-term Monitoring:	\$2,172,131
Total Present Worth of Alternative:	\$2,760,520

MM Alternative GW-3 (Hydraulic Containment (Groundwater Extraction with On-site Treatment)). This alternative would actively control the migration of contaminated groundwater by extracting contaminated groundwater before it moves off-Site and treating the contaminated groundwater to meet Site cleanup levels.

The major components of this alternative are:

- Installation of a long-term groundwater extraction and treatment system to prevent the migration of contaminated groundwater and restore the groundwater to meet federal or state MCLs, federal non-zero MCLGs or State MEGs (whichever is most stringent), or in their absence, an excess cancer risk of 1×10^{-6} or a hazard quotient of 1
- Implementation of restrictions to prevent use of the groundwater
- Long-term monitoring of surface water, groundwater and sediments

Bedrock and overburden extraction wells would be used to extract contaminated groundwater. The objectives of the pumping system would be to restore the aquifer, prevent discharge of contaminated groundwater into the East Branch of the Sebasticook River, minimize the chance that local water supply wells could become contaminated by creating a hydraulic containment zone, and prevent the re-contamination of the soils that were restored as part of the early cleanup.

This approach is expected to result in groundwater restoration in 300 to 600 years. Five-year reviews would be performed to assess the Site conditions and determine if the cleanup approach is protective of public health and the environment.

Record of Decision
Part 2: The Decision Summary

Capital Costs:	\$1,395,933
Present Worth of Maintenance/Monitoring/Periodic Reviews:	\$7,777,632
Total Present Worth of Alternative:	\$9,173,565

MM Alternative GW-4 (Hydraulic Containment with Contaminant Mass Reduction (Groundwater Extraction with On-site Treatment and In-situ Reagent Addition)). This alternative is essentially the same as MM Alternative GW-3 with the additional step of using in-situ reagents to destroy the contamination in the deep overburden and shallow bedrock groundwater and to enhance the flushing of the contamination in the deep bedrock. The major difference between MM Alternatives GW-3 and GW-4 is that MM Alternative GW-4 would use the in-situ reagents to achieve the restoration of the groundwater in the shortest time period.

Several chemical addition technologies have been successful in recent years. These technologies could reduce the time required for restoration from 300 to 600 years to approximately 30 to 60 years.

Capital Costs:	\$5,708,018
Present Worth of Long-term Monitoring:	\$7,331,245
Total Present Worth of Alternative:	\$13,039,262

A. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 121(b)(1) of CERCLA presents several factors that at a minimum EPA is required to consider in its assessment of alternatives. Building upon these specific statutory mandates, the NCP articulates nine evaluation criteria to be used in assessing the individual remedial alternatives.

A detailed analysis was performed on the alternatives using the nine evaluation criteria in order to select a site remedy. The following is a summary of the comparison of each alternative's strengths and weaknesses with respect to the nine evaluation criteria. These criteria are summarized as follows:

Threshold Criteria

The two threshold criteria described below must be met in order for the alternatives to be eligible for selection in accordance with the NCP:

1. Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each

Record of Decision
Part 2: The Decision Summary

pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

2. Compliance with applicable or relevant and appropriate requirements (ARARs) addresses whether or not a remedy will meet all Federal environmental and more stringent State environmental and facility siting standards, requirements, criteria or limitations, unless a waiver is invoked.

Primary Balancing Criteria

The following five criteria are utilized to compare and evaluate the elements of one alternative to another that meet the threshold criteria:

3. Long-term effectiveness and permanence addresses the criteria that are utilized to assess alternatives for the long-term effectiveness and permanence they afford, along with the degree of certainty that they will prove successful.
4. Reduction of toxicity, mobility, or volume through treatment addresses the degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the Site.
5. Short-term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup goals are achieved.
6. Implementability addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.
7. Cost includes estimated capital and Operation and Maintenance (O&M) costs, as well as present-worth costs.

Modifying Criteria

The modifying criteria are used as the final evaluation of remedial alternatives, generally after EPA has received public comment on the RI/FS and Proposed Plan:

Record of Decision
Part 2: The Decision Summary

8. State acceptance addresses the State's position and key concerns related to the preferred alternative and other alternatives, and the State's comments on ARARs or the proposed use of waivers.
9. Community acceptance addresses the public's general response to the alternatives described in the Proposed Plan and RI/FS.

Following the detailed analysis of each individual alternative, a comparative analysis, focusing on the relative performance of each alternative against the nine criteria, was conducted. This comparative analysis can be found in Table 7-1 of the FS.

The section below presents the nine criteria and a brief narrative summary of the alternatives and the strengths and weaknesses according to the detailed and comparative analysis. Only those alternatives that satisfied the first two threshold criteria were balanced and modified using the remaining seven criteria.

Summary for the Comparative Analysis of Alternatives

Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

Of the alternatives evaluated, Alternative GW-1 would not protect either human health or the environment. Alternative GW-2 would be protective of human health once the water line and institutional controls (*i.e.*, deed restrictions) are in place, but would not be protective of the environment as it would allow for continued migration of contaminated groundwater into the East Branch of the Sebasticook River at concentrations that would impact ecological receptors. Alternatives GW-3 and GW-4 are protective of human health and the environment by eliminating, reducing, or controlling risks posed by the Site through extraction and treatment of contaminated groundwater as well as controlling the off-site migration (including the discharge of the contaminated water into the East Branch of the Sebasticook River) of contaminated groundwater. Institutional controls would also be included to prevent exposure during the time period required for restoration of the groundwater. Alternatives 3 and 4 provide comparable protection in the short term. Alternative 4, however, is more protective over the long-term as a result of the significant reduction in the contaminant mass and the shorter time period for restoration.

Compliance with Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA requires that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA section 121(d)(4).

Applicable requirements are those substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address hazardous substances, the remedial action to be

Record of Decision

Part 2: The Decision Summary

implemented at the Site, the location of the Site, or other circumstances present at the Site. Relevant and appropriate requirements are those substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law which, while not applicable to the hazardous materials found at the Site, the remedial action itself, the Site location or other circumstances at the Site, nevertheless address problems or situations sufficiently similar to those encountered at the Site that their use is well-suited to the Site.

Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes or provides a basis for invoking a waiver.

All alternatives, except Alternative GW-1, have common ARARs associated with drinking water standards for ground water, *i.e.*, federal and state MCLs, federal non-zero MCLGs and more stringent State MEGs. Of the alternatives, only Alternative GW-4 would achieve compliance with ARARs in a reasonable time period. All of the other alternatives would require greater than 200 years for cleanup levels to be met.

Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met. This criterion includes the consideration of residual risk and the adequacy and reliability of controls.

Each alternative, except Alternative GW-1, provides some degree of long-term protectiveness. The alternatives increase in effectiveness of reducing potential exposure and leachate generation as additional treatment options are included. The effectiveness and permanence of Alternative GW-2 with respect to human health impacts is dependent entirely upon the degree to which the institutional controls are maintained. Alternative GW-3 provides a greater degree of effectiveness and permanence with the removal of contaminants from the groundwater through treatment. Alternative GW-4 is more effective than Alternative GW-3 with the addition of enhanced flushing and chemical oxidation to more aggressively remove the contamination in the overburden and bedrock.

Alternative GW-4 is both effective and permanent in restoring groundwater quality by attaining drinking water standards in a reasonable time frame. Alternative GW-4 will achieve permanent restoration in the shortest time period.

Five-year reviews would be necessary to evaluate the effectiveness of any of these alternatives because hazardous substances would remain on-site in concentrations above health-based levels.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

Alternatives GW-1 and GW-2 do not include treatment as a component of the remedy. Therefore, these alternatives would not reduce the toxicity or volume of contamination at the Site. Alternatives GW-3 and GW-4 would provide comparable reductions in the mobility, volume, and toxicity of groundwater contamination at the Site. Volatile organic concentrations in groundwater would be reduced to drinking water standards through treatment of groundwater by carbon filters. The volatile organic compounds would eventually be destroyed by the carbon regeneration. Alternative GW-4 further accomplishes the reduction of toxicity, mobility, or volume through the use of in-situ reagents that will facilitate the destruction and removal of the DNAPL.

