

FIVE-YEAR REVIEW REPORT

SACO TANNERY WASTE PITS SITE

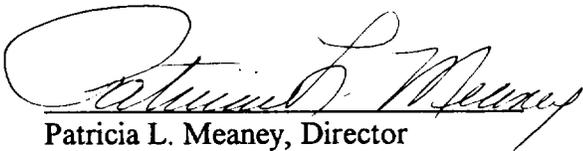
SACO, MAINE

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Region I

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Five-Year Review Report

I. Introduction

EPA Region I conducted this review for the Saco Tannery Waste Pits Site (the "Site") in Saco, Maine pursuant to CERCLA section 121(c), National Oil and Hazardous Substances Pollution Contingency Plan (NCP) section 300.430(f)(4)(ii), and OSWER Directives 9355.7-02 (May 23, 1991), and 9355.7-02A (July 26, 1994). This is a statutory review, conducted for post-October 17, 1986 Remedial Actions. The purpose of a five-year review is to ensure that a remedial action remains protective of human health and the environment. This is the first five-year review for the Site.

The remedial action selected for the Site left hazardous waste in place in the waste pits and lagoons as well as contamination in groundwater. These levels do not allow for unlimited use or unrestricted exposure.

II. Site Chronology

Event	Date
Removal action - neutralization and capping of three acid pits and capping, partial fencing	July through October 1983
NPL Listing	September 1983
Maine DEP Phase I RI, under a Cooperative Agreement with EPA	1985 to 1987
Phase II RI/FS	1987 to 1988
FS Addendum and Wetlands and Floodplains Assessment Report	June 1989
ROD signature	September 27, 1989
Creation of Wildlife Preserve by Maine Legislature	September 4, 1991
Remedial Design Start	October 1991
Remedial Design completion, Site Preparation phase	August 1992

Remedial Design completion, Soil Cover/ compensatory Wetlands phase	September 1992
Superfund State Contract for Site Preparation	September 14, 1992
Superfund State Contract for Soil Cover Systems/Compensatory Wetlands	January 28, 1993
Superfund State Contract for Road Repairs with Maine DEP and City of Saco	April 1994
Explanation for Significant Differences	September 16, 1993
RA for Site Preparation	October 6, 1992 to December 15, 1992
RA for Soil Covers/Compensatory Wetlands	March 1, 1993 to October 20, 1993
Operation and Function, Soil Covers	October 20, 1993 to October 1, 1994
Operation and Function, Compensatory Wetlands	October 20, 1993 to October 1, 1997
Operation and Maintenance, Soil Covers, Maine DEP	October 1, 1994 - ongoing

III Background

Physical Characteristics

The Site is located in a rural section of the City of Saco, Maine. The 213-acre Site is bordered by the Maine Turnpike to the east, residential property along Hearn Road to the west, and largely wooded land to the north and to the south across Flag Pond Road (see Figure 1). Automotive entry to the Site is limited to Flag Pond Road; all-terrain vehicle trails enter the Site from the north and west.

The majority of the Site is forested, both upland and wetland; unforested land consists of disturbed areas, wetlands, and bedrock outcrops. A 100-year floodplain is located within the property boundaries, but none of the waste pits or lagoons are located within the floodplain.

Two streams originate in the western and northern portions of the Site. The headwaters for both streams is a palustrine wetland west of Waste Pits 7, 8, and 9 (see Figure 2). One stream continues south as a swampy stream with poorly defined channels to a culvert under Flag Pond Road and eventually forms Cascade Brook. The second stream flows north and then east, in a well-defined channel, to a confluence with a more northern tributary to form Stuart Brook.

Stuart Brook flows southeast through a culvert under the Maine Turnpike. East of the turnpike Cascade Brook joins Stuart Brook which then flows into the Scarborough River estuary.