Record of Decision
Part 2: The Decision Summary

Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers and the community during construction and operation of the remedy until cleanup goals are achieved.

Alternative GW-2 would be completed in approximately one year. Alternatives GW-3 and GW-4 should be implemented within one to three years. The NTCRA has established much of the infrastructure needed to implement Alternatives GW-3 and GW-4.

Alternative GW-1 would not be an effective alternative because current risks from direct contact would continue to exist. For Alternatives GW-3 and GW-4, there would be the potential for limited exposure during installation of groundwater extraction wells and conveyance pipes. Implementation of Alternative GW-4 may involve increased construction risks due to the handling of chemical reagents.

Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

Alternatives GW-2, GW-3 and GW-4 of the treatment alternatives are easily implemented. All materials and services needed for implementation are readily, commercially available. The components necessary for the groundwater remedy are readily available and would not require any special engineering modification prior to use at the Site. Operation and maintenance of the carbon filters would include cleaning and replacement of well components, regeneration of activated carbon, and maintenance of the pumps.

Implementability may be an issue for the in-situ treatment of the deep bedrock contamination. While the in-situ approach has been well demonstrated for use in overburden aquifers and the effectiveness is expected to be high in the shallow bedrock, the ability to deliver reagents to the deep bedrock fractures may prove to be difficult.

Cost

The estimated present worth costs for the alternatives, not including Alternative GW-1, range from \$2.8 million for Alternative GW-2 to \$13.0 million for Alternative GW-4. When evaluating the alternatives based upon an annual outlay as opposed to present value, the cost benefit of Alternative GW-4 is more apparent. Cumulative expenditures for Alternative GW-3 will reach almost \$90 million by the end of 300 years whereas the cumulative expenditure for Alternative GW-4 is estimated at \$21 million. By reducing the time period required for operation, maintenance and monitoring, the long-term expenditures are greatly reduced.

State / Support Agency Acceptance

The State has expressed its support for Alternative GW-4 as the best balance of the criteria.

Community Acceptance

All of the comments received during the public comment period were supportive of the selected remedy.

Record of Decision
Part 2: The Decision Summary

L. THE SELECTED REMEDY

1. Summary of the Rationale for the Selected Remedy

The selected remedy for OU I is a comprehensive remedy for the downtown Corinna portion of the Site that utilizes groundwater extraction with on-site treatment and the application of in-situ reagents. The selected remedy is the proposed preferred alternative, Alternative GW-4, that was identified in the Proposed Plan and presented in more detail in the FS.

2. Description of Remedial Components

The major components of the remedy are:

- Extraction and treatment of the contaminated overburden and bedrock groundwater. The extraction system will be designed to prevent off-site migration of contaminated groundwater and restore the aquifer to federal and state MCLs, federal non-zero MCLGs and more stringent State MEGs.
- In-situ treatment of the contaminated overburden and bedrock groundwater and remaining areas of contaminated soil/DNAPL. A chemical reagent (e.g., Fenton's Reagent or another oxidizing agent) will be added to the overburden and bedrock aquifer to reduce the mass of contaminants in the system. If the mass reduction is not sufficient to achieve cleanup levels, then enhanced flushing (using surfactants/solvents) and biological degradation (using bio-stimulants) will be attempted to further reduce the mass of contamination.
- Connection of certain residences to the water line to prevent these wells from becoming contaminated and prevent expansion of the contamination in the groundwater.
- Implementation, monitoring and maintenance of institutional controls (i.e., deed restrictions) in the form of groundwater use restrictions (e.g., easements or restrictive covenants) to prevent ingestion of groundwater and disturbance of the groundwater extraction and treatment system.
- Long-term monitoring of groundwater, surface water and sediments to evaluate the success of the remedial action.
- Implementation of five-year reviews to assess protectiveness until cleanup goals have been met.

Record of Decision
Part 2: The Decision Summary

The selected remedy may change somewhat as a result of the remedial design and construction processes. Changes to the remedy described in this Record of Decision will be documented in a technical memorandum in the Administrative Record for the Site, an Explanation of Significant Differences or a Record of Decision Amendment, as appropriate.

To implement the remedial action, EPA plans to:

Perform pre-design investigations and develop a design.

- Perform engineering studies to determine the exact number and location of groundwater extraction wells.
- Develop a more comprehensive understanding of the location and quantity of DNAPL in the overburden and bedrock as well as the groundwater flow system beneath and near the Site.
- Perform bench scale studies to evaluate the potential effectiveness of bio-stimulants and flushing agents.
- Implement field tests to determine the potential for enhanced flushing or chemical addition to improve the performance of the cleanup.

Install a groundwater extraction and treatment system.

A groundwater extraction and treatment system will be designed and implemented to:

- Create a zone of influence that prevents the migration of contaminated groundwater to the East Branch of the Sebasticook River and restricts the migration of contaminated groundwater.
- Treat the groundwater that is collected by the extraction and treatment system to levels that allow for discharge of this water to the East Branch of the Sebasticook River or the groundwater.
- Facilitate the restoration of the aquifer.

See Figure 17 for the conceptual layout of the groundwater extraction and treatment system.

Record of Decision
Part 2: The Decision Summary

Use in-situ reagents and bio-stimulants.

The reagents and bio-stimulants will be used to destroy and facilitate removal of contamination in the overburden and bedrock aquifers. Both of these techniques could dramatically shorten the time period required to restore the groundwater. See Figures 18 and 19 for the layout of the in-situ treatment system.

- Chemical oxidation will target the destruction of the contamination in the overburden and bedrock groundwater. Peroxide or a similar reagent will be added to react with the chlorobenzenes to destroy the contamination in the groundwater.
- Enhanced flushing using a solvent or surfactant will be used to help remove residual contamination in the deep bedrock aquifer.
- Biological degradation of the contamination in the deep bedrock will be enhanced by adding bio-stimulants.

Operate and maintain the groundwater extraction and treatment system.

- Operate and maintain the groundwater extraction and treatment system to limit the migration of the contaminated groundwater and prevent the discharge of contaminated groundwater to the East Branch of the Sebasticook River. EPA will be responsible for the operation and maintenance of the groundwater extraction and treatment system for up to ten years, or until the cleanup levels have been met, whichever is sooner. ME DEP is responsible for paying 10% of the remedial action costs during construction and the initial ten-year period of operation.
- ME DEP will be responsible for the operation and maintenance of the groundwater extraction and treatment system after year 10.

Expansion of water lines and implementation of institutional controls.

- EPA anticipates that several properties will be connected to the public water supply as part of the long-term groundwater restrictions. The groundwater modeling performed as part of the RI/FS indicated that these locations have the potential to influence the migration of the contaminated groundwater, and may become contaminated over time. Final determination of the locations to be connected to the public water supply will occur during the design. A preliminary map of those properties that may be connected to the water line is presented in Figure 20.

Record of Decision
Part 2: The Decision Summary

- EPA and ME DEP will work with those property owners currently on the public water supply and those to be added to the public water supply to implement land use restrictions (in the form of restrictive covenants or easements) (*i.e.*, deed restrictions) that will prevent the use of contaminated groundwater on their property. Such restrictions will be enforceable by the State of Maine. A preliminary map of those properties for which groundwater restrictions may be sought is presented in Figure 20.
- EPA and ME DEP will also work with the Town of Corinna to develop a local mechanism that requires the use of public water for any property within the institutional control zone. This is particularly important for the downtown areas that are targeted for redevelopment after the cleanup. A preliminary map of the institutional control zone is provided on Figure 20.

Implement long-term monitoring program for surface water, groundwater, and sediments.

- EPA will implement a long-term monitoring program to evaluate the effectiveness of this plan and the early cleanup that began in the summer of 1999. As part of this program, EPA will monitor groundwater, surface water and sediments in the area near the former Eastland Woolen Mill complex.
- EPA will sample groundwater and surface water twice per year for the first five years, and then at least annually, until cleanup levels have been attained or MEDEP takes over the cleanup.
- After the cleanup levels have been met and the remedy is determined to be protective, the groundwater treatment system will be shut down. The groundwater monitoring system will be utilized to collect information quarterly for three years to ensure that the cleanup levels have been met and the remedy is protective.