Land and Resource Use

Records dating back to the early 1800s indicate the property was used as a homestead/farm by a few families. In 1956, a tanning company purchased the property for disposal of its process wastes. Disposal of waste is thought to have ceased in the late 1970s, and ownership transferred to a quasi-state agency in 1981 when the tannery went bankrupt. Following the 1989 Record of Decision, the State of Maine legislature passed a resolution which made the Site a wildlife preserve. With this permanent institutional control, which prohibits the use of groundwater and any excavation where waste is located, the projected land use for the Site is expected to remain as it is now.

The Site is located in an area which is undergoing a transition from rural farming to suburban residential housing. There were approximately sixty single family homes located within a half-mile radius of the Site at the time of the ROD and the number has gradually increased as farmland is being turned into residential properties. Residential development is concentrated along Hearn Road and Flag Pond Road. The Maine Turnpike is located on the eastern border of the Site, limiting development in that direction. Residents who live near the Site obtain their water from private drinking wells, and rely on groundwater for their water supply. The groundwater aquifer in the area of the Site is classified under federal standards as IIB, suitable for public water supplies.

History of Contamination

Between 1959 and through the late 1970s a leather tannery operated the Site as a disposal area for process wastes. Wastes from the tanning process included high concentrations of chromium, volatile and semi-volatile organic contaminants, acids, and leather hides and strips. Wastes were disposed in two lagoons, each roughly two acres in size, and 53 smaller disposal pits (see Figure 2). The total surface area of contamination was approximately 13 acres.

Initial Response

Investigations by the Maine DEP and EPA in the early 1980's led to the Site being placed on the National Priorities List in September 1983. EPA, in a removal action from July through October 1983, remediated three acid pits which posed an immediate and significant risk to human health. EPA pumped the liquid from the pits, neutralized the remaining sludge with lime, capped the three pits, and erected a fence along Flag Pond Road to discourage vehicular entry.

From 1985 to 1987 Maine DEP, under a Cooperative Agreement with EPA, conducted an initial Remedial Investigation (RI) to determine the physical site conditions; the contamination resulting from waste disposal at the Site; and the health and/or environmental risks associated

with the wastes. EPA initiated a Phase II RI and a Feasibility Study in October 1987 to address issues raised during the Phase I RI; to meet the requirements of the Superfund Amendments and Reauthorization Act of 1986 (SARA); and to evaluate potential remedial alternatives for the Site and provide the information necessary to select a remedy.

Contaminants - Soil

In 1983, the Site included 53 waste pits typically less than a quarter acre in size and two lagoons, each about two acres in size. The waste pit and lagoon soils are characterized by high concentrations of chromium (on the order of 10,000 ppm) and lead (on the order of 100 to 1,000 ppm), often accompanied by VOC and/or SVOC contamination. VOCs were detected in 19 samples from waste pits; three of these samples contained high VOC concentrations of greater than 100 ppm. SVOCs were detected in 40 samples from waste pits, seven of these samples contained high SVOC concentrations greater than 100 ppm.

Soil contaminant concentrations immediately adjacent to the waste pits and lagoons are two to four orders of magnitude lower than those within which indicates that the highly contaminated soils are generally restricted to the waste pits. Vertically, soil contaminant concentrations decrease immediately below or underneath the visibly contaminated waste sludge. The most common contaminant detected below the sludge was chromium, which was found in concentrations of 1,950 ppm and 3,660 ppm more than two feet below the sludge in two waste pit borings. Otherwise, chromium concentrations below the visibly contaminated sludge were generally low, *i.e.*, below 1,000 ppm. In samples collected from below the sludge, VOCs and SVOCs either were not detected, or were detected at very low levels.

Contaminants - Groundwater

Arsenic and chlorobenzene were the two contaminants present in groundwater on-site at concentrations greater than MCLs. No definable source of arsenic was identified in the wastes or soils on-site. Arsenic is not a characteristic contaminant of tannery wastes, and arsenic concentrations within the pits have not been found to be significantly higher than those found outside the pit areas. The source of the VOCs appears to be the contaminated sludge present in the waste pits and chromium lagoons.