Five-Year Reviews.

- To the extent required by law, EPA will review the Site at least once every five years after the initiation of remedial action at the Site if any hazardous substances, pollutants or contaminants remain at the Site to assure that the remedial action continues to protect human health and the environment.

Record of Decision
Part 2: The Decision Summary

3. Summary of the Estimated Remedy Costs

The estimated capital cost for the remedial action is \$5.7 million. The capital costs are detailed in Table 20 below.

TABLE 20

COST SUMMARY FOR ALTERNATIVE GW-4: HYDRAULIC CONTAINMENT PLUS MASS REDUCTION

<u>ITEM</u> <u>DIRECT CAPITAL COSTS</u>	QUANTITY	UNITS	COST
Pre-design Studies - CITT, PITT	1	LS	\$392,838
Site Preparation and Mobilization	1	LS	\$104,950
Public Water Supply Extension: water main and hookups	2	Bldg	\$9,000
Decommission Wells	13	Wells	\$26,000
Long-term Monitoring Bedrock Well Installation	3	Wells	\$95,371
Borehole Geophysics	1	LS	\$36,022
FLUTe Installations	7	EA	\$152,056
Institutional Controls (<i>i.e.</i> , deed restrictions)	1	LS	\$43,775
Hydraulic Containment Installation and Start-up	1	LS	\$473,043
In-situ Chemical Oxidation at UST/Building 14 Area	1	LS	\$182,266
In-situ Chemical Oxidation at Area 1	1	LS	\$739,976
Surfactant/Cosolvent Flood at Area 1	1	LS	\$1,158,813
Enhanced Biological Treatment Area 1	1	LS	\$237,873
 Direct Cost Subtotal			 \$3,651,981
Contingency Cost (@25 Percent)			\$912,995
Direct and Contingency Cost Subtotal			\$4,564,977
 <u>INDIRECT CAPITAL COSTS</u>			
Engineering and Design (@ 10 Percent)			\$456,498
Construction Management (@ 10 Percent)			\$456,498
Project Management (@ 5 Percent)			\$228,249
 Indirect Cost Subtotal			 \$1,141,244
 TOTAL CAPITAL COSTS			 \$5,706,221

LS - Lump Sum
EA - Each
Bldg - Building

Record of Decision
Part 2: The Decision Summary

The estimated average operation, maintenance, and monitoring costs of the remedial action for years one through ten are \$404,000 per year. The net present value of the EPA maintenance costs for the first ten years of operation are \$3.3 million. The estimated average annual operation, maintenance, and monitoring costs for the ME DEP after EPA completion of the remedial action is \$310,00 per year for years 11 through 45. The net present value of the operation, maintenance and monitoring costs for the ME DEP is \$4.0 million. More detail regarding the operation, maintenance, and monitoring costs are presented in Table 21.

TABLE 21
PRESENT VALUE OF ALTERNATIVE GW-4:
HYDRAULIC CONTAINMENT PLUS MASS REDUCTION

Year (t)	GW/IC Monitoring & Levels	P&T O&M	Five-year Reviews	Contingency @ 0.25	Project Mngnt. @0.05	Tech. Support @ 0.10	Total Annual Cost	Total Present Value
0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$5,706,221
1	\$113,708	\$156,524	\$4,062	\$68,574	\$17,143	\$34,287	\$394,298	\$379,498
2	\$113,708	\$252,887	\$4,062	\$92,664	\$23,166	\$46,332	\$532,819	\$493,570
3	\$106,148	\$155,524	\$4,062	\$66,684	\$16,671	\$33,342	\$383,431	\$341,854
4	\$106,148	\$252,887	\$4,062	\$90,774	\$22,694	\$45,387	\$521,952	\$447,887
5	\$106,148	\$156,524	\$4,062	\$66,684	\$16,671	\$33,342	\$383,431	\$316,672
6	\$54,894	\$252,887	\$4,062	\$77,961	\$19,490	\$38,980	\$448,274	\$356,328
7	\$54,894	\$156,524	\$4,062	\$53,870	\$13,468	\$26,935	\$309,753	\$236,977
8	\$54,894	\$252,887	\$4,062	\$77,961	\$19,490	\$38,980	\$448,274	\$330,080
9	\$54,894	\$156,524	\$4,062	\$53,870	\$13,468	\$26,935	\$309,753	\$219,521
<u>10</u>	<u>\$54,894</u>	<u>\$156,524</u>	<u>\$4,062</u>	<u>\$53,870</u>	<u>\$13,468</u>	<u>\$26,935</u>	<u>\$309,753</u>	<u>\$211,281</u>
<u>Total PV for years 1- 10</u>								<u>\$3,333,666</u>
<u>11 - 45</u>	<u>\$54,894</u>	<u>\$156,524</u>	<u>\$4,062</u>	<u>\$53,870</u>	<u>\$13,468</u>	<u>\$26,935</u>	<u>\$309,753</u>	<u>\$3,997,578</u>
Total								<u>\$13,037,465</u>

Notes:

- Present value based on interest rate of 3.9 percent.
- Annual and periodic costs are presented in constant dollars.
- Five-year review costs pro-rated on annual basis.

The information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record file, an Explanation of Significant Difference (ESD), or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

Record of Decision
Part 2: The Decision Summary

4. Expected Outcomes of the Selected Remedy

The primary expected outcome of the selected remedy is that the Site area included in the OU I will no longer present an unacceptable risk to future user of the groundwater via ingestion and inhalation of groundwater and will be suitable for unrestricted use. Approximately 30-60 years are estimated as the amount of time necessary to achieve the goals consistent with future residential land use. The selected remedy will also reduce the flux of VOCs into the East Branch of the Sebasticook River, allowing for a full recovery of the benthic community. The previous removal actions, including the NTCRA, have eliminated any threat from exposure to soils within the former Eastland Woolen Mill Complex. It is anticipated that the selected remedy will also provide significant socio-economic and community revitalization impacts since the area addressed by the NTCRA and this OU I cleanup are the center of the community. With the completion of the NTCRA and the construction phase of the OU I cleanup, the community can implement the redevelopment plan.

a. Cleanup Levels--Interim Groundwater Cleanup Levels

Interim cleanup levels have been established in groundwater for all COCs identified in the Baseline Risk Assessment found to pose an unacceptable risk to either public health or the environment. Interim cleanup levels have been set based on the ARARs (e.g., federal and state MCLs, federal non-zero MCLGs and more stringent State MEGs) as available, or other suitable criteria described below. Periodic assessments of the protection afforded by remedial actions will be made as the remedy is being implemented and at the completion of the remedial action. At the time, that Interim Ground Water Cleanup Levels identified in the ROD and newly promulgated ARARs and modified ARARs that call into question the protectiveness of the remedy have been achieved and have not been exceeded for a period of three consecutive years, a risk assessment shall be performed on all residual groundwater contamination to determine whether the remedial action is protective. This risk assessment of the residual ground water contamination shall follow EPA procedures and will assess the cumulative carcinogenic and non-carcinogenic risks posed by all COCs (including but not limited to the COCs) via ingestion of groundwater and inhalation of VOCs from domestic water usage. If, after review of the risk assessment, the remedial action is not determined to be protective by EPA, the remedial action shall continue until either protective levels are achieved and are not exceeded for a period of three consecutive years, or until the remedy is otherwise deemed protective or is modified. These protective residual levels shall constitute the final cleanup levels for this ROD and shall be considered performance standards for this remedial action.

Because the aquifer under the Site is a Class IIB aquifer, which is a potential source of drinking water, federal and state MCLs and federal non-zero MCLGs (established under the federal Safe Drinking Water Act) and more stringent State MEGs are ARARs.

Record of Decision

Part 2: The Decision Summary

Interim cleanup levels for known, probable, and possible carcinogenic chemicals of concern (Classes A, B, and C) have been established to protect against potential carcinogenic effects and to conform with ARARs. Since MCLGs for Class A and B compounds are set at zero and are thus not suitable for use as interim cleanup levels, MCLs have been selected as the interim cleanup levels for these COCs. MCLGs for the Class C compounds are greater than zero, and can readily be confirmed; thus MCLGs have been selected as the interim cleanup levels for Class C COCs.

Interim cleanup levels for Class D and E COCs (not classified, and no evidence of carcinogenicity) have been established to protect against potential non-carcinogenic effects and to conform with ARARs. Because the MCLGs for these Classes are greater than zero and can readily be confirmed, MCLGs and proposed MCLGs have been selected as the interim cleanup levels for these classes of chemicals of concern.

Where a promulgated State standard is more stringent than values established under the Safe Drinking Water Act, the State standard is used as the interim cleanup level. In the absence of an MCLG, an MCL, a proposed MCLG, proposed MCL, a more stringent State standard, or other suitable criteria to be considered (e.g., health advisory, state guideline), an interim cleanup level was derived for each COC having carcinogenic potential (Classes A, B, and C compounds) based on a 10^{-6} excess cancer risk level per compound considering the current or future ingestion of groundwater from domestic water usage. In the absence of the above standards and criteria, interim cleanup levels for all other COCs (Classes D and E) were established based on a level that represents an acceptable exposure level to which the human population including sensitive subgroups may be exposed without adverse affect during a lifetime or part of a lifetime, incorporating an adequate margin of safety (hazard quotient = 1) considering the current or future ingestion of groundwater from domestic water usage.

Cleanup levels were not established for five constituents (bis(2-ethylhexyl)phthalate, methylene chloride, tetrachloroethene, antimony, and thallium) that were found to pose a excess cancer risk greater than 1×10^{-6} or a non-cancer HQ greater than 1 in the Human Health Risk Assessment. Bis(2-ethylhexyl)phthalate was considered a sampling artifact and non-site-related in the RI based on a relatively low frequency of detection (5 out of 27 samples) and a distribution that was not consistent with the primary groundwater contaminants. Bis(2-ethylhexyl)phthalate is also a common laboratory contaminant, and the two highest reported concentrations were in laboratory diluted samples, which is consistent with its presence as a laboratory contaminant. Methylene chloride also had a low frequency of detection (2 out of 49 samples), had a maximum reported concentration less than the 1992 MEG, and was considered a laboratory contaminant. Tetrachloroethene had a low frequency of detection (6 out of 82), had a maximum reported concentration less than the MCL and 1992 MEG, and may have been the result of equipment

Record of Decision
Part 2: The Decision Summary

contamination from another Superfund site. In addition, cleanup levels were not developed for the inorganics antimony and thallium. Antimony was only detected in 7 of 46 samples, and thallium was only detected in 3 of 46 samples. Neither of these inorganics showed a distribution consistent with the primary groundwater contaminants, and neither is considered site-related. Table 22 below summarizes the Interim Cleanup Levels for carcinogenic and non-carcinogenic chemicals of concern identified in groundwater.

Table 22 - Interim Groundwater Cleanup Levels				
Carcinogenic Chemicals of Concern	Cancer Classification	Interim Cleanup Level (ug/l)	Basis	RME Risk
arsenic	A	10	MCL	2×10^{-04}
1,4 dichlorobenzene	C	27	1992 MEG	1×10^{-05}
benzene	A	5	MCL	2×10^{-06}
Sum of Carcinogenic Risk				2×10^{-04}
Non-Carcinogenic Chemicals of Concern	Target Endpoint	Interim Cleanup Level (ug/l)	Basis	RME Hazard Quotient
arsenic	skin	10	MCL	2.1
manganese	central nervous system	200	MEG	0.57
benzene	hematological system	5	MCL	0.12
chlorobenzene	liver	47	1992 MEG	0.018
1,2 dichlorobenzene	liver	85	1992 MEG	0.085
1,3 dichlorobenzene	liver	85	1992 MEG	9.4
1,4 dichlorobenzene	liver/kidney	27	1992 MEG	0.080
1,2,4 trichlorobenzene	endocrine system	70	MCL	0.78
HI (liver): 9.7 HI (central nervous system): 0.57 HI (skin): 2.1 HI (endocrine system): 0.78				
<u>Key</u> MCL: Federal Safe Drinking Water Act Maximum Contaminant Level MCLG: Federal Safe Drinking Water Act Maximum Contaminant Level Goal MEG: State of Maine Maximum Exposure Guidelines HI: Hazard Index RME: Reasonable Maximum Exposure				

Record of Decision
Part 2: The Decision Summary

All Interim Groundwater Cleanup Levels identified in the ROD and newly promulgated ARARs and modified ARARs that call into question the protectiveness of the remedy and the protective levels determined as a consequence of the risk assessment of residual contamination must be met at the completion of the remedial action at the points of compliance. At this Site, Interim Cleanup Levels must be met throughout the contaminated groundwater plume. The interim values represent concentration levels that cannot be exceeded in any given well location at the Site. EPA has estimated that the Interim Groundwater Cleanup levels will be obtained within 30 - 60 years after the initiation of the groundwater extraction and treatment system.

M. STATUTORY DETERMINATIONS

The remedial action selected for implementation at the Eastland Woolen Mill Superfund Site is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, will comply with ARARs and is cost-effective. In addition, the selected remedy utilizes permanent solutions and alternate treatment technologies or resource recovery technologies to the maximum extent practicable, and satisfies the statutory preference for treatment that permanently and significantly reduces the mobility, toxicity or volume of hazardous substances as a principal element.

1. The Selected Remedy is Protective of Human Health and the Environment

The remedy at this Site will adequately protect human health and the environment by eliminating, reducing or controlling exposures to human and environmental receptors through treatment, engineering controls and institutional controls (*i.e.*, deed restrictions). More specifically, the selected remedy's groundwater extraction system will prevent the discharge of contaminated water into the East Branch of the Sebasticook River. Institutional controls will limit future Site use to prevent ingestion of groundwater during the period required for restoration. Long-term monitoring will allow for the evaluation of the cleanup and the identification of any future threats. The groundwater extraction and treatment system will prevent off-site migration of contamination and promote the restoration of the aquifer. As local residents are dependent upon groundwater for their water supply, the containment of the plume and restoration of the groundwater are keys to protecting public health.

The selected remedy will reduce potential human health risk levels such that they do not exceed EPA's acceptable risk range of 10^{-4} to 10^{-6} for incremental carcinogenic risk, and such that the non-carcinogenic hazard is below a level of concern. It will reduce potential human health risk levels to protective ARARs levels, *i.e.*, the remedy will comply with ARARs and To Be Considered criteria. Implementation of the selected remedy will not pose any unacceptable short-term risks or cause any cross-media impacts.

Record of Decision
Part 2: The Decision Summary

At the time that the ARAR-based Interim Ground Water Cleanup Levels identified in the ROD and newly promulgated ARARs and modified ARARs that call into question the protectiveness of the remedy have been achieved and have not been exceeded for a period of three consecutive years, a risk assessment shall be performed on the residual ground water contamination to determine whether the remedy is protective. This risk assessment of the residual ground water contamination shall follow EPA procedures and will assess the cumulative carcinogenic and non-carcinogenic risks posed by ingestion of ground water and inhalation of VOCs from domestic water usage. If, after review of the risk assessment, the remedy is not determined to be protective by EPA, the remedial action shall continue until protective levels are achieved and have not been exceeded for a period of three consecutive years, or until the remedy is otherwise deemed protective. These protective residual levels shall constitute the final cleanup levels for this ROD and shall be considered performance standards for any remedial action.

2. The Selected Remedy Complies With ARARs

The selected remedy will comply with all federal and any more stringent state ARARs that pertain to the Site. Table 23 lists the complete set of ARARs for the remedial action. The text below describes the most significant ARARs.