Residential wells sampled in the vicinity of the Site did not reveal any contaminant levels in excess of MCLs. Under current conditions, there is no evidence of any hydraulic connection between the residential wells and the Site. Based on local and regional topography, the regional groundwater movement in the Hearn Road area is generally moving from the residential wells eastward towards the on-site wetlands and streams. In addition, groundwater movement in the on-site monitoring wells indicates upward flow and discharge of groundwater to on-site surface water.

Contaminants - Surface Water and Sediments

Surface water and sediments contamination of chromium and lead was generally limited to two locations on-site. The western berm of Waste Pit 9 was incomplete, providing a path for contaminated soil to move into a wetland area as entrained sediment in overland flow. A seep area outside the northern berm of Chromium Lagoon 2 was found to contain arsenic in addition to chromium and lead. Arsenic, at low levels, was detected in off-site stream sediments collected from a location upstream of the pits and lagoons. The presence of arsenic at this location indicates that arsenic levels on-site cannot be attributed solely to the Site. Standing water in the waste pits and lagoons contained elevated concentrations of chromium, lead, and a limited number of organic compounds.

IV. Remedial Actions

Remedy Selection

In 1989, EPA issued a Record of Decision (ROD) which set forth the remedy selected for the Site. To minimize the threat of direct contact with the soils and sludge in the waste pits and lagoons, the ROD specified construction of soil covers over the pits and lagoons. To assure that the soil covers would be protected and future development prohibited, the ROD specified that the Site would be converted within two years after the signing of the ROD into a permanent wildlife preserve pursuant to an act of the Maine State legislature (the ROD included as a contingency remedy the construction of an on-site RCRA C landfill if the institutional control was not implemented). To address the threat of chromium, arsenic, and other contaminants, the ROD specified a groundwater, surface water, and sediment monitoring network and contingencies based on the results of the monitoring program. Finally, the ROD specified creation of compensatory on-site wetlands for the loss associated with the covering of the pits and lagoons, and five-year reviews.

In April 1990, EPA began a monitoring program which included quarterly sampling of on-site groundwater, bi-annual sampling of on-site surface water and sediments, and annual sampling of residential wells on Flag Pond, Jenkins, and Hearn Road. EPA continued this monitoring program through the remedial action to March 1995. Maine DEP then assumed responsibility for the monitoring program as part of operation and maintenance for the Site.

The monitoring documented outward flow from the waste pits to the wetlands and forested uplands with no flow of contaminants moving offsite. Because of the arrangement of the waste pits along the two roadways and the relatively flat topography, this has resulted in multiple small groundwater contamination areas with isolated areas of chlorobenzene and arsenic contamination. Continuous monitoring of water levels demonstrated that the effects of residential well pumping nearby were not felt in on-site monitoring wells.

Remedy Implementation

Faced with the short construction seasons in Maine, remedial action was separated into two phases so that construction of the soil covers could be completed in 1993. Site preparation began in October 1992 and was completed in December 1992. The site preparation included the following:

- site clearing;
- erosion and sediment control;
- road improvement and construction;
- road improvements and pit access;
- storage areas and truck turnarounds construction; and
- and temporary and permanent security fencing.

Two hundred cords of hardwood were recovered from the clearing in clean areas of the site and transported to City of Saco property where the wood was made available to city residents. A total of three miles of fencing was installed at the Site. Initially a site perimeter fence was contemplated, but by splitting the fencing into five stand-alone units, this allowed for unrestricted wildlife corridors.

EPA awarded the contract for construction of the soil cover system in February 1993 and mobilization began the first week of March. The soil cover system/compensatory wetlands addressed the following:

- clearing within and around the pits and lagoons;
- removing and treating ponded water in pits and lagoons;
- constructing soil cover systems for fifty-three waste pits, two lagoons, wet area, and a seep area;
- re-vegetating the site;
- creating compensatory wetlands; and
- constructing permanent security fencing.