The following chemical-specific ARARs apply to the remediation of the contaminated groundwater at the Site:

Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs) and Non-Zero MCL Goals (MCLGs), 40 CFR §§ 141.11 - 141.16. The SDWA MCLs and non-zero MCLGs are relevant and appropriate chemical-specific ARARs. They are the basis for certain of the interim cleanup levels (*i.e.*, the Interim Ground Water Cleanup Levels) for the Site groundwater, which is a potential future drinking water source. The selected remedy is expected to result in groundwater meeting the concentration requirements of the SDWA specified as federal MCLs and non-zero MCLGs.

Maine Department of Human Services Rule (10-144 CMR 231-233) Primary Drinking Water Standards. The Maine primary drinking water standards are equivalent to MCLs. They are relevant and appropriate chemical-specific ARARs. The Maine primary drinking water standards (*i.e.*, the State MCLs) are the basis for certain of the interim cleanup levels (*i.e.*, the Interim Ground Water Cleanup Levels) for the Site groundwater, which is a potential future drinking water source. The selected remedy is expected to result in groundwater meeting the concentration requirements of the Maine Department of Human Services Rule (10-144 CMR 231-233) specified as State MCLs.

Record of Decision
Part 2: The Decision Summary

Maine Standards for Hazardous Waste Facilities, Miscellaneous Units (06-096 CMR Chapter 854, Section 15), Maximum Exposure Guidelines (MEGs). The State MEGs are relevant and appropriate chemical-specific ARARs. They are the basis for certain of the interim cleanup levels (*i.e.*, the Interim Ground Water Cleanup Levels) for the Site groundwater, which is a potential future drinking water source. The Maine Standards for Hazardous Waste Facilities, which include the State MEGs, require that a miscellaneous unit be closed in a manner that ensures hazardous waste shall not appear in ground or surface waters above MEGs. The Site is considered analogous to a miscellaneous hazardous waste unit. The selected remedy is expected to result in groundwater meeting the concentration requirements of the State MEGs.

Cancer Slope Factors (CSFs) and Reference Doses (RFDs). In addition, CSFs and RFDs are included as criteria “to be considered” in establishing cleanup levels in the absence of a Safe Drinking Water Act MCL or non-zero MCLG or State MEG. CSFs and RFDs are guidance values used to evaluate the potential respective carcinogenic and non-carcinogenic hazard and risk caused by exposure to Site contaminants. The recently issued Maine Department of Human Services, Maximum Exposure Guidelines for Drinking Water (MEGs) dated January 20, 2000 will be used as guidance for establishing cleanup levels when MCLs, non-zero MCLGs and promulgated MEGs (1992) are not available.

The following action-specific ARARs apply to the extraction, treatment and discharge of the contaminated groundwater at the Site:

SDWA MCLs and Non-Zero MCLGs, 40 CFR §§ 141.11 - 141.16. The SDWA MCLs and non-zero MCLGs are also relevant and appropriate action-specific ARARs. They provide effluent limits for the treated groundwater discharged from the treatment plant (*i.e.*, discharge criteria), defining contaminant concentrations in groundwater that would be protective to a future user of the groundwater after discharge. The selected remedy is expected to result in extracted groundwater being treated to meet these levels prior to the discharge to surface water or groundwater.

Underground Injection Control Regulations (40 CFR Parts 144, 145, 146 and 147). These regulations are relevant and appropriate action-specific ARARs because they provide regulatory compliance standards for treatment facilities that inject waste underground. The use of wells to dispose of wastes is prohibited. With regard to the underground injection of treated water, the treatment of the extracted groundwater to meet MCLs will result in the groundwater no longer being considered a hazardous waste; therefore, the selected remedy will comply with this requirement. In-situ injection of reagents is not considered disposal of a waste.

Record of Decision
Part 2: The Decision Summary

RCRA Air Emission Standards for Equipment Leaks (40 CFR Part 264, Subpart BB). These regulations contain air pollutant emission standards for equipment leaks at hazardous waste treatment, storage and disposal facilities where the waste stream has an organic concentration of at least 10 percent by weight. While it is unlikely that the groundwater treatment system will exceed the standards' trigger concentrations, these regulations are relevant and appropriate action-specific ARARs for the selected remedy. A leak detection and repair program will be implemented to meet these standards.

RCRA Containment Building Requirements (40 CFR 264, Subpart DD). These regulations are relevant and appropriate action-specific ARARs because they contain design, operation, closure and post-closure standards and requirements for the storage and treatment of hazardous waste in containment buildings. The selected remedy will be operated to meet these requirements.

Maine Department of Human Services Rule (10-144 CMR 231-233) Primary Drinking Water Standards. As noted above, the Maine primary drinking water standards are equivalent to MCLs. They are relevant and appropriate action-specific ARARs. The Maine primary drinking water standards (i.e., the State MCLs) provide effluent limits for the treated groundwater discharged from the treatment plant (i.e., discharge criteria), defining contaminant concentrations in groundwater that would be protective to a future user of the groundwater after discharge. The selected remedy is expected to result in extracted groundwater being treated to these limits before discharge.

Maine Standards for Hazardous Waste Facilities, Miscellaneous Units (06-096 CMR Chapter 854, Section 15), Maximum Exposure Guidelines (MEGs). The State MEGs are relevant and appropriate action-specific ARARs. The Maine Standards for Hazardous Waste Facilities require that a miscellaneous unit be closed in a manner that will ensure that hazardous waste will not appear in groundwater or surface waters above MEGs. The Site is considered analogous to a miscellaneous hazardous waste unit. The State MEGs provide effluent limits for the treated groundwater discharged from the treatment plant (i.e., discharge criteria), defining contaminant concentrations in groundwater that would be protective to a future user of the groundwater after discharge. The selected remedy is expected to result in extracted groundwater being treated to the MEG levels before discharge.

Maine Rules to Control the Subsurface Discharge of Pollutants by Well Injection (06-096 CMR Chapter 543). These regulations are relevant and appropriate action-specific ARARs because they provide regulatory compliance standards for treatment facilities that inject wastes underground. The use of wells to dispose of wastes is prohibited. If underground injection of treated water is considered, the treatment of the extracted groundwater to meet MCLs will result in the groundwater no longer being considered a hazardous waste; therefore, the selected action

Record of Decision
Part 2: The Decision Summary

will comply with this requirement. In-situ injection of reagents is not considered to be classified as the disposal of a waste.

Criteria “to be considered” in the operation of the groundwater extraction and treatment system include:

Maine Department of Human Services, Interim Ambient Air Guidelines, Memorandum dated February 23, 1993. This memorandum provides a list of risk-based criteria that apply to the ambient air as protective levels. The selected remedy is not expected to create an air emission release. Monitoring of the Site during the NTCRA has confirmed that there is not a concern regarding ambient air.

Maine Department of Human Services, Maximum Exposure Guidelines for Drinking Water (MEGs), Memorandum dated October 23, 1992. The State MEGs are risk-based guidelines developed as recommended maximum levels of contaminants in drinking water (carcinogenic risk of 1×10^{-6} and no lifetime adverse effects). Because the MEGs have been referenced in amendments to the Maine Hazardous Waste Management Rules, these criteria were used as the basis for certain of the cleanup and treatment discharge levels.

The following location-specific ARARs apply as a result of the location of the Site:

Protection of Wetlands (Executive Order 11990, 40 CFR § 6.302(a) and 40 CFR Part 6, Appendix A (Policy on Implementing E.O. 11990)). Federal agencies are required to avoid undertaking or providing assistance for new construction located in wetlands unless there is no practicable alternative and the proposed action includes all practicable measures to minimize harm to wetlands that may result from such use. Only minor unavoidable (de minimis) impacts are expected as a result of the installation of the discharge line to the East Branch of the Sebasticook River. If any impacts occur, then all practical measures will be taken to minimize and mitigate any adverse effects.

Floodplain Management (Executive Order 11988, 40 CFR § 6.302(b) and 40 CFR Part 6, Appendix A (Policy on Implementing E.O. 11988)). Federal agencies are required to avoid impacts associated with the occupancy and modification of a floodplain, and to avoid support of floodplain development wherever there is a practicable alternative. Only minor unavoidable (de minimis) impacts are expected as a result of the installation of the discharge line to the East Branch of the Sebasticook River. The selected remedy will comply with these requirements by avoiding work in the potential floodplain to the extent practicable and minimizing the impacts to the function of the floodplain when impacts are unavoidable.

Record of Decision
Part 2: The Decision Summary

Endangered Species Act (16 USC §§ 1531 et seq.; 40 CFR § 6.302 (h)). This statute is an applicable location-specific ARAR. It requires that federal agencies avoid activities that jeopardize threatened or endangered species or adversely modify habitats essential to their survival. One threatened species, the American Bald Eagle, inhabits the area in which the Site is located. No endangered or threatened species were identified on-site. In addition, the selected remedy is not anticipated to jeopardize or have an adverse effect on the American Bald Eagle or any other threatened or endangered species.

Maine Wetlands Protection Rule (06-096 CMR Chapter 310, § 1). These regulations are applicable location-specific ARARs because activities adjacent to a freshwater wetland greater than ten acres or with an associated stream, brook, or pond must not unreasonably interfere with certain natural features, such as natural flow, quality of waters, nor harm significant aquatic habitat, freshwater fisheries, or other aquatic life. The selected remedy will comply with these regulations through minimization of any impacts along the shoreline and river bank along with erosion and sediment control practices during any necessary activities within 100 feet of the surface water or wetland.

Maine Natural Resources Protection Act, Permit by Rule Standards (06-096 CMR Chapter 305). These regulations are applicable location-specific ARARs because they prescribe standards for specific activities that may take place in or adjacent to wetlands or water bodies. The standards are designed to ensure that the disturbed soil material is stabilized to prevent erosion and siltation of the water. There will be minimal activities during the remedial action that cause a substantial disturbance of the soil. Erosion control and sediment control measures will be put in place to meet the requirements of these regulations.

Maine Endangered Species Act and Regulations (12 MSRA § 7751-7756; 09-137 CMR 008). The State of Maine determines the appropriate uses of habitat for species on the Maine Watch List, Special Concern List, and Indeterminate Category. A freshwater mussel, the brook floater, occurs in the vicinity of the Site and is a Special Concern species in Maine. The selected remedy is not expected to have an impact on this species. The injection of the chemical reagents into the groundwater will be under a controlled situation that will minimize the potential for discharge of any chemicals into the surface water. This regulation will be triggered as an applicable location-specific ARAR only if such species are encountered.

Maine Site Location Law and Regulations (38 MRSA §§ 481-490; 06-096 CMR Chapter 375). These regulations are relevant and appropriate location-specific ARARs because they prescribe standards for specific activities that are considered to be a development. The selected remedy will comply with these standards by (1) preventing unreasonable adverse effects to air quality, runoff/infiltration relationships and surface water quality, and alteration of climate or natural drainage-ways, and (2) implementing erosion, sediment and noise controls.

Record of Decision
Part 2: The Decision Summary

A discussion of why these requirements are applicable or relevant and appropriate may be found in Section 3 of the FS Report.

3. The Selected Remedy is Cost-Effective

In EPA's judgment, the selected remedy is cost-effective because the remedy's costs are proportional to its overall effectiveness (see 40 CFR 300.430(f)(1)(ii)(D)). This determination was made by evaluating the overall effectiveness of those alternatives that satisfied the threshold criteria (i.e., that are protective of human health and the environment and comply with all federal and any more stringent State ARARs, or as appropriate, waive ARARs). Overall effectiveness was evaluated by assessing three of the five balancing criteria – long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness – in combination. The overall effectiveness of each alternative then was compared to the alternative's costs to determine cost-effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence represents a reasonable value for the money to be spent. Only one alternative, Alternative GW-4, is considered to be protective and ARAR-compliant. The cost effectiveness of Alternative GW-4 is predicated upon the ability of the in-situ reagents to facilitate the achievement of cleanup levels within 30 to 60 years. If this assumption proves to be incorrect, then a reevaluation of the cost-effectiveness of the cleanup would be appropriate at that time.

4. The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable

Once the Agency identified those alternatives that attain or, as appropriate, waive ARARs, and that are protective of human health and the environment, EPA identified which alternative utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This determination was made by deciding which one of the identified alternatives provides the best balance of trade-offs among alternatives in terms of: (1) long-term effectiveness and permanence; (2) reduction of toxicity, mobility or volume through treatment; (3) short-term effectiveness; (4) implementability; and (5) cost. The balancing test emphasized long-term effectiveness and permanence and the reduction of toxicity, mobility and volume through treatment, and considered the preference for treatment as a principal element, the bias against off-site land disposal of untreated waste, and community and state acceptance. The selected remedy provides the best balance of trade-offs among the alternatives.

Only one of the alternatives, Alternative GW-4, was considered to be protective and able to fully comply with ARARs. Alternative GW-1 (No Further Action) was not considered to be protective or compliant with ARARs. Alternatives GW-2 (Limited Action/Institutional Controls)

Record of Decision
Part 2: The Decision Summary

and GW-3 (Hydraulic Containment (Groundwater Extraction With On-Site Treatment)) would be more protective than Alternative GW-1; however, neither of these alternatives could achieve compliance with groundwater cleanup ARARs in a reasonable time period. Of the four alternatives evaluated, only Alternative GW-4 (Hydraulic Containment with Mass Reduction (Groundwater Extraction With On-Site Treatment Along With Enhanced Flushing and/or Chemical Oxidation)) is protective and fully compliant with ARARs. Both Alternatives GW-3 and GW-4 achieve similar degrees of long-term effectiveness and permanence while using treatment to reduce the toxicity, mobility, or volume. Treatment is a principal element of both Alternative GW-3 and Alternative GW-4. The State of Maine and the community were very supportive of Alternative GW-4. The potential to achieve cleanup goals in a reasonable time frame supports the selection of Alternative GW-4 over Alternative GW-3.

5. The Selected Remedy Satisfies the Preference for Treatment Which Permanently and Significantly Reduces the Toxicity, Mobility or Volume of the Hazardous Substances as a Principal Element

The principal element of the selected remedy is the extraction and treatment of contaminated groundwater and the in-situ treatment of groundwater and DNAPL. This element addresses the primary threats at the Site – highly contaminated groundwater, DNAPL, and the remaining soil contamination – as defined by the risk to local water supplies and the exceedance of MCLs. The selected remedy satisfies the statutory preference for treatment as a principal element by reducing the contamination in the aquifer through extraction and treatment of the contaminated groundwater, and through in-situ treatment of the mass of contamination in the overburden and bedrock.

6. Five-Year Reviews of the Selected Remedy are Required

Because this remedy will result in hazardous substances remaining on-site above levels that will not allow for unlimited use and unrestricted exposure, a review will be conducted within five years after initiation of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

N. DOCUMENTATION OF NO SIGNIFICANT CHANGES

On July 17, 2002, EPA presented a proposed plan that described extraction and treatment of the groundwater along with the possible use of in-situ reagents as the proposed long-term remediation of the Site. EPA reviewed all written and verbal comments submitted during the public comment period, which was open from July 18 to August 17, 2002. It was determined that no significant changes to the remedy, as originally identified in the proposed plan, were necessary.

Record of Decision
Part 2: The Decision Summary

O. STATE ROLE

The State of Maine Department of Environmental Protection (ME DEP) has reviewed the various alternatives and has indicated its support for the selected remedy. The State has also reviewed the Remedial Investigation, Risk Assessment and Feasibility Study with respect to OU I to determine whether the selected remedy is in compliance with applicable or relevant and appropriate State environmental and facility siting laws and regulations. The State of Maine concurs with the selected remedy for the Eastland Woolen Mill Superfund Site. A copy of the declaration of concurrence is attached as Appendix B.