In May, several public meetings were held to hear the public's concerns over the proposed temporary discharge of treated water into Stuart Brook. Despite the state-of-the-art system set up onsite and testing which detected no VOCs or SVOCs in the system effluent, EPA agreed to transport the treated water offsite to a municipal treatment plant. Discussions were initiated with two public treatment plants and a private industry in need of water for production use. Plant engineers were initially receptive to the proposal, but feedback from other departments led to the decision to not accept the water or require perpetual indemnification. With the import of water onto the Site for dust suppression on the three miles of dirt roads and soil covers (upwards of two hundred trucks a day were bringing rock, stone, and soil onto the site for the construction of the soil covers), EPA's contractor asked for permission to use the treated water for this purpose. As

this had been voiced in a public meeting as a use for a portion of the water, EPA gave the approval for this use and notified the surrounding communities of this decision.

In addition to the waste pits, lagoons, wet area and seep area identified in the ROD, four additional waste pits, a second wet area and a second seep were found during the construction phase. EPA, following discussions with Maine DEP, determined that the contaminated sediments in the wet areas and seeps would be excavated and placed in an adjacent waste pit or lagoon. The design and construction encountered one other situation which required revisions to the original design. A family cemetery located between pits 13 and 14 was examined via ground penetrating radar. Following attempts by Maine DEP to find the descendants, it was decided to revise the soil covers for these two pits, allowing the cemetery to remain undisturbed.

Construction of the soil covers was completed in October 1993 with the hydro seeding of the soil cover systems. Demobilization was completed on October 14, 1993. For a month-by-month chronology and weekly progress reports, see Final Closure Report for Soil Cover/Compensatory Wetlands.

The ROD required the creation of on-site wetlands as compensation for the wetlands permanently lost with the construction of the soil covers. Investigation in 1991-1992 found insufficient suitable acreage on-site to offset the acreage lost through the remediation. Consequently, EPA and Maine DEP explored off-site options. The agencies contacted The Nature Conservancy who identified the Saco Heath, located within two miles of the Site and within the same watershed. Once EPA gained internal approval to allow the purchase of off-site wetlands as the State's ten percent cost share for remedial action, and sought and received buy-in from the federal natural resource trustees, Maine DEP took the lead in the negotiations, culminating in the purchase of 247 acres of a unique and threatened habitat. For further details on this environmental result, see the 1993 Explanation of Significant Difference.

Operation and Function

As noted in the NCP, EPA is required to ensure that the remedy remains operational and functional for up to one year following construction. In addition, Maine regulation requires that the operational and functional time period for restored wetlands is three years. This requirement, when combined with additional activities performed in 1994, set up four different operational and functional periods.

Operational and functional activities began with site restoration in September 1993 with the removal of temporary road expansion, staging and stockpile areas.

Erosion repair took place in the summer 1994 followed by reseeding of these areas as well as those areas where the October 1993 hydroseeding did not establish.

Sediment sampling performed in October 1993 as part of the ongoing monitoring program

detected elevated concentrations of chromium and lead beyond the wet area identified in the ROD. Follow-up sampling in December 1993, January and February 1994 established the extent of contamination above the action levels set in the ROD. The results of the sampling indicated that the contamination originated in pit 18 and flowed overland into the wetlands. The soil cover system for pits 9 and 10 was opened and the excavated sediment from this new wet area was placed within this cover in August 1994. Following the same process used the previous summer, this excavated sediment was covered with geotextile, rock and stone layer, till, and topsoil and then seeded. Working closely with the Army Corps of Engineers, a restoration plan for the excavated area was developed and implemented in the fall 1994.

A construction inspection was performed on site on September 17, 1993. Subsequent to the operational and functional activities completed in 1994, a follow-up inspection was held in March 1995 prior to the transfer of operation and maintenance responsibilities to Maine DEP. A punch list was developed and completed in September 1995.

Inspection by the US Army Corps of Engineers found all but one of the restored and constructed wetlands to be functioning at least equally to their pre-disturbed condition. The one wetland which had not been restored successfully, because of the hummocky topography had not been duplicated, had become an open water/emergent habitat wetlands. As this habitat is rare at the site and because of its relatively small size (one-sixth of an acre), no further restoration efforts were recommended. For more details on the wetlands assessment, see Memorandum for the Record, Saco Superfund Site - Evaluation of Restored and Constructed Wetlands.