Record of Decision
Part 3: The Responsiveness Summary

RECORD OF DECISION RESPONSIVENESS SUMMARY

PREFACE:

The purpose of this Responsiveness Summary is to document EPA's responses to the questions and comments raised during the public comment period. EPA considered all of the comments summarized in this document before selecting a final remedial alternative to address contamination at the Site. Attachment A to the Responsiveness Summary contains a copy of the transcript from the public hearing held on Wednesday, August 7, at the Corinna School in Corinna, Maine. All of the original comments submitted by citizens and the State of Maine are included in the Administrative Record.

This Responsiveness Summary addresses comments pertaining to the Proposed Plan and FS Report that were received by EPA during the comment period from July 18 to August 17, 2002. Several individuals, the Town of Corinna, and the State of Maine submitted comments to EPA either in writing or at the public hearing. None of the comments received were in opposition to the proposed cleanup action.

SUMMARY OF COMMENTS FROM STATE AND LOCAL OFFICIALS AND CITIZENS

All of the local citizens and local officials' comments were in support of the selected remedy.

Comment 1: The Town of Corinna Selectboard provided oral comments in support of the proposed cleanup.

EPA Response: EPA wishes to thank the community and local officials for their continued support for the cleanup of the Site.

Comment 2: The ME DEP provided oral comments in support of the proposed cleanup.

EPA Response: EPA wishes to thank the ME DEP for its continued support for the cleanup of the Site.

Comment 3: An individual representing the Community Re-Development Committee provided comments in support of the cleanup and requested that EPA design and construct any structures at the Site consistent with the building architecture requirements for the new Corinna downtown.

EPA Response: EPA appreciates the support and will fully consider making any structures installed as part of the cleanup consistent with the architecture requirements for the new Corinna downtown.

Record of Decision
Part 3: The Responsiveness Summary

Comment 4: The Sebasticook River Watershed Association submitted a letter in support of the proposed cleanup. The letter contained three additional comments:

- a request that EPA accomplish the cleanup as soon as possible to help the Town of Corinna feel more confident about the redevelopment plans.

EPA Response: Comment noted.

- a request that EPA test and monitor the discharge of treated water for parameters other than the Site COCs (PCBs, mercury, phosphorous)

EPA Response: The parameters that will be monitored will be established during the design. At a minimum, EPA will test for phosphorous based on the regional efforts to reduce phosphorous loading in the East Branch of the Sebasticook River. EPA will consider whether long-term monitoring for mercury and PCBs is necessary.

- a request that EPA evaluate the effect of the temperature and flow of the treated discharge on the East Branch of the Sebasticook River

EPA Response: EPA will evaluate the potential impact of the treated discharge on the East Branch of the Sebasticook River. The discharge will likely be in the range of 10 to 20 gallons per minute which is only 0.02 to 0.04 cubic feet per second as compared to the East Branch of the Sebasticook River which flows in the range of 1,000 cfs during the spring, 84 cfs during the summer, with low flows of 1.5 cfs during the Site sampling. Given the low percentage of flow contributed by the treatment plant and the relatively warm water contributed by Corundel Lake, it is unlikely that the treated water discharged from the Site will have an impact on the temperature or flow of the East Branch of the Sebasticook River.

Comment 5: The Sebasticook Committee for a Clean Environment (SCCE) submitted a comment letter and oral comments supporting the proposed cleanup and seeking input regarding several issues.

- SCCE Comment 1. The SCCE concurs with EPA's selection of Alternative 4 in the FS. We believe that this alternative protects Human Health and Environmental Receptors potentially impacted by former operations at the Eastland Woolen Mill (EWM). It also provides the greatest opportunity to restore the aquifer within a reasonable time frame.

Record of Decision
Part 3: The Responsiveness Summary

EPA Response: Comment noted.

- SCCE Comment 2. Separation of the Site into Operable Unit 1 and 2 has allowed progress to continue with respect to the area around the former Mill (OU-1), while recognizing that unique issues exist at areas more remote from the former Mill. We commend EPA for the progress being made at OU-1 and urge EPA to move forward with evaluation of OU-2. Impacts to the East Branch of the Sebasticook River downstream from the former Mill are a concern to persons using the East Branch of the Sebasticook River for recreation and for persons living along and/or using Sebasticook Lake. What is EPA's schedule for completing OU-2 evaluations?

EPA Response: EPA plans to complete the Feasibility Study for OU II by early 2003 and release a proposed cleanup plan for OU II by summer 2003.

- SCCE Comment 3. Recent news reports have indicated that EPA may be facing significant funding shortages in upcoming years and that a number of Superfund Sites will experience reductions or elimination of funding. Does the EWM project have sufficient funding committed to complete Alternative 4? What is the expected funding for the next few years as Alternative 4 is implemented?

EPA Response: The NTCRA has sufficient funding for this calendar year. Funding needs for the remainder of the NTCRA and the selected remedial action will be assessed as part of EPA's 2003 fiscal year budget.

- SCCE Comment 4: Alternative 4 includes In Situ Chemical oxidation, surfactant and cosolvent flooding, as well as bio-stimulation as part of the ground water treatment process. These measures may involve large quantities of chemicals and reagents to be stored and managed on-site. Because of the Site's proximity to nearby residents, vehicular traffic through town and the East Branch of the Sebasticook River, rigorous procedures should be implemented to minimize the potential for spillage or leaks, as well as measures to quickly respond to unanticipated releases of these materials.

EPA Response: EPA agrees that health and safety as well as material handling issues will require special attention with respect to the in-situ reagents.

- SSCE Comment 5. Discharges of storm water run-off from the Site and ground water treatment discharges will be routed to the East Branch of the Sebasticook River. What sampling protocols are anticipated to ensure that these discharges will

Record of Decision
Part 3: The Responsiveness Summary

not adversely affect the East Branch of the Sebasticook River? Nutrient loading to East Branch of the Sebasticook River (especially phosphorous) is a significant concern to downstream citizens utilizing Sebasticook Lake. Sebasticook Lake has experienced algae blooms for a number of years that have been attributed to nutrient loading to the Lake. Nutrient sampling should be periodically conducted for Site related discharges to East Branch of the Sebasticook River to ensure that increased nutrient loading is not occurring.

EPA Response: EPA will sample the East Branch of the Sebasticook River for these constituents.

- SSCE Comment 6. In conjunction with EPA's cleanup of the EWM Site, the Town of Corinna is proceeding with redevelopment plans for the downtown area including the EWM Site. To that end, EPA should coordinate the placement of permanent structures (e.g. treatment system) with Town officials to ensure that structures coexist as well as possible (i.e., location, size, style, zoning, etc.).

EPA Response: EPA has provided the Town of Corinna with a Superfund Redevelopment Initiative Grant and has worked closely with the Town officials to co-ordinate the cleanup activities to date. EPA expects to continue the collaborative relationship during the remedial action.

- SCCE Comment 7: The introduction of the FS Report notes that a Risk Assessment was not performed for Lot 88 because of the lack of observed impacts in samples from that area. It should be noted that NTCRA activities were completed at Lot 88 and impacted soil was removed.

EPA Response: Comment noted.

- SCCE Comment 8: In several discussions in the RI Report and FS, certain metals were reported present in samples, but were assumed to be non-site related. Did EPA investigate the historic use of metals in preparation of various dyes used by EWM? Many of the pigments are the result of various metals. In fact, coal tar derivatives were noted as a dye component. Metals may also be present in coal tar derivatives. Alternatively, did any of the chemicals used at EWM mobilize naturally occurring metals?

EPA Response: With respect to the OU I cleanup, EPA believes that the only metals that are consistently detected above federal or state drinking water standards are arsenic and manganese. These two elements are naturally occurring. The

Record of Decision
Part 3: The Responsiveness Summary

concentrations found in the groundwater could be naturally occurring or as a result of the Site contamination changing the groundwater geochemistry causing enhanced mobilization of these elements from the parent material. Long-term monitoring during the remedial action will hopefully resolve this issue. To be conservative, EPA has identified these two elements as contaminants of concern and established groundwater cleanup levels for these elements. It is very likely that metals were present in the dyes and other wastes from the Eastland Woolen Mill. The OU II Feasibility Study will identify those metals that are believed to be of concern.