The construction of the soil covers for the pits and lagoons required the transportation of rock and stone, till, and topsoil to the Site. This was done from April 1993 through August 1993 and averaged close to two hundred trucks per day. A one-way traffic pattern over local roads was worked out with city officials, yet it was acknowledged at the beginning by the EPA project manager that Jenkins and Flag Pond Roads would be significantly damaged by this activity. Consequently, EPA's contractor performed time-critical road repairs during 1993 and then EPA, Maine DEP, and the City of Saco worked out a long-term restoration plan to be carried out in 1994. EPA provided funds for the repairs in a grant to the city via a three-way Superfund State Contract, and the City of Saco added additional funds to allow for a more comprehensive repair to the two roads.

Operation and Maintenance

EPA and Maine DEP included an operation and maintenance plan with the Superfund State Contract for Soil Covers. The O&M plan included inspection and maintenance of the soil covers, the three miles of fencing, and the roadways and drainage. As successful establishment of restored wetlands was required under the operational and functional stage, no tasks for the wetlands were required as part of O&M. Maine DEP assumed O&M responsibilities on April 1, 1995.

Maine DEP has continued the monitoring program described in the ROD and implemented for five years by EPA.

The soil cover vegetation has become well established and no further erosional damage to the soil covers has been observed. The fencing, multiple internal gates, and warning signs generally remain intact. The roadways remain serviceable, with no washouts or side slope failures.

There have been only two minor problems identified during the ongoing O&M. The O&M Plan called for semi-annual mowing of the approximately thirteen acres of soil covers to minimize the emergence of woody stem vegetation. This was reduced to annual fall mowing upon the recommendation of US Fish and Wildlife and Maine Inland Fish and Wildlife to allow for ground cover for nesting birds. Nonetheless, because of the slopes of the soil cover systems, local farmers have been reluctant to attempt the mowing. At the time of this review, mowing was not occurring annually yet no woody stem vegetation had been observed on any of the covers.

The second problem deals with the fencing and gates. The Site remains a large block of an undeveloped, forested area within encroaching residential development. As such, traditional use, including deer hunting and snowmobiling, continue. This has resulted in the occasional opening of the Lagoon Two fence and removal of a personnel gate. Maine DEP has repaired the opening in the fence and will replace the missing gate. It was recommended that the gate be left unlocked.

The ROD estimated the present worth of O&M at \$2.5 to 3.8 million, depending on the number of wells included in the regular monitoring. As required in CERCLA and the NCP, the State is responsible for O&M. With this understanding, Maine DEP provided their external costs for sampling analysis and mowing from May 1995 to present. As this does not include the internal costs for sample collection and maintenance activities, comparison with the ROD estimate is not possible.

V. Five-Year Review Findings

Five-Year Review Process

The five-year review process was performed by the EPA project manager with assistance from Maine DEP. The scope of this process included reviews of documents, ARARs, monitoring data, risk guidance, and site inspections.

Interviews

When the five-year process began, the EPA project manager notified the Maine DEP, requesting an update on sampling results and State ARARs. The state project manager indicated two concerns, an apparent increase in chromium concentrations in one sediment sampling location

and new ecological guidance levels for chromium. Consequently, a meeting was held on December 17, 1998 with the state project manager, Lynne Cayting, geologist Camille Parrish, and toxicologist Katie Zeeman. The outcome of this meeting are included in the following sections as well as previously under Operations and Maintenance.

Site Inspection

EPA has assisted in annual inspections of the Site since the State assumed O&M responsibility. The latest site inspection occurred on October 22 and 23, 1998. The inspection included the cover systems, fencing, wetlands, roadways and drainage.

Each of the soil covers, including slope area plus twenty feet beyond, was inspected. Vegetation was extremely well established. No erosion was observed, and the inspection took place two weeks after southern Maine had received approximately eleven inches of rain over a three-day period.

The three miles of interior fencing was walked and cleared of fallen trees and woody stem brambles. The fencing and warning signs appeared in good shape, withstanding severe storms during the previous year including the January 1998 ice storms.

As noted previously, wetland inspection is not a required part of O&M. It was noted that the wetlands restored in the two seeps and wet areas appeared to be functioning as planned.

Roadways and drainage structures were inspected. No potholes, washouts, or side slope failure were visible. Drainage culverts beneath the roads appeared to be functioning as designed.

ARARs Review

The five-year review process mandates that the Applicable or Relevant and Appropriate Requirements (ARARs) set in the ROD be reviewed at this time. The ROD determined that Maximum Contaminant Levels (MCLs) established in the Safe Drinking Water Act were relevant and appropriate as chemical-specific ARARs. The ROD identified arsenic as the only contaminant above its MCL and set individual ACL for the four locations above the MCL. Subsequent to the ROD, a federal MCL was set for chlorobenzene (100 ug/L).

No changes in action-specific or location-specific ARARs were identified.

In addition to ARARs, To Be Considered (TBCs) were noted during this review. The ROD set action levels for sediments based on a risk calculation from a 1980 study of stream water quality associated with a tannery in central Maine. The action level for chromium was set at 2,000 mg/kg. Subsequent to the application of these results to the Saco Tannery Site, EPA began using Ecotox Threshold benchmark values (ETs) for screening purposes of stream and sediment quality, comparing maximum measured contaminant concentration to an ecotoxicologically-

based benchmark. ETs are intended to be used for screening; they are not regulatory criteria, site-specific cleanup standards, or remediation goals. The ET value for chromium in sediments is 81 mg/kg.

Similarly, the Maine DEP has been using the Severe Effect Level (SEL) as a screening level. SELs are listed in Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario, March 1993. A SEL is defined as the level at which pronounced disturbance of the sediment-dwelling community can be expected. The SEL for chromium is 110 mg/kg.

Risk Recalculation/Assessment

The ROD described the baseline risk for existing, pre-remedial action conditions at the Site. Contaminants of concern were selected to represent potential onsite hazards based on toxicity, level of contamination, mobility, and persistence in the environment. Potential human health effects associated with the contaminants of concern in groundwater, soil, surface water, and sediment were estimated quantitatively through the development of several hypothetical exposure scenarios. Incremental lifetime cancer risks and a measure of the potential for noncarcinogenic adverse health effects were estimated for the various exposure scenarios. Exposure scenarios were developed to reflect the potential for exposure to hazardous substances based on the characteristic uses and location of the Site.

The ROD documents the findings of the human health and ecological risk assessments. Two unacceptable human health risks were identified under a future residential use scenario; ingestion of on-site groundwater, and dermal contact with and ingestion of soils/waste. The ecological risk assessment concluded communities of aquatic fauna were depressed in areas of high chromium, and aquatic and terrestrial organisms which use the pits/wetlands are probably at risk where sediment concentrations exceed 2,000 mg/kg.

As indicated elsewhere, the concentration of chlorobenzene is above the respective MCL. In addition, use of ETs and SEL indicate that the ecological risk assessment may need further recalculation. Upon review of the groundwater data, EPA and Maine DEP decided that recalculation of the risk was not necessary at this time. Upon review of the sediment data, the agencies decided that further sampling was needed to answer data gaps before a risk recalculation be made.

Data Review

The ROD stated that arsenic was the only contaminant above the MCLs and established ACLs for four wells where the MCL was exceeded. For three of these wells, MW-101, MW-111B, and MW-114B, arsenic concentrations have decreased below their respective ACL (for two wells, MW-111B and MW-114B, concentrations for the past three years have usually been below the MCL). Only in MW-103 has the arsenic concentrations remained above the ACL.

Arsenic in a fifth well, MW-112A, has fluctuated around the MCL for the past five years.