- SCCE Comment 9. In the RI Report list of ARARs, the State of Maine Solid Waste Regulations are not included. Given the inclusion of the Old Dump in the RI, it would seem that Maine's Solid Waste Regulations would be applicable and relevant. Even if the Old Dump is not remediated under the EWM project, the Site is not in compliance with a number of State Rules and Regulations and action is warranted to address the Old Dump.

EPA Response: The Old Dump and any associated ARARs are included in the OU II portion of the Site. EPA will assess any ARARs associated with the Old Dump as part of the OU II FS.

- SCCE Comment 10. The RI Report and FS Report note that the 1992 version of the State of Maine Maximum Exposure Guidelines (MEGs) was used when comparing and evaluating site data. Why weren't the 2000 MEGs used in the RI/FS?

EPA Response: While the 2000 MEGs are the most recent version, only the 1992 MEGs have been promulgated. As a result, the 1992 are ARARs and the 2000 MEGs can only be evaluated as "to be considered".

- SCCE Comment 11. The FS Report indicates that one possibility for bio-stimulation is to inject phosphorous as a nutrient source (pg. 5-7). Given the concerns about nutrient loading to Sebasticook Lake via the East Branch of the Sebasticook River, this option is of great concern. We would encourage other methods of bio-stimulation rather than injecting phosphorous.

EPA Response: EPA will fully evaluate whether phosphorous injected into the bedrock would eventually migrate into the surface water. Given the local efforts to minimize the loading of phosphorous to Sebasticook Lake, EPA would strongly

consider other options if the phosphorous from the in-situ application has the potential to impact the Lake.

Record of Decision
Part 3: The Responsiveness Summary

- SCCE Comment 12. . The term "negative easements" is used in the FS. What does that mean? If it is the same as "Deed Restrictions", we suggest that Deed Restrictions be used since it is more familiar to the general public.

EPA Response: Comment noted.

- SCCE Comment 13. The FS Report briefly discusses treatment of impacted soil that remained following the NTCRA and mentions a pilot study to assist in designing a treatment strategy. Since the existing contaminated soil stockpile is essentially the same material, and will likely not be fully treated for at least two years, why not utilize some of this soil to conduct a Pilot study? It would be less costly than trying to conduct an in-situ Pilot Study.

EPA Response. The value of using the in-situ approach is that it will better simulate the physical challenges of distributing the reagent in the subsurface.

- SCCE Comment 14. The bio-stimulation discussion references the use of HRC as an option in stimulating microbial activity to enhance degradation of residual contamination. The HRC process results in a change from aerobic to anaerobic conditions in the aquifer. This change results in the reduction of oxygen, iron, nitrate and sulfate and will likely result in increased concentrations of many inorganic constituents. Has it been determined that anaerobic treatment is the preferred environment for degrading chlorobenzenes?

EPA Response: Anaerobic conditions are already present within portions of the aquifer that would be treated using enhanced biological degradation. Anaerobic pathways are preferred for sequential dechlorination of chlorinated benzene target compounds. Dechlorination rates are greatly improved when anaerobic / sulfate reducing conditions have been reached within the aquifer and the microorganisms are forced to utilize the target compounds in electron transfer reactions.

- SCCE Comment 15. A consequence of this change will be a significant change in chemistry that will affect the existing ground water treatment process. The project may want to consider a separate treatment process rather than reconfiguring the current system or mixing two different influent streams prior to treatment. Experience has shown that the chemical differences in ground water from aerobic and anaerobic environments make it difficult to treat in a single treatment system.

EPA Response: The water treatment system design will consider the potential need to accommodate changes in influent water chemistry.

Record of Decision
Part 3: The Responsiveness Summary

- SCCE Comment 16. Discussion of data from the Slab Area indicates the presence of benzene, ethylbenzene and xylene in soil, as well as MTBE in a downgradient ground water sample. This is a typical signature of gasoline fuel. It is unlikely that the source is from across the East Branch of the Sebasticook River (east of Route 7) as assumed for the building 14/UST Area. The presence of these constituents raises the question of whether fuel related impacts on other portions of the EWM Site are attributable to Site operations rather than off-site sources.

EPA Response: The benzene and ethyl benzene were detected in one boring in different vertical intervals. Benzene was detected once in the 4-6 foot interval in SB-00-97 at a concentration of 36 ug/kg or about 6 ug/kg above the NTCRA cleanup goal of 30 ug/kg. Ethyl benzene was detected once in the 10-12 foot interval at 1,100 ug/kg. Xylenes were detected at low concentrations sporadically down to 24 feet below the concrete slab in SB-00-97 and 4-6 feet beneath the slab in SB-00-99. The distribution and low concentration of these compounds do not suggest a fuel source area related to Site operations.

MTBE was detected in monitoring wells OM-01-54 and BM-01-23 located at upgradient edge of this portion of the EWM complex. The presence of MTBE at this location is more likely attributed to the general use of this fuel additive in Maine.

- SCCE Comment 17. Section 3.5.1 notes soil samples exceeding cleanup goals. The slab area is not included, but a sample result indicates that benzene exceeded the cleanup goal in at least one sample from the Slab Area. Therefore, it appears that Slab Area soil should be included in section 3.5.1.

EPA Response: The frequency of detection of benzene in the slab area was 1 of 20 samples in which other VOCs were detected. That one sample was 6 ug/kg higher than the cleanup goal of 30 ug/kg. On this basis, EPA concluded that Slab Area did not pose a risk due to benzene. The Slab Area will be subject to additional confirmation sampling as part of the OUI remedy at the conclusion of the NTCRA.

- SCCE Comment 18. Discussion of Old Dump data indicate that low concentrations of chlorobenzenes were found in at least one bedrock well, although remaining bedrock wells did not report the presence of chlorobenzene. Given the

spatial distribution of bedrock wells does EPA believe that Old Dump bedrock wells are properly located to account for the anisotropy and preferential flow path along bedding planes as seen in OU-1 wells at the former Mill? Also, could the

Record of Decision
Part 3: The Responsiveness Summary

chlorobenzene or other bedrock contaminants be pulled away from the Old Dump by future production wells northeast or southwest of the Old Dump?

EPA Response: The Old Dump will be addressed as part of the cleanup for OU II. The occurrence of very low concentrations of chlorinated benzenes in BM-99-21 is attributed to temporal variability in vertical gradients. BM-99-21 occasionally experiences weak downward gradients and thus a little of the overburden contamination is able to migrate the short distance to shallow bedrock as groundwater approaches discharge points along the river. EPA does not believe this area poses a risk of migration because the hydraulic influence of the discharge area is too strong a sink to be overcome by distant future pumping sources to the northeast or southeast.

- SCCE Comment 19. The SCCE has requested that EPA plan to protect public health during the use of the in-situ reagents

EPA Response: EPA agrees that there be health and safety protocols to protect the public during the use of the in-situ reagents. This reagents have been used safely at numerous sites across the country.

- SCCE Comment 20. The SCCE noted that EPA should move forward with the OU II Feasibility Study.

EPA Response: EPA is developing the FS Report for OU II and expects to complete this document in 2003.

- SCCE Comment 21. The SCCE commented that EPA should complete the cleanup of the Site as soon as possible and that EPA should periodically update the funding for the Site.

EPA Response: EPA is committed to completing the NTCRA as soon as possible. EPA will provide the community with periodic updates of the funding status of the Site.

Comment 6: The Sebasticook Lake Association requested phosphorous monitoring given the significant efforts made to reduce phosphorous loading to Sebasticook Lake.

EPA Response: EPA will monitor for phosphorous.

Record of Decision
Part 3: The Responsiveness Summary

**THE SELECTED REMEDY'S CHANGES TO THE PROPOSED REMEDY MADE
BASED UPON PUBLIC COMMENTS**

There have been no significant changes to the Proposed Remedy as a result of public comments. The local public was supportive of the EPA Proposed Remedy. The State of Maine and Town of Corinna were both supportive of the EPA Proposed Remedy.