Chlorobenzene is detected in several locations across the site with each location representing a separate and localized static plume. It was detected above 100 ug/L in MW-112A and MW-114A both pre-ROD and pre-RD. Concentrations since that time have decreased below 100 ug/L in these two wells and have generally remained below 50 ug/L in the other locations.

Surface water sampling has not shown any contaminants of concern above either the AWQC or the ET screening levels.

Sediment sampling has shown elevated chromium concentrations in two locations. These concentrations are below the ROD action level but above screening values now being used by both EPA and Maine DEP. In one of the two location, sampling downstream reveals that the chromium levels return to background within 250 feet.

VI. Assessment

Effectiveness of Remedy

The state-legislated institutional control, designating the Site as a wildlife preserve, remains in place, preventing use of groundwater onsite.

Ongoing monitoring shows arsenic and chlorobenzene exceedances of their performance standards are limited to a couple areas on the Site, and are not migrating offsite.

The soil cover systems remain intact, preventing dermal contact with the soils and waste and eliminating these areas as habitats for aquatic communities.

Recent sediment sampling appears to show increasing chromium concentrations. Although these concentrations are below the ROD action level, they are above the more recent screening values used by EPA and Maine DEP. This sampling beyond the remediated seep and wet areas may indicate that the flow patterns are returning to pre-remedial conditions. Further sampling will be performed to determine this.

Adequacy and Continued Need for O&M

The O&M requirements have been properly implemented and appear to be adequate for the Site. Regular monitoring has documented the concentrations of Contaminants of Concern in groundwater and has alerted the agencies of possible reemergence of seeps from the waste pits/lagoons.

Site inspections carried out in conjunction with the monitoring has documented the stability of the soil cover systems, and the roads and drainage remain in acceptable condition. For the most

part, the fencing and warning signs continue to function as sufficient deterrence to trespassers, and there has been no damage to the soil covers.

Maine DEP has recently entered into a multi-year contract for annual mowing of the soil covers; this will ensure the covers remain free of woody vegetation.

Early Indicators of Potential Remedy Failure

Recent sediment sampling in two separate locations suggest the possible reemergence of seeps from the waste pits/lagoons. The ROD identified the seeps as areas requiring remediation, but did not anticipate the reoccurrence of them - unlike groundwater and surface water, there are no contingencies in the ROD should monitoring demonstrate exceedance of the action levels set for sediments. Additionally, because the majority of pits and the two lagoons were created by the tannery by excavating below the water table, groundwater has flowed through the waste and likely continues to do the same beneath the soil covers. The sampling may therefore indicate that the soil covers are not preventing the release of chromium from the waste.

The ongoing sediment sampling can also represent the variations common with sampling in a dynamic stream environment with periodic flushing and redeposition downstream. Sampling performed by both EPA and Maine DEP has demonstrated vertical variations of chromium concentrations, further illustrating the difficulty of definitively characterizing the location of site-related concentrations.

Additional sampling by EPA and Maine DEP will include seep/wet areas excavated and then restored during the remedial activities to gauge whether the seeps are reemerging.

As monitoring has continued subsequent to the ROD, first EPA and then Maine DEP have altered the monitoring program. As an example, residential well sampling has been discontinued by Maine DEP. This change in scope of O&M, as well as other changes to the monitoring program, are appropriate based on the extensive data record and the tracking of water quality.

Achievement of Remedial Action Objectives/Cleanup Levels

The remedial goals for the Site are detailed on pages 25-26 and 29 of the ROD and are summarized below:

- minimize the threat of direct contact with and ingestion of the soils and waste;
- prohibit development of the Site and future destruction of the soil covers;
- address the threat of future leaching of chromium from the waste by establishing a monitoring program; and

address the groundwater contamination detected at the Site by monitoring the distribution, migration, and reduction of contaminant concentrations over time.

The remedy has achieved all four remedial action objectives. The legislatively-created institutional control is in effect, the soil cover systems have been constructed and are preventing dermal contact with the waste, the monitoring program has documented the reduction of contaminant concentrations over time as well as alerting the agencies to possible leaching of chromium from the waste.

Opportunities for Optimization

The implemented remedy for the Saco Tannery Site is a source control containment remedy and monitoring of groundwater, surface water, and sediments.

Groundwater sampling performed prior to implementation and continued after has indicated areas where contamination of arsenic and chlorobenzene have decreased. In these locations, sampling frequency has been reduced. Sediment sampling over the same time frame has produced a greater variation, sometimes increasing, other times decreasing. Consequently, sediment sampling has not decreased.

Changes in ARARs or other Risk-Related Factors

The establishment of an MCL for chlorobenzene does not require a change in the cleanup levels or the remedy for the following reasons:

institutional controls prevent the use of groundwater onsite;

ongoing monitoring shows that the chlorobenzene concentrations are decreasing with time, with no exceedance of the MCL for the last four years in any well; and

perimeter monitoring supports the site model with groundwater flow paths discharging into the wetlands and not moving offsite.

Changes in Known Contaminants, Sources, Pathways at the Site

No new sources of contaminants have been found at the Site. The installation of the low permeability soil covers has possibly created minor diversions of surface water runoff but this would not be expected to create any long-term changes in groundwater pathways at the Site.

VII. Deficiencies

The remedy appears to be functioning as designed. Beyond the operational and functional period, no repairs to the soil covers have been needed. The O&M monitoring has measured the distribution, migration, and decrease in site-related groundwater contaminants over time.

Sediment sampling, a component of the ROD mandated monitoring program, suggests seeps from the waste areas may be reemerging. This was not anticipated in the ROD.

VIII. Recommendations and Required Actions

EPA and Maine DEP have reviewed the monitoring data and have agreed to further investigate the chromium concentrations in sediment in light of the possible reemergence of seeps and the much lower ecological screening values which the agencies are using.

EPA will investigate the area known as the wet area, collecting and analyzing a series of sediment samples. Maine DEP will investigate the area known as the seep area, collecting and analyzing sediment samples from that location. Both focused investigations will include samples from the original contaminated areas to determine whether the backfilled topsoil has become contaminated. This sampling will be performed in late winter and analyzed in the spring of 1999.

This required action will allow ecological risk assessors to gauge the protectiveness of the remedy for benthic organisms in the two areas.

IX. Protectiveness Statement

The institutional controls remain in place, preventing exposure to groundwater, and therefore this aspect of the remedial action remains protective of human health and the environment.

The soil cover systems are operating and functioning as design. They continue to prevent dermal exposure to the waste and with O&M, it is anticipated that this aspect of remedial action will remain protective of human health and the environment.

Ongoing monitoring shows that contaminants of concern, arsenic and chlorobenzene are not migrating offsite and therefore this aspect of the remedial action remains protective of human health and the environment. Additionally, groundwater monitoring shows that the levels of chlorobenzene have decreased below the MCL in each area onsite. Arsenic has decreased in three of the four ACL wells to levels near or below the MCL.

Sediment sampling results show an increase of chromium in two locations in the wetlands. This may represent reemergence of seeps from the waste pits/lagoon or it may represent variation associated with stream dynamics. Further investigation will be performed to determine whether

this aspect of the remedial action remains protective of the environment.

X. Next Review

EPA must complete additional five-year reviews because the waste left in place does not allow for unlimited use and unrestricted exposure. The next review is scheduled for September 2003 and shall include a summary of the contents of this review, the steps taken to address the protectiveness issue noted above, and the necessity for further reviews.

ATTACHMENT A
List of Documents Reviewed

Record of Decision Summary, Saco Tannery Waste Pits Site, Saco, Maine, EPA Region I, September 27, 1989

Water Quality Monitoring Reports (1 through 10) Halliburton NUS Corporation, April 1990 - April 1995

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ATTACHMENT B
Site Maps

Figure 1, Site Map

Figure 2, Sampling Locations

Figure 1: Saco Tannery Waste Pits Site Map
Saco, Maine

